

TEXAS TECH UNIVERSITY
HEALTH SCIENCES CENTER

34th GRADUATE SCHOOL OF BIOMEDICAL SCIENCES

STUDENT RESEARCH WEEK



CSI: Immunology

Conducting Scientific Investigations



*34th Annual Student Research Week
March 8-11, 2022
Texas Tech University Health Sciences Center (TTUHSC)
Lubbock, Texas*

The Graduate School of Biomedical Sciences 2022 Student Research Week Committee:

Directors: Rachel Washburn and Peyton Presto

Vice Director of Poster Competition: Taylor Hibler

Vice Director of Operations & Judging: Sayanika Dutta

Vice Director of Marketing: Morgana Kellogg

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Abstract book design: Ashlee Rigsby, Graduate School of Biomedical Sciences

Student Research Week Banquet: Dalia Martinez-Marin and Emily Vanderpool, Graduate School of Biomedical Sciences Graduate Student Association

The 2022 Student Research Week Committee would like to extend their warmest thanks to the following for their contributions and support in making Student Research Week a great success this year:

The Graduate School of Biomedical Sciences staff: Ashley Hanson, Ashlee Rigsby, Pam Johnson, and Tres Boren

The Office of Communications and Marketing: Jordan Pape and Junior Jimenez

The Office of the President: Bryce Looney

The School of Medicine Office of the Dean: Charity Donaldson

The departments of immunology and molecular microbiology, cell biology and biochemistry, pharmacology and neuroscience, cell physiology and molecular biophysics, medical education and graduate medical education;

Graduate School of Biomedical Sciences at Lubbock, Abilene, and Amarillo, the School of Medicine, the School of Nursing, the School of Health Professions, the School of Pharmacy, the Office of Interprofessional Education, and Texas Tech University.

Dr. Beverly Chilton for establishing the Bette B. Chilton scholarship in honor of her mother.

Dr. Claudia Kemper for donating her keynote speaker honorarium as a student scholarship.

We also are very grateful to all the TTUHSC faculty and staff for their guidance and support.

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Friday, March 11, 2022

KEYNOTE LECTURES

Dr. Claudia Kemper, NIH

Time: 9:00 - 10:00 a.m.

Dr. Stanley Hazen, Cleveland Clinic

Time: 1:00 - 2:00 p.m.

STUDENT SPEAKERS

Time: 10:15 a.m. - 12:00 p.m.

A rapid, non-invasive, ante-mortem test for surveillance and monitoring of prion-transmitted Chronic Wasting Disease in cervids

Megan Ashton, Graduate Student, Lubbock

TBX2 promotes Prostate Cancer bone-metastatic phenotype in Prostate through exosomal microRNA-375-3p

Sayanika Dutta, Ph.D. Student, Lubbock

\$100,000+ Ignored & Left on the Table: The Analysis of Cost Savings, Barriers to Implementation & Overall Benefit of Implementing PAP Staff

Michelle Onuoha, Medical Student, Lubbock

Listeria-based vaccines targeting interferon-stimulated gene 15 (ISG15) for renal cell carcinoma and colorectal cancer

My Nguyen, Ph.D. Student, Abilene

A Study on the Ability of an Organo-Selenium, Attached to a Cellulose Polymer Dressing, to Inhibit Candida albicans Biofilm

Unique Jacobo, Graduate Student, Lubbock

Dental Pulp-derived Stem Cells Mitigate Damage to Astrocytes Caused by Astrogliosis

Derek Bathels, Ph.D. Student, Amarillo

From testes to transplants: Sertoli cell complement inhibitors may be the key to transplant survival

Rachel Washburn, Ph.D. Student, Lubbock

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TEXAS TECH UNIVERSITY HEALTH SCIENCES CENTER.

Greetings!

It is my great pleasure to welcome everyone to the 2022 Student Research Week on March 8th-11th. The theme for this year's event is "CSI: Immunology – Conducting Scientific Investigations." We are extremely proud this year to host two outstanding and highly distinguished keynote speakers: Dr. Stanley Hazen, MD, PhD, The Jan Bleeksma Chair in Vascular Cell Biology and Atherosclerosis in the Department of Cardiovascular & Metabolic Sciences at the Lerner Research Institute, Co-Section Head of Preventive Cardiology & Rehabilitation, Heart, Vascular & Thoracic Institute, and Director of the Center for Microbiome & Human Health at the Cleveland Clinic in Cleveland, Ohio; and Dr. Claudia Kemper, PhD, Senior Investigator and Section Chief at the National Heart, Lung, and Blood Institute at the National Institutes of Health, Adjunct Professor of the University of Lübeck in Germany, President of the International Complement Society, and a member of the Scientific Board of Apellis, Inc.

I am extremely indebted to the 2022 Student Research Week Organizing Committee: Rachel Washburn and Peyton Presto (Co-Directors), Morgana Kellogg (Director of Marketing), Sayanika Dutta (Director of Operations), Taylor Hibler (Poster Competition Coordinator), Dalia Martinez-Marin (GSA President) and Emily Vanderpool (GSA Vice-President). They have all done a tremendous job! I am particularly grateful for the hard work and assistance from Ash Hanson, Pam Johnson, Ashlee Rigsby, Tres Boren, the faculty and staff of the Department of Immunology and Molecular Microbiology, and the entire GSBS staff. Also special thanks to the host department chairs, Drs. Grisham and Siddiqui, and Dr. Betsy Jones for coordinating activities with the School of Medicine. The GSBS faculty, staff, and students make Student Research Week a success year after year. Finally, I would like to thank President Rice-Spearman, Chancellor Mitchell, Provost D'Agostino, Sr. VP for Research Dr. McMahon, Dean Berk, Dean Evans, Dean Sechrist, Dean Smith, and Drs. Varma, Prien, Sizer, Siddiqui, Altenberg, Guan, Byrd, Philips, Thekkumkara, Neugebauer, Ganapathy, Abbruscato, Dissanaik, Jumper, Srivastava, and Bergeson for their support that has made this event possible.

This year SRW will be held as a hybrid event due to Covid-19 pandemic, with virtual poster competition sessions and in-person open poster sessions and podium presentations. In addition, the GSBS and the GSA are very excited to host a Student Research Week Banquet at Cagle's Steaks and BBQ. Funds raised from donations and a silent auction will be used to support student scholarships. Thanks to all donors for their help in making this special event possible. I am grateful to GSA President Dalia Martinez-Marin, Vice-President Emily Vanderpool and the entire GSA for organizing and hosting the event this year. We are excited to have Conrad Saucedo DJ this event and greatly appreciate funding from the Department of Cell Biology and Biochemistry.

GSBS Student Research Week is a wonderful opportunity to meet our students, learn about their work, and discuss research in general. This year we have a special IPE session featuring a career panel of recent alumni: Dr. Brianyell Mims, PhD; Dr. Monica Sharma, PhD; Dr. Kandis Wright-Boothe, MD, PhD; Dr. Cynthia Reinoso Webb, PhD; Dr. Ebtesam Islam, MD, PhD; Dr. Benard Ogala, PhD; Lt. Chaselynn Watters, PhD; Aslinn Nelson, BSN/RN-NIC; and Keino McWhinney, MPP.

Let's greet all of our speakers with a West Texas welcome! Thanks much and all the best!

Brandt L Schneider

Dean of the Graduate School of Biomedical Sciences



TEXAS TECH UNIVERSITY HEALTH SCIENCES CENTER.

Welcome!

On behalf of the Student Research Week (SRW) committee, we want to welcome you to the 34th annual Student Research Week 2022: “CSI: Immunology (Conducting Scientific Investigations)”. SRW is an annual event organized by student volunteers in the Texas Tech University Health Sciences (TTUHSC) Graduate School of Biomedical Science (GSBS), Lubbock Campus. SRW is an incredible event that brings together students from different TTU and TTUHSC schools and campuses, which gives them the opportunity to present their research, meet with distinguished keynote speakers, network with other students, and win awards throughout the week. During SRW, students will share their research in a hybrid format, with an in-person poster session at the Academic Event Center and a virtual judging presentation via Zoom. Throughout the week, students also have the opportunity to learn about scientific discoveries from distinguished keynote speakers, student speakers, and by engaging with other students at their posters.

Each year, SRW features a new theme highlighting advances in various areas of biomedical research. This year’s theme is “CSI: Immunology (Conducting Scientific Investigations)” and is hosted by the Department of Immunology and Molecular Microbiology. CSI: Immunology encompasses not just all research aspects of immunology, but also includes all scientific research that may influence human health. Two highly distinguished biomedical scientists will give keynote addresses and selected students will give podium presentations highlighting this topic on Friday, March 11th from 9am to 2pm in the Academic Event Center. This year, the keynote speakers are Dr. Claudia Kemper and Dr. Stanley Hazen.

Claudia Kemper, PhD, is a Senior Investigator and Section Chief at the National Heart, Lung, and Blood Institute (NHLBI) at the National Institutes of Health (NIH) in Bethesda, Maryland. She is also an Adjunct Professor of the University of Lübeck in Germany. Dr. Kemper received her Ph.D. in Immunology in 1998 from the University of Hamburg, the Bernhard-Nocht-Institute for Tropical Medicine, in Germany where she worked on the evolutionary aspect of complement regulatory proteins under the supervision of Prof. Irma Gigli. She joined in 1999 John Atkinson’s laboratory as a postdoctoral fellow at Washington University in Saint Louis where she discovered that the complement regulator CD46 is a key checkpoint in human Th1 induction and contraction. Dr. Kemper left Washington University in 2008 as Assistant Professor to move her laboratory to King’s College London, where she was promoted to Associate Professor in 2012 and Full Professor in 2015. During her time at King’s College London, Dr. Kemper’s group discovered that complement activation is not confined, as always thought, to the extracellular space but that it occurs within a broad range of cells. Importantly, this new location of activation allowed her group to discover that intracellular and autocrine complement (coined the complosome) serves unexpected non-canonical roles in cell biology, including the regulation of key metabolic pathways such as glycolysis, oxidative phosphorylation, fatty acid synthesis and cholesterol flux as well as mitochondrial dynamics. Her group further showed that perturbations in complosome functions are associated with a range of human disease conditions, including primary immune deficiency, arthritic diseases (RA, SLE, and scleroderma) and cardiovascular disease. Dr. Kemper’s research at the NHLBI now focusses on the non-canonical roles of complement in cell physiology in health and disease.

Stanley Hazen, MD/PhD, Hazen received both clinical training in Internal Medicine and subspecialty training in Diabetes, Endocrinology and Metabolism from Barnes/Jewish Hospital, St. Louis, MO, and a PhD in Biophysical Chemistry and Molecular Biology from Washington University School of Medicine, St. Louis, MO. He holds multiple leadership positions at the Cleveland Clinic including chair of the Department of Cardiovascular & Metabolic Sciences, Lerner Research Institute, co-Section head of Preventive Cardiology & Rehabilitation, Heart, Vascular & Thoracic Institute, and Director, Center for Microbiome & Human Health, Cleveland Clinic. He has made pioneering discoveries in new understandings of mechanisms contributing to cardiovascular and inflammatory disease research, including the seminal discovery linking gut microbial pathways to cardiovascular disease pathogenesis. His research in multiple areas has impacted clinical practice and lays the foundation for both FDA- and EU-cleared diagnostic tests for CVD risk assessment in use worldwide. His research has also helped to spawn pharmaceutical development of cardiovascular disease drugs in clinical trials. Dr. Hazen is an elected fellow to both the National Academy of Medicine, USA, and the American Association for the Advancement of Science. He also is an elected member of the American Association of Physicians.

These scientists are impressive and outstanding scientists that fully represent this year’s theme with their discoveries, their



TEXAS TECH UNIVERSITY HEALTH SCIENCES CENTER.

research, and their achievements. The SRW committee encourages everyone to attend their presentations on Friday, which will be followed by a poster awards ceremony and then a roundtable discussion with the speakers in the Academic Event Center and on Zoom.

The SRW poster competition, starting the afternoon of Tuesday, March 8th and ending the afternoon of Thursday, March 10th, gives students the opportunity to present their research and view the research of other students in a conference-like atmosphere. There will be students from all TTU and TTUHSC campuses, with a record-breaking number of students—over 310—presenting their research this year both virtually and in-person. We welcome everyone to attend the virtual poster competitions on Zoom throughout the week. We would also like to invite everyone to visit the posters in-person at our open poster sessions to learn about ongoing student research projects on Tuesday March 8th through Thursday March 10th in the Academic Event Center from 12pm to 1pm and 4pm to 5pm.

SRW would not be possible without the tireless and dedicated efforts of numerous people working to make it the success it is. We would like to thank the faculty and staff of the GSBS, the Department of Immunology and Molecular Microbiology, Offices of Student Services and Marketing and Communications, and the School of Medicine. We would also like to thank President Rice-Spearman, Chancellor Mitchell, Dr. Schneider, Dr. Grisham, Dr. Jones, Dr. Prien, Dr. Berk, Dr. Varma, and Dr. Ashcraft. Lastly, we want to thank all the participants in the 34th annual Student Research Week, as their ideas, research, and collaborative efforts make this such a successful event each year.

Sincerely,

The 34th Annual Student Research Week Committee
Rachel Washburn, Peyton Presto, Taylor Hibler, Sayanika Dutta, and Morgana Kellogg

34TH ANNUAL TTUHSC STUDENT RESEARCH WEEK SCHEDULE

TUESDAY, MARCH 8, 2022

12:00pm - 1:00pm *Poster Session I*

4:00pm - 5:00pm *Poster Session II*

WEDNESDAY, MARCH 9, 2022

12:00pm - 1:00pm *Poster Session III*

4:00pm - 5:00pm *Poster Session IV*

THURSDAY, MARCH 10, 2022

12:00pm - 1:00pm *Poster Session V*

4:00pm - 5:00pm *Poster Session VI*

FRIDAY, MARCH 11, 2022

9:00am - 10:00am *Dr. Claudia Kemper*

10:15am - 12:00pm *Student Speakers*

12:00pm - 1:00pm *Lunch & IPE Panel*

1:00pm - 2:00pm *Dr. Stanley Hazen*

2:00pm - 2:45pm *Awards Ceremony*

3:00pm - 3:30pm *Remarks from TTUHSC Leaders*

3:30pm - 4:15pm *Roundtables*

4:15pm - 5:00pm *Silent Auction*

Claudia Kemper, Ph.D.

Senior Investigator, Section Chief

National Heart, Lung, and Blood Institute (NHLBI) at the National Institutes of Health (NIH)

Dr. Kemper is a Senior Investigator and Section Chief at the National Heart, Lung, and Blood Institute (NHLBI) at the National Institutes of Health (NIH) in Bethesda, Maryland. She is also an Adjunct Professor of the University of Lübeck in Germany.

Dr. Kemper received her Ph.D. in Immunology in 1998 from the University of Hamburg, the Bernhard-Nocht-Institute for Tropical Medicine, in Germany where she worked on the evolutionary aspect of complement regulatory proteins under the supervision of Prof. Irma Gigli. She joined in 1999 John Atkinson's laboratory as a postdoctoral fellow at Washington University in Saint Louis where she discovered that the complement regulator CD46 is a key checkpoint in human Th1 induction and contraction. Dr. Kemper left Washington University in 2008 as Assistant Professor to move her laboratory to King's College London, where she was promoted to Associate Professor in 2012 and Full Professor in 2015. During her time at King's College London, Dr. Kemper's group discovered that complement activation is not confined, as always thought, to the extracellular space but that it occurs within a broad range of cells. Importantly, this new location of activation allowed her group to discover that intracellular and autocrine complement (coined the complosome) serves unexpected non-canonical roles in cell biology, including the regulation of key metabolic pathways such as glycolysis, oxidative phosphorylation, fatty acid synthesis and cholesterol flux as well as mitochondrial dynamics. Her group further showed that perturbations in complosome functions are associated with a range of human disease conditions, including primary immune deficiency, arthritic diseases (RA, SLE, and scleroderma) and cardiovascular disease. Dr. Kemper's research at the NHLBI now focusses on the non-canonical roles of complement in cell physiology in health and disease.

Dr. Kemper is the recipient of a Wellcome Trust Investigator Award, the Merit Award for Excellence in Science from the International Complement Society and two Orloff Awards in Science from the NHLBI/NIH. She also serves on the Scientific Board of Apellis, Inc. and is the current President of the International Complement Society.

Stanley Hazen, M.D., Ph.D.

Chair, Dept. of Cardiovascular & Metabolic Sciences, Lerner Research Institute; Co-Section Head, Preventive Cardiology & Rehabilitation, Heart, Vascular, & Thoracic Institute; Director, Center for Microbiome & Human Health, Cleveland Clinic

Dr. Stanley Hazen received both clinical training in Internal Medicine and subspecialty training in Diabetes, Endocrinology and Metabolism from Barnes/Jewish Hospital, St. Louis, MO, and a PhD in Biophysical Chemistry and Molecular Biology from Washington University School of Medicine, St. Louis, MO. He holds multiple leadership positions at the Cleveland Clinic including chair of the Department of Cardiovascular & Metabolic Sciences, Lerner Research Institute, co-Section head of Preventive Cardiology & Rehabilitation, Heart, Vascular & Thoracic Institute, and Director, Center for Microbiome & Human Health, Cleveland Clinic.

Dr. Hazen (H-index 142; citations >139,000) has published >450 peer-reviewed articles in basic and clinical journals alike in the fields of atherosclerosis, lipoprotein metabolism, inflammation and vascular biology. He has made pioneering discoveries in new understandings of mechanisms contributing to cardiovascular and inflammatory disease research, including the seminal discovery linking gut microbial pathways to cardiovascular disease pathogenesis. His research in multiple areas has impacted clinical practice, and lays the foundation for both FDA- and EU-cleared diagnostic tests for CVD risk assessment in use worldwide. His research has also helped to spawn pharmaceutical development of cardiovascular disease drugs in clinical trials.

Dr. Hazen is an elected fellow to both the National Academy of Medicine, USA, and the American Association for the Advancement of Science. He also is an elected member of the American Association of Physicians.

JUDGES

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Jenny Wilkerson, Ph.D.
Pharmaceutical Sciences

CRITERIA FOR SCIENTIFIC RESEARCH

SIGNIFICANCE/ INTRODUCTION:

1. Does the student address the significance of the work and why it is important to conduct this research?
2. Is the background information clearly presented?
3. Is the hypothesis clearly stated?

ORGANIZATION:

1. Were the methods mentioned/explained?
2. Is the presentation well organized?
3. Does the student show knowledge of the subject?

RESULTS:

1. Are tables or graphs used to enhance the presentation?
2. Does the presenter explain the figures and results?
3. Are the figures appropriately formatted and clearly understood?

CONCLUSIONS/DISCUSSION:

1. Does the presenter summarize the findings?
2. Can the presenter discuss what the findings mean and their significance?
3. Does presenter identify future direction for project?

PRESENTATION /RESPONSE TO QUESTIONS:

1. Was the presentation effective (eye contact, delivery)?
2. Does the presenter use time effectively?
3. Does the presenter answer questions in an organized, concise fashion?

CRITERIA FOR CASE STUDIES

SIGNIFICANCE/ INTRODUCTION:

1. Is the case history clearly defined?
2. Does the student provide sufficient patient background and literature for understanding the medical problem?
3. Is the rationale for reporting the case and the uniqueness of the case clearly explained?

METHODS:

1. Are clinical tests clearly explained, and are normal values of laboratory tests reported?
2. Is the process of determining the appropriate diagnosis, including any differential diagnoses, clearly explained?

RESULTS:

1. Are patient clinical results pertinent and clearly presented?
2. Is the presented diagnosis sufficiently addressed by results/future clinical work?

CONCLUSIONS/DISCUSSIONS:

1. Are conclusions clearly described and supported by observations or literature?
2. Is the recommended treatment or outcome of treatment discussed?
3. Are directions for future investigation or management of similar cases indicated?

PRESENTATION/RESPONSE TO QUESTIONS:

1. Was the presentation effective (eye contact, delivery)?
2. Does presenter use time effectively?
3. Does the presenter answer questions in an organized, concise fashion?

CRITERIA FOR LITERATURE REVIEWS

SIGNIFICANCE/ INTRODUCTION:

1. Is a gap in knowledge identified and is the rationale for the review clear and novel?
2. Are objectives/aims clearly defined?

METHODS:

1. Are complex search strategies used (multiple keywords, etc.)?
2. Are multiple databases used?
3. Are the methods for searching literature clearly defined?

RESULTS:

1. Is a thorough review of the existing literature performed and are results well organized?
2. Are results synthesized into something new and relevant?
3. Is a summary table/graph present, easy to understand, and visually appealing?
4. Are references appropriately cited?

CONCLUSIONS/DISCUSSION:

1. Are review findings clearly summarized?
2. Is the importance of findings addressed?
3. Are future directions/areas of exploration clearly listed?

PRESENTATION/RESPONSE TO QUESTIONS:

1. Was the presentation effective (eye contact, delivery)?
2. Does presenter use time effectively?
3. Does the presenter answer questions in an organized, concise fashion?

PARTICIPANTS

UNDERGRADUATE

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Kaitlyn Bui
Mark Gao
Isaiah K. George
Ananya Madhavaram
Emily Pham

MEDICAL EDUCATION RESEARCH: GRADUATE MEDICAL EDUCATION SCIENCES, SCHOOL OF MEDICINE, REHABILITATION SCIENCES

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CLINICAL RESEARCH - CASE STUDIES: SCHOOL OF MEDICINE, RESIDENTS AND CLINICAL FELLOWS

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Akshay Raghuram
Mikal Ramon
Sanjana Rao
Nandini Ray
Sparsh Ray
Anish Reddy
Joshua Richard
Bayley Richardson
Esther Robbins
Elwin Rutayomba
Emily Sargent
Kaylee Schrader
Alexis Schuck
Chelsea Seaton
Khaja Siddiqui
Jessica Sisco
Fehintola Soetan
Brianna Taylor
Irina Terziyski
Christopher Thompson
Christina Tompkins
Alison Tran
Venus Tran
Mariana Trevino
Cameron Tuazon
Varun Vemulapalli
Adam Wynn
Tiffany Xu
Brandon Youssi
Jad Zeitouni
Christina Zhu

PARTICIPANTS

CLINICAL RESEARCH - CHART REVIEWS AND SURVEYS: SCHOOL OF MEDICINE, RESIDENTS AND CLINICAL FELLOWS

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 Angela Abraham
 Kofi Agyare
 Jessica Akins
 Catherine Anding
 Douglas Bettarelli
 Sanam Bhakta
 Cole Birmingham
 Bridget Boeger
 Evan Bradshaw
 Easton Brewer
 Emily Brumfield
 Stephanie Bui
 Michael Carey
 Erin Choi
 Boone Coleman
 Alex Collins
 Camila Conde
 Meghan Connolly
 Shelby Corbitt
 Brandon Couch
 Roald Credo
 Hannah Daniel
 Bayli Davis
 Zoe Davis
 Alex Demopoulos
 Nayeli Fuentes
 Cynthia Fung
 Michelle Garcia
 Asher George
 Alec Giron
 Jacob Harder
 Kenneth Hardy
 Katherine Holder
 Tiffany Hotchkiss
 Cindy Hu
 Valerie Huerta
 Marvelyn Iweh
 Brooke Jensen
 Taha Jilani
 Hannah Jones
 Amanda Key
 Riya Koshy
 Bailey Leigh

Sujata Luitel
 Kirby Mateja
 Madison McLain
 Lauren McLeod
 Shakira Meltan
 Maddie Miller
 Katherine Mitchell
 Mackensie Morrison
 Esere Nesiana
 Alma Nevarez
 Brittany Nieves
 Michelle Onuoha
 Alexander Park
 Angela Patterson
 Addie Pederson
 Adam Platt
 John Rafael
 Jasmin Rahesh
 Nikita Rao
 Diego Regalado
 Mariam Rizvi
 Kathryn Robison
 Anindya Samanta
 Niki Sankoorikkal
 Jake Sellers
 Emily Shussler
 Robyn Tapp
 Navya Thatigutla
 Annis Toney
 Nicholas Vojtkofsky
 Rachel Vopni
 Ellen Ward
 Abbey Weed
 Christopher Wilhelm
 Alex Zapata

BASIC/TRANSLATIONAL RESEARCH YEARS 1 AND 2: GRADUATE SCHOOL OF BIOMEDICAL SCIENCES, SCHOOL OF MEDICINE, BIOTECHNOLOGY, REHABILITATION SCIENCES

Ganesh Acharya
 Joey Almaguer
 Mays Alshaikhsalama
 Megan Ashton
 Seham Azzam
 Patricia Ines Back

Caroline Black
 Maribel Castro
 Jason Chen
 Jordan Curl
 Canice Dancel
 Sirin Falconi
 Rebecca Gabriliska
 Hector Garcia
 Liza Garcia
 Alejandra Gomez
 Zach Griffin
 Hazael Hernandez
 Md. Howlader
 Unique Jacobo
 Benjamin Johnson
 Riley Junell
 Elizabeth Kamilar
 Jeegisha Kapila
 Hamed Khedmatgozar
 Brent Kisby
 Jocelin Loewen
 Marilyn Mathew
 Anja Matthijs
 Harry May
 Glody Mbaki
 Jon McCord
 Kyle Mimun
 Damieanus Ochola
 Abiodun Okimi
 Naidu Prathyusha
 Naana Quagraine
 Angelica Rodriguez
 Anna Sabu Kurian
 Naresh Sah
 Cesar Augusto Sanchez Villalobos
 Kerri Spontarelli
 Mosharaf Mahmud Syed
 Jeffrey Thompson
 Nghi Tran
 Shreya Uppala
 Johanna Villarreal
 Antonio Vintimilla
 Carina Watson
 Alisa White
 Mingxiao Yang
 Carson Zabel

BASIC/TRANSLATIONAL RESEARCH YEARS 3+:
GRADUATE SCHOOL OF BIOMEDICAL SCIENCES,
SCHOOL OF MEDICINE

Sabrina Rahman Archie

Derek Barthels

Kevin Bass

Trevor Burrow

Sayanika Dutta

Shreyas Gaikwad

Sarah Hernandez

Taylor Hibler

Md. Rakibul Islam

Courtney Katz

Morgana Kellogg

Sonia Khan

Ksenija Korac

Xiaobo Liu

Valeria Jaramillo-Martinez

Dalia Martinez-Marin

Harrison Marsh

Melissa McHann

Sarah Miller

Caitlyn Myers

Stephany Navarro

Hong-My Nguyen

Siavash Shahbazi Nia

Mariam Oladejo

Praneetha Panthagani

Iqra Pervaiz

Peyton Presto

Malvika Ramesh

Bradley Schniers

Sadisna Shahi

Sejal Sharma

Tyler Sniegowski

Ryan Sweazey

Emily Vanderpool

Rachel Washburn

Craig Hannon

Taylor Harder

Nicholas Householder

Rachel Johnson

Jenna Jurecky

Abdurrahman Kharbat

Annika Klein

Patrice Lamey

Dylan Landis

Christopher Le

Benjamin Lin

Nabeela Manal

Brianna Marschke

Hannah McCool

Cody Perry

Akhila Reddy

Emily Riddle

Shayan Sarrami

Anudeeksha Satheeshkumar

Emily Stephens

Kelly Trinh

LITERATURE REVIEWS

Sara Ahmed

Jacob Awkal

Joel Barrett

Buse Baykoca-Arslan

Drew Brownell

Vaishnavi Chiddarwar

Benjamin Daines

Emily Fine

JUDGING GROUPS

Judging Group 1 - Tuesday, March 8, 2022

(All the following times are PM!)

Time	Name
1:15-1:30	Sah, Naresh
1:30-1:45	Spontarelli, Kerri
1:45-2:00	Sanchez Villalobos, Cesar Augusto
2:00-2:15	Kisby, Brent R.
2:15-2:30	Villarreal, Johanna

BREAK

2:45-3:00	Gomez, Alejandra
3:00-3:15	Kamilar, Elizabeth
3:15-3:30	McCord, Jon
3:30-3:45	Gabriliska, Rebecca
3:45-4:00	Oladejo, Mariam

Judging Group 2 - Tuesday, March 8, 2022

(All the following times are PM!)

Time	Name
1:00-1:15	Jurica, Cameron
1:15-1:30	Seaton, Chelsea
1:30-1:45	Richard, Joshua
1:45-2:00	Barrett, Joel
2:00-2:15	Porter, Lindsay
2:15-2:30	Perez, Olivia

BREAK

2:45-3:00	Terziyski, Iliana
3:00-3:15	Chandahas, Sheila
3:15-3:30	Kashyap, Cimron
3:30-3:45	Armin, Sabiha
3:45-4:00	Bolin, Elise & Bui, Kaitlyn

Judging Group 3 - Tuesday, March 8, 2022

(All the following times are PM!)

Time	Name
1:00-1:15	Zabel, Carson
1:15-1:30	Back, Patricia Ines
1:30-1:45	Luitel, Sujata
1:45-2:00	Prathyusha, Naidu
2:00-2:15	Howlader, Md Sariful Islam
2:15-2:30	Quagraine, Naana

BREAK

2:45-3:00	Mimun, Kyle
3:00-3:15	Thompson, Jeffrey
3:15-3:30	Matthijs, Anja, PT, ScD
3:45-4:00	Kapila, Jeegisha

Judging Group 4 - March 8, 2022

(All the following times are PM!)

Time	Name
1:00-1:15	Lowry, Caitlin
1:15-1:30	Li, Ziyang
1:30-1:45	Khodair, Sherif
1:45-2:00	Murchison, Megan
2:00-2:15	Luckstead, Luke
2:15-2:30	Matejka, Caitlyn

BREAK

2:45-3:00	Bloodworth, Scarlett
3:00-3:15	Bandaru, Vishal
3:15-3:30	Chaudhury, Tristin
3:30-3:45	Wilemon, Jake
3:45-4:00	Wolpert, John

Judging Group 5 - March 8, 2022

(All the following times are PM!)

Time	Name
1:00-1:15	Ciubuc, John
1:15-1:30	Moseley, Kaitlyn
1:30-1:45	Jain, Neil
1:45-2:00	Cala, Jeanette
2:00-2:15	Rao, Sanjana
2:15-2:30	Trevino, Mariana

BREAK

2:45-3:00	Garza, Jali
3:00-3:15	Doan, Jeremy
3:15-3:30	Castro, Luis
3:30-3:45	Bashrum, Bryan
3:45-4:00	Ray, Sparsh

Judging Group 6 - March 8, 2022

(All the following times are PM!)

Time	Name
1:00-1:15	Raicevic, Stefan
1:15-1:30	De Simon, Daniel
1:30-1:45	Oti-Nimoh, Joseph
1:45-2:00	Reddy, Anish
2:00-2:15	Agusala, Veena
2:15-2:30	Soetan, Fehintola

BREAK

2:45-3:00	Ehikhuemen, Grace
3:00-3:15	Hayward, Dan
3:15-3:30	Sisco, Jessica
3:30-3:45	Taylor, Brianna
3:45-4:00	Dixon, Robert & Neycheril, Rachel

Judging Group 7 - March 8, 2022

(All the following times are PM!)

Time	Name
1:00-1:15	Patel, Parth
1:15-1:30	Pourghaed, Mohammed
1:30-1:45	Choi, Erin
1:45-2:00	Dowdle, Travis
2:00-2:15	Rao, Nikita
2:15-2:30	Reddy, Soumya

BREAK

2:45-3:00	Sankoorikkal, Niki
3:00-3:15	Satheeshkumar, Anudeeksha (Anu)
3:15-3:30	Schoeberl, Madison
3:30-3:45	Schrader, Kaylee
3:45-4:00	Sheladia, Shyam

Judging Group 1A - Wednesday, March 9, 2022**(All the following times are AM!)**

Time	Name
9:00-9:15	Tompkins, Christina
9:15-9:30	Wynn, Adam
9:30-9:45	Liao, En-Dien
9:45-10:00	Patel, Shree
10:00-10:15	Raef, Abigail
10:15-10:30	Tran, Venus
BREAK	
10:45-11:00	Patel, Patel
11:00-11:15	Mahmud Syed, Mosharaf
11:15-11:30	Dowdle, Travis
11:30-11:45	Xu, Tiffany
11:45-12:00	Thompson, Christopher

Judging Group 2A - Wednesday, March 9, 2022**(All the following times are AM!)**

Time	Name
9:00-9:15	Hibler, Taylor
9:15-9:30	Jaramillo-Martinez, Valeria
9:30-9:45	Sweazey, Ryan
9:45-10:00	Martinez-Marin, Dalia
10:00-10:15	Bass, Kevin
10:15-10:30	Miller, Sarah
BREAK	
10:45-11:00	Myers, Caitlyn
11:00-11:15	Korac, Ksenija,
11:15-11:30	Katz, Courtney
11:30-11:45	Mathew, Marilyn
11:45-12:00	Ramesh, Malvika

Judging Group 3A - Wednesday, March 9, 2022**(All the following times are AM!)**

Time	Name
9:00-9:15	Washburn, Rachel
9:15-9:30	Dutta, Sayanika
9:30-9:45	McHann, Melissa
9:45-10:00	Liu, Xiaobo
10:00-10:15	Panthagani, Praneetha
10:15-10:30	Hernandez, Sarah
BREAK	
10:45-11:00	Navarro, Stephany
11:00-11:15	Burrow, Trevor
11:15-11:30	Sniegowski, Tyler
11:30-11:45	Presto, Peyton
11:45-12:00	Madhavaram, Ananya

Judging Group 4A - Wednesday, March 9, 2022**(All the following times are AM!)**

Time	Name
9:00-9:15	Khedmatgozar, Hamed
9:15-9:30	Ashton, Megan
9:30-9:45	Jacobo, Unique
9:45-10:00	Mbaki, Glody
10:00-10:15	Acharya, Ganesh
10:15-10:30	Ochola Damieanus
BREAK	
10:45-11:00	Rodriguez, Angelica
11:00-11:15	Tran, Nghi
11:15-11:30	Samanta, Anindya

11:30-11:45	George, Isaiah K.
11:45-12:00	Vanderpool, Emily

Judging Group 5A - Wednesday, March 9, 2022**(All the following times are AM!)**

Time	Name
9:15-9:30	George, Asher
9:30-9:45	Abidi, Hussain
9:45-10:00	Holder, Katherine
10:00-10:15	Rahesh, Jasmin
10:15-10:30	Choi, Erin
BREAK	
10:45-11:00	Rafael, John
11:00-11:15	Carey, Michael
11:15-11:30	Rao, Nikita
11:30-11:45	Giron, Alec & Choi, Erin

Judging Group 1B - Wednesday, March 9, 2022**(All the following times are PM!)**

Time	Name
1:00-1:15	Kile, Ranger
1:15-1:30	Robbins, Esther; Hyde, Bridget; & Chen, Angela
1:30-1:45	Vemulapalli, Varun
1:45-2:00	Eboh, Tochi
2:00-2:15	Khan, Shazma
2:15-2:30	Haque, Sarah
BREAK	
2:45-3:00	Galvan, Bernardo
3:00-3:15	Hassan, Taha
3:15-3:30	Lin, Benjamin
3:30-3:45	Sankoorikkal, Niki
3:45-4:00	Zapata, Alex

Judging Group 2B - Wednesday, March 9, 2022**(All the following times are PM!)**

Time	Name
1:00-1:15	Siddiqui, Khaja
1:15-1:30	Zeitouni, Jad
1:30-1:45	Hadidi, Yezan
1:45-2:00	Tuazon, Cameron
2:00-2:15	Youssi, Brandon
2:15-2:30	Morgan, Ryan
BREAK	
2:45-3:00	Pham, Anthony
3:00-3:15	Rutayomba, Elwin
3:15-3:30	Aickareth, Genesy
3:30-3:45	Raghuram, Akshay
3:45-4:00	Jang, Wooyoung

Judging Group 3B - Wednesday, March 9, 2022**(All the following times are PM!)**

Time	Name
1:00-1:15	Natha, Cristina
1:15-1:30	Kankam Jr, Alfred
1:30-1:45	Gutierrez, Bailey
1:45-2:00	Schrader, Kaylee
2:00-2:15	Falco, Adrian
2:15-2:30	Sargent, Emily
BREAK	

2:45-3:00	Arevalo, Gabriel
3:00-3:15	Schuck, Alexis
3:15-3:30	Abraham, Jonathan
3:30-3:45	Galvan, Taylor
3:45-4:00	Majdinasab, Elleana

Judging Group 4B - Wednesday, March 9, 2022
(All the following times are PM!)

Time	Name
1:00-1:15	Chiddarwar, Vaishnavi
1:15-1:30	Perry, Cody
1:30-1:45	Sarrami, Shayan
1:45-2:00	Jurecky, Jenna
2:00-2:15	Daines, Benjamin
2:15-2:30	Hannon, Craig
BREAK	
2:45-3:00	Satheeshkumar, Anudeeksha (Anu)
3:00-3:15	Marschke, Brianna
3:15-3:30	Fine, Emily
3:30-3:45	Le, Christopher
3:45-4:00	Kharbat, Abdurrahman

Judging Group 5B - Wednesday, March 9, 2022
(All the following times are PM!)

Time	Name
1:00-1:15	Pugliese, Matthew
1:15-1:30	Zeitouni, Ferris
1:30-1:45	Regalado, Diego & Connolly, Meghan
1:45-2:00	Kellogg, Morgana
2:00-2:15	Hotchkiss, Tiffany
2:15-2:30	Guerra, Erin
BREAK	
2:45-3:00	Fortner, Riley
3:00-3:15	Boomer, Matthew
3:15-3:30	Marsh, Harrison
3:30-3:45	Mateja, Kirby
3:45-4:00	Khan, Sonia

Judging Group 6A - Thursday, March 10, 2022
(All the following timings are AM!)

Time	Name
9:00-9:15	Jones, Hannah & Thatigutla, Navya
9:15-9:30	Baker, Lauren & Ammerman, Lara
9:30-9:45	Mitchell, Katherine & Demopoulos, Alex
9:45-10:00	Coleman, Boone
10:00-10:15	Harder, Jacob
10:15-10:30	Azzam, Seham
BREAK	
10:45-11:00	Couch, Brandon
11:00-11:15	Kim, Eunjee
11:15-11:30	Baum, Jaxon
11:30-11:45	Seemann, Mallory
11:45-12:00	Weed, Abbey

Judging Group 7A - Thursday, March 10, 2022
(All the following timings are AM!)

Time	Name
9:00-9:15	Johnson, Benjamin
9:15-9:30	Garcia, Liza
9:30-9:45	Falconi, Sirin
9:45-10:00	Garcia, Hector
10:00-10:15	Castro, Maribel
10:15-10:30	May, Harry
BREAK	
10:45-11:00	Chen, Jason
11:00-11:15	Hernandez, Hazael
11:15-11:30	Uppala, Shreya
11:30-11:45	Black, Caroline
11:45-12:00	Griffin, Zach

Judging Group 8A - Thursday, March 10, 2022
(All the following timings are AM!)

Time	Name
9:00-9:15	McCabe, Parker
9:15-9:30	Bhakta, Sanam
9:30-9:45	Brumfield, Emily
9:45-10:00	Wilhelm, Christopher
10:00-10:15	Fuentes, Nayeli
10:15-10:30	Tran, Alison
BREAK	
10:45-11:00	Richardson, Bayley
11:00-11:15	Key, Amanda
11:15-11:30	Keck, Ryan
11:30-11:45	Ramon, Mikal
11:45-12:00	Mittal, Nitish

Judging Group 9A - Thursday, March 10, 2022
(All the following timings are AM!)

Time	Name
9:00-9:15	Robison, Kathryn
9:15-9:30	Anding, Catherine
9:30-9:45	Nesiama, Esere
9:45-10:00	Ward, Ellen
10:00-10:15	Jilani, Taha
10:15-10:30	Hu, Cindy
BREAK	
10:45-11:00	Pederson, Addie
11:00-11:15	Sellers, Jake
11:15-11:30	Bradshaw, Evan
11:30-11:45	Brewer, Easton
11:45-12:00	Boeger, Bridget

Judging Group 10A - Thursday, March 10, 2022
(All the following timings are AM!)

Time	Name
9:00-9:15	Landis, Dylan
9:15-9:30	Stephens, Emily
9:30-9:45	Lamey, Patrice
9:45-10:00	Brownell, Drew
10:00-10:15	Reddy, Akhila
10:15-10:30	Manal, Nabeela
BREAK	
10:45-11:00	Harder, Taylor
11:00-11:15	McCool, Hannah
11:15-11:30	Johnson, Rachel; Ahmed, Sara & Klein, Annika
11:30-11:45	Awkal, Jacob
11:45-12:00	Baykoca-Arslan, Buse

Judging Group 6B - Thursday, March 10, 2022
(All the following timings are PM!)

Time	Name
1:00-1:15	White, Alisa
1:15-1:30	Junell, Riley
1:30-1:45	Sabu Kurian, Anna
1:45-2:00	Yang, Mingxiao
2:00-2:15	Mays, Alshaikhsalama
BREAK	
2:45-3:00	Almaguer, Joey
3:00-3:15	Curl, Jordan
3:15-3:30	Okimi, Abiodun
3:30-3:45	Watson, Carina
3:45-4:00	Dancel, Canice

Judging Group 7B - Thursday, March 10, 2022
(All the following timings are PM!)

Time	Name
1:00-1:15	Jones, Daemar
1:15-1:30	Banafshay, Kiana
1:30-1:45	Pirtle, Andrew
1:45-2:00	Kara, Denizhan
2:00-2:15	Karim, Sulaiman
2:15-2:30	Hawkins, Tramondranique
BREAK	
2:45-3:00	Ochoa, Ozman
3:00-3:15	Ray, Nandini
3:15-3:30	Kondoor, Vishaal
3:30-3:45	Perabo, Arden
3:45-4:00	Zhu, Christina

Judging Group 8B - Thursday, March 10, 2022
(All the following timings are PM!)

Time	Name
1:15-1:30	Iweh, Marvelyn
1:30-1:45	Tapp, Robyn
1:45-2:00	Onuoha, Michelle
2:00-2:15	Davis, Zoe
2:15-2:30	Conde, Camila
BREAK	
2:45-3:00	McLeod, Lauren
3:00-3:15	Meltan, Shakira
3:15-3:30	Rizvi, Mariam

3:30-3:45	Collins, Alex
3:45-4:00	Vopni, Rachel

Judging Group 9B - Thursday, March 12, 2021
(All the following timings are PM!)

Time	Name
1:00-1:15	McLain, Madison
1:15-1:30	Riddle, Emily
1:30-1:45	Collins, Reagan
1:45-2:00	Matsunaga, Sarah
2:00-2:15	Chugh, Julie
2:15-2:30	Alfaro, Andrew
BREAK	
2:45-3:00	Park, Alexander
3:00-3:15	Birmingham, Cole
3:15-3:30	Pati, SivaTeja
3:30-3:45	Daniel, Hannah
3:45-4:00	Batchinsky, Maria

Judging Group 10B - Thursday, March 12, 2021
(All the following timings are PM!)

Time	Name
1:00-1:15	Bettarelli, Douglas
1:15-1:30	Agyare, Kofi
1:30-1:45	Corbitt, Shelby
1:45-2:00	Vojtkofsky, Nicholas
2:00-2:15	Hardy, Kenneth
2:15-2:30	Credo, Roald
BREAK	
2:45-3:00	Okpara, Robin
3:00-3:15	Jensen, Brooke
3:15-3:30	Abraham, Angela
3:30-3:45	Householder, Nicholas
3:45-4:00	Trinh, Kelly

UNDERGRADUATE

BOLIN, ELISE AND BUI, KAITLYN

Investigating the Contribution of Fungal Extracellular Matrix on the Autofluorescent Properties of Biofilm

Elise Bolin, Kaitlyn Bui, Isaiah K. George, Eleanna Carris, Rachel C. Diaz, Allie Clinton Smith

Biofilms are microbial communities contained within an extracellular matrix (EM), which acts as a mechanical barrier to protect against the immune system and antimicrobial treatment. The formation of biofilms within chronic wounds contributes to increased severity of infection and adverse patient outcomes due to decreased treatment efficacy. The MolecuLight i:X is a hand-held bacterial imaging device that detects the autofluorescent properties of most clinically relevant species of bacteria, both planktonically (free-living) and within biofilm. Currently, there is interest in expanding the capabilities of the device by determining if the biofilm-associated extracellular matrix also exhibits any unique fluorescence markers that are detectable with the device. Additionally, there is interest in determining how the contribution of fungal species affects fluorescence detection with the i:X device. To explore these questions, we investigated the fungal pathogen *Candida albicans* both planktonically and as a biofilm and performed a full emission spectral scan to identify any unique fluorescence peaks associated with biofilm EM. This work could inform a specific setting within the MolecuLight i:X device for detection of fungal-associated biofilm within chronic wound infections. This could allow physicians to visualize and diagnose biofilm-associated infections in real-time, improving treatment and patient care.

School: Texas Tech University

GAO, MARK

Determining the Potential of Bacterial and Host Proteases to Inhibit Glycoside Hydrolase Activity

Mark Gao, Whitney K. Redman, Ph.D., Kendra P. Rumbaugh, Ph.D.

Chronic wounds are frequently associated with the formation of a biofilm. Biofilms are communities of microorganisms surrounded by an extracellular polymeric substance (EPS), which can impede antibiotic potency and wound closure. Glycoside hydrolases (GHs) are enzymes that target the glycosidic linkages in the EPS and induce bacterial dispersal and improve antibiotic potency. The GHs amylase and cellulase have previously been shown to induce dispersal both in vitro and in vivo. Proteases, enzymes that catalyze the breakdown of proteins into smaller, non-functional forms, can commonly be found in chronic wounds. Since GHs are active enzymes that could hypothetically be degraded by proteases, this study focused on determining if host and/or bacterial proteases can inhibit GH activity. First, baseline protease activity of *Pseudomonas aeruginosa* (PAO1) supernatant was analyzed with a Hide Powder Blue Assay. Next, supernatant from a PAO1 overnight culture was treated with active or heat inactivated amylase, for 2 or 24 hrs. Amylase activity was then measured using an amylase activity assay. There was no reduction in activity for either treatment time. Then, the protocol was repeated to measure cellulase activity after incubation with PAO1 supernatant for 24 hours. No reduction in cellulase activity was observed. Next, polymicrobial biofilms were established in our in vivo murine chronic wound model with PAO1 and *Staphylococcus aureus* (SA31). The infected wound bed and the surrounding tissue (PAO1 only) was collected and homogenized to determine whether either had protease activity that would inactivate cellulase. Cellulase activity was slightly reduced, though not significantly, after incubation with the homogenates. In conclusion, these preliminary studies suggest that host and bacterial proteases do not significantly inhibit cellulase or amylase activity, further supporting the utilization of GHs as a therapeutic treatment option.

School: Texas Tech University

GEORGE, ISAIAH K.

Exploring the Auto-fluorescent Properties of Biofilm to Improve Diagnostics of Biofilm-Associated Infections

Isaiah K. George, Eleanna Carris, Elise Bolin, Kaitlyn Bui, Rachel C. Diaz, Allie Clinton Smith

Chronic wounds are those that remain open for six weeks or longer and are often driven by polymicrobial biofilm-associated infections. Biofilm-associated bacteria are able to secrete an extracellular polymeric substance (EPS) which acts as a mechanical barrier to both the immune system and antimicrobial treatment. The absence of a reliable diagnostic criterion in assessing biofilm-associated infections impacts effective treatment, which leads to adverse patient outcomes. The MolecuLight i:X handheld bacterial imaging device detects autofluorescent properties of bacteria in real-time via the exoproduct porphyrin to aid in chronic wound diagnostics. The device has previously demonstrated detection of bacteria both planktonically (free-living) and within biofilm, and there is an interest to determine if the bacterial-derived EPS matrix exhibits any unique fluorescence signature that could be indicative of biofilm, and potentially diagnostic for biofilm. To investigate this, a polymicrobial mixture of chronic wound pathogens *Staphylococcus aureus*, *Escherichia coli*, and *Enterobacter cloacae* were evaluated as both planktonic polymicrobial suspensions and biofilms. In a full emission spectral scan, a panel of excitation and emission wavelengths from different bacterial growth environments were evaluated to determine if there was a specific fluorescence peak associated with bacterial EPS that could be indicative of biofilm. This could potentially inform a specific setting within the MolecuLight i:X device for detection of a biofilm within chronic wound infections, allowing clinicians to diagnose not only bacterial infections but also the presence of a biofilm in real-time. The MolecuLight i:X imaging device has the potential to alter how biofilm-associated chronic wounds are diagnosed and treated in a clinical setting, which can significantly reduce patient morbidity and mortality.

School: Texas Tech University

MADHAVARAM, ANANYA

The immune basis of COVID-19 related psychosis - a review

Ananya Madhavaram, Ashish Sarangi

The evidence of underpinning psychosis during the time of viral pandemic has been laid for a very long time and started in the early 1900s when the influenza pandemic reared its ugly head. Similarly, evidence links psychosis to SARS-CoV-2 infection with inflammatory changes in the brain to blame. COVID-19 being a pro-inflammatory condition is linked to the release of several cytokines including IL-6, IL-8 and IL-10 as well as tumor necrosis factor.

COVID-19 psychosis can manifest in many forms with patients experiencing auditory and visual hallucinations and significant persecutory and paranoid delusions. COVID-19 may also unmask underlying pre-existing psychotic conditions such as schizophrenia and lead to what is known as the “first psychotic break.”

The immune-mediated development of psychosis in patients infected with COVID-19 can be the target of pharmaceutical agents which can shorten the psychotic course and long-term implications.

Early studies suggest that along with COVID-19 causing psychosis from an immune-mediated mechanism, the use of steroids that are often used to treat COVID-19 pneumonia can also place a patient at risk of developing psychotic complications. In patients who do develop psychosis, Haloperidol, or new generation atypical antipsychotics such as aripiprazole have shown efficacy.

Neural inflammation is a direct pathway to the development of psychosis in patients with SARS-CoV-2 infection. Further research needs to be conducted to isolate and identify immunological markers which can be targets of pharmaceutical drugs to lessen the impact of COVID-19 related psychosis.

School: Texas Tech University

PHAM, EMILY

Investigation of Cyan Fluorescence in Pseudomonas aeruginosa for Point of Care Detection

Emily Pham, Reynolds, Landry; Smith, Allie C.

Chronic wound infections contribute to high rates of mortality and morbidity and are of significant clinical concern. One of the most significant contributors to the pathogenicity of chronic wounds is the bacterium *Pseudomonas aeruginosa*. The handheld bacterial imaging device MolecuLight i:X is designed to detect the auto-fluorescent characteristics of most clinically relevant species of bacteria; most clinically relevant species of bacteria exhibit red fluorescence with the i:X device due to production of the exoproduct porphyrins. Interestingly, *P. aeruginosa* exhibits a unique, cyan fluorescence signature; clinically, when a chronic wound exhibits cyan fluorescence with the i:X device, there is over a 90% positive predictive value that the wound will harbor *P. aeruginosa*. This could allow for the real-time detection and visualization of *P. aeruginosa*, improving treatment outcomes in the clinical setting. This work describes the determination of the source of the unique cyan fluorescent signature exhibited by *P. aeruginosa*, by utilizing genetic knockout mutants to isolate the exoproduct responsible for the cyan phenotype. Investigations regarding fluorescence is needed to understand the detection of these signatures in chronic wounds through utilization of the MolecuLight i:X device.

School: Texas Tech University

MEDICAL EDUCATION RESEARCH: GRADUATE MEDICAL EDUCATION SCIENCES, SCHOOL OF MEDICINE, REHABILITATION SCIENCES

ALFARO, ANDREW

Integration of Relationship-Centered Communication into Student-Generated Simulation in a Family Medicine Accelerated Track

Andrew Alfaro, Sheldon Baty, Matthew Bigelow, Shivani DalalAllen Fellers, Stephanie Filleur, Mayra Gomez, Joseph Green-eMayra Levario, Zachary Lujan, Benjamin Merrill, Jamie Haynes, Charla Allen, Ron Cook, Betsy Jones

Purpose: The TTUHSC FMAT program includes a systems-based 8-week course between the M1 and M2 years that focuses on the top 24 diagnoses in primary care. The course also uses a unique method of training for and assessing clinical competence in pre-clinical students—the Student-Generated Simulated Clinical Encounter, which provides opportunities for real-time teaching for students who generate the patient case, for those who serve as student doctors, and for those who observe. During the FMAT1 course, students and faculty collaborate on a project to implement and assess an innovation in medical student teaching. **Methods:** FMAT students studied strategies for integrating relationship-centered communication (RCC) skills in primary care and integrating opportunities to practice those skills in their simulated clinical encounters. Learning objectives for this activity included a) defining relationship-centered communication, b) demonstrating each of the skill sets in an OSCE developed by the students (create rapport and set the agenda, use patient centered history building skills, and educate, counsel regarding the plan), and c) using relationship-centered communication in clinical encounters. Students participated in pre- and post-course assessments of knowledge and attitudes about relationship-centered communication, and their simulations were evaluated for effective application of skills. **Results:** FMAT students showed strong increases in their understanding of the value of communication strategies and their own confidants in the ability to use relationship-centered communication. Especially notable was the growth in confidence to set an agenda for a patient encounter, communicate empathy, and demonstrate listening skills. **Conclusions:** This project offered the opportunity to embed a self-directed learning activity into an ongoing course, highlight a focus on effective communication skills, challenge students to integrate RCC within the week's content & diagnoses, give students a series of opportunities to practice and receive feedback on communication skills, and pilot a model that can be expanded to other courses.

School: School of Medicine

AMMERMAN, LAURA AND BAKER, LAUREN

Curricular Structure and Execution of a Novel Mentorship Program Between Medical Students and Rural Highschoolers

Laura Ammerman, Lauren Baker, Asher George, Sivateja Pati, Andrew Salazar, Joseph Silvaggio, Julie Chugh, Lewis Kelly, Madi McLain, Mays Alshaikhsalama

It is estimated that 20% of the US population live in rural areas, while only 9% of the nation's physicians practice in rural communities. Physician's with rural backgrounds are more likely to return to practice in rural areas. Rural high school students have less exposure to medical career pathway resources and benefit from mentoring relationships, where small mentor-to-mentee ratios and career-specific curriculums have indicated higher success rates.

One potential solution to address rural provider shortages includes recruiting individuals from rural communities. In order to help fill this gap, we have developed a mentorship program with the local Area Health Education Center (AHEC of the Plains) that allows high school students to be mentored by medical students attending Texas Tech University Health Sciences Center School of Medicine. We hope that through this program, students will be given a chance to better understand the medical field and hone the skills needed to become a competitive medical school applicant.

Since the start of the Rural Student Health Sciences Mentorship Program (RSHSMP), there has been an increase in the number of mentors and mentees participating in the program. Additionally, during the 2020-2021 school year, there were 7 participating high schools and during the 2021-2022 school year, we had 9 participating high schools from rural communities throughout West Texas.

The RSHSMP has shown success through mentee feedback, which reveals that students have an increased knowledge and interest in medical career pathways. The increase in participating high schools has indicated the widespread need for mentorship. To address this need, we plan to recruit additional rural high schools and mentees while continuing to evaluate program success and updates to the curriculum. In addition, we plan to evaluate the potential of including mentors from additional health sciences programs.

School: School of Medicine

BANDARU, VISHAL

Addressing Resource Overload in Medical School: Resource Recommendation Lectures

Vishal Bandaru, Riley Fortner, John Pelley, PhD

With medical students reporting excessive workload and problems with studying as contributors to high levels of stress, the plethora of medical school resources can also overwhelm students that need to sift through resources causing resource overload. TTUHSC School of Medicine modified its medical school curriculum in 2021 by moving histology into Clinically Oriented Anatomy (COA), now named Anatomy, Histology, and Embryology (AHE). In 2020, we determined which resources that students used to study for COA. During 2021, we sought to determine whether a resource recommendation lecture based on prior data would decrease stress for students. Additionally, we assessed whether resource utilization stayed consistent across years and curriculums.

During COA (2020), a voluntary response survey was sent out to assess class performance, personality type, and student resource preferences based on helpfulness and frequency of use. For AHE, we offered an in-person resource lecture describing resource utilization data from 2020 to students shortly after classes started. Two voluntary responses surveys were sent out after completion of the AHE, the first evaluated student resources utilized during AHE while the second was sent to students who attended the in-person resource recommendation lecture. Data between the two years was then evaluated via the Welch Test to verify resource consistency.

The COA survey (n=83) found that students preferred certain resources in comparison to others that were offered ($p=3.057E-114$ for helpfulness and $p=1.018E-117$ for frequency). After the resource lectures, students reported a marginal reduction in stress with knowledge of resources and 85% of students reported using lecture material to select their resources. Only 38% of resources were rated significantly differently between COA and AHE. We conclude that resource recommendation lectures based on historical student resource data may be beneficial to student learning and stress reduction.

School: Graduate School of Biomedical Sciences

BATCHINSKY, MARIA

Ultrasound Guided Nerve Block for Donor Site Pain Mitigation: A Medical Education Credentialing Model

Maria Batchinsky, Grant Sorensen, MD, John Griswold, MD

Full-thickness burns often require a split-thickness skin graft (STSG) taken from an autologous donor site (DS) in order to re-epithelialize properly. The DS presents injury and heightened pain for 72 hours post-operatively. Several studies aim to improve DS pain through topical application or subcutaneous injection of local anesthetics, only providing temporary pain relief. The use of ultrasound in the administration of lateral femoral cutaneous (LFCN), femoral (FN), or sciatic nerve (SN) block using anesthetic injection may provide feasible DS pain relief for the full 72 hours. This study functions as a template for academic credentialing models through a three-phase approach.

Phase 1: LFCN and FN were visualized with ultrasound (8–18 MHz linear transducer) on the Blue Phantom Regional Anesthesia training model. An 18-gauge needle was used to assess the depth of insertion and to find the perineural space.

Phase 2: Validity of Phase 1 technique was assessed in a cadaver model using ultrasound to detect the LFCN and FN. Green food coloring was injected into the peri-neural plane of both nerves, followed by dissection, revealing the precise location of the injected dye. Outcomes were photographed post-procedure.

Phase 3: Retrospective review of ultrasound guided nerve block for donor site pain mitigation will be conducted in patients undergoing this procedure at Timothy J. Harnar Burn Center.

Phases 1 and 2 were successfully conducted using this training model. LFCN and FN were successfully visualized, and injection occurred at the intended site of the perineural space.

The Ultrasound Guided Nerve Block for Donor Site Pain Mitigation has proven successful through the first two phases of the credentialing model. Continuation of this work will involve patient pain data and management course as per standard reporting measures for retrospective analysis in donor sites with regional nerve block.

School: School of Medicine

BAUM, JAXON

Safe Practices: Training and Assessing Pre-Clinical Student Competency for Sexual Health Interviewing and Counseling Skills

Jaxon Baum, Ozman J. Ochoa, M.S.; Fiona Prabhu, MD

As expressed in a needs-based assessment (NBA) pre-clinical students at the TTUHSC School of Medicine (SOM) did not feel adequately trained to interview, counsel, or manage issues concerning Sexually Transmitted Infections (STIs), nor engage in safe-sex counseling with patients. In addition, previous standardized patient (SP) encounters concerning STI topics were rated favorably amongst TTUHSC SOM students, and there was a strong desire for their continued implantation. Students were invited to sign up for participation in a Sexual Health program that consisted of an Educational Training Session (ETS) and a Clinical Encounter (CE) during the fall of their first year. The 30-minute ETS presentation was led in-person by experienced second-year medical students that discussed various topics regarding sexual health counseling for patients. The CE was with an SP who presented with concerns of an STI. The 12 participants were randomly assigned into one of two groups. Group 1 attended the ETS prior to the CE, whereas Group 2 conducted the CE before receiving the ETS. Each participant completed two separate surveys before and after the program. The survey questions quantified student knowledge and attitude regarding Didactic Knowledge (DK), Sexual Public Health Awareness (SPHA), Attitude towards Clinical Skills (ACS), and Personal Attitudes/Stigma (AS). Additionally, each SP completed an assessment of the student's clinical performance and was given a Clinical Skills Evaluation (CSE) Score from 0-5. Overall, we found that providing a positive Sexual Health Education Program with an Educational Training Session and Clinical Encounter helped improve perceived student confidence and competence in sexual health interviewing, counseling on STIs, and discussing safe-sex practices. While the group that received the ETS prior to the CE performed better on average according to blinded SP surveys, both groups demonstrated increased clinical knowledge, competence, and confidence due to participation in this program.

School: School of Medicine

BLOODWORTH, SCARLETT

Coloring in the Lines: The Use of Annotated Cadaveric Images in Medical Anatomy Education

Scarlett Bloodworth, Dr. Gurvinder Kaur, Dr. Brandt Schneider, Dr. Keith Bishop, Anthony Hewetson

Restrictions on in-person education resulting from COVID-19 have created the need for medical students to efficiently study cadaveric anatomy outside of the lab. The goal of the study was to provide students with a more detailed, more precise dissection manual (dissector) featuring annotated cadaveric images and to assess the importance of dissection methodology and anatomic structure visualization on student performance.

The dissectors created for the TTUHSC SOM's first year medical anatomy class were updated to include step-by-step instructions, color-coded for structures, and incorporated computer-generated anatomical images for each step. Cadaveric images were made available for select steps in the dissection process, and these images were annotated to outline relevant structures and provide color coded labels for each of those structures. Students were evaluated at the end of each dissection, and also completed weekly online lab quizzes and three unit examinations specific to cadaveric dissection. Upon completion of the course, students answered a survey about aspects of the dissector, including frequency of use and overall satisfaction with the resource.

Survey responses indicate students have very high levels of overall satisfaction with the updated dissectors (82% ranking quality at ≥ 9 out of 10, $n = 93$). Of 93 respondents, 76% ranked annotated cadaver images as the "most important" aspect of the dissector as a study resource. Average unit exam scores increased overall from 2020 (utilizing previous dissector) to 2021 (utilizing updated dissector) by 1.9%. Survey and student performance data support the use of annotated cadaveric images in medical anatomy education.

Providing students with annotated cadaveric images allows students to study cadaveric material efficiently outside of a lab setting. Increasing student access to lab concepts in a non-laboratory setting boosts student performance and satisfaction.

School: Graduate School of Biomedical Sciences

BOOMER, MATTHEW

A Physician's Tools: Utilizing Case-Based Learning to Improve Student Understanding of Lab Tests

Matthew Boomer, Dan Webster

Lab tests are an invaluable part of a physician's repertoire, as they provide insight into patient status and are crucial to the diagnostic process. Despite this, there is a paucity of learning opportunities for student-physicians to gain an understanding of the usage and nature of common lab tests (CMP, CBC, ABG), which can affect both student ability and confidence. Case-based learning has often been used to tackle difficult subjects within medical school curricula, therefore it is hypothesized that a case-based learning experience will positively impact student performance and confidence regarding lab tests.

Students will be provided with a presentation outlining commonly used lab tests two days before the case-based learning event. Students will be split into two groups, with Group A undergoing the case-based learning experience while Group B will not. All students will then be provided with a quiz immediately following the case-based learning experience, with two more quizzes to be given in the following two weeks. Additionally, after the first blockwide emergency room simulation, an evaluative survey will be provided to participants.

This project will attempt to determine whether the addition of a case-based learning experience will improve student comprehension of lab tests through a statistical comparison of averaged quiz scores by the Student's T-test. Furthermore, a survey utilizing several Likert scale-based questions will be provided to all participants following the first blockwide emergency room simulation, with the intent to determine student perception of value and confidence.

Following completion of this project, analysis of the results will allow us to determine whether the case-based learning experience is able to positively affect student performance and confidence. This conclusion can then be used to examine and refine sections of the first-year curriculum to enhance the student experience and learning outcomes.

School: Graduate School of Biomedical Sciences

CHAUDHURY, TRISTIN

High-Yield Fact Sheets and Question Bank Enhanced Medical Student Focus and Understanding of Cellular and Molecular Biology While Reducing Stress

Tristin Chaudhury, Dan Webster, Gurvinder Kaur

First year medical students (MS1s) at TTUHSC are provided only 6 days of didactic presentations for an entire Unit of Cellular/Molecular Biology. A needs analysis survey to the previous cohorts of students expressed difficulty with this unit. Our goal was to create high-yield fact sheets and a question bank to help guide MS1 understanding of the relevant material.

Content from each didactic session from the previous year's unit was revisited and core concepts were identified. Next, high-yield fact sheets and a question bank were created and the concept sheets were approved by the appropriate faculty before disseminating them to the MS1 class. The quiz question bank was also constructed and made available to the MS1s at the end of the first week. MS1 students were surveyed at the end of the unit to gauge usefulness and student well-being.

The pre-survey revealed that students had difficulties knowing what and how to study the material within the strict time limitations of this unit and responded favorably to the provision of "high-yield" concept sheets. The post-unit survey (n=69) showed that 93% of students used the sheets generally and half used them daily. Eighty-four percent thought these sheets guided their understanding of the material, while 94% thought they should be used in other medical school blocks. Finally, 77% agreed that this supplement reduced their stress throughout the unit. Similar results were obtained for the quiz question bank provided.

The basic sciences portion of our curriculum is being shortened as it is being reorganized to accommodate a systems-based approach. This necessitates new formulae of initial presentation and supplemental reinforcement. We have found that these high yield fact sheets and question bank are valuable study resources for MS1s to reduce stress and further guide understanding and retention of Cellular/Molecular Biology material.

School: Graduate School of Biomedical Sciences

CHUGH, JULIE

Qualitative Needs Assessment for Modern Realistic Models in Stop The Bleed® Training

Julie Chugh, Toby Brooks, PhD, LAT, ATC; Sharmila Dissanaikie, MD, FACS, FCCM; Ariel Santos, MD, MPH, FRCSC, FACS, FCCM; Robyn Richmond, MD, FACS; Miloš Buhavac, MD; Brittany Bankhead, MD, MS

Uncontrolled bleeding is the leading cause of preventable death by trauma. The Stop the Bleed® (STB) Campaign aims to address this by educating civilians on how to control severe bleeding using direct pressure, tourniquets, and wound-packing. We conducted this study to assess attitudes toward STB and its effectiveness on preparing civilians to act in hemorrhagic emergencies.

Through National Science Foundation Regional I-Corps, one-on-one interviews were conducted with individuals who have taken or taught STB or who work in a profession that requires them to perform hemorrhage control. A sample size of 30 was selected using convenience sampling. Interviews were composed of open-ended questions related to the participants' experiences with hemorrhage control and STB. Interviews were divided among the study team and conducted in-person, over zoom, or via phone. Interview transcripts were held in a shared folder and qualitatively assessed.

A total of 28 interviews were conducted yielding a 93% participation rate. The participants included individuals who have taken and taught STB (n=18), who have only taken STB (n=5), and who have neither taken nor taught STB (n=5). The sample consists of physicians, paramedics, ancillary trauma staff, and community educators. The interviews revealed 96% (22/23) of participants who have taken and/or taught STB indicated the training is not realistic. These participants reported bleeding (61%), the pressure needed to stop a bleed (48%), the psychology of the real-life situation (48%), the reaction of a person experiencing a hemorrhagic emergency (30%), and the anatomical reality of the models (13%) are not well-represented in the course. Interview saturation analysis using a base size of 4 interviews, run length of 2 interviews, and new information threshold of $\leq 5\%$, demonstrated that saturation was achieved after 14 interviews. This study demonstrates that STB training could benefit from an experience that more realistically simulates a hemorrhagic emergency.

School: School of Medicine

COLLINS, REAGAN

The Development of a Student-Led Health Policy and Public Health Think Tank Serving West Texas

Reagan Collins, Jad Zeitouni, Theresa Byrd, Aliza Wong, Cynthia Jumper

Students across the Texas Tech University System founded a 21st century think tank to develop, promote, and implement best practices in health equity and access to care throughout the West Texas region in the wake of the COVID-19 pandemic. This first-of-its-kind system-wide organization connects students, faculty, and staff from five different large academic institutions in West Texas, including two medical schools. This think tank is structured with two student directors, a faculty board, and a student board and includes an “action” component that complements the more traditional components of a think tank - policy and research.

Is it possible to create a collaborative initiative across the West Texas region to address health equity in policy and public health issues?

In the six months since the inception of the think tank, we have started numerous initiatives. We have established our boards, collaborated with the city of Lubbock health department on a COVID-19 vaccine clinic at an NCAA football game, developed COVID-19 educational materials to distribute to hundreds of college students, organized the vaccine administration training of MS1 and MS2 student for future pandemics, started a comprehensive needs assessment spanning multiple communities, and began developing a mentorship program for underserved high school students in partnership with the office of admissions at a West Texas medical school.

The importance of collaboration across the professions within healthcare and amongst the scholars/researchers at small liberal arts colleges and research one universities is integral to adapting to and combatting emerging health challenges. Diversity of thought, background, and expertise is essential to approaching these challenges; therefore, it was heavily valued during the inception of this group. Future endeavors will continue to strive towards health equity among both patients and healthcare professions.

School: School of Medicine

FORTNER, RILEY

Metacognition Training Improves Incoming Medical Students' Study Habits

Riley Fortner, Vishal Bandaru, Dr. John Pelley

The rapid pace of medical school in conjunction with the density of material creates a daunting task for many incoming medical students. Students have little time to adapt their study methods and lifestyle habits to meet the demands of medical school. This study proposes that by giving incoming medical students study habit, resource, and time management recommendations their adjustment will be easier.

Voluntary response surveys were sent out during the Fall of 2020 to first year students at TTUHSC School of Medicine. Six videos focusing on study habit recommendations, time management strategies, and resource recommendations were created based upon the data gathered from this initial survey and “SuccessTypes in Medical Education” by Dr. John Pelley and Dr. Bernell Dalley. These videos were distributed to medical students prior to beginning Clinically Oriented Anatomy. Subsequently, another voluntary response survey was given. This survey focused on resource usage, student opinions on the effectiveness of the videos, and why students who did not view the videos chose not to. Resource usage comparison between years was determined using a Welch test.

Of the respondents (n=24) 72.7% responded that the videos positively affected their study strategies while the remainder stated that their strategies did not change. 81.8% of respondents stated that they attempted to study as prescribed by the videos, and of those students 100% stated that studying in this manner was more effective than their previous habits. Respondents also stated that their stress level was reduced moderately. Those that did not watch the videos reported “Lack of time” and resource overload as primary reasons for not doing so.

This study revealed that metacognition training can help medical students improve their study habits and alleviate some of the stress associated with beginning medical school. Further studies are needed to ascertain the performance benefits of this training.

School: Graduate School of Biomedical Sciences

GUERRA, ERIN

Did the TTUHSC School of Medicine New Curriculum Design Impact Student Success and Stress in Histology Instruction?

Erin Guerra, Caitlyn Matejka, Alice Villalobos, Dan Webster

In Fall 2021, TTUHSC SOM implemented a new curriculum that involved restructuring of Histology instruction. In the legacy curriculum histology was a single 10-day unit in the second block, Biology of Cells & Tissues (BCT) and presented in 20 lecture hours that covered basic tissues and organ histology. In the new integrated systems-based curriculum, histology was divided and distributed among several blocks. Beginning in Fall 2021, basic tissue histology was integrated into Unit 1 of the first block, Anatomy, Histology & Embryology (AH&E), and presented in 7.5 lecture hours over 13 class days. Our objective was to analyze the impact of curriculum changes on student performance and stress levels in histology.

Student performance was evaluated by comparing de-identified raw scores for the 10 histology questions on Fall 2021 AH&E Exam 1 and Fall 2020 BCT Exam 3. Fall 2020 raw scores (mean = 85.1%) were significantly higher than Fall 2021 (mean = 60.7%; $p = 0.002$). However, National Board of Medical Examiners (NBME) exam scores for the 9 histology questions in Fall 2021 (mean = 88.0%) were comparable to scores for the same questions in Fall 2020 (mean = 87.0%; $p = 0.445$). Anonymous pre- and post-block survey responses regarding student concerns, learning resources, and study approaches were collected. On average students anticipated dedicating 12% of their time studying histology, but actually allocated 10% of their time. Top concern at the start of AH&E was the amount of material in the block, but by the end shifted to learning histology.

Restructuring of histology instruction resulted in lower student performance on unit exams, but NBME exam scores were on par compared to Fall 2020. Improved performance by the end of the block could be explained by student acclimation to the rigors of school and fine tuning of time management skills.

School: Graduate School of Biomedical Sciences

KHODAIR, SHERIF

Bridging The Gap Between Anatomy and Histology: Construction Of An Integrated Module Resource

Sherif Khodair, Jake Wilemon, Dan Webster, Kaur Gurvinder

A recent curriculum change at TTUHSC-SOM created a new Anatomy, Histology and Embryology (AHE) block that incorporates the basic tissue histology from our legacy Biology of Cells and Tissues block into Clinically Oriented Anatomy (COA) block. The first-year medical students' performance is affected by their ability to sort through a plethora of study resources. We hypothesize that providing a faculty-vetted Module Learning Resource (MLR) that integrates anatomical and histological concepts will alleviate student stress and enhance students' content perception and performance.

Class of 2024 students were surveyed to determine student willingness to use an integrative MLR compared to other study tools. Content scope and student stress were surveyed by analyzing student rankings of COA block units. To assess the preferred style of learning aids and medium for content dissemination, students were asked to rank media formats based on familiarity and usage probability.

Students ($n=31$) preferred MLR as compared to other study resources ($p=0.051$). For content delivery, PowerPoint was preferred as compared to Prezi, videos, and high-yield fact sheets ($p=0.047$). Students perceived unit 3 of COA to be more challenging as compared to units 1 and 2 ($p=0.037$). Thus, MLRs covering unit 3 anatomy topics tied with histology concepts were created. To further enhance MLR effectiveness, each module included visual aids (histology and cadaveric images), highlighted key concepts and emphasized anatomy lab material. To gather student feedback, MLRs were sent to a focus group consisting of Graduate Medical Education Sciences students ($n=4$) who took the AHE block. Based on student feedback, these modules will be further modified to include interactive visuals, and voice-over incorporated into PowerPoints.

Collectively, these faculty-vetted MLRs provide students a foundation to traverse the terrain of anatomy and histology content in AHE. Implementation of these MLR in AHE block could alleviate student stress, and enhance student performance.

School: Graduate School of Biomedical Sciences

KIM, EUNJEE

Perception Survey of Telemedicine Among a Variety of Students

Eunjee Kim, Kripa Srestha, Michael Penuliar, Drew Brownell, Hector Garcia, Justin Vaughan, Ariel Santos

COVID-19 pandemic has emphasized the importance of alternative methods to provide healthcare: it helped to accelerate the adoption of telemedicine. Telemedicine is the use of technology to connect healthcare providers to patients remotely to deliver care. Although its use has become widely adopted and implemented in hospital systems and the value of telemedicine curricula in graduate programs have been recognized, there is not a formal curriculum in place for many institutions. Participants' perceptions may indicate that there may not be adequate exposure to telemedicine amongst the schools and that there may be interest from the students for telemedicine to be integrated into their learning, which would both identify a need for a telemedicine curriculum. An eight-question need survey was created with the Qualtrics Software to assess the perception of students on telemedicine familiarity, learning experiences, and interest. An anonymous online link to the survey was distributed to corresponding school administrators at TTUHSC to distribute to the students as a voluntary survey. The selected five school programs participated (n=630): School of Medicine, School of Nursing, School of Health Professions, School of Pharmacy, and School of Public Health. Results showed approximately 60% of the participants had not received any telemedicine education, and the majority (65.2% of participants) expressed willingness to take a course on telemedicine if provided as curriculum and participate in telemedicine course if offered (55.7%). The questions about telemedicine use in the future and its importance in the career supported the perception that implementing telemedicine will have positive impact on patient outcome. There is a demonstrated interest from the survey results of a telemedicine course or curricula. Furthermore, there is a demonstrated need for telemedicine integration, and with the direction that healthcare and technology is heading, a formal telemedicine curriculum tailored to each program would be beneficial.

School: School of Medicine

LOWRY, CAITLIN

Successful Orientation to Human Cadaver Lab

Caitlin Lowry, Anthony Hewetson, Brandt Schneider

Changes made for COVID-19 in 2020 resulted in the medical students of the class of 2024 receiving little to no orientation to the cadaver lab or to proper dissection techniques before lab sessions started. As a result, many students felt unprepared for their first dissections. We hypothesized that a formal lab orientation supplemented with introductory videos would significantly improve student preparation for cadaveric dissection. Three orientation videos were created 1) to orient the students to the lab facilities and study materials available, 2) to inform students of lab safety procedures, and 3) to teach students about dissection tools and techniques. A pre and post-quiz (5 questions each) was given before and after each of the 3 videos to assess effectiveness. A hands-on in-person practice session was implemented to give students a chance to practice the techniques on a cadaver before the first graded dissection. A survey was sent out after the first week of lab to assess how orientation sessions impacted student preparation and anxiety. Post-quizzes for all 3 orientation videos showed a significant score improvement over the pre-quizzes for each respective video (Facilities and Resources: $p < 0.0001$; Tools and Techniques: $p < 0.0001$; Lab Safety: $p = 0.0184$). Voluntary surveys sent one week after the start of class indicated that 97.2% of students agreed or strongly agreed (Likert scale) that the in-person practice session adequately prepared them to start human cadaver lab. Polls concerning student anxiety taken before and after the orientations showed a significant reduction in student reported anxiety ($p < 0.0001$). We conclude that videos and a practice lab session reduced anxiety and prepared students to begin human cadaver lab. We recommend that these orientation videos and in-person practice sessions are included as a permanent part of the orientation to the human cadaver lab.

School: Graduate School of Biomedical Sciences

LUKESTEAD, LUKE

Integration of Metabolic Pathways with Clinical Correlates Effects on Conceptual Understanding

Luke Lukestead, Dr. Daniel R. Webster

Unit 1 of General Principles (GPX), formerly Biology of Cells and Tissues (BCT), is historically the most failed exam in the first year of medical school. The cellular metabolism rooted in biochemical concepts is extensive and very condensed, with four hours of lecture per day every day of the week. In retrospect, the material has not changed significantly and is rather intuitive when correlating a deficiency in an enzyme or metabolite with its downstream effects, including the clinical correlate that a medical student is responsible for knowing. However, there is an absence of process-oriented material to supplement the lectures. We hypothesize that this project will serve as an aid to organize and link the plethora of pathways presented to the medical students in Unit 1 of GPX. Specifically, the project investigates the need and usefulness of a metabolic map in conjunction with high-yield clinical correlate slides.

Students were consulted about the need for such a resource via a pre-survey, and respondents supported the idea unanimously (n=56). Students were also sent a google form upon completion of the unit. The post-survey tested for changes in attitude toward the usefulness of resources and self-reported proficiency in material after taking the course and possessing the novel supplemental resources.

According to the post-survey data (n=31), 87.1% of respondents found the supplemental material to be useful in their studies. All respondents indicated that they would find value in the availability of high-yield slides with a concept map being available in other units/blocks.

The collected data support that most students found the material to be a helpful study aid. The material served to tie all the information from lecture together and improve their conceptual understanding of cellular metabolism.

School: Graduate School of Biomedical Sciences

MATEJKA, CAITLYN

Cell biology performance in the premiere semester of organ systems-based curriculum at TTUHSC School of Medicine (SOM)

Caitlyn Matejka, Erin Guerra, Daniel Webster, Alice Villalobos

At TTUHSC SOM a new pre-clerkship curriculum was implemented with the class of 2025. Cell biology had been taught entirely in Biology of Cells & Tissues Unit 2. In the new curriculum, basic cell biology concepts are taught in Anatomy, Histology, & Embryology (AH&E) and specific concepts are taught in General Principles (GPX) Unit 2. Our aim is to evaluate cell biology performance and influential factors, such as student stress and concerns.

The class of 2025 completed pre- and post- block surveys for AH&E and GPX regarding stress levels, most difficult aspects, and top concerns. De-identified raw data were used for the following. GPX Unit 2 exam scores were compared across classes of 2023, 2024, and 2025. Scores for the 10 most difficult cell biology topics were compared for classes of 2025 and 2024. Biochemistry performance was evaluated similarly.

GPX Unit 2 exam scores for class of 2025 were lower than classes of 2023 and 2024 ($p = 0.0035$). However, scores for the 10 most difficult cell biology topics were similar for class of 2025 and 2024 ($p = 0.0664$). For Unit 1, class of 2025 scores for the 13 most difficult biochemistry topics were lower than the class of 2024 ($p = 0.0051$). GPX post-survey responses (n = 34) indicated student stress was comparable or less than anticipated. Top concerns were curriculum design, biochemistry, and amount of material. Over 50% of students expressed being overwhelmed by the amount of material in GPX.

In the new curriculum performance in cell biology was similar, but performance in biochemistry decreased. Inclusion of medical genetics and pharmacology, which had not been taught in the analogous block of the legacy curriculum, might explain lower GPX Unit 2 scores. Compression of material in Unit 1 may explain lower performance in biochemistry.

School: Graduate School of Biomedical Sciences

MURCHISON, MEGAN

Resource Utilization Analysis for the Newly Revised Pre-Clerkship Curriculum at TTUHSC SOM

Megan Murchison, Gurvinder Kaur, Daniel Webster

Texas Tech University Health Sciences Center (TTUHSC) School of Medicine is currently undergoing a curriculum redesign for the pre-clerkship curriculum. This change impacted learning tools and resources offered to students. In the past years, teaching assistants (TAs) from the Graduate Medical Education Sciences program at TTUHSC provided valuable learning tools for first-year medical school courses. The goal of this project is to evaluate the usefulness of resources provided by TAs for this newly implemented curriculum.

The General Principles (GPX) block is a first-year course that covers genetics, biochemistry, microbiology, cell biology, and pharmacology. During this block, a survey and 10-question pre- and post-quiz were given at the beginning and end of each unit to assess performance and the usefulness of resources offered. Student quiz performance along with resource usage analysis were compared for each unit of GPX. Unit 1 offered 7 resources with the top three resources used by students being Lecture, TA Anki-Deck, and TA Led Reviews. Unit 2 offered 8 resources with the top three resources being Lecture, TA Anki-Deck, and TA High-Yield Fact Sheet. No TA resources were offered to students for unit 3.

Comparison of the pre- and post-quiz data revealed that for units 1 and 2, students scored significantly higher on post-quizzes as compared to pre-quizzes ($p=2.35E-17$, $p=8.51E-18$). With unit 3 offering no TA resources, student performance on post-quiz was still significantly high. Although, 75% of respondents stated they would be in favor of a TA resource for this unit.

Overall, majority of the students stated that TA provided resources were useful in preparation for the summative exams and reaching the learning outcomes of GPX. Students felt more comfortable with the material being taught when TA resources were provided. These resources were ranked highly and their utilization along with lectures positively impacted student performance.

School: Graduate School of Biomedical Sciences

LI, ZIYANG

Does early molecular pathology lab exposure prepares students in genomic medicine education?

Ziyang Li, Ericka Hendrix; Dan Webster

As the utilization of genomic medicine grows with technical advancement, the 21st century physicians are highly expected to interpret and contextualize genomic data to patients.¹ However, many physicians struggle to meet the demand.² To narrow the knowledge gap of genomic applications for next generation physicians, interprofessional events with the molecular pathology (MP) laboratory could potentially offer a solution. Our study hypothesizes MP lab experience at the early stage of medical education will better prepare students in genomic medicine education.

All participants were divided into experiential and self-directed groups based on their choice. They will complete a pre-survey before the event. On the event day, students in the experiential group will tour at the molecular pathology lab, and the students in the self-directed group will look up a list of techniques and equipment that the MP lab uses. Both groups will complete a partial post-survey after they finish taking notes. An ethics lesson relating to genomic applications in clinical practice will be given to all students, and followed by the ethical part of the post-survey. Two more post-surveys will be given at 1 week and 1 month time points. In addition, students will fill out a satisfaction survey rating the overall experience.

From the past similar experience with other labs, we anticipate that the experiential group would have a higher satisfaction and longer retention than the self-directed group. Most of the students would agree that the ethical lesson increased their knowledge on genomic medicine education.

School: Graduate School of Biomedical Sciences

OKPARA, ROBIN

3D Printed Modeling: A Novel Hands-On Learning Tool for Craniosynostosis in Medical Education

Robin Okpara, Anthony Pham MS1, Kate Serralde, Roy Jacob MD

The utilization of educational tools for learning the principles of human anatomy have long been a cornerstone of medical education. These tools are the foundation for training new medical students, leading to a vast array of well-equipped physicians within a variety of different specialties. Numerous methods such as traditional anatomical models, cadaveric dissections, and bone specimens all contribute to enhancing students' understanding of the basic anatomical fundamentals. Learning complex pathoanatomy, however, is often limited to 2D radiological imaging which forces many to difficultly conceptualize abnormal structures into a 3D perception.

Craniosynostosis is a rare and complex disease, one that usually includes facial and orbital bones along with a cranial deformity. Learning the surgical correction and pathology of this disease is often complicated, requiring various 3D abstractions of anatomical views around the skull. With the emergence of 3D printing technology, we aim to enhance the medical students' learning experience in this intricate craniofacial pathology by designing our own 3D craniosynostosis model to be used as a hands-on learning tool. Utilizing patient's de-identified, computerized tomography data, the models constructed include various types of craniosynostosis. These include sagittal suture synostosis, coronal suture synostosis, lambdoid suture synostosis, and metopic suture synostosis. Our goal is to illustrate the effects of different craniosynostosis variations on a calvarial shape using 3D models that are difficult to visualize in 2D imaging. We hope over time these models will be beneficial to the learning experience of medical students in enhancing their skills, productivity, and familiarity with pathological anatomy.

School: School of Medicine

PATI, SIVATEJA

Evaluation of the Efficacy of a Novel Rural High School Student Mentorship Program led by Medical Students

Sivateja Pati, Alshaikhsalama, Mays; Ammermann, Lara; Baker, Lauren A; Chugh, Julie; George, Asher K; Kelly, Lewis; Morales, Felix; Quinn, Brian; Salazar, Andrew; Silvaggio, Joseph

Addressing the physician shortage in rural communities requires investments from many fronts. Prior systematic reviews demonstrate that medical students from rural hometowns often return to practice in rural areas, but the numbers still do not meet the demand. In order to address this shortage, we developed a long-term strategy where Texas Tech University Health Sciences Center (TTUHSC) medical students mentor high school students specifically from rural West Texas communities. This developed into the Rural Student Health Sciences Mentorship Program (RSHSMP).

With the support of the Area Health Education Center of the Plains and the TTUHSC School of Medicine Admissions, we are now on our second cohort of mentees. Medical students and high school students are paired off based on matching interests and similar backgrounds. Together, they follow a curriculum which guides the mentorship process. This includes discussing all the steps to go from high school to the medical field and beyond. We predict that students' understanding of the process to get an undergraduate degree and ultimately a degree in the health sciences will increase over the course of the program.

As a means of evaluating our mentoring methods, pre-program and post-program surveys were voluntarily completed by mentees. These surveys primarily used Likert scales to rate various topics, including understanding the school application process, stresses associated with applying, and the impact of a mentor guiding the mentee. We are currently collecting post-program surveys, but pre-program surveys indicate that students were looking forward to having a mentor/role-model.

As we refine our program, this project will serve as a base to propel future cohorts forward. Systematic analysis will be used to continually improve our strategy. We envision this program to be a tool for increasing physicians who will return to rural communities, like the ones they currently live in, to practice medicine.

School: School of Medicine

PUGLIESE, MATTHEW

The Impact of Mentorship and Self-efficacy on Burnout in Physical Therapists

Matthew Pugliese, Jean-Michel Brismee PT, ScD; Brad Allen PT, ScD, Sean Riley PT, DPT, ScD, Justin Tammany PT, DPT, ScD, MBA

Burnout is an occupational and psychological syndrome defined as a state of mental and physical exhaustion caused by one's professional life. To date, no study has examined the relationship between post-professional education, mentorship, professional organization membership or self-efficacy and physical therapists' burnout.

To determine: (1) the prevalence physical therapists' burnout using the Burnout Clinical Subtypes Questionnaire 12 (BCSQ-12); (2) the relationships between burnout and academic degree level, mentorship received, mentorship provided, continuing education, professional certifications, professional organization memberships, number of job roles and self-efficacy level using the General Self-Efficacy Scale (GSES). A 41-question electronic survey was distributed to physical therapists across the United States.

Kruskal Wallis ANOVA was used to determine the significance of (1) practice setting, (2) academic degree type, (3) mentorship received, (4) mentorship provided on physical therapists' burnout (BCSQ-12). Spearman's rho was used to determine the relationship between (1) continuing education level, (2) advanced certification level, (3) professional organization membership level, (4) unique job roles, (5) self-efficacy level (GSES) and the physical therapists' burnout (BCSQ-12).

A sample of 2,813 physical therapists was included. Total BCSQ-12 scores were significantly lower for those who provided formal mentorship ($p=.0001$) when compared to no mentorship. Respondents who received formal mentorship ($p=.0028$) displayed significantly lower scores than those who received no mentorship. A moderate negative correlation was observed between GSES and neglect BCSQ-12 ($\rho=-.49$) scores. A strong positive correlation was found between self-reported burnout status and total BCSQ-12 Scores ($\rho=.61$).

Burnout appears to be prevalent in the physical therapy profession as almost half of respondents (49.34%) considered themselves burned out. Providing or receiving mentorship and higher self-efficacy was associated with lower burnout levels. Organizations should consider measuring burnout levels, investing in mentorship programs and may implement strategies to improve self-efficacy.

School: TTUHSC - Lubbock

SEEMANN, MALLORY

Grit Grid Score: A Novel Way to Measure Grit in the Medical School Applicant Cohort

Mallory Seemann, Bethany Nunez, MD, FAAP, Stephanie Stringer, Brian Pomeroy, MD, FAAP, Dixon Santana, MD, Felix Morales, MD, Katy Medrano

Grit is defined as passion and perseverance toward achieving long-term goals. Recent studies hypothesize that students with higher levels of grit are more likely to succeed in medical school; therefore, it may be advantageous to select for grit in medical school applicants. The objectives of this study were to develop a scoring system (Grit Grid) to measure grit objectively and consistently in medical school applicants, and to determine if a subjective emphasis on grit during the application review process leads to a grittier matriculating cohort, as measured by the Grit Grid Score (GGS). Researchers reviewed de-identified applications of matriculating students from the TTUHSC School of Medicine 2018 (cycle A, $n=178$) and 2019 (cycle B, $n=180$) cycles and applied a Grit Grid tool to select and evaluate three activities in each application based on longevity of commitment (60 weeks or more) and achievement level. Original application screeners of Cycle B placed an emphasis on grit in selecting students during the original review process. The average GGS was calculated for each cycle. Inter-rater reliability was calculated using the Pearson coefficient. There was no difference in GGS between cycles A ($M=5.32$, $SD=1.35$) and B ($M=5.56$, $SD=1.40$), $t(356)=-1.617$, $p=0.053$. There was no correlation between screeners' grit assessment and researchers' GGS ($r=0.072$, $n=16$, $p=0.362$). There was moderate agreement between researchers' GGS ($r=0.573$, $n=74$, $p<0.001$). There was no significant difference in the GGS between cycle A and cycle B, indicating the subjective assessment of grit by screeners was not effective in selecting for grittier students. Future studies may improve inter-rater reliability by improved training of GGS raters so that it can be used in real-time grit assessment of medical school applicants.

School: School of Medicine

WILEMON, JAKE

Back to the Basics: Evaluating Stress Reduction in First-year Medical School Courses using Simplified Learning Modules

Jake Wilemon, Sherif Khodair, Dan Webster, Gurvinder Kaur

The recent trend of medical schools shortening their pre-clerkship curricula, coupled with an ever-expanding pool of resources for students has increased student stress. The TTUHSC School of Medicine (SOM) is also undergoing a pre-clerkship curriculum redesign. Due to these changes basic tissue histology, which previously occupied a two-week unit of the Biology of Cells and Tissues block, was assimilated into the legacy Clinically Oriented Anatomy (COA) block. In this new course, Anatomy, Histology, and Embryology (AHE), students learn both the histology and anatomy within the same time span of the legacy COA block (10 weeks). We hypothesize that creating learning modules that provide foundational concepts prior to lectures will alleviate student stress.

A needs analysis was performed by surveying first year medical students (n=31) who had completed COA. Sixty five percent of students responded that unit 3 of COA was the most challenging, 84% responded that they would be likely to use the learning modules, and 55% responded that PowerPoint would be the best medium for the modules.

PowerPoint modules were developed for lectures in unit 3 of the AHE block, consisting of abdominal, pelvic, and lower limb anatomy. These modules broke down anatomy lectures into foundational concepts with visual aids, avoiding meticulous details. Tissue histology concepts were integrated with associated anatomical structures to assist students in preparing for summative exams. A focus group of students who have already completed the AHE course, will review the modules and fill out surveys pertaining to their efficacy in reducing stress.

By incorporating anatomy and histology into a single learning module and sticking to only basic topics, we expect students to feel less overwhelmed when studying and by extension less stressed.

School: Graduate School of Biomedical Sciences

WOLPERT, JOHN

Creating a 3-D model to facilitate a deeper understanding of Gastrointestinal (GI) Embryology

John Wolpert, Gurvinder Kaur, Kate M Serralde

Embryology, specifically GI development, has been a historically difficult subject for first-year medical students to understand. The traditional model of learning, 2-D images depicting the growth, rotation, and folding of the gut, lacks the diversity of perspective leading to confusion among students. We hypothesized that a novel 3-D model of the GI development can help students to improve spatial understanding thereby enhancing student learning.

A needs-analysis was performed by surveying first-year medical students (n=40) who previously took embryology. GI and heart development were identified equally, 30% of respondents, as the most difficult concepts. Thus, we focused on creating a 3-D model for GI development. Using the 3-D printing capabilities of the Methodology Lab at the TTUHSC Preston Smith Library, we created a model that depicts the foregut and midgut development with relevant structures. The model is malleable so that the student can manually rotate the gut tube at any point to view the development from every angle. In conjunction, a review session focused on GI developmental deformities was provided. The 2-hour review was attended by 43 students in person and 50 virtually via Zoom. A pre-test (an hour prior to review) and a post-test (immediately after the review) was administered to determine the review's efficacy and the student's retention of material.

There was a significant increase in student performance after the review (pre-test average=62% (n=40) and post-test average=86% (n=17); p=3.4E-6). Additionally, the student performance on embryology section of an National Board of Medical Examiners (NBME) exam was improved as compared to last year. For example, the mean item difficulty for embryology section for Class of 2025 was 0.79 (National average-0.69) as compared to Class of 2024 (0.68, National average-0.71). Collectively, a 3-D model of GI development and an in-depth embryology review facilitates a deeper understanding which translates into student performance.

School: Graduate School of Biomedical Sciences

ZEITOUNI, FERRIS

Instructional Video Modules Generate Better Academic Performance and Reduce Anxiety in Learning Clinical Anatomy.

Ferris Zeitouni, Gurvinder Kaur, Brandt Schneider

Anatomy is a challenging course for first year medical students due to the large amount of information presented. Students have relied on “buzzwords” to recognize specific clinical concepts. However, this does not provide an in-depth understanding of the clinical material. We hypothesized that concise instructional video modules covering clinical correlates would increase understanding of important clinical concepts in anatomy.

High yield clinical concepts were identified from the 23 mandatory cadaveric dissection labs and then condensed into five to nine topics per video. Over the 10-week course of Anatomy, Histology and Embryology block, seven videos were created to assess academic performance. The mechanism of injury in clinical scenarios were demonstrated using Complete Anatomy®, a commercially available 3D anatomy atlas, paired with de-identified cadaveric dissection videos. Each video was supplemented with pre- and post-quizzes with questions formulated to assess clinical concept understanding. Surveys were distributed to gauge the usefulness of this resource for exam preparation and reduction of test anxiety.

After watching video modules, student performance significantly improved on all post-quiz scores as compared to the pre-quiz scores. For example, the week 1 quiz score average increased from 46% to 81% correct (P value < .001). Responses (n=75) collected from the end of the block survey showed 80% of students stated that this resource was “helpful” or “very helpful” in preparation for summative exams. Finally, 78% of students surveyed indicated this resource was “helpful” or “very helpful” in alleviating anxiety related to learning the material.

Active learning through a video module incorporating 3D models and cadaveric footage enabled better understanding of clinical anatomy and decreased student stress. These results support the continued use and expansion of these types of resources in the first year of medical school.

School: Graduate School of Biomedical Sciences

CLINICAL RESEARCH - CASE STUDIES: SCHOOL OF MEDICINE, RESIDENTS AND CLINICAL FELLOWS

ABRAHAM, JONATHAN

Focal fibrocartilagenous dysplasia causing genu valgum and treated with lateral based medial closing wedge osteotomy and mass resection

Jonathan Abraham, Erin Choi, Cody Beaver

Focal fibrocartilagenous dysplasia (FFCD) is a rare, benign disorder that typically occurs in the proximal tibia or distal femur and can lead to significant unilateral angular deformity in the pediatric population. It commonly presents early in childhood as they begin to ambulate. Correction of this deformity remains controversial. We report a case of FFCD of distal femur as a cause of genu valgum that was managed with lateral based medial closing wedge osteotomy and mass resection.

A healthy 29-month-old-female presented to our institution with progressive valgus deformity of the right knee. The patient’s mother noticed the deformity at approximately 12 months as she observed more episodes of falling as she began to ambulate. Initial preoperative imaging revealed approximately 30 degrees of valgus deformity at the distal femur and a mechanical lateral distal femoral angle (mLDFA) of 53 degrees. X-rays appeared to be consistent with FFCD causing the angular deformity. Due to the degree of correction, it was recommended to manage the deformity with excision of the FFCD and distal femur osteotomy to restore her right femoral mechanical alignment. At most recent visit, patient exhibited normal gait and no obvious deformity to the lower right extremity. Post-operative imaging at this time revealed symmetrical mLDFA, no angular deformity, and no physal disturbance with appropriate growth.

In cases where FFCD leads to severe angular deformity, it may not be possible to allow for the deformity to correct itself over time or simply curettage the mass. Therefore, surgical management with mass excision and distal femoral osteotomy is an appropriate option and can allow for correction of the deformity and restoration of anatomical alignment.

School: School of Medicine

AGUSALA, VEENA

Acute Postpartum Presentation of SLE in Patient with Previously Negative ANA-Titers

Veena Agusala, Nitish Mittal, Dr. Mohamed Elmassry

This unusual presentation of systemic lupus erythematosus (SLE) with pericardial and pleural effusions highlights the importance of reconsidering the diagnosis in women of childbearing age presenting with new pertinent symptoms regardless of prior ANA testing. Hispanic female, aged 24, with a past medical history of post-inflammatory hypopigmentation presented to the ED at 7 weeks estimated gestation after an episode of seizure-like activity. CT revealed low-lying cerebellar tonsils, and labs showed proteinuria. EEG and MRI were unremarkable, so the patient began levetiracetam for seizure prophylaxis. Strong family history of lupus and vitiligo were noted; however, prior workup by dermatology showed negative ANA titers four years ago. She later developed hypertension, attributed to preeclampsia. 6 months later, she presented to ED for seizure-like activity again. She was induced the next day and underwent vaginal delivery, complicated by hemorrhage requiring blood-transfusion specifically compatible with warm antibodies. Warm antibodies are associated with pregnancy and autoimmune diseases, including SLE. Furthermore, she developed pneumonia and large pericardial and pleural effusions managed with pericardiocentesis and chest tube. Respiratory distress worsened, prompting intubation. Rheumatology was consulted given elevated inflammatory markers and possible warm autoimmune hemolytic anemia. With pan-positive lupus-specific antibodies: ANA, dsDNA, and anti-Smith, the patient began mycophenolate and hydroxychloroquine therapy. Hospitalization was further complicated by diffuse alveolar hemorrhage (associated with SLE), pneumothorax, ventilator-associated pneumonia, postpartum depression, and breakthrough seizure-like activity despite high-dose levetiracetam. Continuous EEG ultimately ruled out any epileptic focus. This case illustrates the importance of considering SLE regardless of previous ANA testing due to its mutability. Although the most recent EEG demonstrated a lack of epileptogenic origin, the previous seizures could have been sequelae of a lupus flare. Therefore, SLE should have been investigated, perhaps preventing the acute, severe pericardial and pleural effusions seen postpartum.

School: School of Medicine

AICKARETH, GENESY

The Delayed Presentation of Chemical Pneumonitis and Related Resemblance to COVID-19 Associated Pneumonia in CT Imaging: A Case Report

Genesy Aickareth, Jad Zeitouni, BAA, Alan Pang, MD

Inhalation of various organic and non-organic compounds like toxic fumes, batteries, and dust can result in lung irritation called chemical pneumonia. This type of injury can initially present as no damage in radiograph scans, and the extent of damage can be difficult to determine. Chemical pneumonitis can also be difficult to distinguish from pneumonia caused by a bacterium or a virus.

A 40-year-old male presented to the emergency department with an 18% total body surface area burn to his upper extremities from an oil pump battery explosion. The battery explosion released chemicals that the patient aspirated. The patient was transferred to the Burn ICU. Given the mechanism of his injury, a bedside bronchoscopy was performed which revealed no soot or signs of inhalation injury. A CT scan was done on the day of admission that showed no lung damage. The patient had a 100% oxygen dependency on the day of admission. Attempts were made to wean the patient off their oxygen dependence without success. A repeat chest CT scan was performed on hospital day 4. The results appeared to be multifocal pneumonia eliciting a possible diagnosis of Covid 19 pneumonia. This delayed his excision and grafting by 5 days, but ultimately, he was excised and grafted. That patient was discharged to rehab on hospital day 21.

This case highlights the complexity that a chemical pneumonitis injury may present, and the various factors providers should keep in mind. Chemical pneumonitis likely has no findings on bronchoscopy, and as previous literature has stated, CT chest scans of chemical pneumonitis may initially present with no apparent injury. Findings from a chemical pneumonitis injury may present on a CT scan later in a patient's course of injury; furthermore, this damage may resemble multifocal pneumonia that COVID-19 is known to cause.

School: School of Medicine

AREVALO, GABRIEL

Case of Syncope and Saddle Emboli in a COVID-19 Patient

Gabriel Arevalo, Katherine Holder, Bernardo Galvan, Benjamin Daines, James Whit Walker MD

COVID-19 has been reported to cause an array of coagulation abnormalities. To correctly diagnose, it is important to be able to recognize presenting symptoms of conditions associated with COVID-19, specifically, atypically presenting, induced clotting disorders. Here we present a case involving fatigue, and syncope secondary to diffuse thromboemboli in a previously healthy, unvaccinated patient, which highlights an underlying embolic pathology associated with COVID-19 infection. A 51-year-old Hispanic male with no significant medical history presented with an occipital laceration secondary to syncope. His new onset syncopal episodes were associated with worsening fatigue, malaise, and weakness. Apart from a positive COVID-19 test and a slightly elevated creatinine, his labs and imaging were otherwise normal. Two days after discharge, the patient returned to the ED for near syncope and new onset shortness of breath and dizziness with minimal exertion. His weakness and fatigue progressively worsened since discharge, and he reported that he could no longer ambulate around his home. His vitals and labs were normal except for tachypnea, hypoxia, and a mildly elevated d-dimer. Repeat chest x-ray displayed diffuse bilateral opacities, and chest CT angiogram with IV contrast showed evidence of diffuse thromboemboli. The patient was treated for COVID-19, weaned off oxygen, and discharged home on oral anticoagulant after 8 days. This unvaccinated patient who lives an active lifestyle with no significant medical history, no family history of coagulation defects, and a low thromboembolic risk was found to have diffuse pulmonary emboli secondary to COVID-19 infection. The literature demonstrates that COVID-19 is well associated with coagulopathies, which may be caused by infection-induced inflammatory changes. COVID-19 can cause rapidly progressive clot formation and clinical deterioration in infected patients. Cases such as this may require a high level of clinical suspicion and more invasive imaging techniques to correctly diagnose the underlying embolic pathology.

School: School of Medicine

ARMIN, SABIHA

A rare case of adult-onset parvovirus B19-induced hemophagocytic lymphohistiocytosis presenting as rash and altered mental status.

Sabiha Armin, Cameron Jurica MD, Natnicha Leeliwaat MD, Kavya Bharathidasan MD

Hemophagocytic lymphohistiocytosis (HLH) is a rare and life-threatening progressive hyperinflammatory syndrome in adults. Clinical manifestations are nonspecific and include fever of unknown origin, encephalitis, hepatitis, renal dysfunction, and a morbilliform skin rash, all of which could be seen in many conditions. Due to its high mortality, clinical suspicion based on clinical and laboratory findings should prompt treatment based on the underlying cause. Primary and acquired HLH cases can be triggered by immunosuppression, malignancies, autoimmune disease, drugs, and genetic predisposition. Differentiating between primary/familial and secondary disorders is important as it can elucidate a specific treatment, such as a hematopoietic stem cell transplant and chemotherapy. Among infectious etiologies, the Epstein–Barr virus and cytomegalovirus are the most common causes. We present a case of a patient with HLH who presented with prolonged fever and rash due to Parvovirus-B19 induced HLH, an uncommon infection for this disorder. This case report of a patient with hemophagocytic lymphohistiocytosis presenting as rash and altered mental status because of either adult-onset Still's disease or reactivated Parvovirus infection illustrates the importance of early diagnosis of HLH and exploration of underlying causes of this life-threatening disease. If the etiology is determined promptly, it could change the chemotherapeutic approach and prognosis for future patients.

School: School of Medicine

BANAFSHAY, KIANA

A Rare Case of Cutaneous CD-30 Positive Intravascular Large T-cell Lymphoma

Kiana Banafshay, Dylan Maldonado MD, Michelle Tarbox MD

Anaplastic large cell lymphoma (ALCL) is a CD30-positive T-cell lymphoma. Primary cutaneous anaplastic large cell lymphoma often presents as a solitary erythematous nodule. Unlike systemic ALCL, cutaneous anaplastic large cell lymphomas are typically ALK (anaplastic lymphoma kinase) negative. Intravascular T-cell ALCL is extremely rare. We present a case of cutaneous, ALK-negative, intravascular anaplastic large T-cell lymphoma.

An 87-year-old female initially presented with a firm subcutaneous nodule on the right mid-abdomen. A biopsy demonstrated a nodular infiltrate within the deep dermis extending into the subcutaneous fat. The cells showed marked cytologic atypia, high mitotic activity, and confinement primarily to lymphatic spaces. Pancytokeratin, CD10, CD20, and SOX-10 markers were negative. CD-3 and CD-30 were markedly positive, consistent with the diagnosis of cutaneous anaplastic large T-cell lymphoma. As a follow-up, the patient had a second adjacent biopsy in September that showed multiple dilated ectatic vascular spaces containing large pleomorphic mononuclear cells within the dermis. Confirmatory immunohistochemical stains were performed, and a diagnosis of intravascular anaplastic large T-cell lymphoma was made.

Intravascular anaplastic large T-cell lymphoma is an extremely rare diagnosis with few cases reported in the literature. At this time, with few reported cases, the prognosis is unclear as to whether this lymphoma behaves more aggressively, similar to other intravascular lymphomas, or whether it behaves similar to primary cutaneous CD-30 positive ALCL. This uncertainty highlights the need to investigate additional cases to determine the appropriate treatment and clinical management of these patients.

School: School of Medicine

BASHRUM, BRYAN

MIS-C Presenting as Maculopapular Rash in a 7yo w/ Seizure Disorder

Bryan Bashrum, Nikita Rao BS, Lauren Barinque BS, Saarah Chaudhri D.O. M.M.S, and Summer Davies MD

As we enter 2022, COVID-19 has presented in various forms within the medical community. Multisystem inflammatory syndrome in children (MIS-C) was first identified in April 2020 by doctors at children's hospitals in the United States and the United Kingdom with clinical signs ranging from fevers and gastrointestinal symptoms to cardiogenic shock. However, MIS-C shows no limitations, as atypical clinical presentations are being discovered everyday and assist in diagnosing this systemic process.

We report one case of an MIS-C dermatologic rash who was originally admitted to the Pediatric Hospitalist team for the investigation of phenytoin-induced DRESS syndrome after testing negative for SARS-CoV-2 prior to admission. Our objectives for this case report are: 1) to differentiate between the dermatologic presentation of DRESS, Stevens Johnson Syndrome MIS-C and Kawasaki disease, 2) to recognize the signs and symptoms of MIS-C.

We present a case report regarding a 7 year old child with a history of seizures being treated with phenytoin and levetiracetam. He was admitted to the Pediatric Hospitalist team for a morbilliform rash that persisted in a cephalo-caudal distribution for 1 week. In addition to the rash, the patient presented with conjunctival injection, cracked/peeling lips, oral mucous membrane changes, and cervical lymphadenopathy. Laboratory results revealed elevated liver enzymes, elevated white blood cell counts with lymphocyte predominance, and elevated brain natriuretic peptide. He later tested positive for SARS-CoV-2 antibodies.

This case highlights the overlap among shared features of MIS-C, DRESS syndrome, Stevens Johnson Syndrome and Kawasaki disease, and the importance of maintaining a broad differential as well as utilizing clinical skills to provide an early diagnosis and prompt treatment.

School: School of Medicine

CALA, JEANETTE

A Rare Case of Lofgren Syndrome in a Hispanic Patient: A Case Study

Jeanette Cala, Roman Karkee, MD; Srikanth Mukkera, MD

Lofgren syndrome is a form of sarcoidosis that presents with a triad of acute arthritis, bilateral hilar adenopathy, and erythema nodosum. It occurs more frequently among African Americans and Caucasians. We present a case report with pathognomonic symptoms of Lofgren syndrome.

A 34-year-old Hispanic male presented to the emergency department complaining of fever and bilateral flank pain for two weeks with BUN 65 and creatinine 5.4. CT abdomen and pelvis showed bilateral stones in the renal collecting system. KUB showed bilateral nephrolithiasis with UPJ calculi. The patient was admitted to the inpatient ward and a ureteral stent was placed. Two days after the procedure, he presented with dyspnea. Chest radiograph showed pleural effusion. Repeat CT showed prominent bilateral mediastinal and abdominal lymphadenopathy, massive splenomegaly, and mild hepatomegaly. Liver function tests showed transaminitis and pancytopenia. Lymph node biopsy showed a singular non-necrotizing granuloma and bone marrow biopsy was negative for malignancy. Liver core needle biopsy showed granulomatous hepatitis, negative for malignancy. Patient also presented with fever, calcinosis cutis, and erythema nodosum. Subsequently, patient was treated with Filgrastim, antibiotics, and corticosteroids. Patient was diagnosed with Lofgren syndrome based on the presenting symptomology and is currently being followed up in the outpatient setting.

This case report shows a classical presentation of a patient with Lofgren syndrome. This highlights the importance of recognizing this diagnosis in a patient who may not fit the usual demographic population that this disease presents in.

School: School of Medicine

CASTRO, LUIS

DRESS Syndrome with Reactivation of Epstein-Barr Virus in Patient Taking Lamotrigine

Luis Castro, Jali Garza B.S., Maribel Castro B.S., Marawan Elmassry M.D., Jasmine Sekhon M.D., Judy Lalmuanpuii M.D.

Drug Reaction with Eosinophilia and Systemic Symptoms (DRESS) syndrome is a cell-mediated hypersensitivity reaction involving CD4+ and CD8+ cells. It is often triggered by high-risk drug exposure. The disease presentation commonly includes systemic symptoms, hematologic abnormalities, diffuse maculopapular rash, and organ involvement. There is evidence that reactivation of latent herpesviridae infection is also common. In this case report we will present a case of DRESS syndrome and EBV reactivation in a patient taking lamotrigine.

A 20-year-old female with a history of bipolar type 2 disorder was admitted for a diffuse maculopapular rash. Four weeks earlier, she had been prescribed lamotrigine that was titrated to maximum dose. The following day she started experiencing a rash on her hand that progressed to the rest of the body with associated fever, nausea, and vomiting. She went to the emergency center, where she was diagnosed with an allergic reaction and discharged with ondansetron and methylprednisone. The fever and rash persisted over the following 2 days, and she started having trouble producing urine despite adequate fluid intake. On readmission, the patient presented with a fever of 105.6° F and a maculopapular rash on greater than 80% of body surface area but without oral mucosa involvement. Dermatology started her on topical steroids due to suspicion of DRESS syndrome and she was admitted for observation.

During hospitalization, abdominal examination was remarkable for hepatosplenomegaly. Complete blood count with differential was remarkable for leukocytosis of 14.96 k/mL and eosinophilia (1.08%). Complete metabolic panel was remarkable for transaminitis. A monoSpot test was positive for EBV. Patient was also oliguric and over the following days, the patient developed acute kidney injury and transient thrombocytopenia. She was treated with pulse-dose steroids and her laboratory results normalized. She was discharged with a steroid taper, and she was doing well at her follow-up appointment.

School: School of Medicine

CHANDRAHAS, SHEILA

FREE FLOATING GANGLIONEUROBLASTOMA IN A 3 YEAR OLD MALE

Sheila Chandrahas, Dr. Janet Meller, MD

We are presenting a case of a 3 year old male with a free floating neuroblastic tumor in the abdomen that was unattached to any organs. A focused comprehensive literature search was done, which yielded no results for a case with this unique presentation.

This case involves a 3 year old male who presented to the emergency department after 3 days of vomiting (projectile, non-bloody, non bilious) after every meal. The patient complained of generalized abdominal pain that resolves after vomiting, and a mass was palpated in the left lower quadrant (LLQ), consistent with ultrasound findings that showed a 7 cm discrete mass medial to the spleen and superior to the left kidney with little blood flow. Abdominal MRI shows well circumscribed mass within the left upper quadrant of the abdomen, measuring 7.8 x 5.9 x 6.1 cm of uncertain etiology (Image 1). Urine homovanillic acid (HVA) and vanillylmandelic acid (VMA) levels were within reference range. The mass was separated from the kidney and not attached to any great vessels of the spine (Image 2). It was free from muscular tissue in the retroperitoneum.

Surgical resection of ganglioneuroblastoma is typically curative and has low complication rates. During clinical follow up for this patient, he was reported to be doing well with no subsequent symptoms suspicious of recurrence. Thus, we hypothesize that because his tumor was free-floating, this could possibly be a contributing factor for him to continue to stay disease free in the future.

This is the first reported case of a free floating ganglioneuroblastoma in the abdomen. This unique feature can present special considerations surgically and have an impact on symptom presentation. However, we propose this feature would have a positive impact on prognosis and a reduction in recurrence rate.

School: School of Medicine

CHEN, ANGELA; HYDE, BRIDGET; AND ROBBINS, ESTHER

Complications of chronic pancreatitis and pancreatic pseudocysts

Angela Chen, Bridget Hyde, Esther Robbins, Corey Jones DO PGY2

This case study involves a 55 year-old man with a history of colorectal cancer s/p resection with ostomy placement, hypertension, diabetes mellitus 2, and chronic pancreatitis who presented to the ED with a two week history of constant, sharp, worsening left periumbilical abdominal pain radiating to his back. Denied nausea, vomiting, fever, or increased ostomy output. Physical exam included soft, distended abdomen, tender to palpation at the left periumbilical region near his ostomy site. His WBC was 15.32, glucose level at 500, and hemoglobin A1C at 10.0%. There were no acute findings on his chest x-ray and KUB. He had a CT abdomen/pelvis without contrast which was consistent with pancreatitis despite initial lipase level being 7. There was a fluid collection adjacent to the tail of the pancreas represented a peripancreatic cyst measuring up to 6.4cm that was later found to have ruptured after admission leading to severe ARDS with ICU admission, large volume loculated exudative pleural effusion, and multiple abdominal and pelvic abscesses treated with a long duration of broad spectrum antibiotics as well as multiple drains placed by IR. Patient had a total of 17 days at floor status/stepdown in addition to 4 days at ICU level care as a result of his ARDS and sepsis. Pancreatic pseudocysts are walled-off fluid collections that can be a complication of acute or chronic pancreatitis. Pseudocyst rupture is rare and occurs in less than 5% of cases. They can leak fluid into the peritoneal or pleural cavities, or into nearby organs, possibly resulting in spontaneous regression or emergent management. The objective of this case presentation is to discuss identification and management of ruptured pseudocysts, cellular signals and pathophysiology of pancreatitis and pancreatic enzymes as it relates to clinical features of sepsis, and differentiate cellular signals from sepsis.

School: TTUHSC - Lubbock

CIUBUC, JOHN

Lateral medullary infarction in a young adult with hypoplastic vertebral artery

John Ciubuc, Eman Alhussain MD, Muhammad Anees MD, James Whit Walker MD

Lateral medullary syndrome, also known as Wallenberg syndrome, was first reported in 1895 by Gaspard Vieusseux and Adolf Wallenberg. Wallenberg syndrome (WS) arises from infarction of the lateral medulla, typical due to obstruction of the posterior inferior cerebellar artery or the vertebral artery. Presentation can include ipsilateral dysphagia, vertigo, hoarseness, cerebellar ataxia, and Horner's syndrome on the side of the lesion, with hypalgesia involving the ipsilateral face and contralateral upper and lower trunk and extremities. WS primarily affects males around sixty years of age. Early recognition of WS symptoms is of marked importance, because of its association with large vessel infarction and arterial dissection that can lead to favourable outcomes if appropriately managed.

This 42 year old male patient presents with sudden onset of dysphagia with no WS risk factors. The patient further developed paresthesia on the right hemisphere of the face, dysphagia, and temperature sensation loss on left side of the body. MRI of the brain was performed, revealing an acute infarct of the right medulla with no associated mass effect or hemorrhage. CTA of the neck revealed a severely atretic right vertebral artery.

Variations of vertebral artery flow is common in the general population, however atretic vertebral arteries is rather rare. While previous cases of young adults with WS and hypoplastic vertebral arteries have been reported, they were often associated with multiple stroke risk factors. The patient we present shows a rare relationship between vertebral artery hypoplasia and WS in the presence of limited stroke risk factors. We conclude that individuals with vertebral artery hypoplasia are asymptomatic but have a higher potential risk to develop lateral medullary infarctions compared to individuals with normal vertebral artery, even in those with minimal stroke risk factors.

School: School of Medicine

DE SIMON, DANIEL

A case of brachial radiculoplexus polyneuropathy responsive to corticosteroids one month after onset

Daniel De Simon, Sparsh Ray; Kevin Chin; John Norbury, MD

A 46-year-old man with a history of type 2 diabetes mellitus presented for one month of intractable neck pain following physical exercise. This was associated with left upper extremity weakness and severe multifocal neuralgia following a plexopathic distribution. A cervical MRI showed degenerative disc disease. On physical examination, the patient displayed marked atrophy of the left thenar eminence and dorsal interosseous. He had weakness of the left upper extremity shoulder girdle muscles involving both the C5-C6 and C8 myotome distribution, as well as mild scapular winging with shoulder anteflexion. Electrodiagnostic studies showed a reduced LABC amplitude on the affecting side, and no abnormalities were found on EMG testing. The patient was treated with a Medrol dose pack which reduced his pain from an 8 to a 2.5 followed by battlefield acupuncture with ASP needles which further reduced his pain to a 1.5.

One explanation for the pathophysiology of neuralgic amyotrophy involves autoimmune attack of a neural plexus following mechanical injury that disrupts the epineural neuron-blood barrier. Given the plexopathic distribution of symptoms, the associated neuralgia often affects multiple myotomes with related muscle atrophy. This is opposed to the focal radiculopathy associated with the initial diagnosis of a single disc herniation. Additionally, the patient's long-standing diabetes contributes to a possible diabetic cervical radiculoplexus neuropathy. This is a primarily monophasic process causing ischemic injury and microvascular inflammation. The associated weakness involves sensory, motor, and autonomic fibers. Evidence from past retrospective studies suggests that prednisone therapy is effective in ameliorating the duration and severity of symptoms, but only if initiated within two weeks of the onset of symptoms. The efficacy of steroids beyond 2 weeks is not known. This case suggests that further research into steroid therapy is needed to explore whether this treatment can be helpful past the two-week mark.

School: School of Medicine

DIXON, ROBERT AND NEYCHERIL, RACHEL

A Case of Delayed Onset Malignant Hyperthermia

Robert Dixon, Rachel Neycheril

Malignant Hyperthermia (MH) is a rare genetic condition caused by an alteration in the ryanodine receptor of myocytes that causes it to be permanently activated upon exposure to specific anesthetic drugs, notably sevoflurane. Once the receptors are activated, a potentially fatal hypermetabolic state ensues, hallmarked by sustained muscle contraction, increased anaerobic metabolism, and the early signs of hypercarbia, tachycardia, and tachypnea. Sustained muscle rigidity leads to rhabdomyolysis with hyperkalemia, myoglobinuria, rising creatinine kinase (CK), and hyperthermia with potential to precipitate disseminated intravascular coagulopathy. Typically, MH presents intraoperatively, but postoperative presentation of MH is described. Dantrolene is the treatment for MH and works by decoupling the ryanodine receptor.

We describe a case of MH that presented atypically, resulting in delayed recognition and treatment and ultimately the demise of our patient. A 74-year-old male presented to the ED with head trauma after a fall. CT scan showed a subdural hematoma shifting parenchyma that necessitated surgery. Baseline labs taken at admission included: potassium 4.5, platelet count 128, and creatinine 1.69. Intraoperatively, sevoflurane was used to maintain anesthesia. Reports indicate the only complication intra/post-op was tachypnea in the PACU. Overnight in the ICU, the patient presented with a climbing temperature that peaked just above 105°F, muscle rigidity, and spasticity, for which he was treated with acetaminophen, Demerol, and cooling blankets. However, he failed to improve, and labs taken the next morning were significant for: potassium 8.2, platelet count 22, creatinine 2.21, CK 815, lactic acid 8.2mmol/L, blood pH 7.18, and urine myoglobin 1750 mcg/L. Dantrolene was administered at 7 am due to suspicion of MH, and the tremors and fever immediately resolved. Ultimately, it was too late though, and the patient's condition had progressed beyond recovery.

School: School of Medicine

DOAN, JEREMY

Diagnosis and Management of Occult Non-Missile Penetrating Brain Injury

Jeremy Doan, Bernardo Galvan, Katherine Holder, Parth Patel, Muhittin Belirgen MD

Penetrating brain injury (PBI), a subtype of traumatic brain injury (TBI), causes significant mortality in young people. These injuries generally only require CT imaging for diagnosis and have obvious findings on physical exam.

We present a 9-year-old male with no past medical history arriving to the ER after being found on the ground in acute distress outside an airplane. He complained only of left eye pain. His parents reported that he seemed confused and could not provide a clear history. On exam, the patient's left orbit was edematous and ecchymotic with a <1cm laceration on the superior right orbit. Head CT demonstrated right sylvian and right temporal subarachnoid hemorrhages with lateral ventricular bleeding. Maxillofacial CT revealed a minimally-displaced fracture in the posterior right orbital wall with associated intraconal and retrobulbar hematoma and minimal gas in the retrobulbar soft tissue. Based on these findings, the patient was diagnosed with closed TBI and secondary subarachnoid hemorrhage.

A high level of clinical suspicion prompted the neurosurgeon to order a head MRI for confirmatory imaging, which showed an edematous intraparenchymal track extending from the posterior right orbit through the medial cortex of the right temporal lobe consistent with a PBI. Further investigation revealed the patient collided with an airplane static discharger, which penetrated his cranium and was immediately removed by the patient's backwards fall. High-dose antibiotics were initiated, and the patient was discharged 2 days later.

While non-contrast head CT is the current standard of care for TBI patients and is an adequate tool for rapid assessment, it lacks the acuity to capture small cranial orifices and subtle parenchymal changes caused by penetrating objects. In hemodynamically stable patients who present with possible PBI but lack capacity to provide a complete trauma history, MRI should be considered as a diagnostic test to evaluate brain damage.

School: School of Medicine

DOWDLE, TRAVIS

Drug Induced Hyperpigmentation

Travis Dowdle, Katherine Holder, BS, Dylan Maldonado, MD, Jeannie M. Nguyen, MD, Michelle B. Tarbox, MD , Cloyce L. Stetson, MD

Drug-induced skin pigmentation accounts for 10-20% of all cases of acquired hyperpigmentation. Pigmentation may be induced by a wide variety of drugs; the main ones implicated include non-steroidal anti-inflammatory drugs (NSAIDs), phenytoin, anti-malarials, amiodarone, antipsychotic drugs, cytotoxin drugs, tetracyclines, and heavy metals. We report the presentation of a case of drug induced hyperpigmentation hereafter with accompanying questions and images provided. A 63-year-old Caucasian woman presented with acute respiratory failure due to metastatic clear cell renal cell carcinoma. Upon admission, she was found to have diffuse blue-gray hyperpigmentation of the bilateral shins and dorsal feet. The rash was asymptomatic and present for about one year. She has no personal or family history of skin cancer and no recent travel history. She has a history of chronic osteomyelitis, for which she was treated. Histopathology via biopsy of the hyperpigmentation was obtained.

School: School of Medicine

EBOH, TOCHI

Discovery of Adrenal Insufficiency in Pregnancy - A Diagnostic Challenge

Tochi Eboh, Nimra Pasha, Stephen J. Usala, MD, PhD

Adrenal insufficiency (AI) is a disorder characterized by inadequate production of cortisol by the adrenal glands. Rare symptoms of adrenal insufficiency can become apparent for the first time during pregnancy. The overlapping symptoms of AI and pregnancy make it a diagnostic challenge for clinicians. A 25-year-old black female presented at 16 weeks gestational age with a history of fatigue, abdominal pain, cramps, nausea, and loss of appetite that had worsened in the last 2 months since she found out she was pregnant. Prior to pregnancy, the patient experienced unintentional weight loss of about 20 lbs and had been gradually regaining weight. Patient had a goiter with an unremarkable thyroid panel leading to an endocrinology referral. At presentation her physical exam was positive for a smooth, firm, 3 cm goiter palpated in the anterior neck, hyperpigmentation of the palmar creases of both hands, knuckles, and hard palate. Clinical suspicion pointed towards hypoadrenalism. ACTH (Cortrosyn) stimulation test was within normal range. Due to her distressing symptoms, she was placed on a prophylactic dose of hydrocortisone for adrenal insufficiency. On follow up, the patient displayed marked improvement of symptoms. ACTH results were not consistent with primary hypoadrenalism and the 21-hydroxylase antibody assays were negative. On subsequent follow ups, the patient was doing well with continued remission of initial symptoms. Although the Cortrosyn test was within normal range in this patient, it is important to keep in mind the change in hormonal physiology during pregnancy. Reliance on normal ranges for Cortrosyn test can lead to a missed diagnosis of adrenal insufficiency in pregnant patients and subsequent increased maternal and fetal morbidity and mortality.

School: School of Medicine

EHIKHUEMAN, GRACE

Granulomatous Polyangiitis (GPA) Refractory to Induction with Rituximab in Three Patients

Grace Ehikhuemen, Malvika Ramesh, John Pixley MD

Granulomatosis polyangiitis (GPA) is a rare kind of vasculitis that predominantly causes symptoms in the lungs, kidney and sinuses. Currently, experts support treatment of GPA with cyclophosphamide, rituximab and/or combined cyclophosphamide and rituximab therapy. In this study, we looked at the outcomes of three patients with GPA treated with rituximab, mycophenolate and high dose steroids.

First was a 66 year old female diagnosed with vasculitis that presented with worsening shortness of breath (SOB). Previously, a renal biopsy showed acute necrotizing glomerulonephritis. She was given mycophenolate, solumedrol, and rituximab. She was then found to have worsening symptoms and started on cyclophosphamide infusion for three days but deteriorated.

Next was a 34 year old male being seen by an ear, nose and throat (ENT) doctor for hearing loss and Bell's palsy. He had positive proteinase 3, rheumatoid factor and c-reactive protein. He was placed on prednisone and rituximab. He was seen one month later with increased respiratory symptoms and mycophenolate was added. Three weeks later, symptoms worsened and chest x-ray showed marked deterioration requiring admission for bronchoscopy.

Last was a 44 year old male with a history of ENT problems who presented with SOB. He was found to have a pleural effusion and high inflammatory markers. He was negative for ANA and proteinase 3 at that time. Days later, he showed worsening symptoms and bilateral pleural effusions. Proteinase 3 was then positive and he was treated with mycophenolate and steroids. He later received rituximab infusions and shortly after developed worsening symptoms with renal involvement.

All three patients deteriorated following induction therapy with rituximab combined with mycophenolate and high dose steroids. We recommend further study of the clinical course of patients with GPA who were on a similar treatment regimen and compare them to the course of those treated without rituximab.

School: School of Medicine

FALCO, ADRIAN

Group B Streptococcal Bacteremia Possibly Due To Genitourinary Invasion From Sexual Encounter: A Case Study

Adrian Falco, Varun Vemulapalli

A 63-year-old hispanic female with a history of cirrhosis, pancytopenia, obesity, esophageal varices was admitted with fever, shortness of breath, epigastric and chest pain. Patient mentions a failed trial of sexual intercourse with her husband one week before presenting to the hospital. Patient stated she had been sexually inactive for at least 5 months prior. On physical exam she does not present with notable vulvar or vaginal discharge or bleeding. Blood cultures came back positive for Group B Streptococcal bacteremia. IV ceftriaxone started on admission was changed to IV vancomycin on day 3 and her symptoms gradually improved. She was discharged after day 10 with plans for outpatient IV vancomycin for a total of 2 weeks. Due to the high disease burden of invasive Group B Streptococcus in non-pregnant women and men and associated mortality rate of 25%, invasive GBS has been a topic of research over the past 50 years. GBS bacteremia in non-pregnant adults have been reported as hospital-acquired or due to an unidentified source. Liver cirrhosis has been reported to significantly increase the risk of GBS bacteremia as seen in this patient due to decreased lymphocyte production. This patient's history of a sexual encounter, impaired immunity due to liver cirrhosis, and symptoms five days before admission suggest a possible hematologic invasion of bacteria from the genitourinary tract. This may shed light on many cases of unidentified sources since sexual history is not always forthcoming. We conclude that although Group B Streptococcus bacteremia due to genitourinary invasion is rare, the genitourinary system must be always considered as a possible source. Sexual history is imperative in these cases.

School: School of Medicine

GALVAN, BERNARDO

A pain in the butt: Ureteral-Cutaneous Fistula Formation Secondary to Polytrauma

Bernardo Galvan, Katherine G. Holder, Muhammad Nazim MD

The diagnosis of ureteral injuries caused by penetrating trauma is often delayed. Those with peritoneal contamination may be at a higher risk for complications following repair due to tissue hypoxia and microbial contamination. In addition, the presence of an abscess, urinoma, or fistula also delays definitive operative repair. We present a case of a delayed presentation left distal ureter transection after multiple gunshot wounds complicated by extensive pelvic and femur fractures necessitating delayed staged repair.

A 25-year-old male patient presented with multiple gunshot wounds. Initial stabilization efforts included chest tube placement, massive transfusion protocol, exploratory laparotomy, multiple extremity splinting, intubation and ventilation followed by weeks of operations to address his poly trauma. A late complication of abdominal urine leakage was noted on serial scans. The patient was deemed a poor surgical candidate for emergent ureteral repair due to inability to achieve surgical lithotomy position secondary to pelvic and extremity fractures. Percutaneous nephrostomy tube was placed for temporary urine diversion. Subsequent radiographic examination identified a fistula formation between the peritoneal cavity and left gluteal region.

Our patient sustained severe injuries including a delayed presentation of a complete transected ureter. Extensive bullet tracts, fragments, intra-abdominal fluid collection, and subsequent inflammation lead to fistula formation between the ureter and cutaneously on the left gluteal region. Complete resolution has not been achieved secondary to extensive skeletal injuries, and recurrent polymicrobial and yeast infections. Through a literature review, we explore whether different approaches have been attempted at repairing traumatic ureteral injuries complicated by significant polytrauma.

School: School of Medicine

GALVAN, TAYLOR

Incidental Finding of Accessory Spleen During Splenectomy for Chronic ITP

Taylor Galvan, Alfred Kankam

An accessory spleen (AS) is a congenital anomaly in which a mass of functional splenic tissue develops in an ectopic location, most commonly near the splenic hilum. Most AS are asymptomatic and remain undiagnosed unless discovered incidentally during surgery or imaging of an unrelated condition. However, after splenectomy, an AS may compensate by increasing activity, which results in a drastic AS enlargement and recurrence of symptoms associated with the original condition that required the splenectomy.

A 34-year-old male was referred to our clinic for surgical management of chronic Immune Thrombocytopenia (ITP). He was initially diagnosed with ITP in 2008, which was successfully treated with corticosteroids. Since then, his condition has relapsed multiple times, necessitating recurrent corticosteroids and rituximab therapy. After developing an intolerance to corticosteroids, he presented to the clinic seeking surgical management. Laparoscopic splenectomy was performed, which revealed a 2.3 cm x 1.2 cm accessory spleen, not previously identified on preoperative imaging. Both the spleen and accessory spleen were removed, and the patient achieved early postoperative remission of ITP.

Approximately 80-90% of patients with recurrent ITP achieve remission after splenectomy. Failed remission immediately post-op is most often due to retained splenic tissue, which commonly occurs if an AS is not identified and removed. Perioperative identification of an AS is particularly important in patients undergoing splenectomy for ITP in order to achieve postoperative success. Surgeons should consider intraoperative exploration of AS during splenectomy in these patients to ensure complete resection of all splenic tissue.

School: School of Medicine

GARZA, JALI

A CASE OF HERPES ZOSTER NEUROPATHY WITH LIMB PARALYSIS

Jali Garza, Castro, Luis; Elmassry, Marawan; Sekhon, Jasmine; Lalmuanpuii, Judy

Varicella zoster virus lies dormant in the spinal dorsal root ganglia until reactivation occurs and causes Herpes zoster. With pain being the most common complication of Herpes zoster, other, more rare manifestations can be looked over. Segmental zoster paresis occurs in around 1-3% of patients. VZV can spread from the dorsal root to the neighboring ventral root and cause subsequent motor weakness. The majority of patient who develop segmental zoster paresis have a good prognosis and will recover all function after three to six months.

We present a 78-year-old female who came to the hospital with altered mental status that was found to have right arm partial paralysis after resolution of her encephalopathy. Magnetic resonance imaging of the brain showed no acute infarction. The patient had been diagnosed with Herpes zoster and prescribed gabapentin three days prior to admission with characteristic vesicular rash eruption present. Segmental zoster paresis was suspected at this point. She was started on IV acyclovir, and physical therapy was consulted. The patient remained hospitalized for 3 weeks awaiting discharge to inpatient rehab in which time she performed daily strength exercises for her arm. IV acyclovir was given for 21 days. The patient was discharged to inpatient rehab for two weeks where she was recommended by PT to perform three hours of intensive therapy per day. After 3 months of physical therapy, the patient's motor function had improved significantly and full motor function was noted a year after her presentation.

Herpes zoster is a common disorder seen in older adults. Although we tend to focus on the associated pain, we must remember other possible manifestations that can occur during or after the initial rash presentation. Segmental zoster paresis should be suspected in any patient with paralysis and recent diagnosis of shingles.

School: School of Medicine

GUTIERREZ, BAILEY

Zosyn Induced Thrombocytopenia in a Neonate Born at 23 Weeks Gestation

Bailey Gutierrez, Katherine G. Holder, Emily Sargent, Bernardo Galvan, Olu Adessanya MD

All medications come at a cost. While they may alleviate symptoms and heal disease, they can also cause new problems. Most providers are aware that antibiotics may cause diarrhea, kidney injury, or potential allergic reactions, as these are all very well documented in the adult population. But what if the patient is a premature neonate? What side effects can be expected in a largely underdeveloped 23-week-old? A literature review yielded few results regarding general antibiotic use in neonates and no documented cases of piperacillin-tazobactam (Zosyn) side effects in this population. Considering patients in the NICU have some of the highest risks of infection due to their underdeveloped immune systems, antibiotics and their associated effects need to be more thoroughly explored to avoid iatrogenic injury or disease in an already compromised population.

We present a case of a premature female infant born at 23.1 weeks complicated by preterm prolonged rupture of membranes, group B strep, and maternal sepsis. The neonate was admitted to the NICU for prematurity, respiratory failure, and suspected sepsis. On day of life (DOL) 5, the patient became febrile and started to show signs of clinical deterioration. A 10-day course of Zosyn and prophylactic fluconazole was subsequently started. The next day she had a decrease in platelets from 63,000 on DOL 5 to 34,000 on DOL 6. The patient was given a 6 mL platelet transfusion to bring her platelet count to 98,000. However, her platelets continued to decrease between 17,000 and 29,000 with each dose of Zosyn. She was given platelet transfusions as needed to manage her thrombocytopenia.

This case is the first documented case of severe thrombocytopenia as a likely side effect of Zosyn. More studies need to be done to demonstrate a correlation between Zosyn and thrombocytopenia in neonates.

School: School of Medicine

HADIDI, YEZAN

The Late Occurrence of a Bilateral Saddle Pulmonary Embolism in an Electrical Injury Patient: A Case Report

Yezan Hadidi, Jad Zeitouni BBA, Alan Pang MD, John Griswold MD, Deepak Bharadia MD

Severe burns from electrical injuries have serious medical implications and can occur when more than 1000 volts pass through the body. These injuries can damage underlying tissue and organs and have been linked to an increase in risk for Deep Vein Thrombosis (DVT) and Pulmonary embolism (PE). DVT occurs when a clot forms in the deep veins of legs, thighs, pelvis, and arms. These clots can travel to the lungs and cause a PE where blood is blocked from circulating.

A forty-six-year-old man with no prior notable medical history presented to the emergency department with a work-related severe electrical injury resulting from a 14400-volt line. The patient has a resulting 15 percent burn and eventual upper right extremity disarticulation. The patient had his left lower leg wound was debrided and grafted on hospital day 21.

The patient presented with shortness of breath and elevated heart rate on hospital day 31, and vascular surgery was consulted. The patient was taken for a CT scan and a saddle pulmonary embolism was found with flattening of the ventricle. A doppler of his Left upper and lower extremities found deep vein thrombosis in both extremities. He was immediately started on a heparin drip. Vascular surgery consult was obtained. The decision was made to evacuate the embolism with a percutaneous pulmonary artery thrombectomy using a triever catheter. Given his propensity for deep vein thrombosis, 10 mg of apixaban daily was prescribed and will be re-evaluated at 6 months post-procedure. The patient was discharged to in-patient rehab on hospital day 41.

This case highlights the risk for delayed DVT and PE in electrical injury patients, and the importance to take preventative measures into account, especially for patients who have other risk factors for DVT and PE (such as amputation).

School: School of Medicine

HAQUE, SARAH

Psychiatric manifestation of domperidone withdrawal: a case series

Sarah Haque, Elleana Majdinasab

Insufficient milk production is an issue commonly discussed in practice, but largely unstudied in research [Shere]. Common etiologies include maternal illness, emotional stressors, maternal perception, premature birth, and low prolactin. Breastfeeding failure is distressing and understandably drives many mothers to seek solutions. Noninvasive interventions are first line options to increase milk supply. Once exhausted, pharmaceutical galactagogues may be appropriate[Sultana].

Domperidone is a dopamine antagonist approved in some countries as an antiemetic and gastric prokinetic agent at doses of 30 mg daily. It is used off-label as a galactagogue by increasing prolactin levels [Campbell-Yeo] [Moriello]. Evidence to suggest domperidone increases milk production reports minimal gains, are of low quality, and are only available for doses up to 60 mg daily. However, galactagogue doses are often 90 to 180 mg, which approach three to five times the amount deemed safe for gastrointestinal treatment.

Domperidone is legally unavailable in the United States due to concerns for QT prolongation [FDA] [Olten]. However, anecdotal evidence suggests domperidone use in the US is not uncommon. Furthermore, there are rare cases in the literature depicting severe withdrawal in breastfeeding mothers [papasterigiou]. In the US, these mothers are without clinical guidance as to risk/benefit evaluations for domperidone; further, they have limited to no supportive resources available to manage adverse events. This report details the presentation and clinical course of domperidone withdrawal among 3 lactating women in the US with separate tapering schedules at different stages of recovery. The aim of this study is to provide evidence of domperidone withdrawal-related psychosis in nursing mothers and to present a potential timeline of the recovery process.

School: School of Medicine

HASSAN, TAHA

Spontaneous Resolution of Symptomatic Chiari Type I Malformation without Resolution of Cerebellar Tonsillar Herniation

Taha Hassan, Ryan Morgan, Reagan Collins

Chiari Type I malformation (CMI) is characterized as a herniation of the cerebellar tonsils more than 5mm below the foramen magnum. The herniation can result in altered CSF flow and aberrant pulsatile movement of the tonsils downward during cardiac systole. Standard treatment of symptomatic CMI entails posterior fossa decompression, although there are a few cases reported in literature of spontaneous resolution of symptoms without surgical intervention. We present the case of a pediatric patient with resolution of CMI symptoms following spontaneous resolution of aberrant CNS tissue motion and restoration of CSF flow.

The patient was initially diagnosed with symptomatic CMI at the age of 9. She presented with a 5mm herniation of the cerebellar tonsils below the foramen magnum without a syrinx. The case was monitored with follow-up appointments and MRIs due to the mild nature of her symptoms. However, the patient returned 6.25 years later complaining of worsening of symptoms which coincided with an increase in cerebellar tonsil movement and decreased CSF flow dorsally. MRI revealed cerebellar tonsils extending 8mm inferior to the foramen magnum, paucity of CSF flow dorsally, and aberrant neural movement at the foramen magnum.

The patient returned a year later for a follow-up with no imaging, presenting with less frequent headaches, albeit no improvement in severity. A year after, MRI showed her cerebellar tonsils still extended 5mm inferior to the foramen magnum with a restoration of CSF flow dorsally. Chiari motion was more static on kinetic MRI, and she reported rare occurrences of her headaches with no other associated symptoms.

Spontaneous resolution of CMI is rare and has only ever been documented as an ascension of the cerebellar tonsils. This case describes restoration of normal tonsil movement and baseline CSF flow correlating with a resolution of symptoms where a resolution in herniation was not present.

School: School of Medicine

HAWKINS, TRAMONDRANIQUE

Term Complete Uterine Rupture with En Caul Expulsion: A Case Report

Tramondranique Hawkins, Joseph Oti-Nimoh, MS-III, Gary Ventolini, M.D., Jerome Yaklic, M.D., Michael Galloway, D.O., Stanley Eboh, MS-IV, Suna Burghul, Ob/Gyn PGY-1

En caul delivery describes when a fetus is born within an intact amniotic sac. Associated with preterm births and low gravida, en caul birth is frequently followed by infant death secondary to respiratory distress, sepsis, hemorrhagic complications, or a combination of these factors. En caul deliveries occur in 1 in 70,000 births and the risk decreases as a pregnancy progresses and reaches full term.

Uterine rupture, also rare, is associated with a high incidence of fetal mortality. The overall risk for uterine rupture is 0.32%, and the most important risk factor is a scarred uterus. History of previous delivery via low-transverse cesarean section (CS), and the resultant uterine scarring, increases the likelihood of uterine rupture during pregnancy.

Here we describe a G2P1001 woman at 39 weeks gestation presenting with abdominal pain, normal vital signs, minimal vaginal bleeding, and lack of fetal movement. Although unapparent at the time of presentation, this patient had undergone asymptomatic uterine rupture approximately 48 hours prior. A full term stillborn fetus surrounded by an intact amnion was delivered and complete rupture of the anterior uterine wall was discovered at this time.

This patient's history of low-transverse CS likely contributed to the spontaneous uterine rupture and subsequent fetal demise. The term gestation with the absence of excessive vaginal bleeding or maternal tachycardia upon presentation exemplifies the diversity of symptoms associated with uterine rupture. We conclude that uterine rupture should always be considered in obstetrics as patients may present atypically and asymptotically.

School: School of Medicine

HAYWARD, DAN

A Case Series of Distal Radial Ulnar Joint Instability Repair Using Tightrope Technology

Dan Hayward, Gracie Baum, Brendan Mackay

Distal radial ulnar joint (DRUJ) instability is a common clinical condition but is often overlooked. Symptomatic instability may present acutely or in a delayed fashion after a traumatic event. Joint instability has chiefly been attributed to damage to the Triangular Fibrocartilage Complex (TFCC). Many techniques have been developed to treat DRUJ instability, however challenges remain in restoring stability, range of motion, and pain relief. Complications often involve nerve injury, ulnar styloid fracture, or tendon graft rupture. Cadaveric studies have shown promise in meeting these challenges using Arthrex Tightrope® fixation. This case series examines the effectiveness of this novel technique in the clinical setting.

In this case series, five patients with DRUJ instability underwent distal radioulnar joint stabilization using Arthrex Tightrope® fixation. Retrospective chart review was performed to assess VAS pain scores, current pain medications, and motor function at each follow-up visit. Descriptive statistics were performed to evaluate endpoints.

Three patients had concurrent TFCC injury. The average pain at initial evaluation was 4.5/10 on VAS scale. One patient reported 0/10 pain at seven weeks postop but was not followed further due to incarceration. Two patients underwent removal of hardware, one at 15 weeks postop for exposed button hardware and the other at 26 weeks postop for unremitting swelling. Both patients reported adequate movement and pain ratings of 0/10 after the hardware was removed. Two patients were recently treated and have future follow-up appointments, reporting pain of 4/10 and 0/10 at 8 weeks and 5 weeks, respectively.

DRUJ instability remains a challenge to treat despite 90 years of technique innovation. The cases presented suggest that tightrope reinforcement can provide adequate stability and resolution of pain. Preliminary data proposes that tightrope fixation may provide equivalent outcomes to techniques described in similar published studies.

School: School of Medicine

JAIN, NEIL

Septal panniculitis with sarcoid granulomas: A Case Report

Neil Jain, Dylan Maldonado, MD

Panniculitis encompasses a variety of disorders in which the primary location of inflammation is in the subcutaneous fat. Descriptors such as septal or lobular further define the main microscopic areas of inflammation. The most common septal panniculitis is erythema nodosum, which classically presents as tender, erythematous, nodules on the shins. We present a patient with multiple subcutaneous nodules that microscopically demonstrated septal panniculitis with naked epithelioid granulomas, referred to as sarcoid granulomas.

A 50-year-old obese female presented with multiple, painful, nodules located on the buttocks, legs, and arms. Initial differential diagnosis raised suspicion for numerous lipomas. An elliptical excision was performed to remove one of the nodules on the buttocks. Histopathology revealed septal panniculitis with sarcoid granulomas. Chest imaging and ACE levels were ordered due to concerns of underlying Darier-Rousey sarcoidosis.

In this report, we present an atypical case of septal panniculitis. The patient's prior history of lung disease raises additional questions of whether her unique presentation is another case of the great mimicker, sarcoidosis, presenting as septal panniculitis, or an unusual case of erythema nodosum.

School: School of Medicine

JANG, WOORYOUNG

Nasal Necrosis Following Use of Nasal Cannula: A Case Series

Wooyoung Jang, Dr. Daniel Nguyen, Dr. Joshua Demke

Necrosis of various parts of the nose can occur after prolonged use of nasal cannula in neonatal patients. Even though such potential complications have been reported in literature, there has been only limited awareness of this problem. These complications occur when the nasal cannula providing oxygen to the neonate is placed too tightly, limiting arterial perfusion to the nasal tissue, causing ischemia and subsequent necrosis. Here we present a case series of two preterm infants who have developed pressure wounds after use of nasal cannula which progressed to columella necrosis, one more severe than the other. In a rare incidence, we see an infratip and partial supratip lobule and partial bilateral alar defects. Both patients are currently doing well and reconstruction at a later date has been discussed to allow for maturity of tissue from potential donor sites and to mitigate anesthesia risks.

School: School of Medicine

JONES, DAEMAR

Combining Supera Stent with Viabahn and Utilizing Anchor Technique in Treatment of Ectasia of SFA to Popliteal

Daemar Jones, Leigh Ann Jenkins, M.D., FACC; Mohammad M. Ansari, M.D.

The treatment of atherosclerotic damage to the popliteal artery has been a challenge mainly because of its relation to the knee. The mobility and biomechanics allow compression of the vessel (restenosis). Ectasia of vessels makes stent placement difficult to treat around the popliteal. The Supera stent has been shown to conform with the extra flexion and extension of the knee joint. We present our case of utilizing the Supera stent with Viabahn covered stents to effectively treat ectasia of the popliteal to SFA utilizing the anchor technique.

Male patient age 75, with a past medical history of PAD, atherosclerosis of native vessels, ALI, atrial fibrillation, HTN, dyslipidemia, and diabetes. Initially, mechanical thrombectomy was performed from proximal SFA to proximal AT. Then, balloon angioplasty was performed. After the vessels were treated due to ectasia, the Supera stent was deployed in mid popliteal artery. Viabahn stent was advanced to distal SFA (overlapping Supera) as in anchor. A second Viabahn stent was then deployed in mid SFA (overlapping prior Viabahn stent). Hence, two Viabahn were placed overlapping each other with the later acting as a bridge to anchor into the initially placed Supera stent in the popliteal.

Significant improvement was noted. Patient left with intact perfusion of both legs, and the ectatic SFA and popliteal that could have occluded again were successfully treated utilizing anchor technique percutaneously.

The combination of GORE Viabahn and Supera stent anchor technique is a safe, efficacious with better outcome in treating popliteal and SF ectasia. The Supera stent is durable and flexible that conforms with biomechanical forces of the knee. This technique was able to anchor the two Viabahn stents to treat the lesion which further protected and allowed for stable placement. Our case confirms the effectiveness, the viability, and safety of the technique.

School: School of Medicine

JURICA, CAMERON

case report of pembrolizumab induced encephalitis complicated by Covid-19

Cameron Jurica, Micah Park

Pembrolizumab an immune checkpoint inhibitor therapy that works by blocking programmed death receptor-1 (PD-1). Immune-related side effects such as encephalitis have emerged in post-marketing surveillance. Management guidelines are beginning to emerge, and cases must continue to be documented to further optimize treatment. Here we report a case of Pembrolizumab-induced encephalopathy in a 77-year-old female with history of malignant melanoma.

A 77-year old woman with history of malignant melanoma status post partial resection presented with altered mental status (AMS). She was diagnosed with melanoma over a year ago and had received thirteen pembrolizumab infusions. She tolerated these without any significant side effects until the last five infusions. Her presentation was complicated by Covid-19 infection. She was admitted to the hospital twice more afterwards with diagnosis of Covid-induced encephalopathy, in between which she received four infusions. Finally, three and a half months after her initial infection with Covid-19, and two days after her final infusion, she presented with AMS. Her laboratory studies, including Covid-19 test, CSF, and autoimmune titers, and head imagings (CT, MRI) were unremarkable except for CRP that was elevated at 2.6. EEG showed generalized slow activity and slowed posterior dominant rhythm. She was started on broad spectrum antibiotics initially, then switched to methylprednisolone 1 g for three days during which she began to show improvement in her mentation. She was later started on prednisone 80 mg PO per day. At discharge, patient's mentation has recovered to baseline. She was instructed to taper off the prednisone by 10 mg per day.

Pembrolizumab induced encephalitis is an uncommon presentation of immune therapy neurotoxicity that can be successfully treated with high-dose steroids. In our patient presentation, with other causes of encephalopathy, including Covid-19, were sequentially ruled out, leaving Pembrolizumab toxicity as the probable cause of the patient's encephalopathy.

School: TTUHSC - Lubbock

KANKAM, JR., ALFRED

A case of intra-abdominal free air and abdominal pain in an 11-year-old male with a history of cerebral palsy and developmental nonverbal disorder.

Alfred Kankam, Jr., Benjamin Daines MS3, Johnathon Abraham MS3, Janet Meller M.D., Jason Nirgiotis M.D.

An 11-year-old male presented to the emergency room with diffuse abdominal pain and a past medical history for cerebral palsy, ventriculoperitoneal shunt, developmental nonverbal disorder, and epilepsy. He was in persistent distress clenching his abdomen and hunching over which alerted his family. The patient had a normal bowel movement before presenting to the emergency room, and denied any fever, chills, vomiting, diarrhea, or cough. The history was limited, due to the patient's developmental nonverbal disorder, but his mother reported a previous history of strabismus surgery and ventriculoperitoneal shunt. A CT scan of the abdominal was conducted, which showed intra-abdominal free air. In addition to the air, wall thickening of the sigmoid colon was apparent, which suggested an infectious or inflammatory colitis. After the discovery of the free air, his mother noted the patient has a habit of putting things in his mouth. Pediatric surgery was consulted for a diagnostic laparoscopy/exploratory laparotomy to investigate a possible perforation of the sigmoid colon. Purulent material was found in the lower abdomen, in addition to an inflammatory reaction in the right lower quadrant. On examination of the distal colon, an object was observed to be protruding out of the sigmoid colon. The bowel was retracted superiorly which allowed the object to be completely visualized. It was determined to be a plastic object, so a rectal exam and anoscopy were performed and deemed normal. After an 8-day hospital stay, the patient was discharged from the hospital and instructed to follow-up in clinic in 2 to 3 weeks. The foreign body was found to be the broken leg of a phone tripod, and that the patient accidentally ingested the broken leg because he had the object in his mouth and tripped on the steps leading to their backyard. The patient made a swift recovery.

School: School of Medicine

KARA, DENIZHAN

A Rare Case of Lamotrigine Induced Hyponatremia in Bipolar Disorder

Denizhan Kara, Dilruba Dulgeroglu-Bayazit, Huseyin Bayazit

Hyponatremia may present as an asymptomatic laboratory finding, but it is a potentially life-threatening adverse drug reaction. Psychotropic medications that are well-known to induce hyponatremia are antipsychotics and serotonin reuptake inhibitors. A Swedish national study investigated more than 14 thousand patients with hyponatremia, and found that lamotrigine had the lowest risk of developing hyponatremia among mood stabilizers. Only two cases with lamotrigine induced hyponatremia were reported in the literature, but they had precipitating factors such as head trauma and craniotomy. This study presents a case where a 58-year-old male had been using Lamictal (lamotrigine) 200mg tablets, along with Quetiapine 450 mg tablets, and Buspirone 30 mg for bipolar disorder. He presented with a serum sodium of 120 (normal range 135-145), however his sodium could not be corrected over the course of one month, despite initiation of salt pills, as well as subsequent tapering and discontinuation of Quetiapine and Buspirone. It was not until the Lamictal was also discontinued that his serum sodium corrected back to normal ranges within two weeks. Although lamotrigine is less likely to cause hyponatremia in patients with ongoing treatment, some such cases are possible. It is recommended to perform routine laboratory tests regularly for those who have been using lamotrigine for a long time.

School: School of Medicine

KARIM, SULAIMAN

Surgical Intervention as Treatment of Dieulafoy's Lesion in a Setting of KT-Weber Syndrome

Sulaiman Karim, Pert, Lauren BS; Huynh, Jonathan MD; Vaughan, Justin MD; Santos Ariel P. MD, MPH, FACS, FCCM

Dieulafoy's lesion presents as a rare gastrointestinal (GI) manifestation in the setting of Klippel-Trenaunay Webber Syndrome (KTS). The pathogenesis of Dieulafoy's lesion is not well-understood, and interventions vary from endoscopic to surgical therapies. Treatment of Dieulafoy's lesion has not been well described in patients with KTS, especially in cases where endoscopic treatments have failed.

A 40-year-old male with a known history of KTS, 2-weeks post-MVC treated with 1000mg ibuprofen daily, and an episode of melena and bright red hematemesis, was admitted following hypotension and severe downward trending hemoglobin (Hgb). Intervention from gastroenterology failed to stop the GI bleed twice despite the placement of endoscopic hemoclips indicated after a Hgb of 8.0. The following day, the patient was transferred to the ICU following active hematemesis and a Hgb of 6.0. During a mesenteric angiogram, interventional radiology (IR) identified a 12 cm blood clot in the lumen of the stomach and a large arterial bleed along the greater curvature of the stomach. Despite a partial embolization, the patient's hemodynamic state worsened, and the patient was taken emergently to the OR for an exploratory laparotomy with gastrotomy creation and oversewing of a Dieulafoy lesion in the proximal stomach; approximately 2.5L of clotted blood was removed from his stomach. Postoperatively, the concern for DVTs was treated with heparin and an IVC filter. Additionally, the patient passed several melenas with subsequent fluctuations in his Hgb levels. In the recovery period, no GI bleeding was appreciated; he was extubated four days postoperatively.

Dieulafoy's lesions can present as a rare cause of potentially fatal upper GI bleeding. Surgical interventions are effective measures in response to failed endoscopic and IR therapies. Our experience describes the first use of surgical intervention to manage Dieulafoy's lesion in a setting of KT-Weber syndrome.

School: School of Medicine

KASHYAP, CIMRON

Differentiating Post-COVID 19 Multisystem Inflammatory Syndrome in Children from Stevens-Johnson Syndrome

Cinrom Kashyap, Dhruv Patel, Karishma Kashyap, Eudys Briceno Brito

Multisystem inflammatory syndrome in children (MIS-C) is a rare but serious complication that occurs approximately 4 weeks after COVID-19 infection. It is hypothesized that MIS-C results from an abnormal immune response to the coronavirus. Significant symptoms include fever, GI symptoms, rash, conjunctivitis, mucous membrane involvement, respiratory symptoms, & lethargy. Stevens-Johnson syndrome (SJS) is a severe mucocutaneous reaction that usually occurs in response to certain medications. SJS presents similarly to MIS-C, however the rash with SJS has extensive necrosis and detachment of the epidermis from the skin.

A 6-year-old male presented with a five-day history of fever, lip and oral ulcers, exudative conjunctivitis, and target-like blister lesions in the setting of a recent COVID-19 infection. The patient took azithromycin a few days prior to admission but otherwise had no significant PMH. Upon admission, lab work demonstrated hyponatremia and elevated inflammatory markers CRP 103, ESR 31, procalcitonin 0.07. The patient was also COVID-19 NAA positive and SARS-CoV-2 Ab was reactive. However, there was no evidence of multisystem (>2) organ involvement. For skin care, calamine lotion, Bactroban, and Vitamin E were used. Over the course of the hospital stay, the patient's pain and pruritis of the lesions improved. Repeat labs 5 days post-admission showed inflammatory markers uptrending in ESR/LDH/Ferritin/ transaminitis and downtrending in CRP/procalcitonin significant for improving disease.

This case is unique due to the acuity of managing a post-covid pediatric patient with a mixed symptomatic presentation. Due to his fever, elevated inflammatory markers, and hyponatremia in the setting of COVID-19, a working diagnosis at that time included atypical MIS-C; however, the rash and oral involvement findings were not typical of MIS-C and were more consistent with EM/SJS. This case highlights the similar characteristics of MIS-C and SJS and the importance of distinguishing the two in a timely manner to ensure proper treatment.

School: School of Medicine

KECK, RYAN

COVID-19 Vaccination Obscuring Inflammatory Breast Cancer in an Elderly Woman.

Ryan Keck, Nimat Alam, MD

Inflammatory breast cancer (IBC) continues to be a difficult condition to manage as distant metastases are usually present by the time of clinical symptoms. IBC contributes to 2-4% of all breast cancers with a 7% mortality in the United States of America. However, treatment with neo-adjuvant chemotherapy, modified radical mastectomy with skin removal, and radiation therapy have contributed to better survivability in patients with IBC. Clinical suspicion for IBC should remain high in patients with refractory breast inflammation of redness, warmth, and skin changes and patients with darker skin tones. IBC requires the clinical presentation mentioned above as well as a positive histological correlation for diagnosis. Although more easily accessible, mammography has a low sensitivity for detecting IBC, while MRI breast biopsy has the highest sensitivity for detection. We discuss a case of inflammatory breast cancer in an elderly patient presenting with breast inflammation after a recent COVID-19 vaccination and a previous mammogram exhibiting Bi-RADS 3, probably benign.

School: School of Medicine

KHAN, SHAZMA

Mania or Just a Seizure? The Atypical Presentation of Nonconvulsive Status Epilepticus

Shazma Khan, Jasmin Rahesh, Safanah Alshinqity, Sean Anderson

We present a case of an elderly male with a history of Bipolar I disorder who was diagnosed with non-convulsive status epilepticus after presenting with altered mental status mimicking mania. Seizure disorders in the adult population are clinically described with the typical tonic-clonic presentation often consisting of convulsions, loss of consciousness, and post-ictal confusion. However, there are seizure disorders such as nonconvulsive status epilepticus with atypical presentations such as altered mental status and undefined electroencephalographic findings. Distinguishing between a seizure disorder and a psychiatric etiology can be difficult to interpret and treat in the clinical setting. The aim of this case report is to increase awareness of the atypical presentations of seizures disorders.

School: School of Medicine

KILE, RANGER

Surgical management of complete urethral duplication: a case report

Ranger Kile, Ruomei Wu, Matthew Timberlake

Urethral duplication is a rare congenital anomaly of the genitourinary tract with several possible anatomic variations and clinical presentations. Owing to its rarity, variability, and unknown embryologic origins, best practices for diagnosis and surgical intervention have yet to be defined. Management must therefore be individualized according to anatomical and clinical presentation, focusing on preserving continence, voiding, and normal cosmesis. We aim to contribute our experience investigating and managing this condition to aid in ultimately defining an ideal surgical intervention.

We describe here the case of an asymptomatic 5-month-old boy that initially presented due to an abnormality suggestive of epispa-dias. Effmann type IIA1 complete urethral duplication was confirmed by cystourethroscopy with retrograde urethrogram revealing an accessory dorsal urethra entering the bladder. The family was counseled on options of observation versus surgical excision, and they opted for intervention. Open cystotomy was performed, with identification of the accessory urethra with retrograde instillation of methylene blue. The outlet was excised with multilayer closure. To avoid sphincteric injury, the prostatic/bulbar segments were left intact. The distal accessory penile urethra was then excised after degloving, together with circumcision. The patient experienced no postoperative complications.

Our case illustrates a safe and effective technique for localizing and excising a type IIA1 urethral duplication while avoiding injury to the sphincteric mechanism. As there is limited literature on the subject, we hope the contribution of our experience will provide guidance to other surgeons caring for children with this rare anomaly.

School: School of Medicine

KONDOOR, VISHAAL

Complete resolution of distal basilar artery occlusion with neurologic deficits, in first ever documented case of a fibrocartilaginous cerebral embolism aspiration thrombectomy from a suspected c5/c6 uncovertebral bone spur.

Vishaal Kondoore, James Tatum

Reported cases of fibrocartilaginous embolization in humans are extremely rare. This case would be the first successful aspiration thrombectomy performed with a complete resolution of presented neurologic symptoms. Our 51 year old African American female patient presented with a case of fibrocartilaginous cerebral embolism that was more than likely dissected from a c5/c6 uncovertebral osteophyte, a common site for bone spurs. We thought it would be an insightful case as there is no other documented case of such an embolism being performed in humans. Fibrocartilaginous embolisms are well documented in dogs, and treatment options are limited. of FCE strokes can vary between sudden and sharp pain to neurologic and autonomic deficits. Weakness is also a common feature among these patients. Recovery rates are variable, but resolution of symptoms is usually slow plateau.

Patient is right handed and presented with acute shoulder pain, neurologic deficits including dysarthria, nystagmus, dysmetria and diplopia. Upon imaging, a CTA revealed occlusion at the C5/C6 level in the dominant left vertebral artery. A lateral disc osteophyte was also observed at this level. A partial filling defect in the left mid Basilar artery and occlusion of distal BA extending into the left P1 segment was also noted. An emergency aspiration thrombectomy was performed to retrieve the embolus and relieve the symptoms. Follow up angiography revealed partial improvement in the opacification of the BA. Two additional aspiration thrombectomy passes led to continuous improvement in the BA with ultimate reperfusion of the basilar artery. Remarkably, the patient's symptoms had completely resolved. A NIHSS score of 0 was given. The patient was released and follow up for future stroke complications was evaluated.

School: School of Medicine

KOPEL, JONATHAN

A Novel Case of Hemiprosopometamorphopsic Hallucinosi

Jonathan Kopel, KJ Oommen, MD, FAAN, FAES

A visual hallucination is the perception of an image without an external stimulus through the eye. A useful scheme of classifying hallucinations is into (a) simple and (b) complex types. Simple or unformed hallucinations consist of elementary forms such as bright lights (phosphenes), geometric figures (photopsia), zig-zag lines (fortification spectra) etc., and can result from injury to the visual pathways anywhere from the retina to the primary visual cortex. In this current case, the patient had a unique visual hallucination in which the right half of the faces he saw, but could not recognize (prosopagnosia), were distorted. This type of hallucination may be called hemiprosopometamorphopsic hallucinosi and has not been described before. Our patient's initial CT of head was negative excluding a primary hemorrhagic event, but the later appearance of subcortical FLARE signal is consistent with a subcortical stroke which caused his convulsive seizure. An MR angiogram was performed because of the presence of a venous angioma in the right cerebellar hemisphere. The study shows the presence of a vein in the area of the encephalomalacia, suggesting that venous angiomas often considered benign may cause seizures and that they may cause strokes, albeit rarely.

School: School of Medicine

LIAO, EN-DIEN

Utility of Radial to Peripheral Access on the Treatment of Acute Limb Ischemia

En-Dien Liao, Leigh Ann Jenkins, MD, Mohammad Ansari, MD

Introduction: Acute limb ischemia (ALI) is a sudden decrease in limb perfusion due to the embolization or thrombosis of the peripheral arteries with a high risk for limb loss and amputation. In patients at high risk for surgical intervention due to complex comorbidities, endovascular intervention is the preferred method via the transfemoral approach in the treatment of ALI. The transfemoral approach has traditionally been preferred over the transradial approach due to the shorter distance to the target site and the larger diameter of the femoral artery to allow the introduction of large-sized tools. In recent years, the transradial approach has demonstrated benefits in a shorter length of hospital stays, lower access site complications, and higher cost-effectiveness. **Case:** Male age 87 presented to the hospital with chronic right lower extremity (RLE) wounds, claudication, and acute on chronic limb ischemia. RLE angiography showed occlusion extending from the right popliteal artery to the anterior tibial, the posterior tibial, and the peroneal arteries. Percutaneous radial to peripheral intervention was performed via the RLE due to anatomic limitations of the groin area. After successful treatment was performed utilizing thrombectomy and percutaneous balloon angioplasty, a QuickClot radial band was applied followed by 10 minutes of manual pressure application. Hemostasis was achieved. **Results:** The patient left the cath lab with intact distal hand perfusion and stable hemodynamics. The right upper extremity arterial duplex showed no evidence of arterial dissection, pseudoaneurysm, or hematoma in the radial artery access site. The total hospital stay was one day. The RLE was successfully treated, and dopplers showed no occlusion with a clear view. **Conclusion:** This case demonstrates the effectiveness of the radial to peripheral below the knee intervention in the treatment of ALI. The transradial approach is safe and feasible, and it is an excellent alternative to the traditional transfemoral approach.

School: School of Medicine

MAJDINASAB, ELLEANA

Ketamine transfer into breast milk: a case series

Elleana Majdinasab, Kaytlin Krutsch, PharmD, MBA, BCPS; Palika Datta PhD; Teresa Baker MD; Thomas W. Hale PhD

Racemic ketamine, an NMDA-antagonistic anesthetic, has recently gained traction for the management of treatment-resistant depression due to its immediate effects. Currently, there is insufficient data surrounding the safety and transfer of ketamine into breastmilk. In this case series, we analyzed the concentration of ketamine in the breastmilk of 3 postpartum mothers being treated for depression. The study participants submitted an extensive survey detailing medical and obstetrical history, current medications, and dosage information along with breast milk samples at hours 0, 1, 2, 4, 6, 8, 12. The mothers noted no adverse effects to their infants. It was found that the average maximum concentration of ketamine was 285.47 ng/mL and occurred 1 hour following the dose before steadily declining over the 24 hour period being studied. The average relative infant dose (RID) was calculated to be 0.43%, suggesting that the transfer of ketamine into breast milk is relatively minimal upon comparison to the generally accepted RID of less than 10%. Our findings remained consistent with one 2021 study preprint which also found insignificant levels of ketamine in breast milk. We cautiously believe that the risks of administering ketamine to breastfeeding mothers is low, but fully acknowledge that larger-scale research is necessary to address various dosages and populations before official recommendations can be made.

School: School of Medicine

MATSUNAGA, SARAH

A Case of a Large Recurrent Bartholin Gland Cyst Infection with An Update on Treatment Alternatives

Sarah Matsunaga, John Rafael, MBA, Asley Sanchez BS, Gary Ventolini MD

Bartholin gland cysts for women of reproductive age account for 2% of all gynecologic visits per year. The treatment goal is to preserve, if possible, the gland and its function while minimizing the formation of scar tissue and dyspareunia. There exists no consensus on a gold standard treatment of symptomatic Bartholin cysts. The choice of treatment is related to various factors including age and history.

We present a 26-year-old female with vaginal pain with increased swelling and discomfort in her vagina. Physical exam showed swelling in the left labia, most prominently on the left posterior vestibule of the labia minora. The location was indicative for Bartholin gland infection extending into the upper labia. The patient reported a 3 year history of recurrent Bartholin gland infections, treated with Sitz baths, antibiotics, surgical drainage, and placement of Word catheter without resolution. A vaginal swab sent for culture returned with polymicrobial infection, and she tested negative for STIs. The patient was started on IM ceftriaxone, and due to her chronicity of her condition, marsupialization of the cyst was performed. No adverse effects or recurrence has been reported on follow up after 3 and 6 months.

Previous literature on the use of marsupialization is mixed. Older sources state that marsupialization should only be performed on cysts. However, more current research demonstrates that both marsupialization and word catheter placement are safe in the treatment of Bartholin abscess. One advantage of marsupialization over Word catheter placement is that it may lead to lower recurrence rates and less postoperative pain, although other studies nevertheless found comparable data.

We report a patient with a large Bartholin gland cyst infection and history of recurrent Bartholin cysts successfully treated with marsupialization, supporting that marsupialization is safe and effective for recurrent large Bartholin gland cysts.

School: School of Medicine

MCCABE, PARKER

Fat Embolization Syndrome after Traumatic Femoral Fracture

Parker McCabe, Kate Holder, Bernardo Galvan

Fat embolism syndrome (FES) is caused by embolization of fat particles which travel to multiple organs in the body, including the brain. FES commonly arises after long bone fractures,¹ especially of the femur.

A 30-year-old male presented to the ED after falling into a hole and was diagnosed with a right midshaft femur fracture. He was admitted to the trauma service and orthopedic surgery was consulted. He subsequently developed altered mental status with associated tachycardia and tachypnea, and a rapid response code was called. He was able to speak in one- to two-word sentences and exhibited extremity spasticity that was initially diagnosed as Neuroleptic Malignant Syndrome (NMS) and attributed to Ondansetron use. An arterial blood gas revealed a PaO₂ of 39, and the patient was intubated. After sedation was decreased, he exhibited spontaneous breathing on the ventilator and movement in all of his extremities; however, he was unable to follow commands or track with his eyes. Magnetic resonance imaging of the head revealed multiple cerebral infarctions consistent with FES. The patient was started on aspirin, clopidogrel, enoxaparin, and atorvastatin per neurology recommendations. On the fifth hospital day, the patient underwent open reduction and internal fixation of the femur. The patient continued to improve over the following three weeks. He was discharged in stable condition to a rehab facility where he continued to improve.

FES typically manifests with a petechial rash, deteriorating mental status, and progressive respiratory insufficiency.² While FES is a condition commonly described in the literature, it's important to realize that it may present atypically without skin findings or progressive weakness. In this case, FES was initially masked by ondansetron associated NMS, making diagnosis extremely difficult. Although manifesting symptoms of FES can vary, prompt recognition of this syndrome is important for proper management and complication avoidance.¹

School: School of Medicine

MITTAL, NITISH

A Case Report of Multi-System Inflammatory Syndrome in Adults (MIS-A) Associated with Heart Failure

Nitish Mittal, Mostafa Abohelwa, MD; Jacob Nichols, MD

Multi-System Inflammatory Syndrome in Children (MIS-C) is a systemic inflammatory condition where various body organs, such as the heart, kidney, gastrointestinal organs, become inflamed. Several cases have been reported in children linking MIS-C with Novel Corona Virus Disease-2019 (COVID-19); however, few cases have been reported in adults (MIS-A).

A case of a 20-year-old male patient with a history of COVID-19 infection two months before presentation who presented with fever and acute right lower quadrant pain. Workup revealed right-sided mesenteric lymphadenopathy and mild colitis that was non-responsive to antibiotics. The patient was found to have significantly elevated inflammatory markers. He also developed myocarditis resulting in acute systolic heart failure with reduced ejection fraction. The diagnosis of MIS-A was made by exclusion. The patient showed improvement with intravenous immunoglobulin and pulse steroids. Based on available literature, MIS-C was defined till the age of 21; however, we think it is a misnomer for adults more than 18. Hence, we prefer to use MIS-A for our patient.

It is essential to diagnose and treat patients with the multi-system inflammatory syndrome at an early stage; the management of these patients, especially with heart disease, should include immune-modulatory therapy as well as guideline-directed therapy.

School: School of Medicine

MORGAN, RYAN

How Did they Survive?

Ryan Morgan, Reagan Collins BS, Laszlo Nagy MD, Muhittin Belirgen MD

Pediatric gunshot wounds to the brain (GSWB) are devastating injuries commonly presenting with a poor prognosis and high mortality rates estimated between 20-60%. The pediatric population tends to have a lower mortality rate than adults due to their increased neural plasticity and development potential. Decompressive craniectomy is a common surgical method for treatment of traumatic brain injury, including gunshot wounds. In this procedure, a section of skull is removed allowing for better management of intracranial pressure (ICP). Once ICP has stabilized, and the brain has healed; the skull is replaced. Here we present two male patients who presented with GSWB managed with emergent decompressive craniectomy.

Both patients arrived intubated with a Glasgow Coma Scale (GCS) of 3. Patient 1 is a 3-year-old with a self-inflicted GSW. The bullet traversed his left frontal lobe entering through the anterior frontal lobe and exiting through the frontoparietal lobe near the vertex where he had a comminuted skull fracture with necrotic brain tissue herniating through the skull defect.

Patient 2 is a 17-year-old with a GSW through his left posterior skull traversing his left parietotemporal region and terminating in his right frontal lobe. There were multiple bullet fragments, diffuse cerebral edema, and subarachnoid hemorrhages present. Both patients were treated with an emergent decompressive craniectomy.

Post-operatively, their GCS rose to 7 and 9 respectively, and then to 15 and 11 at discharge. They recovered nicely with the first only having on-going behavioral issues and the second having occasional seizures which are medically managed.

Both patients presented in critical condition with a poor prognosis based on initial GCS. Despite this, with timely decompressive craniectomy and prompt management of increased ICP, both patients survived. Regardless of their advantage of young age, their outcomes are excellent with their relatively high quality of life.

School: School of Medicine

MOSELEY, KAITLYN

ECG changes in severe hypercalcemia mimicking Brugada's syndrome

Kaitlyn Moseley, Bernardo Galvan, Katherine G. Holder, Mousab Diab, M.D., Rajesh Nambiar M.D

Brugada syndrome is a rare genetic disorder caused by a defect in the sodium voltage-gated channels found in cardiac muscle. This disrupts cardiac electric currents leading to arrhythmias and premature death if not treated early. Brugada look alike patterns on ECG readings are usually explained by non-genetic etiologies including metabolic disturbances, drugs, mechanical compression, and inflammatory conditions.

A 62-year-old Caucasian, female patient with h/o celiac disease and chronic pain s/p spinal cord stimulator presented to our institution for abnormal labs and complaints of weakness, nausea, vomiting, constipation, polydipsia, and palpitations. Labs resulted an elevated serum calcium level (17mg/dL), BUN (32), and creatinine (1.8) indicating AKI. Vitamin-D-25-OH level was >209 and PTH was normal. Interview revealed she was taking 50,000-IU of D3 PO daily for six months. Volume expansion with normal saline and calcitonin successfully decreased the patient's serum calcium.

Diagnostic criteria for reversible Brugada pattern includes four mandatory components. First, an ECG tracing delineating type 1 or 2 Brugada morphology. Secondly, an underlying condition that is identifiable and reversible. Third, complete resolution of the ECG pattern upon correction of the underlying condition. Fourth, a low probability for Brugada syndrome by the lack of symptoms, clinical and family history. Our patient experienced hypercalcemia with palpitations that prompted an ECG. The abnormal ECG produced was read by three experts that independently concluded the ST segment and T wave deviations were consistent with Brugada pattern type 1. The ECG was compared to a year prior which showed normal rate and rhythm. There was complete resolution on repeat ECG when calcium was normal.

Although the mechanism is not completely understood, severe hypercalcemia can cause a reversible type 1 Brugada pattern on ECG. Careful consideration of vitamin supplementation must be discussed with patients to avoid potentially fatal cardiac outcomes.

School: School of Medicine

NATHA, CRISTINA

Anemia Secondary to Pediculosis Capitis

Cristina Natha, Sarah Haque

Pediculosis capitis is a common condition caused by infestation of the hair and scalp by *Pediculus humanus capitis* (the head louse). Transmission of the vector is through contact with the infected host, allowing it to be commonly seen amongst school children. Head lice are known parasites of human blood, however a single louse feeds between 0.004737 and 0.007895 mL of blood per day, leading to insignificant amounts of blood loss in a healthy person with a moderate, short-term infection. Common symptoms of pediculosis capitis are hypersensitivity reactions and pruritus at the infection site. Often, this parasite may also be visible from areas with sparse hair growth, such as around the hairline. Medications labeled pediculicides include permethrin and topical ivermectin, which are utilized as a method of removing lice from infected areas such as the head, eyebrows and eyelashes. Additionally, home remedies are oftentimes seen as secondary measures within populations experiencing a head lice outbreak, especially for individuals who may have been exposed to a host but may not be experiencing symptoms. Although head lice are prevalent in both adult and pediatric populations, there are few studies regarding the consequences of harboring these vectors for extended periods. This study aims to provide further support towards the development of anemia secondary to chronic pediculosis capitis exposure within the human population. This case highlights a 13-year-old female presenting with symptoms of fatigue, palpitations, and dizziness caused by anemia secondary to chronic pediculosis capitis infestation. Treatment included permethrin 1%, ivermectin 24 mg, three units of packed red blood cells, as well as shaving her hair to prevent further infestation. The patient was seen in the clinic one week after the initial encounter and reported improvement of all initial symptoms with improved red blood cell, hemoglobin, and hematocrit levels.

School: School of Medicine

OCHOA, OZMAN

Utilization of Ekos (Ultrasound-Enhanced Catheter-Directed Thrombolysis) in Treating Acute Limb Ischemia

Ozman Ochoa, Leigh Ann Jenkins, M.D.; Mohammad M. Ansari, M.D

With limb amputation due to atherosclerosis being a major risk factor of acute limb ischemia (ALI), an Ultrasound-enhanced catheter-directed thrombolysis (UET) using the Eksonic Endovascular System (EES) was developed to accelerate the fibrinolytic processes, and reduced treatment time and lytic dosages. While this system has shown positive results in correcting pulmonary embolism and aortic occlusions, its efficacy in reducing ALI amputation and reintervention warrants further investigation. Therefore, this case study aims to demonstrate a successful EES utilization that improved the patients ALI status with positive outcomes.

Male age 75 with a past medical history of peripheral arterial disease, ALI Rutherford class IIB, atrial fibrillation, hypertension, dyslipidemia, diabetes was admitted for acute onset of left lower extremity (LLE) pain after doppler demonstrated no flow below the left knee. Ultrasound guided selected LLE angiogram was performed with subsequent percutaneous transluminal angioplasty (PTA) of the popliteal artery (PA) to mid anterior tibial (AT) artery and distal superficial femoral artery (SFA) to the distal PA. Mechanical thrombectomy of the distal SFA to PA with an Angiojet catheter was performed with 2 passes, with subsequent PTA of the SFA to PA and PTA of the DP. A 50cm Ekosonic catheter was successfully placed at the mid SFA to mid AT with resultant TPA. Patient remained stable and discharged home following in-patient care.

Utilization of the Ekosonic catheter with accompanied thrombolytic therapy demonstrates reduced amputation risk and improved lower limb perfusion in a patient with ALI. Therefore, this case study contributes to the literature further efficacy for the Ekosonic's utility in reducing incidence of limb amputation and reintervention. Our case also demonstrates less time utilization as compared to non-Ekos ALI cases, adding on to the economic benefits of patients in treated in the cath lab.

School: School of Medicine

OTI-NIMOH, JOSEPH

Aortic Dissection Leading to Cardiac Arrest and Perimortem Cesarean Section: A Case Report

Joseph Oti-Nimoh, Stanley Eboh, BA, Suna Burghul, MD, Cornelia DeRiese, MD

Aortic dissection (AoD) is rare in young women. Although rare, half of aortic dissection cases in younger women below 40 years old, occur during pregnancy, mostly in the third trimester and in the postpartum period. Typically, it is associated with connective tissue disease, cardiac valve disorders or trauma. Spontaneous AoD is life threatening for both the mother and the fetus especially if the diagnosis is missed or treatment is delayed. During life threatening injury during pregnancy, a perimortem caesarean section may be utilized. The objective of treatment is to provide safety and survival for the mother, with literature suggesting higher likelihood of survival for the fetus as well. In this case, a young 26 year old female at 32 weeks gestation presented to the Emergency Room (ER) due to acute onset of back, left arm and chest pain. Upon arrival she was in cardiac arrest and treated with resuscitations and emergent perimortem caesarean section (PMCS) without recovery. Maternal autopsy revealed aortic dissection. This case presentation serves to provide attention and discuss the clinical approach for critically ill pregnant patients with aortic dissection.

School: School of Medicine

PATEL, PATEL

A case of classic Heyde Syndrome with initial presentation as an NSTEMI

Patel Patel, Bernardo Galvan, Katherine G. Holder, Rajesh Nambiar M.D.

Heyde syndrome is an increasingly recognized triad of aortic stenosis, angiodysplastic gastrointestinal bleeding, and anemia. Only recently has the anemia associated with Heyde syndrome been further explored and discovered to be an acquired von Willebrand factor deficiency caused by turbulent flow distal to the stenotic aortic valve. This case presents a 73-year-old male patient with history of hypertension, mitral valve disease, aortic stenosis, ischemic stroke with current apixaban and aspirin prophylaxis, dyslipidemia and benign prostatic hyperplasia presented with classic acute coronary syndrome symptoms. The patient complained of sudden, severe, tight, substernal chest pain with radiation into his left arm. Further laboratory assessment identified that the patient had an elevated troponin, creatinine, and was severely anemic. The patient unaware of the source of bleeding was subjected to an EGD during which one gastric ulcer, one duodenal ulcer, and diffuse angiodysplasia was noted. Following interventions and withholding of anticoagulation, the patient's hemodynamic status improved and stabilized. Heyde syndrome was an underlying factor of the patient's pathogenesis, but his acute presentation with myocardial tissue damage is rare. This case highlights an unusual initial presentation of Heyde syndrome not currently delineated in the literature.

School: School of Medicine

PATEL, SHREE

A rare case of Hydrocarbon Pneumonitis induced Circulatory Collapse

Shree Patel, Katherine Holder, Bernardo Galvan

Lipoid pneumonia is an uncommon respiratory condition that occurs secondary to the aspiration of fatty substances. Hydrocarbon pneumonitis, a subtype of lipoid pneumonia, is a rare condition that occurs secondary to aspiration of diesel gasoline. Diesel aspiration facilitates an inflammatory reaction in the pulmonary parenchyma, disrupts surfactants, and decreases compliance leading to severe, acute pneumonia or chronic pneumonitis. Fuel siphonage results in a large amount of diesel aspiration and can contribute to an accelerated disease course. This case presents a 34-year-old morbidly obese male with that presented to the hospital after ingestion and inhalation of hydrocarbon diesel fuel while siphoning gas 2 days prior. EMT was called after he was found on the floor by his wife. He underwent 30 rounds of CPR over 3 hours before regaining ROSC. Upon presentation, he was in severe distributive shock, requiring full pressor support. EKG was suggestive of ST elevation MI, elevated troponin, and ABG showed a pH of 7, carbon dioxide of 70, PO₂ of 47, and SPO₂ of 58 on full ventilator support. His condition continued to worsen within 6 hours of admission, so he was started on CRRT. A chest x-ray showed bilateral moderate pulmonary infiltrates. A left heart catheterization showed a non-obstructive cause of MI, and the patient was started on broad-spectrum antibiotics. The patient's acidosis continued to worsen, likely due to pneumonitis induced lung damage. He developed cardiac arrest and family elected to hold resuscitation efforts. Patient passed away. In this patient, siphonage resulted in pneumonitis, causing respiratory failure and toxic exposure leading to severe distributive shock and contributing to the patient's STEMI. A similar report of cardiac arrest following diesel aspiration has not been reported in the literature.

School: School of Medicine

PERABO, ARDEN

Lidocaine and Ketamine as Sedation for Burn Wound Care in a Pediatric Patient: a Case Study

Arden Perabo, Kathryn Robison, Alan Pang MD, Amanda Venable RN, Deepak Bharadia MD, John Griswold MD

This is a case report of a 14-month old developmentally healthy female with partial thickness scald burns of multiple sites of the face, trunk, and bilateral upper extremities. We administered our standard lidocaine and ketamine protocol to perform her daily wound care practices with minimal discomfort. Following the daily protocol, no adverse side effects were observed while also achieving sufficient analgesia and sedation. Currently, there is no literature addressing this combination during burn wound care and dressing changes. The success of this protocol highlights the benefit of a multimodal approach to analgesia.

School: School of Medicine

PEREZ, OLIVIA

Too Young to Seem True: Bloody Diarrhea in a 20 Month-Old-Male

Olivia Perez, Lesley Motheral

Abdominal pain and diarrhea are among the most common chief complaints in pediatrics clinic. It is much more rare, however, for diarrhea to be described as bloody for a prolonged period in young children. Our patient is a 20-month-old male with past medical history of severe eczema and undescended right testicle who presented with initial episode of large volume, painless, bloody stool. Labs in clinic showed positive stool occult guaiac test confirming presence of blood in stool, and complete blood count showed mild anemia. Stool studies were negative for the most common infectious etiologies. Patient was originally suspected to have Meckel's diverticulum, but Meckel's scan did not reveal any abnormality. Colonoscopy performed at age 22 months old showed diffuse moderate inflammation characterized by adherent blood, swelling, redness, friability, and granularity in the entire colon. Colon biopsies sent for histology showed diffuse chronic active colitis. Serum anti-Saccharomyces cerevisiae antibodies (ASCA) were positive while anti-neutrophil cytoplasmic autoantibody (ANCA) was negative, suggesting the diagnosis of Crohn's colitis rather than ulcerative colitis. The patient has continued to follow closely with pediatric gastroenterology for treatment. While peak incidence of Crohn's disease is between ages 15-29, incidence of pediatric cases is on the rise. Very early onset inflammatory bowel disease (VEOIBD), defined as occurring in patients 5 years old and younger, tends to have a unique presentation with increased focality to the colon. VEOIBD is also more difficult to treat with less response to traditional therapies such as steroids, as seen in our patient, as well as less treatment options that are approved for this patient age range. Despite the rare onset of inflammatory bowel disease at a very young age, it is important for clinicians to keep Crohn's on the differential diagnosis for bloody diarrhea, even in infants and toddlers.

School: TTUHSC - Lubbock

PHAM, ANTHONY

Intrauterine Demise: A rare complication of Wernicke Encephalopathy Secondary to Hyperemesis Gravidarum

Anthony Pham, Roy Jacob, MD

Wernicke Encephalopathy is a neurological disorder caused by severe thiamine deficiency that manifests with a common range of clinical features including a triad of global confusion state, ophthalmoplegia, and ataxia. Though frequently associated with the alcohol-dependent population, Wernicke encephalopathy has been seen in other patients where it often goes undiagnosed presumably due to rarity and variable clinical indications.

A 25-year-old woman with a history of hyperemesis gravidarum presented to labor and delivery services with gestational complications resulting in intrauterine fetal demise at week 16 of pregnancy. After receiving postpartum care, the patient was discharged in good conditions. Patient was admitted back to the MICU the following day due to severe altered mental status manifestations leading to sedation and intubation. On evaluation, the patient was hypertensive and tachycardia. Pupils were constricted but reactive. Further neurological examination following extubating portrayed patient status as AOx4 exhibiting ophthalmoplegia as well as slow language. Psychiatric consultation revealed increased episodes of memory loss, confusion, and delirium in the past two weeks before admission into the MICU. These episodes of altered mental status began prior to learning about her intrauterine fetal demise. Patient has no history of alcohol or substance usage.

CT scan of head and chest as well as CT angiogram were unremarkable. MRI of the brain found T2 hyperintensity of medial posterior thalamus, bilateral mammillary body, and periaqueductal region. Diagnosis of Wernicke encephalopathy was entertained through MRI brain imaging. Thiamine deficiency most likely resulted from the period of hyperemesis gravidarum with metabolic disturbances causing Wernicke encephalopathy. IV thiamine replacement therapy was initiated in which the patient exhibited drastic improvements. This case report highlights the importance of Wernicke encephalopathy being considered as a differential diagnosis of acute encephalopathy particularly in women who have experienced fetal demise in conjunction with signs of malnourishment from hyperemesis gravidarum.

School: School of Medicine

PIRTLE, ANDREW

Vertebral Artery Dissection Following Cervical Spine Chiropractic Manipulation: A Case Study

Andrew Pirtle, Katherine Holder, Bernardo Galvan, Yousif Tawqeeq, Mazin Saadaldin, MD

Vertebral artery dissections are gravely concerning, with potential to cause severe neurological complications and possibly death. There are many causes of vertebral artery dissection such as overt trauma or connective tissue disorders, but one cause of rising concern is chiropractic manipulation of the cervical spine. In this case, a 36-year-old female presented with a two-day history of neck pain, nausea, vomiting, blurry vision, vertigo, and a tendency to fall to her left. History revealed a two-week history of headache and neck pain with acute worsening of symptoms following chiropractic neck manipulation two-days prior to presentation. On neurological exam, mild left sided strength and coordination motor deficits were noted. A low grade left sided pronator drift was also noted. Subsequent imaging studies showed bilateral cerebellar infarcts, mainly residing within the territory of the left PICA, along with small caliber changes of the left vertebral artery suggestive of arterial dissection. A comprehensive cardiovascular exam was conducted, with no abnormal findings, ruling out cardiovascular causes of embolization. Antiplatelet therapy was started, with consulting Neurosurgery and Vascular surgery teams suggesting that there were no indications for interventions at that time. With continued antiplatelet therapy and inpatient rehabilitation, the patient's symptoms improved, and she was subsequently discharged to outpatient therapy with Neurosurgery and Vascular surgery follow up. As of this writing, the patient's recovery has continued to follow a positive course. This case displays the importance of physicians and patients to understanding possible complications of spinal manipulation procedures. Preemptive evaluations by a physician before a patient pursues chiropractic manipulation could help decrease the incidence of these adverse events. Both the chiropractor and physician should consider both the patient's overall condition, as well as any underlying vascular conditions before any spinal manipulation is conducted, helping to ensure the patients safety and quality of life.

School: School of Medicine

PORTER, LINDSAY

“But I Feel Fine!”

Lindsay Porter, Haley Hughston, MD; Jenna Duffek, MA, ATC, LAT, RYT; Jennifer Mitchell, MD, FAAFP, FAMSSM

Underlying cardiac issues in athletes can lead to sudden cardiac death (SCD) during activity. Many universities perform pre-participation (PP) cardiac screening, typically including an EKG and echocardiogram, to minimize the risk of SCD.

An 18 year old softball athlete presented to a Division 1 school for freshman PP physical examinations. PMHX: ADHD, no know SARS-CoV-2 Infection Meds: OCP ROS: Asymptomatic Denied: tobacco, alcohol, drug use Fam Hx: HTN VS: BP 140/98 P 110 Physical Exam: entirely normal, no edema EKG: Tachycardia otherwise unremarkable Echocardiogram: Biatrial enlargement; severe dilated left ventricle, normal wall thickness; ejection fraction (EF): 25-30% Cardiac MRI: 4 chamber enlargement, global hypokinesia, EF: 15% Fibrinogen, BNP elevated; CBC, CMP, TSH, Ferritin normal Patient diagnosed with idiopathic dilated cardiomyopathy (DCM), restricted from sports, started on meds

Cardiomyopathy accounts for approximately half of all SCD in athletes, with incidence in NCAA athletes of 1 in 50,000. This is a life-altering diagnosis in an asymptomatic competitive athlete. No genetic or infectious source of the cardiomyopathy has been identified. She is withheld from sports participation due to guidelines advising an EF of >45% in order to participate. Ventricular arrhythmias are common in DCM and represent the greatest risk for SCD. She is cleared for supervised treadmill walking and strength training while waiting to see whether her EF will improve on medications.

History and physical alone will only detect 20% of athletes at risk of SCD. Often, there is no advanced warning of an issue and by adding EKG and Echo screening for life threatening diagnoses is enhanced. Unknown issues at this time are whether this will impact her ability to bear children or if she may ultimately need cardiac intervention. This case exemplifies the benefit of cardiac screening in athletes.

School: TTUHSC - Lubbock

RAEF, ABIGAIL

Endometriosis and Mullerian Anomaly in a Patient with Infertility: A Case Study

Abigail Raef, Bernardo Galvan, Katherine G. Holder, Ashton Hierholzer MD, Robert Kauffman MD

Endometriosis is a chronic inflammatory process driven by estrogen that affects pelvic contents. It is suspected to be caused by retrograde menstruation, leading to implantation of endometrial tissue outside the uterine cavity. Endometriosis is the most common cause of female chronic pelvic pain, presenting as dysmenorrhea, dyspareunia, and dyschezia; it is also strongly linked to infertility. Literature has shown that endometriosis is frequently diagnosed in the setting of Mullerian anomalies, likely because uterine outflow obstructions increase the risk of retrograde menstruation. In this study, we present a case of endometriosis and Mullerian anomaly discovered in a patient with infertility of unknown cause.

A 23 year-old Gravida 1 Para 0 Aborta 1 with polycystic ovarian syndrome, primary hypothyroidism, and hyperprolactinemia presented for an operative laparoscopy/hysteroscopy to diagnose the cause of cyclical pelvic pain and difficulty conceiving. Obstetrical history was significant for a pregnancy of unspecified location in 2018; since then, she had been attempting pregnancy unsuccessfully and was taking letrozole for ovulation induction. A previous hysterosalpingography showed a non-filling right fallopian tube, and preoperative ultrasound suggested an atrophic right uterine horn without endometrial echoes. During the procedure, endometriosis on the bladder and posterior cul-de-sac was visualized. An atrophic right uterine horn was seen connected to a normal fallopian tube. Postoperative diagnosis was conclusive for endometriosis stage I score 4, along with a Mullerian anomaly consisting of a right atrophic horn without an endometrial cavity.

Endometriosis possibly played a role in this patient's infertility, and this case adds to literature suggesting that anatomical anomalies could predispose patients to endometriosis. Because endometriosis is a common cause of infertility, prompt diagnosis is necessary for preserving future fertility. Patients with Mullerian anomalies who desire pregnancy would benefit from further research on this topic, as their anatomy could predispose them to endometriosis, and thus, infertility.

School: School of Medicine

RAICEVIC, STEFAN

Atypical Presentation of Tinea Versicolor in an African American Female - A Case Report

Stefan Raicevic, Kushal Gandhi, Asley Sanchez, Gary Ventolini

Tinea Versicolor is a dermatologic ailment caused by the *Malassezia* genus of fungi. Tinea Versicolor most often affects the lipid-producing sebaceous glands of the neck, chest, back, abdomen, and proximal limbs; symptoms include mild itching and discomfort, as well as sharply demarcated patches of hyper- and hypo-pigmentation that can be made more noticeable after unprotected exposure to sunlight. Diagnosis of Tinea Versicolor can be made via potassium hydroxide normal-saline microscopic preparation, revealing its prototypical spaghetti-and-meatballs appearance. The following patient is an African American female with atypical Tinea Versicolor presentation due to self-management with steroids; treatment with selenium and azole shampoos took several months longer than average to clear the infection, and there was severe inflammation and pruritis. This case report highlights the importance of recognizing unusual presentations of common illnesses such as Tinea Versicolor, especially in diverse patient populations, as well as the negative effects that months of patient-initiated steroid-therapy can have on topical fungal infections.

School: School of Medicine

RAGHURAM, AKSHAY

Biodegradable Temporizing Matrix and Autologous Skin Cell Suspension in Necrotizing Soft Tissue Infection: A Case Report

Akshay Raghuram, Alan Pang MD, Jad Zeitouni MS1, Wooyoung Jang MS1, Nicholas Householder MS1, Deepak Bharadia MD, John Griswold MD, Catherine Ronaghan, MD

Necrotizing soft-tissue infection, or NSTI, is a disease which causes inflammation and eventual death of soft tissue cells. Clinical presentation of NSTIs as well as the bacteria involved vary greatly from case to case. While there are only about 500-1500 cases of NSTIs per year in the United States, the mortality rate is high, ranging from 24-34%. Current treatment models include aggressive antimicrobial therapy and surgical debridement which causes deep divots within the affected site. However, when treated with Biodegradable Temporizing Matrix (BTM), a device that allows tissues to expand after they have healed, the wounded site seems to appear more flushed, leading to cosmetic advantages. Use of BTM also decreases the risk of infection following treatment because the material is inert. In this case study, the patient sustained an NSTI of the right lower extremity and torso measuring 30% of her total body surface area. After initial debridement, biological temporizing matrix (BTM) was applied to integrate for three weeks. Upon delamination, the wound was mechanically debrided to remove all non-viable tissue. The patient's wound was treated with BTM and closed with autologous skin cell suspension and split thickness skin grafts (STSGs). The patient demonstrated a 95% adherence of her grafts on POD 6. This case demonstrates the applicability of biodegradable temporizing matrix (BTM) in necrotizing soft-tissue infections. Compared to conventional skin grafting where the resultant tissue defect is jarring from a cosmetic and functional standpoint, BTM allows for a smoother contour as it provides a layer of expansile tissue between muscle and skin. The advantage of attaining better cosmesis as well as BTM's feasibility in large acutely infected wounds should be considered in future treatment of NSTIs.

School: School of Medicine

RAMON, MIKAL

The Rapid Utilization of Bed-Side ECMO Cannulization to Treat a Patient who coded and had a Massive PE with history of COVID-19 and Moderna vaccine

Mikal Ramon, Leigh Ann Jenkins, M.D., Ralph Paone, M.D., Mohammad Ansari, M.D.

There are multiple studies that have reported variable rates for deep vein thrombosis (DVT) and bleeding among patient with the coronavirus disease 2019 (COVID-19). In addition, at the time of our case, the reports of vaccine-related blood clots peaked further making COVID-19 the topic of discussion in the medical field. We present a case of patient with a history of COVID-19 infection and Moderna vaccine, who was diagnosed with DVT managed with mechanical aspiration thrombectomy that was complicated. Female patient aged 19 with a history of COVID infection one year prior and Moderna vaccine presented with chest left lower extremity pain and swelling and shortness of breath for one week. Abdominal CT scan showed left lower quadrant stranding suggestive of deep vein thrombosis of the left common and external iliac. Patient was hemodynamically stable and had no oxygen requirements; therefore, medical management was initiated. Patient wanted to pursue interventional management with endovascular aspiration thrombectomy due to patient's pain. The patient was taken to the Cath lab where two successful passes using the thrombectomy device was done. Venography showed improvement and recanalization of the left extremity veins. During the final moments of the procedure the patient became unresponsive, likely due to augmentation of pain medication and pulmonary embolism. The patient eventually became bradycardic and lost her pulse. Even though code was ran for an hour the physicians decided to place ECMO at the bedside by interventional cardiology and cardiovascular surgery teams. The patient's post-operative course was uneventful. She had no neurological deficits on discharge and follow-up. Our case demonstrates an example of DVT in a patient with a history of COVID-19 infection and demonstrates the utilization of ECMO which can be done successfully even at bed side. This case is a glaring example of cooperation and coordination between various medical services.

School: School of Medicine

RAO, SANJANA

Atrial flutter leading to Saddle Embolus in Coronary Artery – What happens next?

Sanjana Rao, Nitish Mittal MS4, Mostafa Abohelwa MD, Mohammad Elmassry MD, Scott Shurmur, MD

Embolization is a common phenomenon in atrial fibrillation and flutter cases but an embolus in the coronary arteries is a rare phenomenon. We present a case report of embolization in a patient with atrial flutter who has a saddle embolus in mid left circumflex artery and major obtuse marginal branch.

A 70 year old Hispanic male, with a past medical history of coronary artery disease, hypertension, transient ischemic attack and stroke, presented to ER with acute substernal chest pain that started 3 hours prior to arrival. The patient had noticeable left facial droop, mild left upper and lower extremities weakness, left-sided ataxia, and dysarthria. Patient got admitted to the ICU and was intubated due to acute hypoxic respiratory failure. EKG showed atrial flutter with right bundle branch block. Troponin trended up to 17,000, prompting us to perform left heart catheterization. It showed saddle embolus in mid left circumflex artery and major obtuse marginal branch. Aspiration thrombectomy was performed to remove the saddle embolus, and patient showed improvement after the procedure with decreased troponin levels. Interestingly, the neurology team ordered computed tomography angiogram (CTA) of neck that showed occlusion of right middle cerebral artery. The patient was outside the therapeutic window of tPA and not a candidate for mechanical thrombectomy. Therefore, he was treated medically with anti-coagulation, but the follow-up computed tomography showed hemorrhagic conversion. Patient went into septic shock with hypotension. Unfortunately, the patient was not able to recover from this episode, and his health kept deteriorating with eventual death.

This case highlights the cardioembolic phenomenon secondary to atrial flutter disrupting two organ systems: heart and brain. In our patient, the embolus led to right middle cerebral artery stroke and saddle embolization of left circumflex artery and major obtuse marginal branch.

School: School of Medicine

RAY, NANDINI

An unusual presentation of rounded atelectasis complicated by pulmonary embolism

Nandini Ray, Brittany Tu, Emily Stephens, Drew Payne, DO

Rounded atelectasis is a unique form of lung collapse that occurs when redundant pleura separates from the chest wall, creating a false mass-like appearance. Rounded atelectasis is often asymptomatic, making it difficult to diagnose in the absence of a computed tomography (CT) scan. This case illustrates an association between unprovoked pulmonary embolism and rounded atelectasis.

A 40-year-old female with a history of hypothyroidism and endometriosis presented to the internal medicine clinic with a 3-day history of shoulder and back pain on her left side that worsened on inspiration and movement following strenuous exercise. Vital signs were all within normal limits and a chest x-ray showed no acute injury to bony structures, obvious soft tissue swelling, or pneumothorax. She returned to the emergency department three weeks later with a similar presentation of intermittent pleuritic chest pain and shortness of breath. Upon admission, she had stable vital signs, but a chest CT scan without contrast revealed a wedge-shaped pleural-based opacity in the left lower lung, consistent with rounded atelectasis. A second scan with pulmonary embolism protocol showed bilateral tiny emboli, compatible with unprovoked pulmonary embolism. She was discharged with a full dose of anticoagulation. Upon follow-up, the patient stated that her shortness of breath, chest tightness, and back pain were improving. Her labs revealed an elevation in factor VIII, an elevated lupus type anticoagulant profile, and a negative COVID-19 IgG antibody. Further testing revealed no malignancies.

The characteristic findings of rounded atelectasis upon imaging in which the lesion adheres to the pleura of the lung may suggest a possible malignancy, but the mismatch in clinical symptoms and radiologic findings may prolong the path to initial diagnosis. However, signs of pulmonary embolism should be monitored in patients with radiographic evidence of rounded atelectasis to ensure proper treatment or management of the underlying cause.

School: School of Medicine

RAY, SPARSH

Nitrous Oxide Abuse Associated with Polyneuropathy In 32-Year-Old Female

Sparsh Ray, Kevin Chin, Dan De Simon

The patient is a 32-year-old female with a past medical history of lumbar spine pain since 2019, presented to the electrodiagnostic (EDX) clinic with decreased sensation in both legs and possible weakness. The patient has a prior history of nitrous oxide abuse, alcohol use, and metabolic syndrome. The x-ray from nine days prior showed degenerative joint disease at T11/12 and T12/L1 with some foraminal narrowing as well as degenerative disc narrowing at L5/S1. The patient has abstained from alcohol and nitrous oxide over the past 9 months. The patient smoked 4 to 5 packs a day and had made dietary changes to decrease grain intake as well as processed foods. EDX studies demonstrated a length dependent sensorimotor axonal polyneuropathy with no demyelinating features as manifested by low motor amplitudes and slowed velocities which were not in the demyelinating range. No sensory responses could be elicited.

Nitrous oxide (N₂O) is a gaseous agent used for aerosol canisters, automobiles, as well as sedation in medical and dental procedures. Due to its euphoric, anxiolytic, and analgesic properties, nitrous gas has a high potential for abuse. It has been shown to have neurological side effects, more specifically an axonal rather than demyelinating neuropathy. The gas's toxicity lies in its ability to precipitate a vitamin B12 deficiency, confirmed by remarkably elevated levels of methylmalonyl CoA and homocysteine.

In younger patients presenting with a sensorimotor axonal polyneuropathy, a careful medical and social history including a specific inquiry about previous nitrous oxide abuse. Neurologic toxicity is linked with patients who abuse nitrous oxide. This case suggests that these polyneuropathies can be quite severe and improve following cessation.

*Average age of chronic nitrous oxide abuse was 21 years old

School: School of Medicine

REDDY, ANISH

Atypical Perinatal presentation of Umbilical Cord Hyper-coiling

Anish Reddy, John Rafael

The coiling of the umbilical cord is one of its most predominant and identifying features. The umbilical cord is the conduit between mother and fetus for delivering nutrition and removing waste generated in utero. The variability of coiling can be quantified by the Umbilical Cord Index. Hypercoiling has been associated with different forms of perinatal adverse effects, including non-reassuring fetal tones, 5 minute APGAR score (>7), and low birth weight. The prevalence of hypercoiling in single births can range from 6 to 20% of total pregnancies.

The patient was a 23 year old female G1 at 37.3 weeks with an uncomplicated pregnancy who presented to the OBGYN with decreased fetal movement. In triage, a Non-Stress Test (NST) was completed and resulted as non-reactive, leading to an amniotic fluid level (AFL) being drawn. The AFL showed oligohydramnios and the decision to induce labor was made. ROM showed meconium staining and the fetus did not tolerate the IOL with oxytocin. Late decelerations that did not alleviate with repositioning led to the decision to perform a cesarean delivery. The neonate was 2.85kg and had APGAR scores of 3 and 6 at 1 and 5 minutes, respectively. The placenta showed no abnormalities, however the umbilical cord showed hypercoiling. The neonate was given respiratory care, and then released after 3 days in the NICU.

The atypicality of this case stems from the congregation of perinatal indicators of fetal distress. The mystery around the relationships between adverse perinatal outcomes and the umbilical cord coil density shows potential for correlations to be found. Identification of hypercoiling of the umbilical cord can be done in the second and third trimesters via ultrasound with doppler. Associations between adverse outcomes and umbilical hypercoiling could aid in preparing for complications towards the end of the pregnancy and delivery.

School: School of Medicine

RICHARD, JOSHUA

That Kick Packed A Punch!

Richard, Joshua; Littlejohn, Margaret, MD; Mitchell, Jennifer, MD, FAAFP, FAMSSM; Mitchell, Kelly, MD

Assessing the severity of a sports related eye injuries can be critical to avoid permanent loss of vision. Over 31,000 sport related eye injuries occur annually.

During a match, a 22 year old male collegiate soccer athlete was hit on the right side of the face by the ball at high velocity from a point blank kick. Immediate eye pain and vision changes occurred. Right eye (OD) pain, decreased inferonasal vision, blurry vision to the rest of his eye; “flashing” sensation, floaters in the right eye Mild conjunctival injection, unequal pupillary reflex, miotic pupil non-reactive to light/accommodation, loss of visual field inferonasally Ophthalmology exam: Acuity: 20/80 OD, 20/20 OS. Intra-ocular pressures(IOP): 50 OD, 17 OS (normal 10-21 mmHg) OD: anterior chamber many red cells; posterior: large area of whitish color change, superior temporal retina Diagnosis: Post-traumatic Commotio Retinae with Microhyphema

Initial bed rest due to hyphema; Eye drops to decrease IOP and treat iritis. Initially had “flickering lights,” floaters, and irritation; eventually improved over 2-3 weeks. Medications were weaned as his exam and symptoms improved. Mild blurred vision from the commotio should improve over time, but may not entirely resolve. He returned to activity three weeks after injury. He was encouraged to wear eye protection, but declined.

Commotio retinae is an area of retinal whitening from intracellular edema after blunt ocular trauma. Patients may be asymptomatic or complain of blurry vision, vision loss, blind spots, or wavy lines. Associated ocular injury may occur, as in this case, with increased IOP, microhyphema and traumatic iritis.

Ocular complaints associated with sports trauma should be quickly addressed. If unsure of the extent of injury, formal eye evaluation is essential. Monocular athletes should wear impact resistant frames with polycarbonate lenses.

School: TTUHSC - Lubbock

RICHARDSON, BAYLEY

Uterine Artery Embolization to Treat Hemorrhage in a 12-year-old Female with Sarcoma Botryoides of the Cervix

Bayley Richardson, Komaraiah Palle, Ph.D., Mark Reedy, MD

A 12-year-old, Caucasian, female presented with profuse vaginal bleeding from 18cm x 15cm polyploid mass prolapsed through the vagina. Gynecologic oncology took the patient to surgery and consulted interventional radiology for possible uterine artery embolization (UAE). A cervical embryonal rhabdomyosarcoma (sarcoma botryoides, a rare soft-tissue sarcoma occurring in the lower genital tract of pediatric and adolescent females) was resected, and the vagina packed. The patient was then taken to the IR suite where bilateral UAE was performed with gel foam particles.

UAE is minimally invasive procedure where a catheter is inserted into the femoral artery and guided by using C-arm x-ray machine to the internal iliac arteries then the uterine artery. After intravenous contrast confirmation, small gelatin particles are injected until each uterine artery is occluded.

In this case, bilateral UAE terminated the vaginal bleeding. UAE was chosen to avoid a hysterectomy and preserve fertility. The literature is mixed on fertility in childbearing-aged women following a UAE, and there is no data that evaluates the impact of UAE on fertility in early adolescent females. Following the UAE procedure and treatment of sarcoma botryoides, the patient became pregnant and carried two singleton pregnancies to term without any complications.

We describe the successful use of UAE in a 12-year-old adolescent female who presented to the ED with a large, prolapsed embryonal rhabdomyosarcoma of the cervix. Following intraoperative resection, UAE was vital in preventing life-threatening blood loss while preserving fertility. The novel use of UAE results from few published reports in pediatric literature and fewer describing UAE in pediatric population to successfully manage sarcoma botryoides. To our knowledge, this is the first report documenting UAE, multi-agent chemotherapy, and high-dose-rate brachytherapy followed by successful conception resulting in two uncomplicated vaginal deliveries at term.

School: School of Medicine

RUTAYOMBA, ELWIN

non-operative management of alkali chemical injury in a pediatric patient: case study

Elwin Rutayomba, John Griswold, Jad Zeitouni

Alkaline burns are a subset of chemical burns that are resultant of exposure to substances with a pH greater than 7. In children, these burns are most commonly caused by accidental exposure to household cleaning products. What makes alkali burns unique in particular is that they result in liquefactive necrosis leading to irreversible changes and tissue damage that is continuous and progressive until the pH returns to the physiological level. This is due to the saponification of membrane lipids at a cellular level through combining with free alkali particles that result in an extended change in the pH below the surface of injury that continuously penetrates deeper, causing quick but severe damage.

Current pediatric treatment for chemical burns is via the same protocol as for adults requiring the irrigation of the area with water for eight to twenty-four hours, neutralizing of the base, and if necessary performing invasive reconstruction procedures including skin grafting.

However, there is not much that has been seen in the literature regarding pediatric alkaline burns in general as well as the features or characteristics of recovery from alkaline chemical burns in pediatric patients.

We present a case of a pediatric patient who endured a severe alkaline skin burn due to exposure to a lye-based cleaner and was able to self-recover without the need for any invasive procedure.

School: School of Medicine

SARGENT, EMILY

Atypical Neurocysticercosis in a 64-Year-Old Woman

Emily Sargent, Amaka Odimegwu, MD Whit Walker, MD

Neurocysticercosis is caused by the larval stage of the pork tapeworm, *Taenia solium*. Clinical manifestations depend on several factors such as location, size, and quantity of cysts as well as the inflammatory response of the host. Intraparenchymal cysticerci are associated with seizures.

A 64-year-old Caucasian woman with no known medical history experienced seizure-like activity witnessed by family. She was intubated on scene and brought to the Emergency Department. Vitals were significant for hypertensive emergency and bradycardia. A computed tomography (CT) scan of the head and neck were unremarkable. She was transferred to the ICU where fentanyl and versed were started. Four days after admission, the patient underwent a spontaneous breathing trial. She was unable to regain consciousness despite being off sedation and on minimum ventilation settings. Repeat CT showed no acute intracranial abnormalities. Neurology was consulted and recommended MRI. MRI showed three cerebral and cerebellar lesions associated with mild edema suggestive of neurocysticercosis as well as a right anterior temporal resection cavity secondary to past right frontotemporal craniotomy. Infectious disease was consulted and recommended high dose dexamethasone and albendazole for two weeks. After initiation of medications, the patient regained consciousness and was extubated the following day. When later asked about her diet she was adamant she and her household did not consume pork products or travel recently. While the patient's mental status improved, she remained physically weak. She was counseled on the need for physical rehabilitation and agreed to a skilled nursing facility for continued care.

Individuals with no history of pork consumption or travel to endemic areas can develop neurocysticercosis. Epidemiologic evidence suggests the most common source of infective eggs is an asymptomatic household tapeworm carrier. Further studies of the epidemiology and pathophysiology of *T. solium* are needed to develop better preventive strategies in this population.

School: School of Medicine

SCHRADER, KAYLEE

Case Report: Presentation of Paraesophageal Hernia After Gastroschisis Repair in a Neonate

Kaylee Schrader, Sheila Chandrahas, BS; Muhammad Subhani, MD; Janet Meller, MD; Jason Nirgiotis, MD

Gastroschisis is a rare congenital anterior abdominal wall defect with protrusion of unencapsulated intestines, typically to the right of the umbilicus. Complications include fetal growth restriction, bowel ischemia, and intestinal atresia. A paraesophageal hernia is the protrusion of the stomach through a diaphragmatic defect into the thoracic cavity, with Gastroesophageal Reflux (GER) being the most common sequelae. This case report discusses the rare co-occurrence of gastroschisis and paraesophageal hernia in a neonate with failure to thrive.

A 27-year-old, gravida 6 para 4, gave birth via cesarean section to a premature female at 34.3 weeks gestation, weighing 1540 g. Apgar score was 7 and 9 at 1 and 5 minutes. The neonate was admitted to the NICU for intrauterine growth restriction and gastroschisis right of the umbilicus, with the small and large bowel, appendix, stomach, spleen, and left fallopian tube eviscerating through a full-thickness abdominal wall defect. A staged closure of the eviscerated organs using a silo was performed. On the 6th postnatal day, the silo was removed, and the eviscerated organs were surgically closed in the abdominal cavity. After near full oral feeds were achieved, the neonate had a period of regression with frequent moderate volume regurgitations. On the 35th postoperative day, an upper GI series with small bowel follow through found a large paraesophageal hernia with severe reflux traversing up the thoracic inlet. The paraesophageal hernia was subsequently repaired with Nissen Fundoplication and gastrostomy tube placement. The infant restarted oral feeds and was discharged the subsequent week with a final weight of 2188 g.

Although GER is common in neonates, further consideration of a paraesophageal hernia in neonates with gastroschisis is necessary. An upper GI series with small bowel follow through can prevent failure to thrive and delay in diagnosis and treatment in these patients.

School: School of Medicine

SCHUCK, ALEXIS

Extramedullary Presentation of B-cell Acute Lymphoblastic Leukemia in a 5-year-old Male

Alexis Schuck, Chukwunonye Ogbuji MD, Niki Sankoorikkal, Samer Zaid-Kaylani MD, Smita Bhaskaran MD

Acute Lymphoblastic Leukemia (ALL) is the most common childhood leukemia. ALL can present with bleeding, fever, enlargement of lymph nodes, liver, and spleen, as well as bone pain. In 25% of cases, bone pain is the first symptom. This results from direct leukemic infiltration of the periosteum, bone infarction, or expansion of marrow cavity by leukemic cells.

To highlight the similarities in presentation of Ewing's Sarcoma and extramedullary presentation of B-ALL to better understand diagnosis, treatment, and incidence of such cases.

This is a case report with literature review.

A 5-year-old male was referred to our pediatric hematology and oncology clinic for severe pain in the left shin following a fall at school. Bone tumor was initially suspected to be Ewing sarcoma. Bone marrow aspiration and biopsy showed blasts consistent with precursor B-cell Acute Lymphoblastic Leukemia. The patient was started on the induction phase of Children Oncology like protocol AALL0932. Patient is currently in remission and has reported no further episodes of bone pain.

While ALL commonly presents in sites of lymphocyte development, extramedullary manifestation can occur. This case underscores the importance of considering less common presentations of ALL as a differential diagnosis. With contributions from research organizations such as the Children's Oncology Group, prognosis for pediatric cancers, including ALL, have improved significantly over the years. Continuing trials and research allows for advancement in treatment, consolidation of resources, and coordinated care and support for patients and their families.

School: School of Medicine

SEATON, CHELSEA

HSV Encephalitis Deterioration Despite Initiation of Antiviral Therapy

Chelsea Seaton, Megan Clapp, Jessica Pathrose

Herpes simplex encephalitis (HSE) is inflammation of the brain and despite antiviral therapy, remains a devastating disease with significant morbidity and mortality. We present a case of a 17-year-old previously healthy female who presented with altered mental status and subjective fever. A lumbar puncture was performed in the emergency department on arrival and it was discovered the patient was positive for herpes simplex virus type 1 (HSV-1) in the cerebrospinal fluid. She was immediately admitted to the pediatric floor and started on IV acyclovir. On day four of admission, the patient experienced new onset vomiting, headache, and neck pain. Brain MRI revealed worsening edema with mass defect and bilateral uncal herniation, a potentially fatal complication. She spent the next four days in the pediatric intensive care unit receiving mannitol, steroids, and hyperosmolar fluids to decrease intracranial pressure. Neurosurgery was consulted and recommended against surgical intervention. After 21 days in the hospital and a near fatal disease complication, the patient was discharged home with only slight impairment of short term memory. This case demonstrates the importance of considering HSE when a patient presents with fever and altered mental status. Initiation of treatment without delay is crucial for good neurological outcomes. Even with early initiation of IV antiviral therapy, as in this case, patients can have rapid deterioration following a period of clinical stability. Care for these patients should take place at a center with pediatric neurosurgery and ICU level care.

School: TTUHSC - Lubbock

SIDDIQUI, KHAJA

Disseminated Intravascular Coagulation in Burn: A Case Report

Khaja Siddiqui, Alan Pang MD, Deepak Bharadia, MD MPH, John Griswold, MD, Jad Zeitouni BBA

Disseminated intravascular coagulation (DIC) is characterized by the overactive formation of blood clots and increased bleeding in the body generally due to a complication of another disease or clinical disorder that activates the coagulation cascade. Severe burns present as risk factors in developing DIC. This study presents a case of a patient who experienced a severe burn injury and DIC.

The patient presented with sustained 50.5% Total body surface area (TBSA) burns status post an oilfield explosion involving a gas pipeline. After the patient's initial excision and graft surgery, the patient had to be sent back to the OR for emergent hemostasis management, due to increased bleeding from bandages. During this procedure, the patient continued to face challenges in hemostasis despite administration of multiple units of blood, platelets, Desmopressin, Cryoprecipitate, Fresh frozen plasma (FFP), and Factor 7. DIC was attributed as a probable cause. Throughout the patient's hospital course, Factor 7 was the most helpful in controlling bleeding.

For operative procedures, aminocaproic acid was used to alleviate possible complications from fibrinolysis. Epinephrine soaked Telfa, laparotomy pads, fluff dressings, and Tubigrip was also used to achieve hemostasis. Ultimately, the treatment for DIC is to address the underlying pathology that may be causing coagulopathy. In this case, the patient's active DIC resolved once his burn was excised in entirety.

Once the burn was excised, this allowed for effective grafting of the majority of the patient's wounds. At discharge the patient's burn had recovered more than 35.5% in TBSA.

This is a rare diagnosis of DIC in a large area burn patient. This made for a complicated treatment plan given the large volume blood loss possible from excision and grafting of burn patients. This patient was effectively treated with the appropriate blood products to complete the excision of his injury and abate DIC.

School: School of Medicine

SISCO, JESSICA

Failure to Thrive Secondary to Hypervitaminosis D in an Infant

Jessica Sisco, Joseph Cafferata III, MS, Amy Davis, Ngozi Eboh, MD

This report describes hypervitaminosis D in a breast-fed infant following unintentional over-administration of Vitamin D (Vit D) supplementation, resulting in hypercalcemia and poor feeding with subsequent failure to thrive (FTT). The infant improved after intervention with intravenous fluids, furosemide, and steroids. Unintentional excessive administration was due to the use of different formulations of Vit D and miscommunication between medical providers and the family regarding the appropriate dose of Vit D. This patient's story highlights the existence of varying formulations of Vit D supplementation, some of which differ from the usual over-the-counter Vit D drops commonly known to pediatricians. Therefore, a potential for error and harm exists if care is not taken to note the type of formulation and calculate the appropriate dose accordingly.

School: School of Medicine

SOETAN, FEHINTOLA

Focal and Segmental Glomerulosclerosis and Crescentic Glomerulonephritis following COVID-19 infection: A Case Report

Fehintola Soetan, Patricia Aristimuno, Kuldeep Lohano

Recent studies have reported renal involvement as a manifestation of COVID-19 infection. Here, we report a case of Focal and Segmental Glomerulosclerosis (FSGS) and Crescentic glomerulonephritis following COVID infection. A 49-year-old male with no past medical history presented with peripheral edema and rashes while incarcerated and was found positive for COVID-19. Following release from jail, he presented to a hospital in New Mexico with peripheral edema. He was found to have elevated Antistreptolysin O titers, was treated with diuretics, and was discharged with a Creatinine of 2.5. Two weeks later, he presented to the same hospital with worsening peripheral edema, and new onset hematuria. Serum Creatinine at this time was found to be 5.5. Patient was transferred to UMC for renal biopsy. Upon UMC admission, his serum creatinine had risen to 6.3. Patient was started on Lasix for his edema. Persistent creatinine increases prompted initiation of high dose IV steroids for 72 hours. Initial renal biopsy was inconclusive. Urinalysis was positive for hematuria and proteinuria. Renal ultrasound showed increased echogenicity in both kidneys. Second renal biopsy performed 6 days later revealed FSGS and crescentic glomerulonephritis. Patient was restarted on IV steroids for 6 days and then high-dose prednisone. Hematuria, proteinuria, and kidney function began to improve. This case report aims to add to reports of COVID-19 as a possible precipitant of glomerular disorders.

School: School of Medicine

TAYLOR, BRIANNA

Homozygous POMC Mutation In Hispanic Male with Obesity and Adrenal Insufficiency

Brianna Taylor, Gabriel Arevalo

Some forms of obesity are genetically determined and can be very difficult to correct with lifestyle modification alone. For three very rare forms of genetically determined obesity, however, the FDA has approved treatment with melanocortin-4 receptor agonists. One of these forms of obesity is related to proopiomelanocorticotropin (POMC) gene defects, which often leads to red hair, early-onset obesity, and congenital hypocortisolism.

We identified a 21-year-old Hispanic male with a homozygous mutation in the POMC gene. He presented to us with the triad of adrenal insufficiency, obesity, and a red tint to his hair, as well as hypothyroidism, asthma, and IgA nephropathy. This mutation has been reported only once before in a person with epilepsy, but no additional phenotypic or genetic data were provided for that person (PubMed ID: 26795593).

The patient was born at 8 months gestation to a preeclamptic mother and shortly thereafter was diagnosed with adrenal insufficiency as he struggled with his blood pressures and glycemic control. In the newborn period, he began having seizures that were controlled by medications. At only six months of age, he began showing signs of excessive weight gain. At three years old, he was diagnosed with asthma, and at ten, renal insufficiency and hypertension. The patient now has a number of medical conditions directly related to his POMC mutation and complications of obesity. The patient has recently been initiated on Imcivree (setmelanotide), a melanocortin 4 (MC4) receptor agonist, for weight control.

Genetic evaluation has become an essential tool in pediatric clinical practice for very early onsets of severe obesity because of new treatment availability. It may help not only maintain a child's weight, but also prevent obesity related complications later in life.

School: School of Medicine

TERZIYSKI, ILINA

Where is the Pectoralis?: A Unique Case of Poland Syndrome in Puberty

Ilina Terziyski, John Mistrot, MD; Rakhshanda Layeequr Rahman, MD

On rare occasions, a baby is born without pectoral muscles. This condition, known as Poland syndrome, affects 1/10,000 to 1/100,000 live births. Poland syndrome is characterized by a complete or partial absence of pectoral muscles – most commonly the pectoralis major which in 93% of cases is unilaterally absent. Individuals with Poland syndrome may also have aplasia or hypoplasia of other chest wall muscles, absent rib cartilage, high-riding scapula, brachydactyly, syndactyly, amastia, and/or athelia.

A 9-year old girl presented to the breast clinic with a chief complaint of an asymmetric chest. Menarche was 2 months ago. She reported no shortness of breath, breast/chest pain, abnormal discharge, or lumps in her breasts or axilla. Upon physical exam, the patient had absent right-sided breast tissue and no palpable right pectoralis major. Nipples were present bilaterally, and we did not observe any rib, scapula, or hand abnormalities. A bedside ultrasound of the right chest wall confirmed the absence of a right pectoralis major. The abnormality was causing concern in the parent and affecting the patient's self-image. We diagnosed the patient with Poland syndrome and scheduled her for prosthesis fitting at the breast cancer clinic to help her feel like she fits in better with her other female classmates. When the patient reaches adulthood, she may get reconstructive breast surgery if desired.

Although Poland syndrome does not cause any known malignant symptoms, girls with Poland syndrome who have associated amastia would benefit from early detection and education. Once they reach adulthood and their contralateral breast has fully developed, these young women may elect to have reconstructive breast surgery. Until that time, especially during puberty, we should offer them interventions like prosthetics.

School: School of Medicine

THOMPSON, CHRISTOPHER

Transgenderism in Monozygotic (Identical) Triplets Case Report

Christopher Thompson, Carly Guerra

The origins of transgender identity are complex and involve genetics, hormones, environmental factors, and subtle differences in brain development and physiology. Historical twin studies implicate a genetic role in the formation of gender identity.

Present further support of a genetic role in gender identity in a case report of monozygotic (identical) triplets who have transitioned from female to male.

Psychological and endocrine records from a university transgender health program.

Each triplet has experienced gender dysphoria from childhood and undergone medical and some aspects of gender affirming surgical procedures.

This unusual case of transgenderism among a set of monozygotic triplets adds support for a genetic role in gender identity formation.

School: School of Medicine

TOMPKINS, CHRISTINA

Klippel-Trenaunay Syndrome: A Case Report

Christina Tompkins, Dr. Alam

Klippel-Trenaunay Syndrome (KTS) is a rare and complex multisystem overgrowth syndrome associated with PIK3CA gene mutation. It typically presents with a triad of distinguishing features at birth with the following: port-wine stain, cutaneous capillary and venous malformations, and soft tissue and bony extremity hypertrophy. These findings are classically seen unilaterally in a lower extremity compared to an upper extremity or trunk. KTS has an unknown incidence and prevalence, with no significant preference in sex or ethnicity.

This case report discusses the atypical presentation of KTS in an 11-year-old male. More specifically, this individual was found to have multiple port wine stains involving the right lower abdomen and genitalia. This in-depth analysis will highlight the symptoms, signs, diagnosis, differential diagnoses, treatment, and follow-up of this patient. Qualitative data was collected from this patient's encounter at the clinic and was compared to previous KTS presentations in the pediatric population. Due to KTS' rarity, it is important to raise awareness and spread medical knowledge about its classic and atypical presentations so future KTS patients are not misdiagnosed.

School: School of Medicine

TRAN, ALISON

Use of Penumbra and EKOS Ultrasonic Device in Treating Submassive Pulmonary Embolism in Obese Patient

Alison Tran, Leigh Ann Jenkins, M.D, Mohammad M. Ansari, M.D.

Mechanical thrombectomy has been used for recanalization of occluded arteries with limitations among the obese population. Inari FlowTriever System is indicated for pulmonary embolism (PE), however there are limitations when dealing with obese patients and concerns regarding growing excess complications. So in such patients, the combination of Penumbra and the EKOS device has been shown to effectively remove the clot and treat with thrombolytic agents. We report a case of a submassive pulmonary embolism in an obese patient.

A 46 year-old obese, female patient with a PMH of PE presents with bilateral PE. CT scan confirmed acute PE and clinically patient was in hypoxic respiratory failure. The combination of aspiration thrombectomy and EKOS ultrasonic valve utilization was pursued to treat the submassive PE with cor pulmonale. Right heart strain confirmed on echocardiogram. Penumbra's aspiration thrombectomy was used first to deliver pure, continuous vacuum to the catheters to remove the embolism in the pulmonary artery. Placement of the EKOS device was then used to deliver low intensity ultrasound to unwind fibrin and expose plasminogen receptor sites necessary for the binding of thrombolytic agents. To establish recanalization, tissue plasminogen activator (tPA) drip, a thrombolytic agent, was continued through EKOS catheter for 6 hours as per the Seattle II Trial. Significant improvement in the lesion was noted. Post-operative course was unremarkable, and patient was transferred out of CICU for on-going care and subsequent discharged on room oxygen.

Our case validates that using Penumbra and the EKOS device combination is a good option in treating a submassive pulmonary embolism with cor pulmonale in an obese patient. Therapy time of 6 hours proves to be most beneficial, economical, safe, and feasible.

School: School of Medicine

TRAN, VENUS

Systematic Review of Atypical Croup Presentation in Pediatric Patients

Venus Tran, Dr. Rahul Varman

Croup is a virus caused by parainfluenza, an RNA virus that causes a seal-bark like cough and stridor in young children most commonly between 18 and 24 months of age. Typically, croup is a common respiratory illness with a clinical course that is well defined with a majority of cases being self-limiting and not requiring any hospitalization. There are, however, atypical presentations of croup which causes difficulty in diagnosis and effective treatment. This case study aims to integrate published information about atypical croup including diagnosis and treatment. Peer-reviewed journals looking at pediatric patients less than 18 years old with diagnosis of atypical croup were reviewed. Patients ranging from 1 month to 9 years with the diagnosis of atypical croup was selected for this case review. Many atypical croup cases involve critically ill patients who require intubation. Additionally, they can be associated with esophagitis, atopy and airway lesions. Atypical croup is inadequately defined. The term is used to describe croup like symptoms that do not follow the typical disease course.

School: School of Medicine

TREVINO, MARIANA

Bilobate Placenta with Intervillous Thrombosis and Infarct— a report of good neonatal outcome

Mariana Trevino, Asley Sanchez, Gary Ventolini

A bilobed placenta (bipartite placenta, placenta bilobate) describes a variant of normal placental morphology in which the placenta is separated into two near equal-sized lobes. The umbilical cord may insert into either lobe, in between both lobes, and/or as a velamentous cord. The estimated incidence is approximately 2-8% of placentas [1]. Bilobate placenta can be associated with an increased risk of first trimester bleeding, polyhydramnios, abruption, and retained placenta [2]. Prenatal diagnosis of bilobed placenta is important for appropriate patient management at the time of delivery and treatment of complications. We report a case of a 42-year-old G1P1 African American female with a history of infertility, intrauterine insemination, diabetes mellitus type II, and cigarette smoking. She underwent an uncomplicated pregnancy course, however decided to continue smoking despite extensive counseling. At 39 1/7 weeks-gestation, the patient underwent a caesarean section for repeat deep decelerations and birthed a female neonate with an uncomplicated outcome (3,650 g, APGARS 5 and 9). At delivery, the placenta showed to be bilobate with an evident infarct. PICTURE 1. Microscopic placental examination of the placenta revealed intervillous thrombosis and the infarct was confirmed. PICTURE 2. Neonate continued to do well and both patients' postpartum period were uneventful.

School: School of Medicine

TUAZON, CAMERON

Negative pressure wound therapy and Autologous Skin Cell suspension in large area necrotizing soft tissue: A case report

Cameron Tuazon, Jad Zeitouni BBA, Alan Pang MD, Akshay Raghuram BA, John Griswold MD, Catherine Ronaghan MD

Split thickness skin grafts (STSGs) are commonly used for healthy wound coverage. Autologous skin cell suspension (ASCS) is a means by which a STSG is harvested and processed into a spray application of epidermal cells in order to decrease healing duration. Negative pressure wound therapy (NPWT) uses negative pressure to stimulate granulation of a wound by stabilizing, reducing infection risk via decreased bacterial load, and stimulating capillary formation. This case report describes the use of ASCS with NPWT on a large wound after debridement of a necrotizing soft tissue infection (NSTI).

The patient had a NSTI of the right lower extremity and torso measuring 30% of her total body surface area. After initial debridement, biological temporizing matrix (BTM) and applied and allowed to integrate for three weeks. Upon delamination, the wound was mechanically debrided to remove all non-viable tissue. STSGs were harvested in standard fashion to a depth of 0.015” from the left lower extremity and abdomen. ASCS was prepared in the standard fashion from a STSG harvested at a depth of 0.008”. Fibrin sealant was applied and STSGs affixed to the wound. ASCS was sprayed over the STSGs and donor sites. A NPWT dressing was applied with the standard black sponge and clear plastic. The dressings were taken off on a postoperative day (POD) 6.

The patient demonstrated a 95% adherence of her grafts on POD 6. At POD 9, the wound was 95% closed and left open to air with application of lotion.

This case demonstrates the efficacy of NPWT as a dressing for ASCS and STSG. The combined use of these methods could provide more efficient and effective closure for large wounds.

The combined use of NPWT and ASCS and STSG could be an effective practice to mitigate long healing times of large wounds.

School: School of Medicine

VEMULAPALLI, VARUN

WHEN YOU HEAR HOOVES, THINK ZEBRAS: DIAGNOSING CAUDA EQUINA IN PATIENTS PRESENTING WITH PERIPHERAL ARTERY DISEASE

Vemulapalli, Varun; Holder, Katherine Grace; Kankam, Alfred; Daines, Benjamin; Nambiar, Rajesh

A 49-year-old hispanic male with a history of obesity, hyperlipidemia, 20 pack-year smoking history, and type 2 diabetes mellitus presented to a cardiology clinic for evaluation of peripheral vascular disease. His cardiovascular diagnostics were unremarkable. The patient’s primary symptoms were new onset bilateral numbness and weakness in his legs. He experienced a similar episode one month ago where he lost feeling in his lower limbs and felt weak for 1-2 days. The episode lasted 1-2 days and fully resolved without medical intervention. The current episode of weakness began 2 weeks ago while the patient was operating a lawn mower at his job as a city landscaper. His symptoms of weakness and numbness worsened and do not have any exacerbating or relieving factors. The patient initially attributed his leg weakness to heart disease or diabetic neuropathy. He could not think of any trauma for these episodes, and says his only associated symptoms are lower back pain and occasional episodes of fecal and urinary incontinence. Before this episode, the patient was extremely active with no physical limitations. Recently he has been ambulating with the help of a cane. Brief neurological examination revealed lower leg bradykinesia, unsteady gait, inability to elevate his right leg, and difficulty standing unassisted. At this point, a probable diagnosis of spinal cord dysfunction was made. He was scheduled urgently for an MRI of the spine to evaluate for cauda equina or conus medullaris syndromes. Both of these syndromes are rare (1/100,000) and overlap in anatomy and clinical presentation as outlined in Figure 1. MRI revealed shortened pedicles combined with multi-level lumbar spondylosis producing severe spinal stenosis from L1-L5 with crowding of the cauda equina nerve roots. Additionally, multilevel neural foraminal narrows to a severe degree from L4-S1 contributed to the motor and sensory deficits experienced by this patient. Emergent surgical decompression was planned after clearance from the patient’s cardiologist. This case demonstrates the high level of clinical suspicion required to diagnose diseases outside a physician’s daily purview. In cases such as this one, the patient receives the highest quality of care when providers work collaboratively and utilize a multisystem approach to holistically evaluate a chief complaint.

School: School of Medicine

WYNN, ADAM

An Early Outpatient Presentation of Stevens-Johnson Syndrome

Adam Wynn, Joshua A. Peterson, William “David” Boothe, Cloyce L. Stetson

Stevens-Johnson syndrome (SJS) and toxic epidermal necrolysis (TEN) are medical emergencies with death rates of 5% and 25%, respectively. Given the severity of these conditions, early diagnosis and intervention is crucial in maximizing patient outcomes. Unfortunately, SJS and TEN are commonly misdiagnosed and are usually identified in an inpatient setting. We present the case of a 48-year-old male who presented to our outpatient clinic with desquamation and pruritic dusky papules and plaques affecting the trunk, face, lips, genitals, and eyes, vision problems, weakness, and a mild fever. The patient was subsequently diagnosed with SJS that progressed to TEN in correlation with several newly started medications. While uncommon, recognition of early SJS in an outpatient setting can expedite treatment, thereby reducing morbidity and mortality. We hope to educate other medical providers on the early presentation of SJS so they can initiate treatment in future patients in a more timely manner.

School: School of Medicine

XU, TIFFANY

Multifactorial Causes of Altered Mental Status in Elderly Patients

Tiffany Xu, Bala Mohanakrishnan, PGY-2

Altered mental status is a common chief complaint among elderly patients and is usually secondary to another underlying condition. A 77 year-old male with a past medical history of HTN, CAD, COPD, GERD, depression, and chronic hypercapnia was admitted for altered mental status (AMS), encephalopathy, and hypoxia. During the initial few days of admission, the patient was confused and combative. Wound cultures in the left forearm showed growth of *Stenotrophomonas* species and was treated with Bactrim. Neurology was consulted for AMS and suggested to stop all narcotic use and to start antipsychotics for combative behavior. Sleep injection strategies with benzos and short-acting pain medications were attempted, however, there was no benefit. He continued to be sleepy and three episodes of code orange were called on him. A few days later, he was found to have desaturated to 70s with a GCS of 3 and was intubated for mixed respiratory failure. Chest tube was placed and drained pleural fluid bloody in nature likely from trauma. Echocardiogram showed left ventricular diastolic dysfunction. Patient was noted to be grossly fluid overloaded and Lasix was initiated. He needed inotrope support post intubation likely due to sepsis versus IV sedation use. Post diuretic he was found to be in hyposmolar hyponatremic state and SIADH work-up was negative. This was resolved after treatment with hypertonic saline. Work-up for multiple myeloma showed 2 oligoclonal bands spike and cytology results are pending and need to be followed outpatient. The possible cause for altered mental status was possibly from multiple etiology including chronic narcotic use, diastolic heart failure, fluid overload, severe COPD and kyphotic spine. He is advised to avoid using Norco on a regular basis. For patients with acute mental status changes, thorough work-up is necessary to address the underlying cause to prevent potentially life-threatening consequences.

School: School of Medicine

YOUSSI, BRANDON

Stoma Retraction in Super-Morbidly Obese Patient Leading to Class IV Midline Wound: A Cautionary Tale

Brandon Youssi, Ryan Morgan, Albin John, Shirley McReynolds FNP-C, Yana Puckett MD, Catherine Ronaghan MD.

Stoma creation is often necessary for fecal diversion in general surgery. Creation of stomas involves mobilization of either the large or small intestine through the abdominal wall in order to allow for the passage of waste that traverses the intestinal tract. Among the complications of stoma creation, particularly in the obese patient, is stoma retraction whereby the stoma retracts greater than 5 mm from the skin. This is often accompanied by extensive dermal dehiscence, which can lead to extensive leakage resulting in infection. Here we present the case of a super-morbidly obese female patient with an end ileostomy following total colectomy in which abdominal closure was not initially achieved. The stoma became retracted and dehisced leading to continued contamination of the open abdomen, necessitating multiple abdominal washouts. Injection of 300 units botulinum toxin A was administered into the abdominal wall muscles on later the same day of her index operation. An Abdominal Wall Reapproximation Anchor (ABRA) dynamic tissue system (DTS) was utilized successfully in subsequent operations for primary myofascial closure. Heavy continuous contamination of the midline wound through the subcutaneous cleft between the retracted ileostomy and midline surgical wound was treated with intensive wound care, strict bedrest, nothing to eat or drink (NPO) and total parenteral nutrition (TPN). Post-operative stoma complications occur frequently, and stoma retraction is commonly encountered, especially in the obese patient. The patient presented in this case study had multiple risk factors which led to a complicated and difficult treatment course. Successful primary myofascial closure and complete healing of midline surgical wound, highlights the importance of a patient tailored multi-modal approach.

School: School of Medicine

ZEITOUNI, JAD

USE OF DYNAMIC TISSUE SYSTEMS (DTS) ADHESIVE SKIN CLOSURE DEVICE AND MTP PORCINE XENOGRAFT TO ACHIEVE PRIMARY CLOSURE AFTER WIDE LOCAL EXCISION OF A MELANOMA

Jad Zeitouni, RA Collins, P Arledge, Y Puckett, C Ronaghan

Malignant melanoma accounts for only 1 % of all skin cancers but is the leading cause of skin cancer deaths. Treatment is multi-modal, but wide local excision is typically utilized. Often, there are soft tissue defects that are not amenable to primary closure. The DTS adhesive skin closure device is designed to achieve the primary closure of large wounds utilizing dynamic tension. We present a case report of a melanoma involving the posterior calf, the resulting soft tissue defect was successfully, primarily closed with the DTS adhesive skin closure device.

A 61-year-old male presented with a pigmented lesion mid, right posterior calf measuring 1.3 centimeters in maximum dimension. A narrow excisional biopsy revealed a superficial spreading malignant melanoma with a Breslow depth of 1.1 mm. The patient underwent a 2 cm wide local excision of the melanoma biopsy site. The resulting soft tissue defect dimension: 11 cm length by max 9 cm width by 1.0 cm depth. The soft tissue defect could not be closed primarily. The DTS adhesive skin closure device was applied. Primary skin closure was achieved post-op day 7. The DTS adhesive skin closure device remained in place for ten days after primary closure to offload tension on the primary skin closure. The patient was ambulatory and able to participate in his daily activities with the DTS adhesive skin closure device in place. One month postoperatively, the patient was back participating in full activities including multiple 18-hole rounds of golf every week.

This case highlights the use of dynamic tissue systems to achieve primary closure in the setting of soft tissue loss. It is another option to be considered by dermatologists and surgical oncologists when dealing with cutaneous malignancies requiring more extensive soft tissue excision where primary closure cannot be achieved.

School: School of Medicine

ZHU, CHRISTINA

Management of complex sternal wounds with bilateral pectoralis major advancement flap in delayed setting

Christina Zhu, Ferris Zeitouni, BS, Theophilus Pham, MD, Deepak Bharadia, MD MPH

Management of sternal wounds following open cardiac procedures is complex due to increased morbidity and mortality. Deep sternal wound infection (DSWI) and superficial sternal wound infection (SSWI) following median sternotomy occur in 1-3% and 0.5-8% of patients respectively. Common sternal wound management techniques include vacuum-assisted closure (VAC) and/or flap reconstruction following thorough debridement and establishing a clean wound bed. We present a case-series of three male patients who had median sternotomies that were complicated by wound dehiscence (WD) post-operatively and subsequently managed using bilateral pectoralis major advancement flaps (BPMAFs) following varied amounts of wound VAC therapy.

The 3-male patients presented were 57, 60, and 70 years of age. Duration between their original cardiac surgery and development of wound complication was 13, 29, and 37 days. Flap reconstruction using the BPMAF was used to achieve primary sternal wound closure. Duration between final debridement and the flap surgery were: 19, 41, and 168 days.

The first patient was successfully discharged from the hospital without post-flap surgery complications. The second patient had successful coverage of the sternal wound but developed bleeding related to anticoagulation five days later. He succumbed to multiple medical comorbidities and unrelated subsequent complications. The third patient with seven months of conservative management followed by flap surgery and successful mediastinal coverage developed sepsis but recovered well. He had a wound dehiscence post-operatively requiring further local wound care but continued to have adequate coverage of his mediastinum.

Complex deep sternal wound infections following cardiothoracic surgery are typically treated early with debridement followed by immediate flap coverage. This has led to significant reduction in overall morbidity and mortality. However, when presented in delayed fashion, BPMAF remains to be the best option in sternal wound reconstruction for its versatility and proximity to the wound.

School: School of Medicine

CLINICAL RESEARCH - CHART REVIEWS AND SURVEYS: SCHOOL OF MEDICINE, RESIDENTS AND CLINICAL FELLOWS

ABIDI, HUSSAIN

Exploring the Relationship between Serum Manganese and Patient Morbidity in a Burn Center

Hussain Abidi, Deepak Bharadia M.D. MPH, Alan Pang M.D., John Griswold M.D.

Amongst all hospital admissions in the United States, patients admitted for burn injury treatment make up 40,000 admissions each year. The process of intense healing and tissue repair can last for weeks after the primary insult. Alongside the slow healing and slew of procedures is the possibility of concomitant nutritional deficiencies, which can precede delays in wound healing, inflammation, and infections. Amongst the many measures in patient metabolic and chemistry panels, the least regarded are serum concentrations of trace minerals. Trace minerals are present in living tissues in small amounts but are known to be essential to processes within the human body, functioning as catalysts in enzyme systems, mediators of reaction and essential cogs of many proteins. One such trace mineral is Manganese. Manganese is found throughout bones, the liver, kidneys, and pancreas, functioning to help form connective tissues, bones, blood clotting factors and sex hormones. It plays a role in fat and carbohydrate metabolism, regulation of blood sugar, absorption of nutrients, and enzymatic reactions involving synthesis of amino acids, lipids, proteins, and carbohydrates. Higher serum levels are associated with compulsive and violent behavior, while severe excess can lead to neurotoxicity. Low levels have shown to cause deceleration of the growth process, bone abnormalities, and central nervous system pathology.

This information shows that the balance of serum manganese is possibly an essential component of burn care. At University Medical Center's burn unit, we will investigate burn patients admitted to the BICU and their serum Manganese concentrations on admission, correlating these with patient morbidity and mortality. Data collection is yet to be completed, but we hypothesize that patients with greater changes in serum concentrations of manganese will correlate with more extensive burns and worse morbidities. This study aims to analyze this association as well as those found with other trace minerals.

School: School of Medicine

ABRAHAM, ANGELA

Assessment of appropriateness and thoroughness of hematology referrals for iron deficiency anemia

Angela Abraham, Dr. Brittany Mitchell MD, Dr. Chibuzo O'Suoji MD

Iron deficiency anemia (IDA) is a common pediatric concern with neurocognitive and behavioral ramifications if untreated. The purpose of this study is to assess the role of appropriateness and thoroughness of pediatric hematology referrals to subspecialty clinics and improve initial management by pediatricians.

An IRB-approved retrospective chart review of 76 patients seen in the Pediatric Hematology Clinic for chief complaint of anemia was conducted. Thoroughness was based on inclusion of laboratory values including hemoglobin (Hb), hematocrit (Hct), red blood cell count (RBC), serum iron level, ferritin, and total iron binding capacity (TIBC). Less than 40% of referrals were expected to include at least four of these six elements. Appropriateness was based on evaluation of hemoglobin values, dietary history, and history of prior iron therapy. Less than 50% of referrals were expected to include three or more of these criteria.

Of the 76 patients included, 17 (22%) met all criteria for appropriateness, and 11 (14%) were missing only one component, for a total of 28 records (37%) with three or more criteria. Thirty-four (45%) records met four or more of the thoroughness criteria, and only 14 (18%) included all six criteria. When Pearson-Chi test applied to evaluate for any statistical significance in appropriateness between patients 0-4 years of age and those older than 4, no statistical significance was found ($p=0.68$).

Less than 50% of referrals met appropriateness criteria, with only 37% including three out of the four listed elements. Regarding thoroughness, 45% of records included four of the six criteria, surpassing the 40% initially hypothesized. The most omitted elements included ferritin and TIBC. Dietary history was missing from 58% of referrals. These would be possible targets of education and may help reduce unnecessary referrals by improving the initial evaluation by general pediatricians.

School: School of Medicine

AGYARE, KOFI

Exploring the Relationship between Chromium and Burn Patient Comorbidity in the ICU

Kofi Agyare, Hussain Abidi, B.S., M.B.A.; Jaxon T. Baum, B.S.; Alan Pang, M.D.; Deepak Bharadia, M.D., M.P.H.; John Griswold, M.D.

Burn injuries induce a diffuse stress response that can result in a myriad of physiological responses, including nutritional deficiencies. Delayed wound healing, inflammation, and infections can be perpetuated by the lack of nutrients, vitamins, and minerals, which can be influenced by dietary status and medical history preceding burn injury. Trivalent chromium (Cr^{3+}) is a trace mineral found in various food products and supplements. Its bioactive form plays a key role in glucose regulation, serving as a cofactor for insulin, and in metabolism of dietary macromolecules. Severe burn and other acute injuries can induce a hypercatabolic stress response resulting in an inflammation, corticosterone release, insulin resistance, muscle protein catabolism, and decreased Cr^{3+} levels. Cr^{3+} replacement in deficient patients has been well established but variable results in the literature breed uncertainty towards the perceived benefits and clinical recommendations of supplementation. Due to the complex physiologic roles of Cr^{3+} and dearth of conclusive evidence, this retrospective-prospective study aims to clarify the relationship between Cr^{3+} and wound healing in burn patients. This chart review will take additional health outcomes such as complications, interventions, morbidity, and mortality into account. After the completion of burn patient data collection, a comparative analysis will be conducted to investigate any existing correlation between patient injury, overall outcomes, and Chromium concentration. We hypothesize that patients with more extensive burns and more numerous, severe comorbidities will have a greater change in serum concentrations of chromium. Additionally, serum Chromium levels may be correlated with outcomes such as length of stay, mortality, or morbidity at discharge.

School: School of Medicine

AKINS, JESSICA

Cognitive Behavioral Therapy (CBT) as an Adjunct to Antipsychotics

Jessica Akins, Anne Feeler

PICOT Question: In patients who have schizophrenia (P), does the use of cognitive behavioral therapy (CBT) along with antipsychotic medication (I) compared to use of medication only (C) affect symptom severity (O) within one year (T)?

School: School of Nursing

ANDING, CATHERINE

Efficacy of Metabolic Surgery During the COVID-19 Pandemic

Catherine Anding, Vinay, Goyal, MD; Tina Chung, MD; Bayli Davis, BS, MBA

There is an obesity epidemic in the United States and many people have resorted to bariatric surgery (BS) as an aid in weight loss and comorbidity resolution. Research has shown that the COVID-19 Pandemic led to changes in nutritional and health habits resulting in fluctuating weight. The purpose of this study was to determine if patients who received BS immediately prior to the pandemic were less successful in weight loss and comorbidity resolution.

Weight loss and comorbidity resolution were recorded through EMRs and phone surveys. The experimental group included patients who received BS from December 2019-February 2020 (immediately prior to the start of the pandemic). The control group included patients from December 2018-February 2019. Additionally, participants were administered a phone survey to address lifestyle habits potentially impacted by COVID-19.

Of the 64 participants who met inclusion criteria and completed the phone survey (control, N=34; experimental, N=30), the average starting weight was 300.9lbs (BMI=47), 6-month weight of 228.7 (BMI=35.6) and 12-month weight of 213.1 (BMI=33.8). Compared to the control, the 6-month weight loss for the experimental group was significantly less by 20.7lbs ($p=0.044$). Additionally, 6-month and 12-month weight loss was significantly less in women compared to men ($p=0.001$ and $p=0.009$ respectively). There were no significant findings related to resolution of comorbidities or the lifestyle changes survey as a tool for COVID impact.

Results indicate a lowered success of bariatric surgery (as measured by weight loss) for the experimental group compared to the control group. Further research is warranted to investigate the reason for lowered success during the COVID-19 Pandemic. Additionally, repeating this study in an area of the country with increased COVID-19 restrictions for a longer period would be warranted to determine if the pattern of decreased weight loss held, or was worse.

School: School of Medicine

BETTARELLI, DOUGLAS

Implementation of a Checklist in Burn Surgery: A Study to Improve Operation Efficiency and Patient Outcome

Douglas Bettarelli, Shakira Meltan BS MSII, Elizabeth Brown BS MSIII, Alan Pang MD, Deepak Bharadia, MD MPH, John Griswold, MD

Checklists have been implemented in operating rooms around the United States to improve communication, efficiency, and patient wellbeing. They can be a relatively simple addition to facilitate communication and prepare an operating room before surgery, but team member buy-in is required, especially from physicians, for optimal implementation. In addition, systematizing operations can be more challenging in emergent operations, so effects on time, whether positively or negatively, should be assessed. However, proper checklist execution has dramatically improved results, namely those in operating rooms with complex surgeries.

The World Health Organization advocates for specialized checklists in operating rooms that encounter diverse and complex surgeries that we can often find in a burn unit. For example, patients that require debridement and skin grafting often have several complications that make surgery intricate and can lead to consequences that affect a person's entire body. Additionally, patients may require multiple nonelective surgeries to have the best outcome, further differentiating burn surgery from other operations. The addition of a specialized checklist to a burn unit could facilitate communication and staff readiness that improve surgery efficiency and patient outcomes.

We are studying on-time patient procedures, patient turnover, and the utilization rate of surgery sets requested in the University Medical Center Burn Unit. Data collection is incomplete for patient surgery times, but we have evaluated burn unit container requests. Before checklist implementation in the burn unit, there were 289 containers requested; after being implemented, there were 200 containers requested. With an equivalent number of surgeries before and after, we expect a reduced cost of surgery to patients when combined with changes to surgery efficiency.

School: School of Medicine

BHAKTA, SANAM

The Patient Experience for Patients with Limited English Proficiency

Sanam Bhakta, Dennis Lamb

Medical comprehension is a vital part of the patient-physician interaction. The ability of a patient to understand and comprehend their provider has implications in compliance, call-back rates, and poor health outcomes. The patient experience can be drastically different for different patient demographics. Those with Limited English Proficiency (LEP) face barriers to safe and high-quality healthcare. Patient experience has emerged to become an important component of healthcare quality. Therefore, the study will question how Limited English Proficiency can cause barriers to medical comprehension and affect the patient experience.

In the survey, patients were asked "Is English your preferred language?" Only 1.62% of respondents reported a language other than English whereas 6.51% of patients seen during the study period had a different preferred language. This could be for a variety of reasons: inability to complete survey to due low literacy, education level, or fear of bias from answering the survey.

Survey results showed LEP patients reported equal, if not better, patient experience when asked if care was personalized and for an overall rating of the medical provider. On the other hand, when asked if the patient would recommend the provider to their family and friends, LEP patients had an average of 9.11 while English Proficient patients responded with 9.43. The data gathered has illuminated an interesting trend. While individuals with LEP feel they have received personalized care, they are less likely to recommend their provider to others, relative to individuals with a preferred language of English.

The study shows that further research is necessary. In the coming months, the survey will be sent out to patients of more departments, giving new data on a variety of patients. I will continue to track trends of LEP patients. Factors that may improve LEP patient experience include: mitigating language barriers through interpretation or language-concordant providers, offering translated patient resources, and educating health care professionals about cultural safety.

School: School of Medicine

BIRMINGHAM, COLE

Community Sexual Health Resource Awareness in the Emergency Department

Cole Birmingham, Kelsey Sprinkles, MPH

It is possible that patients with sexual health problems (SHP) prefer the emergency department (ED) compared to a typical primary care physician's office. Patients with SHP may, due to the problem's sexual nature, prefer the ED for its perceived expediency, ease of access, and anonymous atmosphere. While community resources with these qualities are available, lack of public awareness poses a barrier to access. This project's goals included: (1) determining the effectiveness of the ED as a resource for patients with SHP and (2) identifying the need for a comprehensive online guide directing patients to alternative community resources.

Over a three-week period, six EDs in Lubbock, TX were contacted and a self-administered Google Forms questionnaire were distributed to staff. In the exploratory survey, participants were asked to rank three responses on a scale gauging the perceived effectiveness of sexual health education in the ED and determining the usefulness of a comprehensive guide for community sexual health resources. Two free response/multiple choice questions identified possible resources to be included and what demographics would be best targeted for such a guide.

Out of 34 total survey responses, 41.2% of surveyed staff strongly agreed that sexual health education and prevention of sexual health problems could be improved in the ED, 52.9% indicated a website that condensed and provided information on all available community sexual health resources would be very helpful in treatment of patients, and 52.9% indicated that they would be very likely to recommend this website to patients. Free responses indicated the most important aspects to have on the website included: STI information and prevention and cost-effective STI treatment options.

In conclusion, the need for a guide for community sexual health resources was established. Developing this resource will be useful for redirecting non-emergent patients and reducing ED overcrowding.

School: School of Medicine

BOEGER, BRIDGET

Maintaining Time-To-Surgery in the Early Months of the COVID-19 Pandemic at a Level 1 Trauma Center - Single Center Experience

Bridget Boeger, Bernardo Galvan, Katherine Holder, Abigail Raef, Karishma Desai, Kirpa Shrestha MBBS, Ariel Santos MD, Dixon Santana MD

The COVID-19 pandemic brought new changes to the delivery of healthcare in the United States, and guidelines imposed to prevent the spread of the virus altered the management of surgical patients. The purpose of this study is to identify the impact of COVID-19 on the delivery of acute surgical care for patients at a Level 1 trauma center during the lockdown period of the pandemic between March and May 2020.

A retrospective chart review of 865 patients, who underwent acute surgical intervention between March 13 to May 1 of 2019 and 2020, was conducted. The chart review included assessing demographic information, clinical information, and perioperative characteristics of patients. The data was then analyzed using Chi-Square, Fisher Exact, and the Mann Whitney U test depending on best fit into categorical or continuous data sets.

No significant differences in diagnosis time, surgery time, anesthesia time, surgical preparation time, operation time, and transit time between 2019 and 2020 data were noted in this study. Additionally, patients did not have significant differences in mean hospital stay or mortality.

The results of this study demonstrate that the COVID-19 pandemic did not significantly affect acute care surgery at a Level 1 trauma center in West Texas during the lockdown period. Despite changes to healthcare delivery during the pandemic, care of surgical patients was conserved as timely and of high quality. Further studies are needed to aid in a more robust understanding of how the pandemic impacted trauma services around the world.

School: School of Medicine

BRADSHAW, EVAN

Using Geography as a Determining Factor in Outcomes of Burn Care Follow-Up in Rural West Texas

Evan Bradshaw, Liza Garcia, Catherine Anding, Alan Pang MD, John Griswold MD, Deepak Bharadia MD

Follow-up appointments (FUAs) are crucial to monitor proper healing in burn patients. Some studies have evaluated social determinants of health in predicting FUA attendance. No literature currently exists that evaluates burn care FUA outcomes specifically for a rural setting. This study aims to determine if there is a predictive relationship between the distance a patient lives from the burn center or particular area of residence and FUA outcome (including attendance). Our hypothesis was that patients who lived further from the burn center had more no shows and more complications in their healing progression than patients who lived closer to the burn center. Data was collected from the Burn Registry of the Timothy J. Harner Burn Center in Lubbock, TX on patients who were admitted for an inpatient stay and discharged from January, 2019 through December, 2020. This yielded 699 patients. For each patient, we recorded demographic factors, zip code of residence, discharge location, TBSA, and outcomes of FUAs. The potential outcomes of a FUA were no show, future FUA scheduled, outpatient surgery scheduled, readmission to the burn unit, transfer to another burn service, transfer to another provider, or discharge from the service. We intend to evaluate patients by both distance to the burn center and median income for their zip code and see if there was an effect on attendance or complications. So far, 101 patients have been reviewed. The driving distance in miles to the Burn Center for the group that attended the first FUA ($M = 195.16$, $SD = 165.40$, $n = 68$) was found to be less than the distance for the group that did not attend the FUA ($M = 283.16$, $SD = 190.78$, $n = 18$). Using an independent t-Test, this difference was found to be significant, $t(84) = -1.94$, $p = 0.027$ (1 tail). The results so far confirm that patients who live further from the burn center have less follow up attendance. Further testing will be conducted to evaluate the effects of median income on follow up outcome. These preliminary results are highly encouraging and we look forward to robust statistical testing of the full dataset. The Timothy J. Harner Burn Center in Lubbock, TX is in a unique position to evaluate burn care as a function of geography because it serves a vast area of patients throughout West Texas, Eastern New Mexico, Western Oklahoma, and even Southern Colorado and operates a telemedicine burn clinic in El Paso, TX. Potential ways to mitigate this geographical lack of follow up might be expansion of telemedicine initiatives, specific referral to regional providers, or more patient education on the importance of follow up. Further research should evaluate if strategies such as these are beneficial in improving follow up care.

School: School of Medicine

BREWER, EASTON

BMI and Physical Activity in Adolescents Before and During the COVID-19 Pandemic

Easton Brewer, Crystal Craig, MD

To combat the COVID-19 pandemic, social distancing measures were put into place that altered the routines of adolescents and decreased their opportunity for physical activity. A decrease in physical activity could put them at risk for increased Body Mass Index (BMI). Our goal was to determine if there was a significant increase in BMI in adolescents during the COVID-19 pandemic and if physical activity was correlated to any observed changes.

A retrospective chart review was performed using data collected from well check visits during 6/1/2019 – 3/11/2020 (pre-pandemic period) and 6/1/2020 – 3/11/2021 (pandemic period) at four pediatric clinics in Lubbock, Texas. Information collected included BMI, BMI percentile, and self-reported level of physical activity. SPSS software was used to perform statistical analysis.

Data from 676 subjects were collected. Results showed an increase in BMI percentile from the pre-pandemic period (mean = 68.6200, SD 29.1762) to the pandemic period (mean = 69.9232, SD 29.2334). A paired samples t-test showed the difference in BMI percentile to be significant, $t(675) = 2.872$, $p = 0.004$. The prevalence of adolescents that reported being active before the pandemic was 89.6% compared to 82.5% during the pandemic. The difference in change of BMI between those that were active during both periods and those that were active only during the pre-pandemic period was not significant ($p = 0.1961$).

The results show a notable increase in overall BMI percentile during the COVID-19 pandemic. However, there was not enough evidence to show increased BMI was related to change in physical activity. Future studies should investigate which combination of factors contributed to weight gain during the COVID-19 pandemic and look at how to mitigate these factors for the future.

School: School of Medicine

BRUMFIELD, EMILY

Assessment of the Readability and Quality of Google Sources Regarding Thread Lift Procedures for Plastic Surgery Patients

Emily Brumfield, Shayan M Sarrami, Deepak Bharadia M.D., Samudani Dhanasekara M.D., Simran Singh M.D.

Thread lift procedures have become an increasingly popular cosmetic option in plastic surgery clinics due to their minimally invasive technique and naturally appearing results. Patient education on this procedure is an important part of cosmetic expectation and surgical success. Plastic surgery patients likely supplement their knowledge on this procedure utilizing online sources. Our study focuses on the readability of these sources, utilizing websites provided by Google when searching certain key terms related to thread lifting. A total of twenty-four websites were analyzed which were either owned by physician or professional societies. Each website was analyzed by ten different readability tests and the mean readability score of the websites were compared, then subsequent pair assessments were performed. The correlation between mean readability score and Flesch reading ease score was assessed. Additionally, an accountability analysis was performed to assess the correlation between quality, using JAMA benchmarks, and readability. We have found the readability of these websites to be within the range correlating to 7th – 9th grade reading levels. This is above 6th grade reading level recommended by the US Department of Health and Human Services. This analysis allows physicians and clinic administrators to gain a better understanding of the comprehensiveness of resources their patients use.

School: School of Medicine

BUI, STEPHANIE

Prevalence of Substance Use and Mental Health Disorders in Hospitalized Patients: 2007 vs 2017

Stephanie Bui, John Rafael, Chintan Trivedi, Mudasar Hassan, Karrar Hussain, Shailesh Jain

Mental health disorders (MHD) and substance use disorders (SUD) lead to outstanding socioeconomic costs and increased hospital visits. Few studies have quantified this trend over time and across specific disorders. Our study objective is to investigate and compare the prevalence of MHDs and SUDs within hospitalizations between 2007 and 2017.

We used hospital records for 2007 and 2017 from the National Inpatient Sample (NIS) datasets to identify young adults (18-44 years) hospitalized with MHD and SUD. The prevalence of SA and MHD in hospitalized patients in 2017 vs. 2007 was measured. Multivariate logistic regression analysis controlled for confounders including age, sex, race, and payer status. We evaluated these outcomes using Odds Ratio (OR) and 95% Confidence Interval (CI).

A total 10,353,890 patients were included in 2007, and 8,569,789 patients were included in 2017. Prevalence of overall drug abuse among hospitalized patients was 8.4% in 2017 vs. 6.2% in 2007. Prevalence increased in both genders (15.7% vs. 13.0% among male, 5.7% vs. 3.9% among females) in 2017 vs. 2007. All psychiatric disorders showed a higher prevalence in 2017 compared to 2007. When stratified by race, prevalence of substance use disorder increased among all races except Blacks between 2017 vs. 2007. On multivariable analysis, overall drug abuse showed a significant association with hospital admissions in 2017 vs. 2007 (OR: 1.27, 95% CI: 1.20-1.34, $p < 0.001$). These associations held true across many substance abuse and mental health disorders with the exception of cocaine abuse (OR: 0.84, 95%CI: 0.76-0.93, $p < 0.001$).

There is an increased association between SA and MHD and hospitalizations across 2007 and 2017. These odds remain even when stratified across many substances or mental health conditions.

School: School of Medicine

CAREY, MICHAEL

Retrospective review of 1-year BMI reduction in West Texas bariatric surgery patients

Michael Carey, Shayan Sarrami, Kirby Mateja, Dr. Russell Van Husen MD

Bariatric surgery has been documented to achieve meaningful and lasting weight loss to those suffering from morbid obesity in addition to improving conditions such as diabetes mellitus and dyslipidemia. This study investigates the role of age and procedure type in bariatric surgery weight-loss outcomes through a retrospective review of 147 patients from a West Texas private surgical practice. The patients were stratified in the following three age groups: under 35, 35 to 59, and over 60. The age groups had 29, 86, and 32 patients respectively. The mean BMI percent reductions were 30.8%, 28.5%, and 26.2% for the under 35, 35 to 59, and over 60 age groups respectively. The bariatric surgery procedures were further divided into gastric sleeve and gastric bypass. In the under 35 category, gastric sleeve and gastric bypass had a mean BMI reduction % of 31.8% and 29.7% respectively. In the 35 to 39 category, gastric sleeve and gastric bypass had a mean BMI reduction % of 26.5% and 30.2% respectively. In the over 60 category, gastric sleeve and gastric bypass had a mean BMI reduction % of 25.5% and 26.9% respectively. Overall, gastric sleeve and gastric bypass had a BMI % reduction of 27.5% and 29.4% respectively. The results of this study show that bariatric surgery leads to a significant BMI % reduction at the 1-year mark for each age group, and that both gastric sleeve and gastric bypass resulted in similar reduction in % BMI.

This meta-analysis examined the efficacy of positive psychological interventions (PPIs) in treating depression in eleven articles. PubMed, Web of Science, and Clinical Key were used to identify papers published from 2010-2020 that utilized PPIs. Key terms were “positive psychology” AND “treatment of depression”. Studies with adults with (a) depressive symptoms or (b) diagnosed clinical depression were included. A random effects model was used to compare PPIs and control groups on post- vs. pre-intervention differences in depression scores. Data analysis examined BDI-II, CES-D, and QIDS-SR16 scores. Findings show PPIs are effective in treating depressive symptoms, with significant improvements of depression scores when compared to control groups in all but one study. This was true for both post- vs. pre-intervention (pooled Cohen’s $d = -0.44, [-0.77, -0.11]$) and follow-up- vs. pre-intervention analyses (pooled Cohen’s $d = -0.46, [-1.02, 0.09]$). PPIs can improve accessibility and affordability of depression treatments.

School: School of Medicine

CHOI, ERIN

Increased Compliance and Cost Savings with Universal Preoperative Povidone-Iodine Nasal Decolonization Versus PCR Testing and Mupirocin Treatment in Total Joint Patients

Erin Choi, Brenton Albracht, Taylor Blackwood, Alexis Rounds, Simson Hale, George Brindley, Jordan Simpson

Staphylococcus aureus (S. Aureus) colonization is an independent risk factor for surgical site (SSI) infection in total joint arthroplasty (TJA). Historical decolonization protocols have included preoperative Chlorhexidine gluconate (CHG) baths, polymerase chain reaction (PCR) testing for S. aureus colonization and treatment with nasal application of mupirocin in colonized patients. We retrospectively compared the compliance and cost-effectiveness of the historical decolonization protocol and a universal preoperative nasal application of povidone-iodine protocol in TJA patients at one institution.

We retrospectively reviewed 742 primary hip and knee arthroplasty from January 2015 through June 2018 at one institution. 312 consecutive patients underwent PCR-mupirocin treatment protocol and 412 consecutive patients underwent universal povidone-iodine nasal swab treatment.

In the PCR-mupirocin cohort 101/312 patient’s (32.4%) were positive carriers. Compliance with completing the 5-day preoperative mupirocin treatment course was 68/101 patients (67.3%). All 412 patients in the povidone-iodine universal protocol received preoperative nasal swab treatment and no PCR test was completed. The mean cost of decolonization per patient in mupirocin cohort was \$307.73 (SD, 78.08) compared to \$28.18 (SD, 0) and the povidone-iodine group. There was not a statistically significant difference in rates of readmission or surgical site infection between the treatment protocols.

A universal preoperative treatment protocol with povidone-iodine intranasal swab resulted in 100% compliance and an estimated \$115, 174.60 savings over an 18-month treatment protocol with no statistically significant difference in surgical site infection in TJA patients at a single institution.

School: School of Medicine

COLEMAN, BOONE

Post-COVID syndrome: Incidence of Post COVID-19 symptoms affecting outpatient surgical outcomes

Boone Coleman, John Garza, Dr. Robert Johnston

“Long COVID” is a phrase coined to describe symptoms of SARS CoV-2 infection that remain present beyond acute viral recovery. Symptoms attributed to “Long COVID”, such as fatigue, breathlessness, joint pain, chest pain, psychological distress, and several others, continue ≥ 3 weeks from the start of initial infection. Studies show that Incidence of “Long COVID” in patients recovering from SARS CoV-2 infection may be as high as 87.4%. One difficulty with “Long COVID” is the ability to diagnose it in clinical practice since patients will test negative for SARS CoV-2 via antigen PCR beyond the acute viral recovery stage.

At University Medical Center in Lubbock, Texas, chart review data from the Post Anesthesia Care Unit (PACU) and Outpatient Surgery was examined. We examined whether prior COVID infections in individuals lead to an increase in the incidence of unanticipated outcomes (i.e. general hospital or ICU admissions) during outpatient surgical procedures.

Among patients who underwent outpatient surgery at UMC Lubbock between 1/1/21 and 5/31/21, we identified patients (n=81) who were previously diagnosed with SARS CoV-2 (mean=12.8 weeks prior). We did not observe any statistically significant differences between unanticipated outcomes in the COVID group (n=1/81) and the control group (n=4866/4889) (SMD=0.10, p=0.32). Interestingly, we did observe a statistically significant difference in the number of weeks between a patient’s SARS CoV-infection and the outpatient surgical procedure in male (11.25) and female (15.24) (SMD=0.47, p=0.05).

Ultimately we need to continue to gather and examine more data on more SARS CoV-2 patients in order to better understand the potential impacts of “Long COVID” on outpatient surgery patients.

School: School of Medicine

COLLINS, ALEX

Positive Psychological Factors and Their Correlation to Depression and Anxiety Symptoms Among Medical Students

Alex Collins, Yasin Ibrahim, MD, Regina Baronia, MD M.Ed, Dr. Chanaka N. Kahathuduwa, M.B.B.S., M.Phil., Ph.D.

Medical education is perceived as being stressful. High level of stress may precipitate or exacerbate symptoms of anxiety and depression during the first two years of medical school.

Despite a well-established association between poor academic achievement and susceptibility to anxiety and depressive disorders among medical students, the association between positive psychological factors and anxiety or depressive symptoms among medical students has not been examined. We explored the associations between positive psychological traits and anxiety / depression symptoms at the beginning (T0), first (T1) and second (T2) years of medical school.

Medical students were surveyed at T0, T1 and T2 using Qualtrics . De Jong Gierveld Loneliness Scale, Duke University Religion Index, Engaged Living Scale, Connor-Davidson Resilience Scale, and Psychological Wellbeing Scale were used to measure loneliness, religiosity, engaged living, resilience, and wellbeing. Patient Health Questionnaire-9 and Generalized Anxiety Disorder- 7 scales were used to measure depressive and anxiety symptoms. Linear correlations between the positive psychological traits and depressive / anxiety symptoms at T0, T1 and T2 were examined using R (4.0.2).

Significant positive correlation was observed between depressive and anxiety symptoms and total loneliness scores while the same symptoms had significant negative correlations with engaged living scores at all three time points. A negative correlation was observed between life fulfillment and depressive symptoms and increased in magnitude at T1 vs. T0, accounting for 41% of the variance of the depressive symptoms at T1. A similar negative association was seen between psychological wellbeing and anxiety and depression symptoms.

Our study shows that first- and second-year medical students with lower loneliness scores and higher engaged living scores are less likely to have anxiety and depressive symptoms.

School: School of Medicine

CONDE, CAMILA

The Follow-Up Characteristics of Hospitalized Covid-19 Patients: A Single-Center Retrospective Chart Review

Dylan Landis, Duc Lee, Camila Conde, Charles DeWare, Dr. Drew Payne

As of October 2021, there were more than 43 million cases of COVID-19 and nearly 700,000 deaths in the United States. In addition, many people who survived COVID-19 had long-term symptoms such as fatigue, dyspnea, loss of smell and taste, depression, and anxiety.

The purpose of our study is to monitor the status of COVID-19 patients that were previously hospitalized.

We conducted a single-center retrospective cohort study at Texas Tech University Health Science Center and its affiliated University Medical Center. We included all patients hospitalized for COVID-19 and followed up in our internal medicine clinic at any time between April 1, 2020, and April 1, 2021, and reviewed follow-up data for these patients after discharge.

A total of 128 patients were included, 46% (n = 59) were men, and 54% were women (n = 69) with an average age of 59.7 ± 14.8 years old. The average number of days until post-hospitalization follow-up was 36 ± 38 days. A total of 26.56% (n = 34) reported respiratory symptoms at their follow-up appointments, 18.75% (n = 24) of patients reported constitutional symptoms, 9.37% (n = 12) of patients reported GI symptoms, and 19.5% (n = 25) of patients reported other symptoms such as paresthesia, lower extremity edema, or psychological symptoms. After discharge, 54 patients received follow-up X-rays. 75.9% (41/54) were found to still have abnormal findings consistent with COVID-19 imaging characteristics. Of the follow-up patients with labs, 77.2% (44/57) had an elevated D-Dimer value, 78.6% (44/56) had an elevated Ferritin value, and 35.6% (21/59) had an elevated Troponin T HS value.

The mechanisms for long-lasting post-viral syndrome are not fully understood and should be uncovered to better treat these patients.

School: School of Medicine

CORBITT, SHELBY

Palliative Care Consultations in the Burn Unit

Shelby Corbitt, Roald Credo, Vanessa Davis, Michelle Onuoha, Samantha Brown, Theophilus Pham, Sean Simpson, Alan Pang, Deepack Bharadia

The goal of palliative care is to provide symptom relief to critically ill patients, while also providing care specific to patient's personal goals. The inclusion of palliative care has been shown to positively impact patient comfort, decision making, psychological factors, and family care. Studies have shown that patients who meet the criteria often do not receive a palliative care consultation. Early palliative care consultations may aid in conducting effective goal of care discussions to prevent interventions that are incongruous with patient values. We aim to analyze the use of palliative care consultations for burn patients and their effect on factors such as length of stay, cost of care, and number of surgeries or interventions.

We will use University Medical Center's EMR to conduct a retrospective study of patients over the age of 18 with a total burn surface area of 20% or greater. Variables analyzed will include: degree of burn, primary diagnoses, comorbidities, the number and types of procedures, and cost of care to the patient and hospital. We will also evaluate patient length of stay and on which hospital day a palliative care consultation was received. We will analyze the data with appropriate tests and descriptive statistics.

Though data collection and analysis are not yet complete, we posit that earlier palliative care consultations for patients in the Burn ICU will reduce the cost of care, number of interventions, and length of stay for severely burned patients.

If we discover that data does not support our hypothesis, this may indicate that current usage of palliative care consultations in burn units is sufficient. However, supportive data may reduce physician hesitancy in consulting palliative care for critically ill patients.

School: School of Medicine

COUCH, BRANDON

Comparison of Exparel with Other Analgesic Medication for the Traumatic Rib Fracture: A Retrospective Study

Brandon Couch, Anna Sabu-Kurian; Kripa Shrestha, MBBS, MPH, MS; Ariel Santos, MD, MPH; Justin Vaughan, MD, MS; Charles Bayouth, MD

The pain associated with rib fracture limits the patient's ability to breathe and to cough which prevents clearing of airway secretion leading to complications. Pain management with liposomal bupivacaine (Exparel) have been studied as a nerve block; however, the efficacy as infiltration to the fracture site has not been analyzed. Therefore, the aim of this study was to evaluate the effect of Exparel on pain score and opioid use (MME/day) in patients with isolated rib fracture compared to patients who do not receive Exparel at Covenant Medical Center.

A retrospective review of patients aged 18-89 years with isolated rib fracture was conducted. Pain scores and MME/day at 24, 48, 72, 96, and 120 hours were analyzed using linear mixed effect model. Patient demographics, characteristics of injury and hospital outcome were analyzed with Mann Whitney and Chi square/Fisher's test.

78 patients satisfied criteria: of which 20 used Exparel along with other opioid or non-opioid analgesics. No difference in demographics or rib fracture characteristics were observed. No significant difference was observed in Pain score regressed over time. A significant decrease in opioid use expressed as MME/day was seen in non Exparel.

Although Exparel is known to provide prolonged analgesic for up to 72 hours with a single dose of infiltration at surgical site, our study showed there was no significant change in course of pain score in Exparel group. Additionally, MME/day was significantly lower in patients who did not receive Exparel. Therefore, further study should be conducted with adequate sample size controlling covariates in an attempt to elicit if Exparel in fact has any beneficial effect in relieving pain in isolated rib fracture patients as well as reducing the need of opioid analgesics.

School: School of Medicine

CREDO, ROALD

Fluid Resuscitation in Burn Patients: A Retrospective Analysis on Methamphetamine's Role in Fluid Extravasation

Roald Credo, Shelby Corbitt MS, John Wall MS, Hussain Abidi MBA, Elizabeth Brown, Michelle Onuoha, Alan Pang MD, Jonathan Huynh MD, Deepak Bharadia MD MPH, John Griswold MD

Burn injuries can be debilitating in both acute and chronic settings. The American Burn Association (ABA) reports that approximately 450,000 severe burn injuries requiring medical treatment occur annually. One of the great challenges faced throughout the years by burn and wound care specialists is the dysregulated inflammatory cascade that occurs in serious burn cases. Early burn edema becomes a hindrance because of the prolonged healing process. Fluid resuscitation is required in these individuals. The inflammatory response induced by resident cells increases vascular permeability. This influences plasma and leukocyte recruitment at the site of injury. Activation of 5-hydroxytryptamine (5-HT) receptors have been associated with an increase in plasma extravasation into surrounding tissue due to the inflammatory chain. Immunomodulatory factors influence cellular permeability, and this has been shown through burn plasma transfer from burn-induced rats into healthy rats; antagonism of the 5-HT_{2a} receptor decreases this outflow. Methamphetamine (METH) is a powerful class II stimulant. Certain 5-HT receptors are stimulated by METH and its respective antagonists significantly reduced METH-induced hyperactivity. METH-induced sensitization influences upregulation of 5-HT₂ receptors and increased release of 5-HT.

University Medical Center's (UMC) Burn Unit has a population of METH related burns. Study personnel will conduct a retrospective chart review of burn patients from the UMC Burn Unit via Power Chart. We will investigate 24-hour intake of continuous fluids and medications in METH-positive patients. Data collection is yet to be completed, but we posit that these cases will require lengthier, higher volume resuscitation given their increased serotonin levels. This study aims to analyze this association and explore antagonism of 5HT_{2a} receptors.

School: School of Medicine

DANIEL, HANNAH

Association of Dynamic Motion of Cerebellar Tonsils in the Outcome in Pediatric Chiari I Malformation

Hannah Daniel, Reagan Collins, Albin John, Laszlo Nagy, Roy Jacob

Chiari I malformation has a prevalence of 0.5-3.5% among the general population, and is diagnosed based on descent of the cerebellar tonsils 5mm or more.¹ Suboccipital decompression with C1 posterior arch removal and duraplasty are the most common surgical intervention.² Prior studies have assessed postoperative outcomes by evaluating tonsillar ectopia, symptom severity, and associated tonsillar motion.³ However, to our knowledge no other studies have assessed tonsillar pulsatility and its relationship to the severity of symptoms.

Evaluate the presence of cerebellar tonsil motion and its correlation with symptoms pre and post-surgery on gated fast imaging employing steady-state acquisition (FIESTA) and phase contrast CSF flow magnetic resonance imaging (MRI) sequences.

This is a retrospective review of 25 children from 1 year to 18 years of age with a diagnosis of Chiari I Malformation who received a gated FIESTA and phase-contrast MRI. The tonsillar motion was measured on gated FIESTA quantitatively and qualitatively. Other radiologic measurements included: foramen magnum diameter, tonsillar ectopia, clivus canal angle, and anterior and posterior flow on the phase-contrast images.

All patients selected for surgery demonstrated decreased CSF flow along the dorsal aspect of the foramen magnum with over 80% demonstrating abnormal tonsillar motion. Preliminary findings demonstrate improvement in the CSF flow at the foramen magnum with no significant change in tonsillar motion following decompression. Further associations suggest improvement of symptoms, most notably headache, vertigo, and neck pain following surgical decompression.

Abnormal tonsillar motion is a useful imaging sign in the radiological evaluation of Chiari I Malformation, however, there is no significant change in motion on the post-surgical MRI. There is improvement in CSF flow along the anterior and posterior aspect of the foramen magnum following decompression.

School: School of Medicine

DAVIS, BAYLI

Perceived Pain in Burn Patients with Mental Health Disorders vs Those without

Bayli Davis, Dr. John Griswold, Dr. Alan Pang, Catherine Anding

It has been established burn patients have a significantly higher incidence of pre-existing psychiatric comorbidities compared to the general population. Numerous studies have shown a high prevalence of pre-existing mental health conditions in self-harm burn patients, in particular. Prior research has also shown that perceived pain levels and amount of pain relief experienced by patients with psychiatric morbidity are higher and lower, respectively, than those without psychiatric morbidity. These findings implicate that, compared to those without, burn patients with psychiatric illness prior to injury – a significant portion of total burn patients – experience their recovery situation very differently and have additional factors exacerbating the inherent painful experience attributable to the burn injury per se. While numerous studies have separately explored psychiatric disorders in the pre-morbid state and pain perceptions in burn patients, there has been minimal research exploring the relationship between the two. A deeper understanding of how the presence of mental health disorders impacts subjective pain levels and analgesic use during inpatient burn care is warranted.

School: School of Medicine

DAVIS, ZOE

Rates of Women Health Screening in a Student-Run Free Clinic

Zoe Davis, Dr. Fiona Prabhu, Dr. Kelly Bennett

According to Centers for Disease Control and Prevention (CDC), each year in the U.S., about 100,000 people die from cervical, breast, or colorectal cancer, while approximately 350,000 are diagnosed with one of these diseases (2). The national breast cancer screening rate is about 72.4% (2). Furthermore, data shows that low-income women have lower screening rates compared to higher-income women: in 2008, 72.8% of non-poor women had had a mammogram within the past two years while only 51.4% of non-poor women had the same screening rates (4).

Rates of cervical cancer and mortality are higher in under-screened women compared to their women that are screened according to recommended guidelines (5), and invasive cervical cancer affects more women that lack access to healthcare (6). Women that are under-screened for cervical cancer have higher rates of cervical cancer as well. HPV vaccination rates in the U.S. remain below the recommendations by the Advisory Committee for Immunization Practices (3).

Data was retro-actively collected from 39 women that opted for mammogram screening services offered through a student-run free clinic in Lubbock, Texas with a partnership with The University Medical Center Breast and Imaging Center.

Discussion of rates of pap smears, mammograms, and income levels in this population of uninsured women as compared to the general population.

Discussion of breast cancer screening compliance, Pap smears, and HPV vaccination rates in historically marginalized and low-income populations as compared to the general population as a whole with discussion on better preventative health implementation in uninsured populations.

School: School of Medicine

DEMOPOULOS, ALEX AND MITCHELL, KATHERINE

Toxicities of Pediatric Cancers and Hematological Disorders for Epidemiological Studies

Alex Demopoulos, Katherine Mitchell, Dr. Mohamad Al-Rahawan

As a part of the Case Ascertainment for Epidemiological Studies of Childhood Cancers and Hematological Conditions used by the Adolescent and Childhood Cancer Epidemiology and Susceptibility Service for Texas (ACCESS), the goal of this project was to establish a cohort of patients with pediatric cancer or hematologic conditions, to be utilized in future epidemiological studies. Epidemiological characteristics, such as DNA polymorphisms and plasma protein levels indicative of environmental, dietary, and infectious exposures, can be compared between pediatric cancer or hematological disorder patients and healthy controls, to potentially identify risk factors for development of these pediatric conditions.

Our contribution involved identifying currently enrolled or eligible patients, documenting treatment roadmaps, and subsequently identifying, describing, and consolidating toxic events experienced during each patient's treatment course. Toxicities that met the ACCESS criteria for a grade 3 toxicity or higher, were compiled with corresponding treatment information and outcomes. Additional components of the study at-large include collection and analysis of blood, saliva, buccal brushings, urine, and cerebral spinal fluid from enrolled patients and their direct relatives, for markers of toxic exposures.

Out of the 20 patients who were enrolled in the study during our course of investigation; 13 (65%) were male with an average age of 5.9 (SD 3.7) at the onset of treatment. Patients experienced an average of 20 (SD 15.3) toxicities over the course of completed treatments. Preliminary findings suggest febrile neutropenia to be the most common blood and lymphatic system toxicity with 9 (45%) patients experiencing at least once incidence.

This data extraction and entry enhanced the size of the data pool for meaningful observations and analysis to be made in the future. This collaboration across seven different academic institutions will expedite future epidemiological studies exploring risk factors, and ultimately better predict, treat, and cure pediatric cancer and hematologic conditions.

School: School of Medicine

FUENTES, NAYELI

Premature Sudden Cardiac Death Among Black and White Young and middle-aged Women in Rural and Urban Communities in the United States (1999-2019)

Nayeli Fuentes, Dr. Duke Appiah

Sudden cardiac death (SCD) is the unexpected death of an individual due to a loss in heart function. Overall, sudden cardiac death occurs more among men than women. Women are often underrepresented in studies of this health outcome, and are underdiagnosed and undertreated for SCD. The purpose of this study was to determine the occurrence of premature sudden cardiac death among young and middle-aged women in the United States from 1999 to 2019.

Data on SCD mortality among women aged 25 to 54 years in the United States were obtained from the Centers for Disease Control Prevention Wide-ranging Online Data for Epidemiologic Research (CDC WONDER) database from 1999 to 2019. Crude and age-adjusted rates for SCD were estimated comparing rates by location (rural or urban), race, and place of death.

Over the 20-year period, there were a total of 12,730 deaths due to Sudden cardiac death. SCD deaths were higher in Black/African American (2.06) compared to White (0.82) and higher in rural compared to urban areas (25% vs 75%) ethnicities and Rural or Urban communities. The age-adjusted mortality rate of SCD per 100,000 was greater in rural communities than urban communities (1.90 vs 0.79), and Black compared to White women (2.07 vs 0.79). Overall, the rate of SCD was higher in out-of-hospital settings than inpatient settings.

In this study, Black women living in rural communities have a significantly higher mortality due to sudden cardiac arrest. Thus, interventions targeting Black women living in rural communities is needed in order to reduce the risk of cardiovascular disease.

School: School of Medicine

FUNG, CYNTHIA

Nonpharmacological Interventions (NI) for Dementia

Cynthia Fung, Josue Reyes

PICOT Question : In elderly patients with dementia (P), how do nonpharmacological interventions (I) compared with only using pharmacological interventions (C) affect agitation levels (O) within 6 months (T)?

School: School of Nursing

GARCIA, MICHELLE

Social Media Impact on Vaccination of Teens

Michelle Garcia, Jennifer Group

PICOT Question: In adolescents attending high school (P), how does delivery of HPV content via social media (I) compared with traditional classroom presentation of HPV (C) affect intention to obtain an HPV vaccine (O), within 1 year (T)?

School: School of Nursing

GEORGE, ASHER

Testing for Testosterone: Adherence to Clinical Guidelines for Testosterone Replacement Therapy Monitoring

Asher George, Swapna Kolli, MD, Sonika Malik, MD, Devipriya Suravajjala, MD, Vijay Eranki, MD, Kushal Gandhi, PhD

Male hypogonadism causes considerable morbidity and affects a patient's quality of life. Despite its widespread prevalence, it is estimated that only 5% of hypogonadal men are on testosterone replacement therapy (TRT) therapy, possibly due to overtreatment risks and lack of proper follow-up in clinic. Current guidelines suggest measuring hemoglobin and hematocrit at baseline, at 3-6 months, and annually following the initiation of TRT to prevent the risks from erythrocytosis and thrombosis. Prostate monitoring guidelines for patients on TRT include age and ethnicity-based PSA and digital rectal examinations (DRE) at baseline and at 1 year of initiating therapy.

The centers involved in this study have adhered to current TRT guidelines in the treatment of male hypogonadism.

We retrospectively identified 123 men from the electronic health record of multiple clinics in our health system, who were diagnosed with hypogonadism and received TRT between July 2020-July 2021. The variables recorded for assessment were at baseline, 3-6 months, and 1-year measurements of hemoglobin and hematocrit, as well as baseline and 1-year PSA levels. Demographic variables for this study include race, age, and BMI. Statistical analysis occurred using Fisher's exact test and Chi-Square analysis.

In 123 patients, we monitored baseline hemoglobin and hematocrit in 93 patients (75%). Follow up at 3-6 months and at one year was achieved in 46 patients (37%) and 79 patients (64%) respectively; Chi-Square analysis was used with $p < 0.001$. For PSA levels, we examined baseline values in 53 patients (43%) and at 1 year in 34 patients (28%). Fisher's exact test was used for PSA levels with $p = 0.0382$ ($p < 0.05$).

The centers involved in this study can improve adherence to the guidelines by instituting protocol-driven management of such patients by placing reminder checks in the EMR or placing placards in the clinical areas.

School: School of Medicine

GIRON, ALEC AND CHOI, ERIN

Threaded Intramedullary Headless Nail for Metacarpal and Phalanx Fixation

Metacarpal fractures are most common in young males (age 10-40) who are often physically active. While these comprise a large percentage of upper extremity fractures, no single treatment has emerged as a gold standard. K-wire fixation was used initially due to its simplicity and flexibility, but it requires extended immobilization and carries a high rate of complications. Dorsal metacarpal plating has also been used for greater stability, but complication rates using plates remain high. Intramedullary threadless nails have previously been used to reduce time to union and improve postoperative range of motion. More recently, headless intrametacarpal screws have been used for fixation of metacarpal fractures. These provide a dramatic reduction in procedure time compared to other solutions, allowing rapid return to activity for the patient, no secondary procedure, reduced follow-up, and reduced cost of care. However, in situations such as a comminuted fracture the compression forces may shorten the metacarpals and produce non-anatomic final structures. The INnate threaded intramedullary nail offers the all of the aforementioned benefits without the compression forces due to the spacing of the threads on the nail. In this study, we will evaluate outcomes using the INnate threaded intramedullary nail and compare our findings to the literature describing historical fixation methods.

School: School of Medicine

HARDER, JACOB

Opinions About COVID-19 Vaccine Among Females in the Texas Tech Community

Jacob Harder, Taylor Harder, Hannah McCool

BACKGROUND: By spring of 2021, the Texas Tech community contributed 3,312 COVID-19 cases to the overall city of Lubbock data, which had a total of 48,458 positive cases. This amounts to 6.8% of the total cases in the city of Lubbock. Even though the majority of Covid-19 deaths occur in those aged 60 and older, it is important to learn about what the population between ages 18 and 60 thinks of vaccination. This younger population is larger and has increased odds of spreading the virus to the older and more at risk population above age 60. The initial question proposed was “What is the general opinion of the receipt of the Covid-19 vaccine amongst Females students, faculty, and staff aged 18-60, who attended Girls Night Out at the Texas Tech Recreational Center?” **HYPOTHESIS:** We proposed that if an individual is lacking understanding of the qualities of the COVID-19 vaccine, then they will be less likely to agree with the importance of receiving the vaccine. **METHODS:** This project used the TTUHSC School of Medicine P3-1 Women’s Night at the Rec Survey, an online survey instrument available to women who participated in the Texas Tech Recreation Center’s Women’s Night at the Rec event on March 5th, 2021. The question set that our group submitted received 98 responses. **RESULTS:** Our hypothesis is supported by a paired T-test showing that there was a significant correlation between understanding how the vaccine works and the belief that it is important to receive the vaccine. **CONCLUSION:** A future study is planned to see how a politically neutral educational tool, in the form of a flyer, will be implemented and analyzed to determine its effectiveness in the population.

School: School of Medicine

HARDY, KENNETH

Outcome of STSG with or without RECELL in patients with burn injuries: a retrospective cohort study

Kenneth Hardy, Roald Credo, Elizabeth Brown, Mays Alshaikhsalama, Rodan Devega, Holly Grossman, Riya Koshy, Mariam Rizvi, Alan Pang, Deepak Bharadia, John Griswold.

Advancements in medical technology lead to new treatment options and often to improved prognoses for patients in all fields of medicine. Those who experience injuries due to thermal, electrical, or chemical energy frequently require grafting if the area and depth of damaged tissue is great enough. The current standard grafting procedure is split thickness skin autografts (STSG), however new techniques are being implemented to enhance or replace the current standards. One such technique is RECELL Ö, a non-cultured autologous cell therapy, which entails isolation of donor cells then administration to the burn area in an autologous skin cell suspension. This method can produce a donor to grafting site ratio of 1:80, which has a positive effect on wound healing and shortens patient length of stay, which improves patient outcomes and reduces hospital costs. Operation room time is one determinant of length of stay (LOS), with increased OR time leading to increased LOS. This retrospective study will compare the total OR times of patients who received RECELL Ö with patients who received conventional grafting at University Medical Center in Lubbock Tx.

The chart review will split patients into quartiles based on their total burn surface area (TBSA) and compare between quartiles the total hours of operation during their stay. We hypothesize that patients who underwent procedures involving RECELL Ö will have lower average OR times than patients who did not receive RECELL Ö therapy.

By breaking the patients into quartiles we will be able to see if only certain levels of TBSA show improved OR times, or if all or no OR times are affected by RECELL Ö.

If patients show a decreased OR time following RECELL Ö therapy, this would be a factor contributing to the shortened LOS found in other studies.

School: School of Medicine

HOLDER, KATHERINE

Post-COVID Myalgic Encephalomyelitis in Chronic Heart Disease Patients: a Case Series

Katherine Holder, Briar Reyes, RN; Varun Vemulapalli, BS, MBS; Bernardo Galvan, BS; Rajesh Nambiar, MD.

Myalgic encephalomyelitis (ME), also called chronic fatigue syndrome, is a condition characterized by severe fatigue that impairs a patient's ability to perform common daily activities. Criteria for ME include 6 months of fatigue-limited daily activities, unrefreshing sleep, and symptom exacerbation following physical or mental strain, and orthostatic intolerance. New reports indicate that ME incidence may be higher in specific patient populations, including patients with heart disease and those recovering from COVID-19 infection^{1,2}. The patient population used for this study includes 19 patients that were referred to the Amarillo Heart Group in Amarillo, TX who also tested positive for Covid-19 at least 6 months prior to September 1, 2021. The patients that fit this timeline were asked a series of standardized questions and rate the severity of their symptoms on a scale of 0 to 5, with 0 being the absence of symptoms and 5 being the most severe. Two sets of questions were created and named Life Spheres Criteria (4 questions) and Symptoms Criteria (3 questions) based on the 2015 IOM Diagnostic Criteria for CFS. Rating more than 1 Life Spheres question as a 3 or higher or rating all 3 Symptoms Criteria questions as a 3 or higher indicated Chronic Fatigue Syndrome. Information from the survey, including time since infection, demographics, and question scores, were analyzed. Our study included 10 women and 10 men, with the average amount of time since Covid-19 infection being 328.17 ± 41.36 days. Worsening of symptoms with mild exertion was the most commonly endorsed criteria (3.58 ± 1.64) and the least common criterion was fatigue reducing activity in school (2.00 ± 1.94). Women scored higher in every category except reduced activity in school when compared to men. However, there was no significant difference in symptom scores between the two groups with the Combined Fatigue Score being 2.89 ± 1.47 for women and 2.67 ± 1.59 for men. Nearly all symptom scores significantly positively correlated with one another, meaning if one category was high it was likely for other categories to be high as well. Ultimately, when looking at the Cumulative Pearson Correlation Scores, reduced social life, difficulty concentrating, and symptoms worsening with mild exertion were found to be most predictive of a high Combined Fatigue Score. In this case series, over 80% of patients met the criteria for Post-COVID Myalgic Encephalomyelitis. While the link between ME and both COVID-19 and cardiovascular disease has been established, little is known about the severity of ME in patients who have a history of both cardiovascular disease and COVID-19 infection. To our knowledge, this is the first study to examine ME in patients with both of these predisposing conditions. A high degree of clinical suspicion for ME should be used when screening and treating cardiac patients who have been infected with COVID-19.

School: School of Medicine

HOTCHKISS, TIFFANY

Results from the TTUHSC Human Trafficking Assessment Survey

Tiffany Hotchkiss, Abbey Weed

Over 300,000 Texans have been affected by human trafficking in the past decade. In 2019, Texas introduced House Bill 2059 in response to being second in the nation with the highest trafficking incidences and number one in reported cases. This bill requires all healthcare providers with direct patient interaction to be trained in human trafficking. TTUHSC is a recognized fighter against human trafficking and formed the TTUHSC Social Justice & Human Trafficking Collaboration (SJHTC) comprised of staff, faculty, students, and community partners in an effort to reduce and ultimately end human trafficking. This Applied Practice Experience project—as part of the Master of Public Health program—aimed to assess TTUHSC students, staff, faculty, and community members' knowledge and attitudes related to human trafficking. The research team assessed this knowledge and gained perspectives from participants via an online survey. Participants varied by age, sex, and race—which helped ensure results were representative of TTUHSC and our communities. The results of this project will aid TTUHSC by providing a foundation for developing human trafficking training among the school's body as well as shed light on the missing gaps of information on human trafficking.

School: Graduate School of Biomedical Sciences

HU, CINDY

IMPROVING COMPLIANCE WITH AAP IRON SUPPLEMENTATION GUIDELINES IN BREASTFED INFANTS

Cindy Hu, Brittany Mitchell, Austin Healy, Lisa Pomeroy, Elisabeth Conser, Erin K. Barr

Healthy infants born at term, who are exclusively or primarily breastfed, have sufficient iron stores to last four to six months. A substantial proportion of infants over six months of age, particularly breastfed infants, appear to have low absorbed iron and are at risk for iron deficiency. In addition to anemia, iron deficiency has been linked to neurocognitive and behavioral deficiencies, some of which may be irreversible. As a result, the American Academy of Pediatrics (AAP) recommends iron supplementation for exclusively or primarily breastfed infants starting at 4 months of age until they are well established on iron rich foods.

To increase documentation and compliance to the AAP guidelines for iron supplementation requirements in exclusively and primarily breastfed infants in a pediatric academic clinic.

Interim analysis of a prospective quality improvement study. The study compared all four and six month well child checks (WCC) of otherwise healthy, term infants who were primarily or exclusively breastfed. Data were collected before and after an educational intervention in our academic pediatric resident continuity clinic. The study compared documentation of and compliance with existing AAP iron guidelines before and after the intervention.

Interim analysis of four and six month WCCs included 164 records of exclusively or primarily breastfed infants. There were 146 pre-intervention visits and 18 post-intervention visits. Prior to the intervention, iron supplementation was reported in 4.2% of the four-month WCCs, whereas post-intervention it was reported in 16.7% ($p = 0.089$). At the six month WCCs, 9.8% documented iron supplementation pre-intervention, whereas post-intervention documentation was 16.7% ($p=0.598$).

Interim analysis showed that the educational intervention may increase compliance with AAP iron supplementation guidelines in exclusively and primarily breastfed infants, although at this time statistical significance has not been met. Follow up data collection and analyses continue at our institution.

School: School of Medicine

HUERTA, VALERIE

Adjunctively and Alone, Acupuncture Reduces Osteoarthritis Pain

Valerie Huerta, BSN, RN, Jennier Ozzello, BSN, RN

PICO/foreground question: In patients with osteoarthritis (P), is the singular or adjunctive use of acupuncture (I) compared with the use of NSAIDs alone (C) more effective in relieving pain (O)?

School: School of Nursing

IWEH, MARVELYN

Epidemiology of COVID-19 and MIS-C Hospitalizations for Children in West Texas

Shannon Ward, Mariya Shkolnaya, Brittany Tu, Zane Boerner, Lara Johnson, M.D., FAAP, MHS, Ngozi Eboh, M.D., FAAP

Over the past two years, COVID-19 has spread worldwide, resulting in changes in healthcare, public health, and the introduction of novel diseases. The clinical characteristics of COVID-19 in children differ significantly from adults. We compared the clinical and demographic characteristics of children requiring hospital admission in our region for acute COVID-19 and MIS-C during the first year of the pandemic. We conducted a retrospective review of pediatric patients (< 18 years) admitted from April 1, 2020 through March 31, 2021 with MIS-C or acute COVID-19. We collected demographic and clinical information via direct chart review. We generated descriptive statistics of patient characteristics for acute COVID and MIS-C admissions. We generated population-based estimates of hospital admission in children in our region. There were 175 subjects in the cohort including 36% (n=63) with acute COVID-19 and 21.7% (n=38) with MIS-C. Excluding patients with an incidental diagnosis of COVID-19, there were 101 patients hospitalized secondary to acute COVID-19 or MIS-C. Patients were predominantly male (59.4%, n=60) with a median age of 6 years for acute COVID and 9.5 years for MIS-C. For the largest county in the hospital catchment area there were 23 children hospitalized with acute COVID-19 (0.03% of the county's children) and 16 hospitalized with MIS-C (0.02% of the county's children). Resource utilization was higher in patients with MIS-C compared to acute COVID-19. These data indicate that hospitalization is a rare aspect of pediatric COVID-19 disease and that MIS-C has played a significant role in the burden of inpatient disease for pediatric patients in our region during the first year of the pandemic. Further investigations should explore the role of newer variants (Delta, Omicron) in the epidemiology of pediatric patients requiring hospital care for COVID-19 related conditions.

School: School of Medicine

JENSEN, BROOKE

Socio-demographic Disparity in Cervical Cancer Among West Texas Women

Brooke Jensen, Rakhshanda Rahman, MD; Hafiz Khan, PhD

Pap smear is associated with a 60% reduction in cervical cancer rates in women over the age of 40. West Texas presents a socio-geographic challenge for cervical cancer screening as demonstrated by the highest incidence and mortality in this region of the state. Access to Breast and Cervical Care for West Texas (ABC24WT) program offers no-cost cervical screening to underserved women in West Texas (COG-1, COG-2, and COG-7).

ABC24WT program database was analyzed from January 1st, 2018 to June 1st, 2021 for socio-demographic variables, screening history, and screening results to identify high-risk groups for outreach.

1,995 women from ABC24WT program were included in the study. The rate of abnormal Pap tests was 21.4%, 5.3%, 7.2% in COG-1, COG-2, and COG-7, respectively compared with the nation's average of 5%. Women with no cervical screening for 5 years or more represented 8.7 % (n= 74) of COG-1, 11.1% (n= 104) of COG-2, and 19.5% (n= 39) of COG-7. Hispanic women were more likely to comply with appointments than non-Hispanic women (OR: 1.99; p = 0.003). However, Hispanic women required more colposcopies and biopsies due to abnormal cervical screen results (OR: 62.6, p = 0.015). Women with an average monthly household income of greater than \$1500 were more likely to have cervical screens within the last 5 years than women with lower monthly household incomes (OR: 3.06, p = 0.004).

Hispanic race and poverty represent a high-risk category for cervical cancer and form an important target for community outreach.

School: School of Medicine

JILANI, TAHA

Evaluating the Role of Sunlight Exposure and Fenestration in Burn Surgical Complication Rates and Length of Stay - A Retrospective Study

Taha Jilani, Akshay Raghuram; Alan Pang, MD; Khaja Siddiqui; Viviann Robles; John Griswold MD FACS; Deepak Bharadia, MD, MPH, FACS

Increased length of stay (LOS), defined as the number of days a patient stays in the hospital from day of admission to day of discharge, is associated with increased risk of infections, medication errors/side effects, and mortality. While the national average for LOS is around 5 days, burn injury victims often have an extended LOS estimated at about 1 day per percent of total body surface area (%TBSA) burned. Studies have shown that burn victims with extended LOS perceive a decreased quality of life in addition to outcomes listed above. Therefore, safely and effectively reducing LOS serves as an important goal in regards to improving quality of care in these patients. One way to do so is through exposing patients to natural light during their hospital stay. Previous studies on various patient populations have shown that patients exposed to natural light during their stay reported decreased LOS and increased quality of life compared to those without natural light. However, little has been done regarding the effects of natural sunlight on length of stay on burn patients in particular. This retrospective study examines the impact of exposure to natural light on LOS and patient outcomes in burn injury patients. Chart data for patients admitted at UMC's Timothy J. Harnar Regional Burn Center intermediate care unit between July 2015 to July 2021 will be reviewed and length of stay and outcome measures will be compared for those admitted in a room with fenestrations and natural light versus those in rooms without fenestrations. At the time of abstract submission, data is still in the process of being collected and analyzed. Our hope is that the results will provide insight on how to use hospital design to better care for burn injury patients by reducing their LOS and ultimately improving their health outcomes.

School: School of Medicine

JONES, HANNAH AND THATIGUTLA, NAVYA

Positive Psychological Traits and the Effect of the Covid-19 Pandemic on Depression and Anxiety

Hannah Jones, Navya Thatigutla, Alison Tran, Rachel Johnson, Dr. Chanaka Kahathuduwa, Dr. Regina Baronia, Dr. Yasin Ibrahim

Positive psychological traits have been recognized as an integral part of mental health care. Many studies have reported associations between COVID-19-related stressors vs. depression and anxiety measures. Understanding the impact of positive psychological traits (PPsy-T) on depression and anxiety levels pre- vs. post-COVID-19 pandemic could provide insight into how adaptability, support networks, and spirituality could improve psychiatric outcomes.

Do positive PPsy-T differentially predict depression and anxiety levels pre- vs. post-COVID-19?

This retrospective analysis included data of patients seen at the TTUHSC outpatient psychiatry clinic who completed PPsy-T, depression and anxiety scales for an ongoing study. A series of multiple linear regression models were computed using R statistical software (4.0.2) to predict the PHQ-9 or GAD-7 scores using each PPsy-T, time of data collection (i.e. post- vs. pre-COVID) and their interaction. The interaction term specifically tested for the pre- vs. post-COVID differences in the association between PHQ-9 or GAD-7 and each PPsy-T.

Increasing loneliness trait was associated with a decrease in PHQ-9 and GAD-7 during the post-COVID time point. However, these associations were not observed in the pre-COVID state. Furthermore, when controlled for loneliness, GAD-7 scores in the pre-COVID state were significantly lower than the GAD-7 scores of the post-COVID state. Engaged living was positively associated with increased PHQ-9 and GAD-7 scores in the post-COVID state. The negative and significant interaction terms indicated that these associations were non-existent in the pre-COVID state.

While high engaged living traits and low loneliness traits are often purported to be protective factors, depression and anxiety scores among patients with high engaged living traits and low loneliness traits seem to have worsened following the onset of COVID-19. Targeted interventions are warranted to prevent depression and anxiety among these patient populations with high engaged living and low loneliness traits.

School: School of Medicine

KEY, AMANDA

Rash Decisions: Evaluating Diagnostic Methods for Tinea in a Family Medicine Clinic

Amanda Key, Dr. Franklyn Babb

Tinea is a common superficial dermatologic presentation in family medicine that is easily treatable once correctly diagnosed. The gold standard for diagnosis is a KOH test to identify the presence of fungal elements. This test is available in the family medicine clinic but rarely used. A chart review was conducted to analyze the current diagnostic methods for tinea to improve its diagnostic accuracy in the future. We hypothesized that the use of diagnostic testing for tinea would be low, and that increasing testing frequency could improve diagnostic accuracy. The EMR was reviewed for diagnoses under the ICD-10 code 35.- (tinea) at the TTUHSC family medicine clinic between 1/1/19 and 7/2/21. We found that a diagnostic test was performed at 2% of the 607 appointments meeting these criteria. We also found that 78% of the presumed tinea cases diagnosed in family medicine and referred to dermatology were determined not to be tinea. Even though most were not tinea, 79% of patients were placed on an antifungal by family medicine. Finally, we found that the resolution rate for patients placed on more than one antifungal was 67% compared to the 91% resolution rate for patients receiving only one course of treatment. This research points to several practical implications: 1) increasing use of KOH prep at the level of primary care can increase the diagnostic accuracy of tinea 2) the most beneficial times to perform a diagnostic test are in ambiguous cases, before referring to dermatology, and before prescribing a second antifungal treatment 3) most antifungal treatments prescribed while concurrently referring to dermatology are not beneficial. Improving the diagnostic accuracy of tinea at the level of primary care will improve the patient's time to resolution, reduce unnecessary antifungal treatments, and reduce unnecessary dermatology referrals.

School: School of Medicine

KOSHY, RIYA

A retrospective comparative study of graft adherence between ReCell with STSG and STSG alone for the treatment of second-and third-degree burns.

Riya Koshy, Elizabeth Brown, MS3, Kenneth Hardy, MS1, Holly Grossman, MS3, Rodan Devega, MS3, Mays Alshaikhsalama, MS2, Mariam Rizvi MS2, Alan Pang, MD, Deepak Bharadia MD MPH, John Griswold, MD

Although many options are present currently for grafting, few compare the options that are currently available for use to determine whether the current standard of care should be replaced. Split thickness skin grafts have been the standard of care for full and partial-thickness burns, but new techniques have been developed in recent years and they show enhanced potential. The goal of this study is to compare ReCell + STSG and STSG to determine whether there is a statistically significant difference between the graft adherence when using either one for the treatment of second-and third-degree burns. A chart review of the patients that have undergone either ReCell or STSG will be conducted and analyzed to determine graft adherence. Preliminary results demonstrate that patients who received ReCell in conjunction with STSG showcased graft take of 100% more than patients who were treated with STSG alone. These results suggest that ReCell in addition to STSG can optimize adherence of grafts leading to better outcomes for burn patients.

School: School of Medicine

LEIGH, BAILEY

Acupuncture and Functionality in Knee Osteoarthritis

Bailey Leigh, Sarah Nowaski

PICOT question: In adults with knee osteoarthritis (KOA) (P), how does acupuncture (I) compared with aerobic exercise (C) affect patient functionality (O) within 3-6 months (T)?

School: School of Nursing

LUITEL, SUJATA

Disparities in cardiovascular disease mortality among cancer survivors by rural/urban residence in west Texas compared to the rest of Texas (1995-2017)

Sujata Luitel, Dr. Appiah Duke and Kanak Parmar

Geographic disparities in cancer survivorship contribute to cardiovascular disease (CVD) mortality. Some studies suggest that place of residency is associated with CVD and cancer survivors. However, analysis of the CVD mortality among cancer survivors from rural/urban communities of west Texas is limited. We evaluated rural-urban disparities in CVD mortality among cancer survivors' from west Texas and other regions of Texas.

Data on cancer and CVD mortality during the period of 1995 to 2017 were obtained from the Texas Cancer Registry. Cox proportional hazard models accounting for competing risk events were used to identify potential factors that may explain rural-urban disparities in CVD mortality among persons with cancer in rural and urban counties of Texas.

From 1995 to 2017, 104,165 deaths due to CVD was observed among 1,426,376 cancer patients. CVD mortality was higher in rural than urban counties (9.7% vs 6.9%). The highest proportion of mortality was observed in the rural West Texas region (9.8%). A greater proportion of rural county residents who developed cancer at an early age lived in a location with high poverty compared to urban residents. Compared to residents living in the non-West Texas region, the hazard ratio (HR) for CVD mortality for West Texas was 1.16 (95% CI: 1.14 - 1.18). After controlling for age, sex, race/ethnicity, tumor stage at diagnosis, rurality, and county-level poverty, there was no disparity in CVD mortality between cancer survivors in West Texas and other regions of Texas ($p>0.05$).

Intervening in sociodemographic factors offers an opportunity to reduce the disparity in CVD among cancer patients in Texas, regardless of region.

School: Graduate School of Biomedical Sciences

MATEJA, KIRBY

An Online Calculator for Estimating Breast Implant Volume from Imaging

Kirby Mateja, Aaron S. Long, BS, Sacha C. Hauc, MPH, Joshua Z. Glahn, BA; Clara F. Weber; Adam H. Junn, BS; Hui Yu Juan, BS; Pratheek S. Bobba, BS; John A. Persing, MD; Michael Alperovich, MD, MSc

Breast implant surgery remains one of the most common surgical procedures performed in the United States. Implant exchange can be complicated by unavailability of medical records or implant identification cards. Using chest imaging of 154 breast implants, an algorithm for estimating breast implant volume was generated. Five variables - axial diameter (mm), axial projection (mm), sagittal diameter (mm), sagittal projection (mm), and BMI (kg/m^2) – were obtained from chest computed tomography images and included in the model for estimating breast implant volume. Based on four simple measurements and patient body-mass index, a free, online calculator was created with a mean error of volume estimate of less than 1 cc and a standard deviation of 44 cc. In instances where a surgeon does not have implant records available but has chest imaging, this online tool can be used to obtain a relatively accurate estimate of implant volume. Our study validated an algorithm created to estimate implant volume using simple measurements from a chest CT scan and introduces a free, interactive, online tool for volume estimation.

School: School of Medicine

MCLAIN, MADISON

Diabetic Management and the Role of Telemedicine Amid Global Pandemic of COVID-19

Madison McLain, Maria Kastis

The forced shift of Covid-19 to implement virtual medicine provided an opportunity to study the potential role technology could play in the future of medicine in the post-pandemic world through evaluating the effect of telemedicine during the pandemic. This study also evaluated the impact of COVID-19 on patients' hemoglobin A1c levels, rate of diabetic eye appointments, and rate of LDL monitoring pre and post pandemic. The hypothesis was that glycemic control of diabetic patients would either remain relatively stable or improve in patients who participated in telemedicine during the pandemic.

Results showed many patients fell out of care or had uncontrolled diabetes during the pandemic. For the 55% of patients who were under control prior to the pandemic, 13% of them lost control over their diabetes and 22% of them completely fell out of regular patient monitoring during the pandemic. The rate of diabetic eye exams and LDL monitoring significantly decreased during the pandemic. Almost half of the patients utilized telemedicine for their diabetic care during the pandemic and in-person appointments and telemedicine worked hand-in-hand as many patients who were under control had a combination of both. While in-person and telemedicine appointments showed important for the patients who were under control during the pandemic, there was a profound negative impact of Covid-19 on overall diabetic management regardless if patients were seen or not.

Covid-19 had a significant negative impact on the diabetic population seen in the Family Medicine Department at TTUHSC with many patients falling out of care or having uncontrolled diabetes despite in-person or telemedicine appointments. While in-person appointments are still the most reliable method of patient care, telemedicine can be a tool of enhancement for diabetic management and possibly other chronic diseases when typical in-person care is not an option.

School: School of Medicine

MCLEOD, LAUREN

Patterns of recording Sexual Orientation and Gender Identity (SOGI) information in Electronic Health Records in patients presenting to Texas Tech Family Medicine Clinic

Lauren McLeod, Dr. Fiona Prabhu

This retrospective study aimed to assess if any trends are present in the occurrence of reporting Sexual Orientation and Gender Identity (SOGI) in Texas Tech Family Medicine Clinic patients across ages, sexes, gender identities or physician specialties. Patient Electronic Health Records (EHR), in Power Chart, from six different Texas Tech Family Medicine Clinic physicians were accessed. The six physicians were divided into three pairs: two family medicine physicians who regularly care for transgender patients, but do not have obstetric patients, two physicians that have obstetric patients, but do not regularly treat transgender patients, and two general family medicine physicians that do not care for obstetrics patients or transgender patients. Across a 90 day period, we documented how frequently SOGI data was collected from patients, the age of patients when SOGI information was collected, the sex of patients if SOGI was collected, and the gender identity of patients if documented. In total, 910 patient charts were reviewed. Across the three pairs of physicians, it was documented that physicians who care for obstetric patients reported SO and GI for their patients at the highest rate, 19% of patients, while the physicians who care for transgender patients ranked second at 17% of patients, and physicians without obstetric patients or transgender patients had the lowest reporting at 15% of patients. Female patients were more likely than males to have SO and GI documented. Transgender patients were the more likely to have GI documented than cis patients. Lastly patients over fifty years old were likely to have SOGI documented compared to younger patients. This study demonstrated, for the first time, the general disparity in SOGI reporting at Texas Tech Family Medicine Clinic across all patient ages, sexes, gender identities and physician specialties when compared to national averages.

School: School of Medicine

MELTAN, SHAKIRA

Impact of Pandemic on Incidences of child maltreatment in Texas

Shakira Meltan, Zach Griffin, Seham Azzam, Hazael Hernandez, Gerardo Amador, Alex Demopoulos

The World Health Organization defines child maltreatment as any physical or emotional neglect, abuse, ill-treatment, and/or exploitation of children under 18. Child maltreatment is a global phenomenon with severe lifelong consequences to the sufferer and societal development. In Texas and many other US regions, the incidence of maltreatment is troublingly high and often underreported. The onset and continuation of the COVID-19 pandemic have resulted in the emergence of mechanisms that might exacerbate maltreatment incidences such as stay-at-home orders, school district closures, mounting unemployment rates, and increased societal stress.

We are investigating any statistically significant increase in child maltreatment incidence in Texas during the COVID-19 pandemic.

The reported incidence of child maltreatment will increase since the onset of the pandemic compared to previous periods.

Total child population of Texas reported by the US Department of Health and Services: Children's Bureau. The child population was divided into groups based on factors such as race, gender, and victim population size per 1000.

We used the Children's Bureau database from the US Department of Health and Human Services to collect data in Texas for patterns in ethnicity, gender, age, child population, and victims per 1000 from 2004 to 2019.

Upon analysis of the data, we found while the Child Population of Texas has increased every year, the incidents of child abuse per 1000 have remained relatively static from 2015-2019. There was an increase from 2004-2007, and a steady decline began from 2008-2012. A Notable Outlier is 2016 that showed the lowest rate per 1000 of any year. The incidents of abuse per 1000 based on race show Hispanics and White almost mirror each other, while African American people have higher incidents than Hispanic and White, and Asians have the lowest.

School: School of Medicine

MILLER, MADDIE

Preventing Post-Operative Cognitive Decline

Maddie Miller, BSN, RN, Lexi Stiles, BSN, RN

PICOT Question: In elderly (65+) post-operative patients, how does early ambulatory mobilization compare with cognitive training therapies on preventing post-operative cognitive decline in the year following surgery?

School: School of Nursing

MORRISON, MACKENSIE

Exercise Reduces Rate of Cognitive Decline

Mackensie Morrison, BSN, RN, Heather Smith, BSN, RN

PICOT Question: In patients diagnosed with mild cognitive impairment (MCI) (P), how does physical activity/exercise coupled with cognitive stimuli (I) compared to inactive or sedentary lifestyles (C) influence the rate of cognitive decline (O) over a six-month period (T)?

School: School of Nursing

NESIAMA, ESERE

Exploring the Relationship between Serum Selenium and Patient morbidity in a Burn Center

Esere Nesiama, Blake Tuazon, Hussain Abidi, Dr. Alan Pang, Dr. Deepak Bharadia, Dr. John Griswold

Approximately 500,000 people in the United States seek treatment for burn injuries each year. It is estimated that 40,000 of these cases require hospitalization, with 30,000 of these hospitalizations taking place at care centers specialized in treating burn injuries. Despite the major advances that have been seen in surgical and critical care management, major burn injuries are complex and often result in physiologic and metabolic disturbances. Major burn victims have an increased risk for nutritional deficiencies due to the increased metabolic expenditure and increased tissue catabolism when they recover from a burn injury. Therefore, nutritional intake is a vital component of burn therapy, contributing to decreased post-injury mortality and morbidity. Micronutrients, such as trace minerals, are important for healing and bodily functions, however, due to the nature of burn injuries and the increased metabolism that accompanies them, there may be loss of fluids and a depletion of trace minerals at a faster rate. More specifically, trace minerals are vital for cellular and humoral immunity and in this study, we will focus on the trace mineral selenium. Selenium is a vital component to selenoproteins, which are proteins that have been observed to have various functions and benefits, including serving as antioxidants and possessing anti-inflammatory effects. The various side effects that selenium concentrations exhibit in relation to metabolic processes suggests that selenium may impact the healing process and outcomes of burn patients.

University Medical Center's Burn Unit has an ample population of burn patients. We will compare serum concentrations of trace minerals in burn patients to comorbidities and burns that these patients present with in the burn unit. Data collection is yet to be completed but we hypothesize that patients with more extensive burns and more numerous and severe comorbidities will have a greater change in serum concentrations of selenium.

School: School of Medicine

NEVAREZ, ALMA

Cognitive Behavioral Therapy for Depression in Schizophrenia

Alma Nevarez, BSN, RN

PICOT Question: In patients with schizophrenia (P), how does cognitive behavioral therapy with pharmacological treatment (I) compared with any other therapies with pharmacological treatment (C) affect depressive symptoms (O) within a year of treatment (T)?

School: School of Nursing

NIEVES, BRITTANY

Progesterone in the Prevention of Preterm Birth

Brittany Nieves, BSN, RN, Shamika Saint Pierre, BSN, RN

PICOT Question: In women of childbearing age at risk for preterm labor (P), does administering progesterone supplements (I) compared to no progesterone supplements (C) improve the gestational age at delivery in current and future pregnancies (T)?

School: School of Nursing

ONUOHA, MICHELLE

\$100,000+ Ignored & Left on the Table: The Analysis of Cost Savings, Barriers to Implementation & Overall Benefit of Implementing PAP Staff

Michelle Onuoha, Anna Sabu-Kurian, John Rafael, Stephanie Bui, Nathan Chow, Annie Snitman, Kelly Little, MPH, Chibuzo Akalonu, Fiona Prabhu, MD, Kelly Bennett, MD

The cost of prescription medications has risen significantly over the past few decades. For uninsured and underserved patients, this ultimately contributes to both higher disease burden and avoidable healthcare costs. One attempt to address medication affordability has been the provision of Prescription Assistance Programs (PAPs) by pharmaceutical companies, which supply eligible patients with medications at little or no cost. We examined the cost benefits to the patient and the clinic from implementation and subsequent increase in PAP coordination staff at The Free Clinic at Lubbock Impact (TFC). TFC is a student-run free clinic staffed by volunteers from TTUHSC in Lubbock, Texas that provides free medical care to the uninsured community. TFC began utilizing PAPs through a volunteer coordinator with the goal of increasing patient medication accessibility. This led to patient savings of \$377519.27 from February 2019 thru January 2022. This oral presentation will bring awareness of PAPs and serve as a guide for individuals interested in understanding our program and establishing PAP coordination programs at their clinics. We'll examine the logistical workflow, challenges, and solutions encountered by TFC's PAP coordination program throughout its operation. Furthermore, we will discuss various requirements such as time, partnerships, staff members, documentation, medication storage as well as examining challenges faced with continuity of medication delivery between refills and program enrollment. PAP coordinators at TFC offer patients accessibility and consistency in obtaining medication for the uninsured West Texas population. For individuals looking to utilize PAPs at their clinic, it's crucial to have a comprehensive understanding of all factors related to the clinic's demographics, their common presenting conditions, and have the logistical accommodations to be able to sustain it within the clinic workflow. PAP coordinators can become an integral part of any free clinic looking to increase medication accessibility and potentially improve adherence and quality of life.

School: School of Medicine

PARK, ALEXANDER

Retrospective Chart Review of ER Ophthalmic Cases in Odessa

Alexander Park, Dr. Kelly Mitchell

The research project was a retrospective chart review of patients with ophthalmic cases seen in the emergency room at Medical Center Hospital in Odessa, Texas. A total of 283 primary diagnoses were evaluated. A Microsoft Excel data sheet was used to record the age, sex, race, height/weight, primary diagnosis, presence of diabetes, smoking, hypertension, job type, injury reason and discharge disposition. A total of 30 different ICD-10 diagnosis codes for various ophthalmic injuries were used to search for patients. Evaluation revealed that most of the cases were male patients. The top 3 primary diagnoses, in order, were corneal abrasion, foreign body in the cornea, and visual blurring. For corneal abrasions, work-related causes (welding, grinding, other work) were close in number to household accidents. For cases with a foreign body in the cornea, work-related injuries were about half the cases, with the majority being from the welding and grinding industry. For future directions, a retrospective chart review of patients with ophthalmic cases seen in the emergency room at University Medical Center in Lubbock could provide a direct comparison of trends. This study could then possibly extend to other TTUHSC locations such as Amarillo to provide an entire view of West Texas emergent ophthalmic cases.

School: School of Medicine

PATTERSON, ANGELA

Treatment of Children and Adolescents with Anxiety Disorders Using Medications and/or CBT

Angela Patterson, BSN, RN, CPEN, Justin Solomon, BSN, RN, CCRN

PICOT Question: In children and adolescents diagnosed with anxiety disorders (P), how does cognitive behavioral therapy (I) compared with medications only (C) affect symptoms of anxiety (O) within six months of treatment?

School: School of Nursing

PEDERSON, ADDIE

Selective Laser Trabeculoplasty in Treatment Naïve Anti-Vascular Endothelial Growth Factor Associated Open Angle Glaucoma Patients

Addie Pederson, Anindya Samanta MD, Chelsey Krambeer MD, and Matthew Porter MD

Anti-vascular endothelial growth factor (Anti- VEGF) intraocular injections are used in the field of ophthalmology to treat pathologies such as diabetic retinopathy, macular edema, and branch retinal vein occlusion.¹ However, some patients have sustained increases in intraocular pressure (IOP) after receiving Anti-VEGF injections.² Increases in IOP are concerning because elevated IOP is a risk factor for glaucoma, which can result in damage to the optic nerve. Therefore, patients that have received anti-VEGF injections and have glaucoma are classified as anti-VEGF associated open angle glaucoma.¹

Selective laser trabeculoplasty (SLT) is a cold laser procedure that increases aqueous humor outflow and can lower IOP in cases of open angle glaucoma.³ While SLT has been successful as a first-line treatment for increased IOP in primary open-angle glaucoma⁴, and ocular hypertension, there is no consensus on the usage of SLT for the treatment of anti-VEGF associated open angle glaucoma patients.⁵⁻⁸ This retrospective chart review aims to determine if SLT is a treatment option for anti-VEGF associated open angle glaucoma patients in treatment-naïve patients.

6 patients of with an average of 72.6 ± 10.0 years with an average of 3.5 ± 3 intravitreal anti-VEGF injections had a pre-operative IOP of 18 ± 3.4 mm Hg. 3 months after undergoing SLT, the eyes had a reduction of IOP of 2.7 ± 2.6 mm Hg. A paired two tail T test approached statistical significance ($p = 0.052$). While the sample size is limited, the early results show the potential for the usage of SLT as a first-line treatment for treatment naïve patients with anti-VEGF associated open angle glaucoma.

School: School of Medicine

PLATT, ADAM

Treatment Options for Obesity

Platt, Adam; Torres, Amanda; Porter, Tracy

PICOT Question: In morbidly obese persons (P), how does bariatric surgery combined with diet and exercise changes (I) compared to diet and exercise alone (C) affect weight loss (O) over a 12-month period (T).

School: School of Nursing

RAFAEL, JOHN

The association between ADHD and Vitamin D status: Insight From the United States inpatient hospitalization dataset

John Rafael, Stephanie Bui, Chintan Trivedi, Muhammad Saad, Kaushal Shah, Zeeshan Mansuri, Shailesh Jain

Attention-Deficit/Hyperactivity Disorder (ADHD) is one of the most prevalent childhood neuropsychiatric disorders worldwide. Few studies have suggested an association between low Vitamin D (Vit D) levels and ADHD. Our study objective is to elucidate an association of Vit D deficiency with ADHD among an inpatient adolescent population.

We used the 2016-2018 National Inpatient Sample (NIS) datasets to identify and propensity score match (1:1) 2 groups: patients with Vit D deficiency and normal Vit D levels. The prevalence of ADHD between the groups was compared. Multivariate logistic regression analysis included a first model of age, gender, race, and median household income, while significant depression was added to the first for the second model. We evaluated Vit D deficiency and ADHD associations with Odds Ratio (OR) and 95% Confidence Interval (CI).

Each group included 24395 patients. The prevalence of ADHD was high in patients with Vit D deficiency (13.8% vs. 11.6%) compared to patients without Vit D deficiency. The prevalence remained higher in those with Vit D deficiency in both males (18.8% vs. 16.3%) and females (10.9% vs. 8.9%). This association held when stratified by race in all groups except for Hispanics. On univariate analysis, the odds of ADHD diagnosis were higher with Vit D deficiency (OR = 1.22; 95% CI: 1.02-1.46). After controlling for age, gender, race, and median household income, Vit D deficiency was associated with higher odds of having ADHD (OR = 1.29; 95% CI, 1.07-1.56). When major depression was added, the strength of association between Vit D deficiency and ADHD remained marginally significant (OR = 1.16; 95% CI: 0.99-1.37, p: 0.06).

There is an association between Vit D deficiency and ADHD. It is only marginally significant after adding depression in the model.

School: School of Medicine

RAHESH, JASMINE

Percutaneous Cholecystostomy Tube Placement Outcomes

Jasmine Rahesh, Ben Daines, Muhammad Nazim MD FACS, Hassan Ahmed MD FACS

The standard of care for acute cholecystitis is antibiotics and laparoscopic cholecystectomy. The latter requires general anesthesia, patients who are poor candidates for that, placing a percutaneous cholecystostomy tube instead of an open or laparoscopic procedure is a second option. However, there are not much data explaining what happens to the group of patients afterwards. We aim in this study to follow the course of treatment following the placement of cholecystostomy tube.

A retrospective chart review from July 1, 2016 to December 31, 2018 was done at Northwest Texas Healthcare System. Northwest Texas Healthcare System is in Amarillo, Texas, for every patient who underwent cholecystostomy tube placement. Patients age 18-100 years old, demographic, laboratory testing, radiological imaging, length of tube stay, readmission, follow up visits and operative records were collected and analyzed.

Total number of patient s who had cholecystostomy tube was 29. 12 (41%) patients underwent cholecystectomy after tube placement. 100% of patients who required cholecystectomy underwent laparoscopic cholecystectomy, no open procedures were performed. None of the patients had a readmission for the same problem after the tube was pulled without cholecystectomy. 1 patient's tubes had to be replaced due to being dislodged. 1 other patient had a dislodged tube, however, his symptoms resolved, and no further interventions were needed. 3 patients had their tube removed without cholecystectomy, others who did not have the tube removed or had surgery died with the tube in place. Average length of time between tube placement and laparoscopic cholecystectomy in the eight patients: 36.875 days. Average length of time between tube placement and removal in five patients: 52.8 days

The fate of patients after undergoing percutaneous cholecystostomy tube varies. It is a good option to temporarily treat acute cholecystitis, however, further well designed studies are needed to best characterize the best treatment algorithm.

School: School of Medicine

RAO, NIKITA

A Retrospective Study of Psychiatric Hospitalizations in a West Texas Mental Health Treatment Facility During the Early COVID-19 Pandemic

Nikita Rao, Jimin Kim (BS), Alex Collins (BS, MBA), Julie Chugh (BS), Tochi Eboh (BS), Shyam Sheladia (BS), Mhd Hasan Al-Mekdash (MA, MS, PhD), Tarek Naguib (MD, MBA, FACP)

The COVID-19 pandemic and lockdown period have been linked to adverse mental health outcomes globally. The goal of this study was to compare and characterize inpatient psychiatric admissions in a West Texas mental health treatment facility during the initial months of the COVID-19 pandemic in 2020 compared to the same time period in 2019.

A retrospective study using electronic health records of 1,392 inpatient psychiatric admissions from period A (March 13th to July 3rd 2019) and period B (March 13th to July 3rd 2020) were summarized using descriptive statistics. Differences in continuous variables of interest (average daily admissions, average weekly admissions, average monthly admissions, average age at admission) across both period groups were evaluated using independent samples t-test. Associations among categorical variables of interest (sex, race, ethnicity, employment, living situation, insurance status, primary diagnosis, history of psychiatric medication use, substance use, suicide risk) were assessed using Pearson's chi-squared and Fisher's exact tests.

There was a significant difference ($p < 0.05$) in age, employment status, history of psychiatric medication use, living situation, substance use, ethnicity, and suicide risk among inpatient psychiatric admissions in 2020 compared to 2019.

Vulnerable populations in West Texas had increased psychiatric hospitalizations during the early months of the COVID-19 pandemic; this warrants further investigation into the mental health burden of the pandemic.

School: School of Medicine

REGALADO, DIEGO AND CONNOLLY, MEGHAN

Impact of Expanded Public Health Emergency Telehealth Provisions on Chronic Disease Management and Follow-up

Diego Regalado, Meghan Connolly, Olusegun Adeshola, Les P Covington, Evelyn S Sbar, Nicole D Lopez, Rodney B Young, Eric J MacLaughlin

Non-adherence to outpatient clinic appointments reduces clinic and provider productivity as well as efficiency. However, pursuant to the COVID-19 health emergency, the Centers for Medicare and Medicaid Services (CMS) authorized lifting geographic and originating site restrictions to furnishing telehealth services for Medicare beneficiaries. Since telehealth may eliminate some of the barriers to in-clinic follow-up, this project focused on evaluating the impact of telehealth expansion on patient adherence to scheduled follow-up during the COVID-19 pandemic public health emergency compared to the 2 previous years before telehealth expansion.

This study showed that prior to the expansion of telehealth (March 5, 2018-March 5, 2020), 14.7% of appointments resulted in the patient “no showing” for the appointment (1337 “no shows” out of 9080 total appointments). After telehealth expansion (March 6, 2020-March 6, 2021), the percentage of “no shows” dropped substantially to only 6.8% (248 “no shows” out of 3632 total appointments).

Telehealth expansion significantly reduced appointment no-show rates as can be seen in the results. Telehealth has served as a new tool for outreach to patients that can help improve their health management.

School: School of Medicine

RIZVI, MARIAM

PREGNANCY OUTCOMES IN PATIENTS WITH COVID-19: A SINGLE-CENTER RETROSPECTIVE CHART REVIEW

Mariam Rizvi, Dylan Landis, Nandini Ray, Nabeela Manal, Patrice Lamey, Akhila Reddy, Drew Payne, DO

It is understood that pregnant women are at higher risk for severe COVID-19 illness compared to non-pregnant people (CDC 2021). Because of this, careful monitoring and research of this population should be carried out. The purpose of this study was to identify the clinical characteristics, neonatal outcomes, and population demographics of COVID-positive pregnant women admitted the UMC Health Center in Lubbock, Texas.

We reviewed the charts of 35 pregnant patients with confirmed COVID-19 admitted to the UMC Medical Center between April 12, 2020, and January 25, 2021. Results were reported with summative statistics such as mean and standard deviation along with percentages and counts for categorical values.

The average patient age was 29 ± 4.8 years, and 71.43% of patients identified their ethnicity as Hispanic or Latino origin. Average LOS was 3.33 ± 3.56 days, and average number of weeks at delivery was 37.79 ± 2.27 weeks. No deaths were reported among the mothers, but there were three pregnancies that did not result in live birth. Notable findings were an increased rate of preterm birth (18.18%), an increased rate of NICU admission (16.67%), and an increased rate of gestational diabetes (13.89%) compared to national averages among pregnant women.

Many of our findings confirmed the existing literature concerning pregnancy outcomes among COVID-19 positive pregnant women, including relatively high preterm birth and NICU admission rates. The number of women who identified their ethnicity as Hispanic or Latino was over-represented, which may be reflective of Lubbock’s overall demographics or health inequities in West Texas. Furthermore, our gestational diabetes rate was also higher than the national average, potentially reflective of Lubbock’s high obesity rates. We recommend further research on the mechanisms of preterm birth in COVID-19 illness and ways to improve the health and healthcare equity of West Texas residents.

School: School of Medicine

ROBISON, KATHRYN

Weight Percentile and Intentional Burns In the Pediatric Population

Kathryn Robison, John Griswold MD, Deepak Bharadia MD, Alan Pang MD, Arden Perabo, Jaclyn Cole

There has been limited data assessing the influence of low weight percentile and the incidence of intentional burn injury in pediatric patients. Negligence in children can lead to intentional burns and lower weight percentiles due to poor nutrition. Physical abuse and failure to thrive can be concurrent, and some children are starved intentionally as a form of physical abuse⁴. Failure to thrive can lead to impeded height, head circumference and decreased cognitive skills and immune function development⁵. These factors can make it more difficult to recover from a burn. Here, we aim to investigate the association between a pediatric burn patient's weight percentile and their risk for having an intentional burn. A retrospective database analysis included 830 burn patients ages 0-4 years seen at The Burn Center at University Medical Center Hospital, Lubbock, TX between January 1, 2010 and November 15, 2021. Of the cohort, 69 patients were determined to have intentional burns and 761 patients had non intentional burns. Patients that fell into a low weight percentile (<10%) were found to have a significantly ($p=0.016$) higher incidence of intentional burn injury as compared to patients with weight percentiles above 10%. This study suggests that the relationship between low weight percentile and intentional burn injury could be used as objective risk factor criteria to stratify pediatric patients and search for an inflection point where the likelihood of an intentional burn is more likely than not.

School: School of Medicine

SAMANTA, ANINDYA

Street Spectacles: Results from the SMART study

Anindya Samanta, Shikha Bhatia, Max Jacobs, James Miller, Patricia Nelson

Existing studies have found that when compared to adults in the same age-group, the homeless population has more abnormal ocular findings. The most common issue is refractive error. A significant portion of this population is not seen in a clinical setting, representing a gap in care.

Street Medicine Auto-Refracton Technology (SMART) Study is a collaboration between the Texas Tech University Health Sciences Center and Allegheny Health Network (AHN). The street medicine team (comprised of internal medicine physicians) from AHN followed a protocol to screen patients at homeless camps and homeless shelters in Pittsburgh, PA. In the first encounter, patients that had clinically significant refractive error, as demonstrated by improvement with pinhole testing, underwent handheld portable auto-refraction. Glasses were then purchased from an online retailer and distributed during a second encounter. Vision was measured with the new glasses. Patients were then asked to fill out a 5-item 5-point Likert scale survey.

To date 40 patients have been screened. 29 patients showed improvement with PH and 26/29 (90.0%) successfully underwent portable auto-refraction in at least one eye. To date 13/26 (50.0%) have received their glasses. On average, glasses improved VA by 0.32 ± 0.22 logMAR (~3-line ETDRS improvement) for the right eye and 0.3 ± 0.33 logMAR (~3-line ETDRS improvement) for the left eye. The cost of the average glasses purchased was \$15.31.

Surveys ($n = 13$) show that patients are satisfied with the testing (4.5) and the portable auto-refractor (4.7). Patients see better with prescribed glasses (4.8) and felt that they would not have been able to get new glasses without this program (4.3).

Early results from the SMART Study shows that portable auto-refraction can be used by street medicine teams to give affordable glasses to the homeless population in a non-ambulatory setting, addressing an important gap in current care.

School: TTUHSC - Lubbock

SANKOORIKKAL, NIKI

Strengthening Capacity for a Hardly Reached Patient Population to Achieve Equity in Access to Rare Disease Clinical Trials

Niki Sankoorikkal, Tetyana L. Vasylyeva, MD, PhD

Clinical trials for rare genetic and medical conditions are constantly underway, with the goal of advancing treatment and improving quality of care and survival for patients suffering from these conditions. While organizations and websites such as Clinicaltrials.gov increase availability to clinical trials for rare diseases, equity of access remains a problem as many factors from the physician and patient perspective contribute to challenges and barriers. Barriers faced by physicians include ability to diagnose rare conditions in early phases and knowledge of ongoing clinical trials. Barriers faced by patients from geographically isolated areas include lack of resources to travel to clinical sites for participation, limitations based on socioeconomic status, social surroundings, and more.

The goal of this study is to identify barriers faced by patients with rare diseases and their primary care physicians to increase the availability of clinical trials to these patients and help achieve equity in access to medical care. Through an initial needs-assessment we have found a significant population in Amarillo with rare diseases who would benefit from access to clinical trials. Through a retrospective chart review, we are identifying our patient population and the prominent rare genetic conditions in the area. With a clear need to increase equity in access, we hope to better understand barriers faced by patients and physicians to create support networks and resources to help patients get enrolled and close the gap.

School: School of Medicine

SELLERS, JAKE

Association between prostate size and MRI determined quantitative prostate zonal measurements using high-dose methotrexate.

Jake Sellers, Rachel Wagstaff, Naseem Helo, M.D., and Werner TW de Riese, M.D., Ph.D.

Benign prostatic hyperplasia (BPH) and Prostate Cancer (PCa) are the two most prevalent and common urologic diseases impacting elderly men. The current literature has well documented an inverse relationship between prostate/ BPH-size and incidence of PCa, but the exact interaction between these two disease entities is not well understood. The purpose of this study is to analyze prostatic zonal measurements with magnetic resonance imaging (MRI) in order to investigate the dynamic changes of the transition zone (TZ) and peripheral zone (PZ) in response to prostate/ BPH growth.

Multiparametric magnetic resonance imaging (mpMRI) scans of 430 consecutive male patients aged 18-89 years were obtained to measure the different zonal areas of the prostate. The data was statistically analyzed to identify specific associations between the different measurement parameters and total prostate volume (TPV).

The Mann-Whitney U test showed a significant decline of the average peripheral zone thickness (PZT) ($z=-4.5665$, $p<.0001$) in larger prostates when compared to smaller prostates. The Spearman's correlation between total prostate volume (TPV) and PZT demonstrated a significant negative correlation (-0.20 , $p<.0001$).

The data revealed that PZT was significantly smaller in the subgroup of patients with higher TPV. This supports the hypothesis of PZ compression and thinning caused by the growing and expanding transition zone (TZ) in BPH prostates. This dynamic growth-related process in the different prostatic zones may explain the protective effect of BPH against PCa.

School: School of Medicine

SHUSSLER, EMILY

Benefits of Early Mobility in Post-op Patients

Emily Shussler, BSN, RN, Candace Webb, BSN, RN

PICOT

In post-operative surgical adult patients (P), how does early mobilization (I) compared with delayed mobilization (C) affect postoperative recovery (O), within the hospitalization course (T).

School: School of Nursing

TAPP, ROBYN

Exploring the Relationship between Serum Zinc and Patient morbidity in a Burn Center

Robyn Tapp, Shakira Meltan, Hussain Abidi, Dr. Alan Pang, Dr. Deepak Bharadia, and Dr. John Griswold

Children and the elderly are the most vulnerable group with high morbidity and mortality rates when it comes to burn injuries. The healing process takes many overlapping phases, and the duration of the process is dependent on anatomical location, the thickness of skin, patient age, nutritional state, and quality of restoration. Burn surgeries should perform within the first two months to achieve the best rehabilitation, reconstruction, and resuscitation outcome. A recent study has shown that intravenous zinc, copper, and selenium can help to decrease the number of infections and improve healing in burn patients. These trace elements are essential for many enzymatic reactions in the human body and are present in a small amount within all living tissues. These elements play an important role in tissue growth and repair. Zinc is one of the most important trace elements, as it is involved in many enzymatic reactions and is essential for the synthesis of many hormones. Zinc is a very important mineral that is found in high concentrations in the epidermis of the skin, skeletal muscles, and bone. Many studies dating back to 1970 emphasize the role of zinc supplementation in decreasing healing time in burn patients. Zinc is an essential mineral for wound healing and immune system activation, which is why it should be considered as part of burn treatment. Zinc supplementation lowers the length of the healing process and the number of infections during burn therapy. Comorbidities can have a significant impact on zinc serum concentrations in burn victims. This research aims to improve patient outcomes by better understanding the link between comorbidities and zinc serum levels.

For our research we hypothesized that patients with more extensive burns and more numerous and severe comorbidities will have a greater change in serum concentrations of Zinc. Our secondary hypothesis was that there is an overall greater change in serum concentrations of other trace minerals as well in patients with more extensive burns and comorbidities. Although data collection is still ongoing, we believe that if there is a link between patient comorbidity/burns and serum Zinc levels, Zinc supplementation in burn units should be standard practice to improve patient outcomes.

School: School of Medicine

TONEY, ANNIS

Early Ambulation in Post Abdominal Surgical Patients

Toney, Annis; Rattanasavanh, Soumaly

PICOT Question: In older hospitalized adults after abdominal surgery (P), how does early ambulation (I) compared with bedrest (C) affect the post op complication rate (O) within 1 month following surgery (T)?

School: School of Nursing

VOJTKOFSKY, NICHOLAS

Exploring the Relationship between Serum Cobalt and Patient morbidity in a Burn Center

Nicholas Vojtkofsky, Dr. John Griswold, Dr. Deepak Bharadia, Dr. Alan Pang, Hussain Abidi, Anish Reddy

The World Health Organization estimates suggest that worldwide, approximately 11 million burn injuries occur each year. The intricate step by step process of wound healing is complex and lengthy, needing multiple cofactors and energy-dependent enzymatic reactions. The nutritional load of burn wound healing is extensive, and overlooked in the process of nutritional replacement are the trace minerals. Trace minerals are micronutrients that are present throughout the human body in small amounts, and essential in the body's homeostatic processes. Although there are many important trace minerals, we will be focusing on Cobalt. Cobalt predominantly comes in inorganic (Co²⁺) and organic (hydroxocobalamin) forms, it is found predominantly in the liver and skeletal system; however, it can be found in lesser concentrations in myelin sheaths, the brain, and the urinary tract. At physiologic concentrations, cobalt is used as a cofactor in amino acid metabolism, myelin sheath repair, cell mitosis, and erythropoiesis. Decreased levels of cobalt have been shown to cause anemia and the low vitamin B12 can lead to neurologic complications. Elevated levels of cobalt can cause complications such as dysfunctional iodine absorption, erythrocytosis, cardiotoxicity, and pulmonary fibrosis.

The information above shows that the homeostasis of Cobalt is important in many reactions that are imperative for the healing process for burn wounds. Through the UMC burn unit, we will be exploring the relationship between serum Cobalt levels and the morbidity and mortality of burn wound patients. Data for this has not been collected yet, however we hypothesize that as the change in serum cobalt levels increases, there will be an increase in the morbidity of the burn wounds in these patients. The hope of this study is to find a correlation between these two variables to improve patient outcomes and provide a higher standard of care to these patients.

School: School of Medicine

VOPNI, RACHEL

Retrospective Chart Review of Patients receiving Gastric Pacemaker to treat Medically Refractory Gastroparesis

Rachel Vopni, Dr. Vinay Goyal, Dr. John Griswold, Ziyang (Sue) Li

Gastroparesis is a gastrointestinal disease in which the stomach does not empty normally due to impaired gastric motility. Patients with idiopathic or diabetic gastroparesis may experience nausea, vomiting, bloating, abdominal pain, and other symptoms negatively affect their quality of life. Gastric pacemaker is a device surgically implanted that sends mild electric shocks to stomach muscle to help control symptoms of medically refractory gastroparesis. Approved in the United States as a Humanitarian Use Device, its placement is restricted to medical centers with an Institutional Review Board. Texas Tech University Health Sciences Center is one of limited facilities nationwide that offer surgical gastric pacemaker placement (IRB #L07-099). While gastric pacemakers are believed to improve symptoms of gastroparesis, long-term data and analysis of patients who have received the device is scarce.

The purpose of this study is to better understand attributes and outcomes for patients treated with gastric pacemaker. Retrospective chart review was performed for the 123 patients who have received or been seen for a gastric pacemaker at our institution. Data collection included demographics, vital signs, comorbidities, and surgical information for pacemaker-related procedures. Preliminary analysis showed 52% idiopathic/non-diabetic and 48% diabetic gastroparesis etiology. Average age of insertion was 46-47 years old. Demographically, 19 males versus 104 females received the device while race/ethnicity of patients was 61.7% White, 26% Hispanic, 7% Black, 5.3% other/no response. Average pre-operative BMI was 28.55. Considering outcomes, 34 patients required subsequent surgical revisions and 29 eventually required device removal.

Although gastroparesis is associated diabetes, the higher incidence of idiopathic/non-diabetic gastroparesis patients suggests this etiology may more often be refractory to medical treatment. Additionally, patients receiving the gastric pacemaker were of overweight BMI on average despite gastroparesis-associated weight loss. Finally, demographic differences in incidence, particularly gender, and the relatively high incidence of surgical revision and removal warrant further exploration.

School: School of Medicine

WARD, ELLEN

Association of Prostate Size with Capsule Thickness and Glandular Epithelial Cell Density: The Possible Clinical Implications on Prostate Cancer Development

Ellen Ward, Jake Sellers, Preston Weaver, John Garza PhD, Luis Brandi MD, Werner TW de Riese MD PhD

Benign prostatic hyperplasia (BPH) and prostate cancer (PCa) are the two most common urologic diseases in aging males. The negative association between prostate/BPH size and incidence of PCa is well documented in the literature. However, the exact mechanism is not well understood. This study aims to further investigate the possible effect of prostate volume on prostate capsule thickness and glandular cell density in the prostatic peripheral zone (PZ).

A total of 100 patients were selected that had undergone radical prostatectomy with prostate sizes ranging from 20 ml to 160 ml. Quantitative measurements of capsule thickness and density of epithelial glands within the peripheral zone not affected by cancer were analyzed and calculated on histo-anatomical slides using computer-based imaging software. Associations between the different variables were calculated using Spearman correlation with 95% confidence intervals.

In the non-cancerous areas of the PZ: Prostate volume and average capsule thickness are positively associated ($r_s = +0.6526$, 95% CI $+0.5233$ to $+0.7526$, $p < 0.0001$) while prostate volume and average glandular epithelial cell density of the PZ are negatively associated ($r_s = -0.6011$, 95% CI -0.7133 to -0.4589 , $p < 0.0001$). These associations remain consistent on subgroup analysis.

The findings of this study support the hypothesis that transition zone (TZ) growth in large BPH prostates may cause pressure on the outer peripheral zone (PZ), leading to fibrosis and atrophy of glandular tissue. This may provide a protective effect against PCa, as most PCa originates in the PZ of the prostate.

School: School of Medicine

WEED, ABBEY

Results of the qualitative components of the 2022 TTUHSC Human Trafficking Community Needs Assessment

Abbey Weed, Tiffany Hotchkiss, Julie St. John

Texas has the second highest incidence of human trafficking in the nation and is number one in human trafficking hotline calls to report suspected human trafficking. Human trafficking impacted over 300,000 Texans in the past decade alone. In response to this public health crisis, Texas passed HB 2059 in 2019, which requires all healthcare providers with direct patient contact to complete training in human trafficking. In response to this legislation, the Texas Tech University Health Sciences Center (TTUHSC) developed the Social Justice and Human Trafficking Collaborative (SJHTC), which works together with faculty, staff, students, and community stakeholders to address human trafficking in Texas and to develop and implement interventions to reduce the rates of human trafficking in the state and nationally. To inform the work and efforts of the SJHTC, two Master of Public Health students conducted a community health needs assessment in collaboration with the SJHTC on human trafficking with TTUHSC students, staff, faculty, and community stakeholders as part of their Applied Practice Experience (APE) project. The assessment included an online survey, focus groups, and key informant interviews that examined current training, education, knowledge, attitudes, and beliefs of TTUHSC faculty, staff, students, and community stakeholders on the topic of human trafficking (exempt IRB study #A22-4244). This presentation will focus on the results of the qualitative components of the assessment—focus groups and interviews—conducted in January-February 2022 using semi-structured interview guides and trained facilitators. The research team conducted thematic content analysis of the qualitative data. Following the publishing of the report and peer-reviewed manuscript that included assessment data and findings, the report will be disseminated among the SJHTC, constituents, participants, and community stakeholders to serve as baseline of human trafficking data that will guide future TTUHSC SJHTC trainings, activities, and events.

School: Graduate School of Biomedical Sciences

WILHELM, CHRISTOPHER

Factors Predicting Increased Complications of Penile Abscesses

Christopher Wilhelm, Mia Ivos, John Buie MD, Melissa Sanford MD

Penile abscesses are rare and the literature regarding their diagnosis, management and recurrence is limited. In this retrospective review, we examined various clinical characteristics in patients with penile abscesses to identify a relationship between the existing comorbidities and degree of abscess involvement, prevalence of complications, and rate of recurrence.

We performed a retrospective review of 15 patients with penile abscess from January 2009 to December 2020. Clinical characteristics, type of treatment received, extent of tissue involvement, requirement of extensive debridement (i.e., debridement down to the layer of buck's fascia and/or the urethra), recurrence, and complications were extracted. We hypothesized that there is a correlation between diseases such as hypertension, diabetes mellitus, and peripheral vascular disease and penile abscess involvement.

All 15 patients required debridement, as all patients demonstrated subcutaneous involvement from the abscesses. Of these 15 patients, five (33%) required extensive debridement. Of the five patients that required extensive debridement, three had a recurrent penile abscess. The average follow-up was four weeks (the shortest being one week and the longest being 6 weeks) and none of the 15 patients had developed complications, such as erectile dysfunction, urethral stricture, or increased curvature due to scarring. Diabetes mellitus was a predominant comorbidity associated with the formation of a penile abscess (27%). Hypertension and peripheral vascular disease were also seen in 20% and 6.7% of patients respectively. The recurrence rate was 26.7% based on clinical follow-up and involved re-debridement.

Penile abscesses should be managed with surgical intervention to remove the abscess, as well as to decrease recurrence. The diagnosis is based on clinical presentation. Surgical intervention should remain first-line for treatment. Treatment of underlying diseases, such as diabetes mellitus, hypertension, and peripheral vascular disease, should be taken into consideration when treating patients with penile abscesses if applicable.

School: School of Medicine

ZAPATA, ALEX

A retrospective analysis of diagnoses and prescriptions managed by The Free Clinic at Lubbock Impact

Alex Zapata, Abigail Ellington, Aaron Thomas, Brianna Marschke, Blake Tuazon, Omid Hosseini, Steph Bui, Khaja Siddiqui, Carly “Chuck” Guerra, Caezaan Keshvani

The Free Clinic at Lubbock Impact (FC) serves the uninsured adult population, aged 18-65, of Lubbock, Texas using a paper charting system, which complicates population tracking and analysis. The FC model melds primary care with urgent care to serve our unique population, though no prior research directly elucidates the ways in which our patients are directly served. This retrospective analysis delineates the services provided to our patients in 2021 such that FC may better understand align itself to better serve the community moving forward.

What are the important diagnoses treated by FC and how are they managed?

Patient visit information from 2021 was reviewed and data is presented to reflect the incidences per individual visits. The top 5 diagnoses within 2021 visits have been HTN (30%), DM (8.5%), CHF (8.5%), Thyroid disorder (hypo or hyper) (6%), and COPD (8.5%). The most prescribed medications include ACE/ARB class medications (21%), diuretics (6% loop, 15% thiazide, 21% combined), non-insulin diabetes management drugs (10%), calcium channel blockers (7%), and beta-blockers (4%). (*Further analysis with increased sampling will alter these numbers prior to final poster presentation)

Understanding our patient population can help guide future grant proposals and the creation of population-specific programs & interventions. Future engagement with our patients could even go so far as targeting more specifically partnerships with medication manufacturers and our incoming pharmacy to work toward decreasing cost and accessibility for treatment of the most prevalent conditions in our community.

School: School of Medicine

BASIC/TRANSLATIONAL RESEARCH YEARS 1 AND 2: GRADUATE SCHOOL OF BIOMEDICAL SCIENCES, SCHOOL OF MEDICINE, BIOTECHNOLOGY, REHABILITATION SCIENCES

ACHARYA, GANESH

A Novel Role for BRIP1/FANCD1 in Neuronal Cells Health and in Resolving Oxidative Stress-Induced DNA Lesions

Ganesh Acharya, Chinnadurai Mani, Komaraiah Palle

The accumulation of DNA damage and mitochondrial abnormalities in neurons increases with age, which may contribute to neuronal dysfunction in age-related neurodegenerative conditions like Alzheimer’s disease. BRCA1 interacting protein 1 (BRIP1) is a 5’ to 3’ DNA helicase that contributes to genomic integrity by catalyzing numerous aberrant DNA structures during DNA replication, gene transcription, and recombination. BRIP1’s functions in DNA repair have been well studied; however, there is limited information on its role and regulation during aging and neurodegenerative diseases, warranting the development of novel preventive and treatment strategies as the population grows globally. We analyzed BRIP1 expression by performing immunohistochemistry, immunoblotting, and qRT-PCR. We performed immunofluorescence studies to analyze the formation of R-loops, generation of reactive oxygen species (ROS), and mitochondrial morphology. We evaluated mitochondrial ROS and mitochondrial structures by using flow cytometry and transmission electron microscope, respectively. Oxygen consumption rate was measured using Seahorse, and the Presto Blue™ assays were used to evaluate cell viability. BRIP1 was expressed in mouse and human brain tissues, as well as neuronal cells, and its levels were shown to be higher in the hippocampus area of the brain, particularly in the dentate gyrus (DG). Downregulation of BRIP1 in neuronal cells resulted in increased R-loop formation both basally and in response to H₂O₂ treatment. Additionally, in both cycling and terminally differentiated neuronal cells, BRIP1 deficient neuronal cells caused downregulation of BRCA1, increased DNA damage, and cell death. Furthermore, compared to BRIP1 proficient neural cells, BRIP1 deficient cells showed increased levels of excitotoxicity generated by L-Glutamic acid (LGA) exposure, as shown by mitochondrial ROS levels, deteriorated mitochondrial health, and cell death. Our results indicate BRIP1 plays a key role in maintaining neuronal cell health and homeostasis by decreasing cellular oxidative stress (OS).atients, before pathologic processes develop.

School: Graduate School of Biomedical Sciences

ALMAGUER, JOEY

All-trans retinoic acid deficiency in Alzheimer's disease: evidence from human transcriptomics and a novel mouse model

Joey Almaguer, J.J. Lawrence

To investigate whether ATRA deficiency occurs in the hippocampus of human AD, we performed a secondary analysis of hippocampal transcriptomic data from post-mortem AD and control brains. ATRA-responsive genes were downregulated, but RAR co-repressors were upregulated. Moreover, consistent with antioxidant depletion, ROS sensors Nrf1/Nrf2 were upregulated. In the J20 AD mouse model crossed with a somatostatin (SOM)-CRE:tdTomato reporter mouse, we tested the hypothesis that ATRA delays AD-related behavioral, circuit, and transcriptional abnormalities in the DG. We administered ATRA (20 mg/kg) or vehicle (corn oil) IP 3x/week for 8 weeks, followed by Y-maze and open field maze (OFM) testing. Consistent with the hyperactivity phenotype of J20 mice, vehicle-treated (VT) mice traveled a greater distance compared to WT mice ($U = 5.000$, $p = 0.009$). By contrast, ATRA-treated (RT) AD and WT mice did not vary in their overall distance traveled ($U = 16.000$, $p = 0.727$). In the OFM, a similar pattern of results was observed. We then performed correlative histological and molecular analyses. Through tdTomato visualization, we found that DG SOM circuits were aberrantly targeted to the DG inner molecular layer in J20 \pm AD mice. However, ATRA treatment prevented formation of this aberrant SOM circuit in 6/6 males but not in 3/3 female mice. Finally, in RNA-Seq analysis from DG tissue, pairwise comparison of VT WT and VT AD groups indicated that Synaptogenesis, PKA, and Calcium Signaling pathways were dysregulated. Pairwise comparison of ATRA-treated WT and AD groups revealed that ATRA treatment partly normalized these signaling pathways. Therefore, chronic treatment with ATRA normalized behavior, prevented formation of aberrant SOM circuits in the DG, and normalized a number of molecular pathways. Thus, our human and preclinical studies support the hypothesis that ATRA deficiency occurs in AD, suggesting that maintenance of hippocampal ATRA levels protect hippocampal function.

School: School of Medicine

ALSHAIKHSALAMA, MAYS

rR2P Pyocin as a treatment for P.Aeruginosa in severe burn patients

Mays Alshaiksalama, Dr. Abdul Hamood

Following a severe burn, the wound surface is colonized by bacterial pathogens. These organisms establish infection, translocate into the bloodstream, and cause bacteremia, sepsis, septic shock, and multiple organ failure. Among the different pathogens that cause sepsis in burn patients is the opportunistic pathogen *Pseudomonas aeruginosa*. The multidrug resistance of *P. aeruginosa* combined with the high cost of producing new antibiotics necessitates the search for other potential therapies. One such therapy is the utilization of pyocins – narrow-spectrum antimicrobials produced by *P. aeruginosa* to eliminate other competing bacteria. R-type pyocins are high-molecular weight proteins that resemble the contractile tail structures of bacteriophages. Using the murine model of excision wound, we recently showed that recombinant R2 pyocin (rR2P) significantly reduced the *P. aeruginosa* wound bioburden. We hypothesized that rR2P interferes with *P. aeruginosa* sepsis in severely burned patients. We examined this possibility using the murine model of thermal injury and the *P. Aeruginosa* clinical isolate BPI-86 obtained from a burn patient. Thermally injured mice 103 colony forming units (CFU) of BPI-86 were injected under the burn wound followed by either normal saline (control group) or rR2P (10.4 mg/Kg) (treatment group). The mice were monitored for mortality, local growth of BPI-86 within the infected skin, and systemic spread to the liver and spleen. At 72 h post infection/treatment, the mortality rate within the control group was 100% but 0% within the treatment group. We recovered comparable numbers of bacteria (CFU/gm of tissue) from the infected skin of both groups. While we recovered about 1×10^4 CFU/gm of tissue from the livers and spleens of the control group, we recovered no bacteria from either the livers or spleens within the rR2P-treated group. These results suggest that rR2 pyocin is a potential therapy to prevent *P. aeruginosa* bacteremia and sepsis in severely burned patients.

School: School of Medicine

ASHTON, MEGAN

A rapid, non-invasive, ante-mortem test for surveillance and monitoring of prion-transmitted Chronic Wasting Disease in cervids

Megan Ashton, Asha Worsham, Emma Roberts, Emily Wright, Angela Grogan, Courtney Ramsey, Warren Conway, Robert Bradley, Daniel Hardy

Wild and captive animal populations serve as reservoirs for zoonotic agents, including prions. Prion-induced neurodegenerative diseases are inevitably fatal, so disease management must focus on preventing transmission, both within and between species, which in turn requires continuous surveillance and monitoring. Currently approved immunohistological tests for Chronic Wasting Disease (CWD) a prion-induced spongiform encephalopathy endemic in cervids (mule deer, white-tailed deer, axis deer, and elk), necessarily require invasive specimen collection, and are typically done post-mortem. Thus, available tests are unsuitable for large scale, ante-mortem surveillance. Here we report studies aimed at validating a biomarker-based test for CWD. The test exploits the observation that membrane-bound vesicles released into the blood (exosomes) carry unique protein and RNA cargo reflecting the pathophysiological state of their tissue of origin. Because many recent studies demonstrated the utility of exosomal micro-RNAs (miRNAs) as biomarkers for various diseases, we quantified potentially diagnostic miRNAs in blood by PCR. Blood serum levels of three miRNAs, measured relative to a reference miRNA in specimens from >300 animals, showed varying correlation with CWD diagnosed immunohistologically. Two of the markers exhibited stronger positive correlations, and together may be diagnostic of prion infection, possibly even before clinical manifestations of CWD appear. Our ongoing studies now focus on characterizing the relationships of our biomarker test results with CWD transmission and progression, including among populations with different susceptibility/resistance alleles, to model the potential spread of the disease. Ultimately our refined and validated test may prove to be an essential tool for managing CWD by extensive ante-mortem surveillance and monitoring, both to sustain viability of wild and captive deer populations and to prevent possible cross-species transmission to humans.

School: Graduate School of Biomedical Sciences

AZZAM, SEHAM

Studying the effect of mitochondrial dysfunction and other hallmarks of Alzheimer's

Seham Azzam, Maria Manczak, Volker Neugebauer

Alzheimer's disease (AD) is a neurodegenerative disease that causes cognitive impairment, characterized by progressive cognitive decline, memory loss, and neuronal death in the cerebral cortex, hippocampus, and other brain regions. Hallmarks of its pathology are amyloid beta ($A\beta$) plaques, neurofibrillary tangles of hyperphosphorylated tau, and dysfunctional mitochondria. Mechanisms and relationship to the progression of AD are not well understood. For these reasons, our research focused on analyzing and extrapolating the effects of mitochondrial dysfunction, tau pathology, oxidative stress secondary to ROS production, ADAM10 (Alpha secretase) expression, and BACE1 (β -secretase) expression in MCI (Mild Cognitive Impairment) and AD groups. Assessment was carried out using human brain tissue samples collected from the cortex of a control group, MCI group, and AD group from the Kentucky Brain Bank, and included multiple experiments such as SYBR-Green chemistry-based quantitative real-time PCR for measurement of gene expression, ELISA for measurement of $A\beta_{42}/A\beta_{40}$ peptides and levels of phosphorylated tau, ATP production measured with an ATP kit, and finally, kits that measured H_2O_2 production and lipid peroxidation. Results indicated phosphorylated tau levels progressively increased from control to MCI to AD. We also found decreased levels of ADAM10 and mitochondrial fusion genes (Mfn1, Mfn2, OPA) in MCI and AD groups in comparison with control, but increased levels in mitochondrial fission genes (DRP1, Fis1) and BACE1 in the AD group in comparison with control. Additionally, $A\beta_{42}$ and soluble amyloid oligomer levels were higher in the AD group. Our data showed that mitochondrial dysfunction correlated with AD pathology (beta - amyloid, phosphorylated-Tau). Because mitophagy are critical processes for regulating mitochondrial function and homeostasis, next we will be studying mitophagy markers in AD.

School: School of Medicine

BACK, PATRICIA INES

Toxicity evaluation of liposomal alendronate in combination with PD1 blockading antibodies in a murine melanoma model

Patricia Ines Back, Md. Rakibul Islam, Jalpa Patel, Hilary Schmeeda, Maciej Markiewski, Alberto Gabizon, Ninh M. La-Beck

Immune checkpoint inhibitors (e.g., PD1-blockading antibodies) are standard of care in melanoma patients, but only 20-40% of respond [1], likely due to immunosuppression caused by tumor-associated macrophages [2,3]. We hypothesize that alendronate could be an effective adjuvant therapy since it modulates cytokine responses in macrophages and stimulates T cell response [4,5]. We encapsulated alendronate in liposomes (PLA) to overcome the low systemic bioavailability of free alendronate [6] and evaluated the toxicity of PLA in combination with PD-1 inhibition.

Male and female 6-8 weeks-old C57BL/6J mice were subcutaneously implanted with B16-OVA melanoma cells and randomized to: PLA at 4 mg/kg alendronate with PD1-inhibitor at 10 mg/kg, PLA+isotype control, dextrose vehicle+PD1-inhibitor, or vehicle+isotype controls. Mice received two weekly doses of PLA or control intravenously and three doses of PD1-inhibitor or isotype intraperitoneally. Systemic toxicity was determined by weight loss and organ (liver, colon, jejunum, lung, heart, stomach, kidney and spleen) toxicity assessed by histopathology.

PLA induced similar rates of lost weight ($\geq 10\%$) with and without PD1-inhibitor (7/19 and 7/12 animals, respectively). PD1-inhibitor was associated with 5% (1/19) mortality, which increased to 10% (2/19) when combined with PLA; there was no mortality with PLA monotherapy (0/12) or vehicle+isotype (0/17) groups. Pneumonitis and colitis were observed only in mice treated with PLA+PD1-inhibitor; there were no pathological changes in other organs and no difference between males and females.

PLA increases toxicity when used with PD1-inhibitor. Ongoing studies will determine impact on anticancer efficacy and optimize dosing of the combination regimen.

School: Graduate School of Biomedical Sciences

BLACK, CAROLINE

Polymicrobial Communities in Chronic Wounds Affect Individual Antimicrobial Susceptibilities to Multiple Antibiotics

Caroline Black, Sabrina Wilson, Catherine Wakeman, Allie Smith

New advances in sequencing technologies have demonstrated that many chronic infections are polymicrobial in nature. Within a polymicrobial community, interactions between multiple species can allow for synergism, leading to decreased antibiotic efficacy and worse patient outcomes. Despite the knowledge that persistent infections are often polymicrobial in nature, hospital laboratories assess antimicrobial susceptibility based on monomicrobial suspensions. This project investigates the shifts in antimicrobial susceptibilities driven by the presence of the organism in a polymicrobial community. Four relevant chronic wound pathogens (*Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Acinetobacter baumannii*, and *Enterococcus faecalis*) were grown in both monomicrobial and polymicrobial conditions. When comparing species growth individually versus in a community, shifts in antimicrobial susceptibilities were observed. Using the data obtained from individual antibiotics, a combinatorial antibiotic therapy was proposed, and was shown to be effective in inhibiting bacterial growth. This demonstrates that current clinical methods for determining antimicrobial susceptibility based on the monomicrobial causative agent of disease may not fully represent the clinical environment. However, by acknowledging the impact of the community on antimicrobial susceptibilities, we can more effectively determine potent antibiotic therapies needed to treat persistent infections and improve patient outcomes.

School: School of Medicine

CASTRO, MARIBEL

Cryoablation in combination with the checkpoint inhibitor anti-CTLA4 increased T cell activation in a murine breast cancer model

Maribel Castro, Sonia Y. Khan, Carsen Roach, Rasha Fahmida, Flávia Sardela de Miranda, Chang Hyun Lee, Luis Brandi, Kevin Pruitt, Harvinder Singh Gill, Michael W. Melkus, Rakhshanda Layeequr Rahman

A promising area of breast cancer cryoablation research is its combinational use with checkpoint inhibitors to enhance the antitumor response. Ipilimumab (anti-CTLA4) has already been approved for melanoma and is currently being investigated in breast cancer. A pilot study of preoperative single-dose ipilimumab and cryoablation in women with early-stage breast cancer was safe and showed favorable intra-tumoral and systemic immunologic responses. Using a murine model of high-risk metastatic breast cancer, we investigated cryoablation in conjunction with anti-CTLA4 to enhance the anti-tumor T-cell immune response.

Balb/C mice were bilaterally transplanted in the mammary fat pad with 4T1-12b-luc - luciferase-expressing metastatic breast cancer cells. Mice (n=5) were treated with 100 µg anti-CTLA4 24-hrs pre- and post-cryoablation with control mice (n=5) receiving cryoablation alone. Left tumors were cryoablated while the right untreated tumors served as proxy for metastatic tumor for abscopal immune readout. One-week post cryoablation, mice were sacrificed and necropsied for tissue analysis. Peripheral blood and splenocytes were analyzed for T-cell subsets and the activation marker ICOS by flow cytometry. Cryoablated and treatment naive tumors were analyzed for tumor-infiltrating lymphocyte (TIL) scores by hematoxylin and eosin (H&E) and activated cytotoxic T lymphocytes (CTLs) by CD8/ICOS immunofluorescence.

Mouse necropsies showed cryoablated tumors undergoing coagulative necrosis. Mice treated with both cryoablation and anti-CTLA4 had an increased percentage of CD4 and CD8 T cells expressing ICOS in peripheral blood and spleen compared to cryoablation alone. Interestingly, mice treated with cryoablation and anti-CTLA4 had a significant increase in TILs in the cryoablated tumors. Tumor analysis for CTLs is underway.

Cryoablation in combination with anti-CTLA4 increased T-cell activation compared to cryoablation treatment alone. The next step is to evaluate whether combinational therapy increases the abscopal effect in controlling metastasis in long-term survival studies in our breast cancer murine model before proceeding to clinical trials.

School: School of Medicine

CHEN, JASON

Pathogenic bacteria form mature biofilms on the surface of a stainless-steel orthopedic device

Jason Chen, Vishal Ubha, Jeremy Garza, Dominic Campano, Abdul Hamood

Orthopedic implants are essential components of modern orthopedic surgeries. However, a relatively common complication of orthopedic surgeries is the infection of these implants. In the USA, more than two million cases of medical implant infections occur each year costing the health care system more than \$5 billion. Bacterial pathogens frequently associated with orthopedic implant infections include *Staphylococcus aureus*, *Staphylococcus epidermidis*, and *Pseudomonas aeruginosa*. These pathogens form formidable biofilms that readily adhere to the surface of the implant and are difficult to treat with either systemic antibiotics and/or simple debridement and irrigation. One potential strategy is to apply topical antibiotics to the surface of the implant immediately after its insertion. Prior to antibiotic treatment, it is essential to determine the extent of biofilms formed by different pathogens on any specific orthopedic device. We hypothesize that *S. aureus*, *S. epidermidis*, or *P. aeruginosa* form mature biofilms on stainless steel orthopedic devices. Using the microtiter plate and the nutrient agar plate assays, we assessed biofilms formed by *S. aureus*, *S. epidermidis*, or *P. aeruginosa* on stainless steel orthopedic coupons. At an initial inoculum of 2-5 X10⁵ colony forming unit (CFU)/ml, each tested strain was incubated with a 1X1 CM coupon for 24 hours at 37°C. The coupons were then extracted, gently rinsed, and the biofilms were measured by determining the CFU/coupon. *P. aeruginosa* formed comparable biofilms in both assays, while *S. aureus* and *S. epidermidis* formed relatively better biofilms in the nutrient agar plate assay. In the microtiter plate assay, *P. aeruginosa* formed a significantly better biofilm than those formed by *S. aureus* or *S. epidermidis* (108 vs. 104 CFU/coupon). These results suggest that the microtiter plate assay is suitable to assess the effects of antibiotics on biofilm formation by either *P. aeruginosa*, *S. aureus*, or *S. epidermidis* on stainless steel orthopedic coupons.

School: School of Medicine

CURL, JORDAN

The Frequency of the Alternative Lengthening of Telomeres in a Large Panel of Patient-Derived Cell Lines and Xenografts as Determined by the C-Circle Assay

Jordan Curl, Alec Fulton, Trevor Burrow, Patrick Reynolds

In 2022, over 1.9 million new cancer cases and over 600,000 cancer deaths are projected to occur in the US. Approximately 85-90% of cancers maintain their telomeres via telomerase; however, 10-15% of cancer cases do not express telomerase. Instead, they use the alternative lengthening of telomeres (ALT) mechanism to achieve replicative immortality. ALT cancers typically have poor outcomes, but recently, our lab has identified unique molecular vulnerabilities in ALT cancers. Identification of pre-clinical ALT patient-derived models will facilitate preclinical studies of investigational agents targeting ALT cancers. C-circles, self-primed circular extrachromosomal telomeric DNA repeats, are a sensitive and specific biomarker for ALT. The clinically applicable Real-time PCR C-circle Assay (CCA) consists of an isothermal phi-polymerase reaction that selectively amplifies telomeric DNA C-circles, which are subsequently detected by Real-time PCR. We utilized the Real-time PCR CCA to screen cell lines and patient-derived xenografts from the South Plains Oncology Consortium (SPOC) and the Children's Oncology Group (COG) repositories. Of the 187 tested samples, 12.3% were determined to be ALT+. Future studies will include characterization of ALT+ models and further screening of newly established cell lines and xenografts.

School: School of Medicine

DANCEL, CANICE

Sex-dependent antinociceptive effects of ACEA on acute inflammatory and chemotherapy-induced chronic pain models

Canice Dancel, Haley De-Selle, Melissa Mchann, Josee Guindon

Cannabinoid (CB) receptor agonists are promising therapeutic agents in the alleviation of inflammatory and chronic pain. CB receptor agonists modulate pain transmission by acting at G-protein coupled CB1 and CB2 receptors to activate descending inhibitory pain pathways. Previous studies have shown that administration of the highly selective CB1 receptor agonist, arachidonyl-2-chloroethylamide (ACEA), resulted in sex-specific antinociception in several rodent pain models. In this study, we examine the dose and sex-dependent effects of ACEA on alleviating inflammatory and chemotherapy-induced pain in male and female wild-type mice. We used the formalin test (2.5 % formalin intraplantar) to evaluate inflammatory pain. Our results demonstrate sex differences in the response to ACEA alleviating inflammatory (formalin test) pain when administered at different doses (between 0.1 – 1 mg/kg i.p.) in male and female wild-type mice. A chemotherapy-induced peripheral neuropathy model was implemented using cisplatin (5 mg/kg i.p. once a week for four weeks) to evaluate ACEA's effectiveness in treating chronic pain by testing mechanical (Von Frey) and cold (acetone) allodynia. We found that ACEA can reverse mechanical and cold allodynia in both male and female wild-type mice. Females also developed tolerance faster than male mice. Indeed, females are tolerant to the antinociceptive effect of ACEA after 5 days of chronic ACEA i.p. injection whereas males become tolerant after 8 days. Moreover, we also evaluated the oestrous cycle, via vaginal lavage of the female mice, and found that ACEA disrupts the oestrous cycle toward the metestrus stage of the cycle. Taken together, our results suggest a clear interaction between sex, antinociception and tolerance. To shed light on these differences and better understand the mechanisms of action involved, we need to scientifically recognize the importance of sex in influencing pain responses to develop effectual therapies and improve treatment of chronic and inflammatory pain in patients.

School: School of Medicine

FALCONI, SIRIN

Carbidopa/a-methyltryptophan as an ideal combination therapy for obesity-associated breast cancer

Falconi, Sirin; Ganapathy, Vadivel; Ramachandran, Sabarish

Cancers associated with overweight/obesity represent ~40% of all cancers diagnosed in the United States. Several studies have documented that a higher body mass index in postmenopausal women raises the risk of breast cancer by 30-40%. This connection to obesity is particularly relevant to estrogen receptor-positive breast cancer, the subtype that represents 75-80% of all breast cancers. Several mechanisms have been proposed for the potentiation of cancer by obesity, including chronic low-level inflammation. Strong evidence supports the fact that weight loss in obese women decreases breast cancer risk exponentially. The carbidopa/a-methyltryptophan combination to treat obesity-associated breast cancer targets cancer as well as reduces body weight. Furthermore, since carbidopa blocks the synthesis of a-methylserotonin in the periphery, the proposed combination will prevent detrimental effects on cardiac valves.

Carbidopa alters the pharmacokinetics of a-methyltryptophan in the periphery and in the brain such that it potentiates the efficacy of the latter as an anti-cancer drug and a weight-loss drug, thus making the carbidopa/a-methyltryptophan combination ideal for the treatment of obesity-associated breast cancer.

A syngeneic tumor-cell transplant mouse model was used for ER-positive breast cancer. Drug treatment was started after tumor growth was noticeable. The drugs were administered in drinking water. There were four treatment groups: (i) control; (ii) a-methyltryptophan at 0.5 mg/ml; (iii) carbidopa at 0.25 mg/ml; (iv) a-methyltryptophan at 0.5 mg/ml + carbidopa at 0.25 mg/ml. Our results showed that carbidopa/a-methyltryptophan combination treatment was the most efficacious at both decreasing the average tumor weight and average tumor volume.

The combination treatment significantly decreased the tumor size and volume compared to carbidopa and a-methyltryptophan alone. This demonstrates the effective use of carbidopa to potentiate the anti-cancer efficacy of a-methyltryptophan. Transcriptomic analyses of the tumor tissues are underway to understand the molecular basis of the observed potentiation of the two-drug combination.

School: School of Medicine

GABRILSKA, REBECCA

Host-pathogen transcriptomics of a polymicrobial dermonecrotic infection

Rebecca Gabrilska, Craig Tipton, Hannah Zhao-Fleming MD, PhD, Caleb Phillips PhD, Kendra Rumbaugh PhD

Skin and soft tissue infections (SSTIs) are caused by invading microorganisms and range from superficial to complicated infections that extend into the deeper underlying tissue. Over the past two decades, there has been a significant increase in the frequency and severity of both outpatient and inpatient SSTIs. Despite diverse etiologies, *Staphylococcus aureus* remains the leading cause of SSTIs. Additionally, improved microbial detection methods have recently illuminated the presence of obligate anaerobes as a potential mediator of disease severity with worsened prognoses in polymicrobial infections. We have observed that together, *S. aureus* and the opportunistic obligate anaerobe *Bacteroides fragilis* cause significantly larger dermonecrosis in vivo when compared to mono-infection; however, how this microbial interaction influences disease severity is not known. We hypothesize that there is increased virulence in co-infection compared to mono-infection, which leads to increased disease severity. In this study, we used a dual-RNA sequencing approach to investigate the interplay between these pathogens and the murine host response. First, we infected mice subcutaneously on the ventral aspect of the inner thigh with *S. aureus* or co-inoculation of *S. aureus* and *B. fragilis*, then monitored for dermonecrosis over the course of 5 days. Gross examination of the skin was classified as either intact or ulcerated. Dermal tissues were collected for RNA extraction and sequencing, with subsequent transcriptome analysis. Our preliminary results suggest that there is significant but minor variance in RNA expression that results in dermonecrosis as opposed to intact abscess infections. Although traditionally challenging to detect in culture, obligate anaerobes may synergize with common skin pathogens and be a significant determinant of complicated SSTI progression. Future studies will aim to validate our findings and serve as potential catalysts to expand therapeutic development.

School: Graduate School of Biomedical Sciences

GARCIA, HECTOR

Evaluation of the checkpoint inhibitor anti-CTLA4 in a mouse surgical model of breast cancer.

Hector Garcia, Maninder Kumar, Harvinder Singh Gill, Michael W. Melkus, Rakhshanda Layeequr Rahman

Patients with higher biopsy tumor infiltrating lymphocytes (TILs) counts respond better following surgical resection and therapy. The tumor immune microenvironment (TIME) influences the anti-tumor immune response. TIME TILs may be suppressed through tumor-T-cell immune checkpoint receptors. Checkpoint inhibitor therapy seems to improve anti-tumor immune responses for several solid tumors, but data is lacking for high-risk breast cancer.

To investigate the use of anti-CTLA4, a check-point inhibitor, in conjunction with surgical resection to improve the anti-tumor immune response in a murine model of metastatic breast cancer.

Anti-CTLA4 pharmacokinetic (PK) studies were performed and anti-CTLA4 therapy evaluated in our murine model for surgical breast cancer. Mice were bilateral orthotopic transplanted with 4T1-12b-luc (luciferase expressing cell line) with left tumor serving as the primary tumor and right tumor as the metastatic tumor for abscopal immune readout. Mice were divided into 3 groups: resection only, treat intraperitoneal with 100 ug anti-CTLA4 one-week before primary tumor resection or 24-hours post-resection. Mice underwent primary tumor resection; one week later the abscopal tumor was excised. Mice were monitored for recurrence and metastasis by in-vivo imaging and blood analyzed for T-cell activation.

The PK study detected a peak average concentration of 65 ug/ml anti-CTLA4 in the blood at 24-hr with an average 47 ug/ml concentration at 5 days. Anti-CTLA4 treatment pre-resection showed overall higher percentage of activated T-cell expressing ICOS, while longitudinal survival studies showed increased survival rates for anti-CTLA4 treatment post-resection. We are in the process of analyzing the tumors for TIL counts and T-cell activation markers.

Survival studies suggest a more specific anti-tumor immune response post-resection CTLA4 therapy. These studies are being evaluated in our breast cancer cryoablation murine model. The long-term goal is a clinical trial with anti-CTLA4 comparing standard of care to cryoablation therapy for high-risk metastatic breast cancer.

School: School of Medicine

GARCIA, LIZA

PcrV and Hep-P: two targets for potential therapy for Pseudomonas aeruginosa infected severely burned patients

Liza Garcia, Jeremy Garza, Emily Bouffard, Nyaradzo Dzvova, Jane Colmer-Hamood, John Griswold, and Abdul Hamood

Severely burned patients are immunocompromised locally and systemically. Bacterial pathogens, including the gram-negative opportunistic *Pseudomonas aeruginosa*, colonize injured tissues causing infections which if untreated lead to bacteremia, sepsis and death. *P. aeruginosa* resistance to numerous antibiotics necessitates the search for alternative therapies to prevent *P. aeruginosa* infection of severely burned patients. We recently identified two potential targets to combat *P. aeruginosa* infection in burned patients, PcrV and heparinase (HepP). PcrV is one of several proteins that translocates different toxins of the *P. aeruginosa* type III secretion system. Using the murine model of thermal injury and a specific PcrV antibody (PcrV-Ab), we assessed the contribution of PcrV to *P. aeruginosa* bacteremia in vivo. A single dose of PcrV-Ab reduced the mortality rate among thermally injured/*P. aeruginosa*-infected mice from 95% to 0%. While PcrV-Ab did not affect the wound bioburden, it prevented the bacteria from reaching the livers and spleens of infected mice. HepP is a potential virulence associated enzyme. In the same animal model and compared with its parent strain, an isogenic *P. aeruginosa* heparin deficient mutant PA14_23420 (Δ hepP), failed to produce mortality in infected mice and grew within the infected wound but failed to reach the liver or spleen. In the in vitro serum sensitivity assay, using pooled human serum and compared with its parent strain, PA14_23420 was serum sensitive. This sensitivity was eliminated using heat treated (complement inactivated) serum and restored when we treated the serum with a chelating agent to inactivate the classical pathway of the complement system. These results suggest that 1) both proteins are targets for potential therapy for *P. aeruginosa*-infected severely burned patients, and 2) HepP but not PcrV is essential for *P. aeruginosa* resistance to serum complement.

School: School of Medicine

GOMEZ, ALEJANDRA

CRES and CRES Subgroup Members as Functional Amyloids in the Brain

Alejandra Gomez, Petar Grozdanov, Jeremy D. Bailoo, Aveline Hewetson, Gail A. Cornwall

Amyloids are highly ordered cross β -sheet aggregates that are typically associated with disease states such as neurodegeneration and diabetes. However, growing evidence shows that some amyloids can carry out biological roles including as structural scaffolds and signaling complexes and are categorized as functional amyloids. We previously demonstrated an amyloid matrix is present throughout the normal mouse epididymal lumen with proposed functions in sperm protection and maturation. The epididymal amyloid matrix is composed of several members of the highly amyloidogenic reproductive CRES (cystatin-related epididymal spermatogenic) subgroup of cystatin cysteine protease inhibitors suggesting it is a complex functional amyloid. In the mammalian brain, studies suggest amyloids are important structural components of synapses as well as being involved in regulating synapse structure and function making them potential key players in synaptic plasticity and memory maintenance. We hypothesize CRES and CRES subgroup members are also found in the brain and may carry out functional roles as amyloids. Preliminary RT-PCR and Western blot showed CRES and other subgroup members are present in the mouse hippocampus and other brain regions as well as in a mouse hippocampal neuronal cell line. Cognitive-behavioral studies between wild-type (WT) mice and a global CRES knockout (KO) mouse model highlight that male, but not female, KO mice displayed impairments in learning in a 2-choice water-escape task as well as behavioral inflexibility during reversal (they perseverate on the previously learned escape location) when the location of the platform to escape is changed. These findings suggest CRES and CRES subgroup members may be implicated in learning and memory processes and provide a basis to further study their role as potential functional amyloids in the brain.

School: Graduate School of Biomedical Sciences

GRIFFIN, ZACH

Kappa opioid receptor blockade reduces pain-like behaviors and restores inhibition of amygdala CRF neurons in a functional pain model in rats

ZACH GRIFFIN, VADIM YAKHNITSA, MATTHEW HEIN, EDITA NAVRATILOVA, PEYTON PRESTO, FRANK PORRECA, VOLKER NEUGEBAUER

Chronic pain is observed in conditions related to identifiable injury as well as in functional pain syndromes (FPS), including fibromyalgia, irritable bowel syndrome, and migraine, in which the pain cannot be attributed to tissue pathology. The amygdala is an important contributor to pain-related emotional-affective conditions and pain modulation. The central nucleus of amygdala (CeA) is also a major site of opioid receptors. Activation of kappa opioid receptors (KOR) in the CeA has been shown to generate pain-like behaviors, enhance neuropathic pain behaviors, and disinhibit corticotropin releasing factor (CRF) expressing CeA neurons. Similar adverse effects can also be induced by the endogenous KOR agonist-dynorphin. Here we tested the hypothesis that blockade of KOR signaling with a KOR antagonist (nor-binaltorphimine, nor-BNI) in the right CeA inhibits pain-like behaviors by restoring inhibitory control of CRF neurons in the CeA in a rat model of FPS. The FPS model was induced by morphine priming for 7 days (using subcutaneously implanted mini osmotic pumps) followed 2 weeks later by one hour of restraint stress on two consecutive days. The control group received morphine without stress. For behavioral experiments, animals were implanted with microdialysis probes into the right CeA 5 days prior to testing. Brain slice electrophysiology was used to determine the effects of nor-BNI on CeA-CRF neurons. To visualize CRF-expressing neurons in CeA we used CRF-Cre rats (original breeding pairs kindly provided by Dr. Michael Burman, Univ. of New England). AAV5-ChR2-CaMKII-eYFP was injected into the right lateral parabrachial area (LPB) to allow optical activation of glutamatergic synaptic inputs to CeA neurons. Administration of nor-BNI into the right CeA decreased vocalizations evoked by noxious mechanical stimuli and anxiety-like behaviors in elevated plus maze test. Whole-cell patch-clamp recordings of CRF-positive and CRF-negative CeA neurons revealed that in the FPS model, nor-BNI increased optically and electrically evoked inhibitory synaptic currents (IPSCs) from LPB, while decreasing neuronal excitability (frequency-current F-I relationship). Nor-BNI also decreased spontaneous and miniature IPSCs frequency, but not amplitude. The data suggest that blockade of KOR signaling in a rodent model of FPS reduces pain-like behaviors and restores synaptic inhibition of CRF-CeA neurons through a presynaptic mechanism of action.

School: School of Medicine

HERNANDEZ, HAZAEL

Dispersal of Polymicrobial Candida albicans and Methicillin Resistant Staphylococcus aureus Biofilms using Glycoside Hydrolases

Hazael Hernandez, Rebecca Gabrielska, Lars Northcut, Garrett Welch, Kendra Rumbaugh

Chronic wounds are non-healing injuries to the skin, affecting millions of patients worldwide. Infection is a major determinant of chronicity in wounds and is often associated with the ability of microorganisms to form biofilms. Medical biofilms are an advantageous phenotype of microbial communities, which are encased in a protective extracellular polymeric substances (EPS) that promotes microorganism survivability through host evasion and increased antimicrobial resistance. Commonly isolated biofilm-producing pathogens in wounds include the opportunistic yeast *Candida albicans* (Ca) and the Gram-positive bacteria *Staphylococcus aureus* (Sa). Efficacious treatments against biofilms, particularly multi-kingdom communities, are limited, thus there is potential for adjunctive therapy with agents that disrupt biofilms and promote dispersal of microbes. Here, we investigated the ability of the glycoside hydrolases α -amylase and cellulase to disperse Ca and Sa biofilms using an in vitro biofilm model. Glycoside hydrolases were chosen for their ability to successfully disperse bacterial biofilms. We hypothesized that the association of Sa to Ca hyphae would result in improved dispersal with glycoside hydrolases. Preliminary results suggest glycoside hydrolases disperse fungal-bacterial biofilms as effectively as bacterial biofilms. These results will serve as a foundation for future studies using a murine chronic wound model to provide further insight into the therapeutic potential of glycoside hydrolases against polymicrobial biofilms.

School: School of Medicine

HOWLADER, MD. SARIFUL ISLAM

KLF2 regulates osteoclast differentiation by modulating mitochondrial activity and function

Md. Sariful Islam Howlader, Ripon Sarkar, Hiranmony Das

We have previously demonstrated that Kruppel-like factor 2 (KLF2) promotes autophagy during osteoclastogenesis. However, it remains unclear how KLF2 regulates autophagy during the process that produces a bone loss in a variety of bone disorders, including osteoporosis, osteoarthritis, and rheumatoid arthritis. In this current investigation, we found that the number and mass of mitochondria and the mitochondrial membrane potentiality were augmented during osteoclastic differentiation, mediated by the addition of soluble receptor activator of nuclear factor- κ B ligand (sRANKL) to the RAW 264.7 cells and that these measures were significantly reduced by chemical induction of KLF2 (induced by addition of GGTI298). As a result of the increased number of mitochondria, oxygen consumption rate (OCR) and extracellular acidification rate (ECAR) increased, which were almost restored by overexpression of KLF2. Furthermore, scanning electron microscopy and western blot data indicated that osteoclast differentiation increased mitochondrial fission by increasing mitophagy; this process was reduced by overexpression of KLF2. Finally, we observed high expression of autophagy molecules in the late endosome of myeloid cells, as determined by immune co-localization and western blot. In conclusion, we have shown for the first time that mitochondrial activity and functions significantly influence osteoclastic differentiation and that KLF2 plays a significant role in orchestrating these processes. Through identifying the regulatory mechanisms of KLF2, novel therapeutic strategies could be developed to treat a wide range of bone-related diseases by targeting osteoclast cells.

School: Graduate School of Biomedical Sciences

JACOBO, UNIQUE

A Study on the Ability of an Organo-Selenium, Attached to a Cellulose Polymer Dressing, to Inhibit Candida albicans Biofilm

Unique Jacobo, Phat Tran, Nouredine Abidi, Nicholas Bergfeld, Ted Reid

Candida species are fungal pathogens known to cause superficial and systemic infections in the human host. These pathogens are able to persist inside the host due to the development of virulence factors and multidrug resistance traits, often leading to the failure of therapeutic strategies. The following research was carried out to determine the ability of organo-selenium compounds attached to a cotton dressing, to block the attachment and potential biofilm formation of *Candida albicans* on the dressing.

Cotton wound dressings were prepared by covalently attaching organo-selenium (OS) to the dressing. It was shown that this OS dressing can catalyze the formation of superoxide radicals which is required to block the biofilm formation. These OS-dressings were then treated with a multi-antifungal drug resistant *Candida albicans* in vitro. After 48-hours of growth, the amounts of bacteria growing in the cotton wound dressings were determined by a colony forming unit (CFU) assay and imaged by scanning electron microscopy. To test for stability, the dressings were soaked for over 2 years in phosphate buffered saline (PBS) and then tested by the CFU assay.

Utilizing the CFU assays, over 8 logs of inhibition (100%) were found for the *Candida albicans* on the OS materials containing 1% and 8.0% concentrations of selenium. The dressing containing 0.5% selenium showed over 4 logs of inhibition when compared with the untreated control. Scanning electron microscopy was also carried out to confirm the results obtained with the CFU assays. Stability study of the OS dressing was carried out by the CFU assay.

Cotton dressings can be incorporated with selenium monomers. Dressings attached with 1.0% and 0.8% selenium inhibits over 8 logs of *Candida albicans* biofilm formation. OS attached to the cotton dressing is stable for over 2 years soaking in PBS and still exhibits biofilm inhibition.

School: Graduate School of Biomedical Sciences

JOHNSON, BENJAMIN

Expression of Transsynaptic Proteins in a Mouse Model of Alzheimer's

Bejamin Johnson, Seham Azzam

Neurodegenerative diseases such as Alzheimer's disease (AD) impair important brain functions involved in memory, cognitive, and affective behaviors. These functions are conducted through the communication points, known as synapses, for the billions of nerve cells in the brain. However, in AD there are changes in these synaptic communications which are hypothesized to be an early mechanism of the neurodegenerative properties associated with the disease. The transsynaptic signaling complex GluD-Cerebellin-1-Neurexin plays an important role in synaptic development and maintaining the integrity of the synapses in the brain. It is unclear, however, how the expression of these proteins is altered throughout the process for AD. We investigated the changes in expression of Cerebellin-1 in J20 mice, a mouse model of AD, to better understand how AD may alter the expression or localization of Cerebellin-1. We believe there will be a decrease in the amount of Cerebellin-1 expressed in the brain and altered localization as the J20 mice grow older. To investigate our hypothesis, we extracted RNA from the amygdala, hippocampus, and cortex of wild type and J20 mice at 3 months of age and 12 months of age. A RT-PCR was then performed on the RNA extracted from various tissue samples to determine differences in the expression of Cerebellin-1 between the different brain regions and different ages. In all three brain regions, a decrease in expression of Cerebellin-1 was found when comparing J20 mice at 3 months versus 12 months. Finally, an immunohistochemistry assay was done to visualize Cerebellin-1 in tissue samples from the J20 mice, as well as wild type mice. Data from these experiments will be available in February and added to the poster at that time.

School: School of Medicine

JUNELL, RILEY

Subacute silencing of HMGB1 in the amygdala inhibits pain-related behaviors in a rat model of chronic neuropathic pain

RILEY JUNELL, PEYTON PRESTO¹, IGOR PONOMAREV^{1,2}, VOLKER NEUGEBAUER^{1,2,3};

Chronic pain is a pervasive health care issue that affects a significant portion of the global population each year. An intricate interplay between sensory, cognitive, and emotional-affective dimensions forms the highly complex experience of pain, presenting a challenge to identifying effective treatment options. Maladaptive neuroplasticity is a key contributor in the transition from acute to chronic pathological pain. This transition may be associated with neuroimmune mechanisms in the brain, which have yet to be elucidated. High motility group box 1 (HMGB1) is a “proinflammatory” molecule that is involved in pain-related crosstalk between neurons and glia in the spinal cord, though its role in the amygdala in pain states has yet to be explored. Here we tested the hypothesis that HMGB1 is involved in pain-related amygdala plasticity and that inhibition of this molecule can reduce neuropathic pain behaviors. Transcriptomic analysis showed that HMGB1 was upregulated in the central nucleus of the amygdala (CeA) of adult chronic neuropathic rats (4 weeks after spinal nerve ligation, SNL). HMGB1 siRNA (pooled AAV vector) was injected stereotaxically into the right CeA of adult male and female rats as either a pretreatment (2 weeks before) or posttreatment (1 week after) to SNL surgery. Sensory and affective behaviors were measured 4 weeks after SNL. HMGB1 silencing ameliorated anxiety-like behaviors (open field test and elevated plus maze), increased mechanical withdrawal thresholds (von Frey test and tissue compression with calibrated forceps), and reduced emotional-affective responses (audible and ultrasonic vocalizations) in the posttreatment but not pretreatment group. mRNA analysis showed upregulation of HMGB1 expression in the pretreatment group compared to sham controls, indicating recovery of HMGB1 at the chronic stage. Together these findings suggest that HMGB1 in the amygdala contributes to the transition from acute to chronic neuropathic pain.

School: School of Medicine

KAMILAR, ELIZABETH

SMALPs Consist of Diverse Self-Assembled States Characterized by Different Polymer-to-Lipid Ratios

Elizabeth Kamilar, Dr. J. Bariwal, Dr. H. Liang, Dr. H. Ma

Styrene maleic acid (SMA) copolymers allow for the direct solubilization of biological membranes into styrene maleic acid lipid nanoparticles (SMALPs), which in many studies are simply regarded as lipid nanodiscs and enthusiastically pursued as the native membrane platform to support the structure and function of membrane proteins. The commercially available SMA resins are notoriously heterogeneous with large polydispersity indices (PDI ~ 2.0-3.0). To better understand SMALP formation and test the effect of SMA chain size distribution on defining the SMALP structures, we study here precisely engineered SMA copolymer with a hydrophobic/hydrophilic (i.e., S/MA) ratio of 2/1 synthesized by reversible addition fragmentation chain transfer (RAFT) polymerization. This model SMA has a similar S/MA ratio and number-average molecular weight as the commercial SMA resin typically used in membrane biology studies but much more focused chain size distribution (PDI ~ 1.05). We demonstrated that any SMALP preparation consists of distinct alternative structures in addition to the putative lipid nanodiscs, including polymer-decorated liposomes, polymer-lipid micelles, and excess polymers. This heterogeneity is present to an even greater degree for commercially available SMAs, likely due to their increased polydispersity. We further determined the polymer-to-lipid ratios for all of the characteristic self-assembled states in SMALPs. These ratios, which have never been determined previously, play a critical role on identifying the true nanodisc fraction amongst the diverse self-assembled states in SMALPs. The kinetics of the SMALP formation itself are also analyzed, allowing for optimization of the yield when different SMA copolymers are used. This study demonstrates that SMALPs can't be simply regarded as lipid nanodiscs. This popular yet blithe presumption could lead to erroneous measurements and data interpretation of the structure and function of membrane proteins. Fortunately, the true nanodisc fraction in SMALPs can be identified and separated by chromatography methods, and the yield of nanodiscs can be enhanced by the use of more monodisperse SMA copolymers that help optimize the SMALP formation.

School: Graduate School of Biomedical Sciences

KAPILA, JEEGISHA

Cervical Multifidus Muscle Stiffness During Active Neck Movements: A Shear Wave Elastography Study

Jeegisha Kapila, C.R. James, J.M. Brismée, P.S. Sizer, S. Sobczack, A. Likness, T.L. Hooper

Neck pain is a common problem associated with deep cervical muscle impairments and proprioceptive deficits. Shear wave elastography (SWE) measures regional tissue stiffness, which provides a safe method to evaluate deep cervical muscle function.

The purpose was to compare two neck extensor movements to determine which maximally activates the cervical multifidus. The secondary purpose was to establish intra rater reliability of cervical extensor SWE stiffness measurements.

Twenty-five subjects (8 males and 17 females) between the ages of 22-29 years (mean= 23.9 years) without any history of neck pain completed the study. Subjects performed three trials of the following activities while in 4-point kneeling: a) neck retraction movement, and 2) crainocervical extension using a stabilizer. Three shear wave elastograms were recorded during each trial. A paired t-test was used to compare multifidus stiffness during the two activities. All measurements were repeated after a minimum of 24 hours period in the first fifteen subjects to establish intra-rater reliability (ICC3,9).

Cervical multifidus stiffness during neck retraction (5.55 ± 1) was significantly higher compared to craniocervical extension movement (4.86 ± 0.66) at ($p = 0.02$, $d = 0.8$). The multifidus SWE stiffness measurements demonstrated moderate reliability (0.75-0.77).

Maximal multifidus stiffness, which is an indirect measurement of muscle activation, is greatest during neck retraction. The results of this study may assist clinicians to design interventions targeting maximal multifidus activation.

School: TTUHSC - Lubbock

KHEDMATGOZAR, HAMED

Identification of signature genes, pathways and potential therapeutic agents for Benign Prostate Hyperplasia, using an integrated bioinformatic analysis

Hamed Khedmatgozar, Sayanika Dutta, Girijesh Kumar Patel, Luis Brandi, Jonathan Welsh, Werner de Riese, Simon Hayward, Omar Franco, Robert Matusik, Renjie Jin, Srinivas Nandana, Manisha Tripathi

Benign Prostatic hyperplasia (BPH) – a hyperproliferation of epithelial and stromal compartments, is a common pathological condition affecting older men and severely impacting the quality of life. Currently, treatments are limited to 5-ARI and/or Alpha-blockers, commonly failing in BPH. Hence there is a need to understand the underlying mechanisms of this disease and come up with alternative treatment strategies. Transcriptome data provide a valuable resource for studying molecular mechanisms of BPH. Still, technical biases, samples' heterogeneity, and small sample sizes result in poorly reproducible lists of regulated genes. We integrated three human BPH RNA Seq datasets to eliminate these caveats and identified common differentially expressed genes (DEGs) among the three data sets.

Datasets and expression profiles were downloaded from Gene Expression Omnibus (GEO) and dbGap. DEGs were identified by DNASTAR and Array star and analyzed/represented using RStudio, GSEA, DAVID, STRING, Cytoscape.

We found 85 common DEGs enriched for biological processes, the top three being a cellular response to hormone stimulus, endothelial cell migration, cellular response to EGF stimulus. By comparing the 85 common genes with the 5ARI treatment group, we found that SLIT3 might be one of the candidate genes that may play a role in BPH development. We subsequently validated the results with IHC staining in a fourth BPH cohort and investigated the molecular function of SLIT3 by performing studies based on genetic modulation. Our studies showed that reduced SLIT3 expression resulted in decreased proliferation of both epithelial and stromal human BPH cells when compared with the respective control cells. SLIT3 knockdown resulted in smaller and fewer organoids. In summary, SLIT3 might be a key player contributing to BPH pathogenesis.

We identified the signature genes and pathways along with a novel potential therapeutic target that might play an important role in BPH development and treatment resistance.

School: Graduate School of Biomedical Sciences

KISBY, BRENT

Cell-type specific gene expression changes in the mouse Prefrontal Cortex after chronic ethanol drinking

Kisby, Brent; McManus, Michelle M.; Shanmugam, Sambantham; Ponomarev, Igor

Excessive alcohol (ethanol) consumption is one of the criteria for alcohol use disorder (AUD). Every-other-day (EOD) alcohol drinking in mice increases ethanol consumption over weeks, however, it is unclear which brain cell-types are key for regulating this drinking behavior. One of the primary brain regions affected by ethanol and involved in regulation of ethanol consumption is the Prefrontal Cortex (PFC). The goal of this study was to identify cell-type-specific gene expression changes within the PFC after alcohol drinking in mice. Male C57BL/6J male mice (n=4/ group) were randomly assigned to either the ethanol drinking group or water drinking group. We used the (EOD) drinking paradigm for a total of 17 alcohol sessions, which resulted in higher levels of ethanol drinking at the end of the procedure, compared with baseline. Twenty four hours after the last drinking session, brains were harvested and cell nuclei from the PFC were isolated for single nucleus RNA Sequencing (snRNA-Seq). We identified 27,207 nuclei which were organized into 30 discrete clusters. To identify cell-type clusters, we used known molecular markers of various cell types, such as astrocytes (Slc1a3), microglia (C1qa), endothelial cells (Flt1), and inhibitory and excitatory neurons. We used DESeq2 to identify differentially expressed genes (DEGs) in different cell types between the two drinking groups. With respect to global DEGs, we identified 1,337 genes at nominal p value of less than 0.05 with 731 genes down-regulated and 606 genes up-regulated in the ethanol drinking group compared with the water drinking group. Cell types most responsive to ethanol exposure were certain inhibitory neurons (i.g., DEGs: Vip, Gad2), some excitatory neurons (i.g., DEGs: Kcnq5, Kcnh7), endothelial cells (i.g., DEGs: Ptpm, Pltp), and microglia (i.g., DEGs: Hexb, Cst3). The data taken together suggest a large heterogeneity of responses in PFC cell types to prolonged drinking in mice.

School: Graduate School of Biomedical Sciences

LOEWEN, JOCELIN

Increased levels of SARS CoV-2 ACE2 receptors and TMPRSS enzyme in an age-dependent manner in Alzheimer's and Huntington's mouse models

Jocelin Loewen, Shreya Uppala, Erika Orlov, Razelle Alvir, Murali Vijayan, P. Hemachandra Reddy

The purpose of our study is to assess the levels of angiotensin-converting enzyme 2 (ACE2) and transmembrane protease serine 2 (TMPRSS) in mouse models of Alzheimer's disease and Huntington's disease. SARS CoV-2, commonly known as COVID-19, has been the cause of a global outbreak since 2019. The virus is spread directly via respiratory droplets and utilizes receptors like ACE2 to enter host cells and then primed by TMPRSS. SARS CoV-2 is most known for the severe respiratory distress it can cause, most often affecting older individuals as well as those with comorbidities, such as Alzheimer's, Huntington's, diabetes, kidney disease, etc. Neurodegenerative disorders have also been reported in those infected with COVID-19 and show correlations to both ACE2 and TMPRSS levels, suggesting a connection to increased susceptibility to SARS CoV-2. Our initial investigation makes use of mouse cerebellum models to understand the correlation between age and enzyme levels of ACE2 and TMPRSS. It is believed that there is an upregulation of these levels with age and age-related neurological diseases such as Alzheimer's and Huntington's. Our methods include using brain tissues from 2-, 6-, 12- and 20-month-old wild-type (WT) and age-matched transgenic mouse models of Alzheimer's disease (APP and Tau) and Huntington's disease (BACHD and HD-knockin) to measure levels of ACE2 and TMPRSS. We found that levels of both ACE2 and TMPRSS increased in an age-dependent manner in WT, APP, Tau, BACHD, and HD mice. A comparative analysis of 1) WT to APP, 2) WT to Tau, 3) WT to BACHD mice also revealed increased levels in APP, Tau, BACHD, and HD mice. These observations suggest that ACE2 and TMPRSS levels increase with disease progression in Alzheimer's disease and Huntington's disease in an age-dependent manner. Our study findings suggest that age and neurodegenerative diseases result in increased susceptibility to acquiring COVID-19.

School: School of Medicine

MATHEW, MARILYN

Comparing Weight Loss and Metabolic Improvements Using a Low Starch Dietary Education Program vs. Traditional Treatment for Polycystic Ovary Syndrome (PCOS)

Marilyn Mathew, Benjamin Jackson, Jennifer Phy, Jaou-Chen Huang

Polycystic Ovary Syndrome (PCOS) affects roughly 10% of premenopausal women and correlates heavily with insulin resistance, type 2 diabetes, cardiovascular disease, cancer, and is suggested as one of the leading causes of infertility. Hyperinsulinemia and elevated LH play a synergistic role in creating a pathologic hyperandrogenic state in women with PCOS. High-starch foods and dairy have been shown to induce hyperinsulinemic states producing the characteristic hyperandrogenic clinical presentation of PCOS. 56 participants who had previously been diagnosed with PCOS underwent a prospective randomized control 8-week ad libitum low starch/low dairy diet. This dietary education was composed of a face-to-face (F2F) arm and an online education arm (WEB). Preliminary results from participants who underwent the dietary intervention through either of the arms experienced a statistically significant reduction in BMI, HbA1C, fasting serum glucose and insulin; as well as a notable reduction in free/total/and bioavailable serum testosterone.

School: Graduate School of Biomedical Sciences

MATTHIJS, ANJA

Neck Sidebent Pre-Positioning Isolates Atlanto-Axial Joint Rotation By Locking The Other Cervical Segments: A Cadaveric Study

Matthijs, Anja, PT, ScD; Matthijs, Omer, PT, ScD; Windisch, Gunther, MD; Streitmayer, Bruno, MD; Kerner, Alexander, MSc; Sizer, Phillip, PT, PhD; Brismée, Jean-Michel, PT, ScD

Neck pain and headaches can result from atlanto-axial (C1-2) joint hypo- or hypermobility. However, little research has been published to assess the isolated C1-2 rotation range of motion (ROM), although cervical manipulations are commonly used in clinical practice.

To assess (1) intra-rater reliability of measuring cervical sidebent ROM and cervical rotation ROM in cervical neutral position and at end ROM right cervical sidebent position; and (2) segmental (C0-C7) rotation ROM in cervical neutral and end ROM cervical sidebent positions to determine whether rotation in pre-positioned cervical sidebent position mainly assesses C1-2 mobility.

Thiel-embalmed cadaveric specimen were used to assess: (1) intra-rater reliability of (a) cervical sidebent ROM; (b) cervical rotation ROM (in neutral and end ROM cervical sidebent) using an iPhone application and (c) C1-2 segmental rotation in neutral and end ROM cervical sidebent position using CT scan; and (2) total available rotation and cervical segmental contribution in cervical neutral and end ROM cervical sidebent pre-positions.

Ten cadavers age 80.8 ± 12.2 years were used. Both iPhone and CT scan measurements showed high intra-rater reliability coefficients for measuring cervical sidebent ROM and rotation ROM in both cervical neutral and end ROM sidebent position with ICC_{3,3} > .97. End ROM cervical sidebent pre-positioning decreased the total available cervical rotation by 44% compared to cervical rotation in neutral position ($p = .005$). End ROM cervical sidebent pre-positioning excluded all cervical disc segments for cervical rotation. In end ROM cervical sidebent pre-positioning, 89% of the total available cervical rotation occurred at C1-2 and only 1% at C2-7.

End ROM cervical sidebent pre-positioning mainly assesses the C1-2 segment during cervical rotation.

School: TTUHSC - Lubbock

MAY, HARRY

Synergistic effects of DNA-PK inhibitors with standard chemotherapeutic drugs in neuroblastoma

Harry May, In-Hyoung Yang, Min H Kang

In neuroblastoma, c-MYC oncogene expression is reported as one of the bad prognosis factors. In our previous studies in neuroblastoma, we found that c-MYC is transcriptionally activated by OCT4, a stem cell factor, and OCT4 is phosphorylated by MAPKAPK2 and DNA-PKcs at S111 and S93 residues. This activation pathway is mostly observed in progressive disease neuroblastoma models independent of MYC genomic amplification. In our previous study, we also studied and confirmed the DNA-PKcs-OCT4- cMYC axis being active in neuroblastoma models. Since we discovered new agents that interfere the protein interaction between DNA-PKcs and OCT4, we aimed to characterize the activity of the agents in comparison to commercially available PNA-PKcs kinase inhibitors. The purposes of the study are to investigate single-agent cytotoxicity of five DNA-PKcs inhibitors and to identify combination cytotoxicity of DNA-PKcs inhibitors with the standard of care chemotherapeutic drugs such as DNA-damage drug, 4-HC, and Bcl-2 inhibitor, ABT199. The methods used for the current study includes western blotting, DIMSCAN, a semi-automated cytotoxicity assay system, copy number determination using PCR, and gene expression by RT-PCR. We found that narciclasine, one of the agents we discovered as the inhibitors of the protein interaction between OCT4 and DNA-PKcs, inhibits phosphorylation of DNA-PKcs and reduces c-MYC expression in neuroblastoma. The cytotoxicity testing was conducted in neuroblastoma cell lines with various c-MYC expression status, including low c-MYC without genomic amplification, high c-MYC without genomic amplification, and high c-MYC with and without genomic amplification. In addition, we confirmed the effect of the single agents and the combination on c-MYC expression and synergistic cell kill effect. Further work is warranted to investigate the activity of narciclasine and its combination in xenograft models.

School: School of Medicine

MBAKI, GLODY

Exposing cultured renal epithelial cells to elevated concentration of fatty acids leads to pre-neoplastic changes

Mbaki, Glody; Subash, Sabiha

Intracellular lipid deposits are a distinguishing histological characteristic of clear cell renal carcinoma (ccRCC), the most common and deadly type of cancer affecting the kidney. These deposits are thought to result from lipid metabolic reprogramming occurring in tumor cells. Obesity is an independent risk factor for clear cell renal cell carcinoma. In patients and animal models of obesity, lipid accumulation also occurs in noncancerous epithelial cells of the proximal tubules, where ccRCC originates. The potential links between obesity-associated lipid accumulation in noncancerous renal cells and the pathogenesis of ccRCC remains unknown. We hypothesized that lipid accumulation has toxic effects leading to pre-neoplastic changes in renal epithelial cells in culture. We used cultured human kidney proximal tubule cells (HK2), in which lipid accumulation was achieved using an established protocol of incubation with a mixture of fatty acids carried on albumin, in concentrations commonly encountered in the serum of patients with obesity. We assessed DNA damage by Comet assay and Western blot for protein markers of DNA damage response. We also examined changes in the gene expression of inflammatory, ER stress and oxidative stress markers by qPCR, as well as changes in mitochondrial function by measurement of the pro-oncogenic TCA cycle metabolites succinate and fumarate. Lipids-loaded cells showed evidence of DNA damage, DNA damage response, and accumulation of fumarate and succinate. No significant differences were observed in inflammatory, oxidative stress or ER stress markers. In conclusion, Lipid accumulation in renal epithelial cells in culture leads to DNA damage, activation of DNA damage response mechanisms, and increased levels of pro-oncogenic TCA cycle metabolites fumarate and succinate. Additional research using cell culture, animal models and human kidney samples is required to test whether obesity-associated lipid accumulation in noncancerous renal cells plays a role and the pathogenesis of ccRCC.

School: Graduate School of Biomedical Sciences

MCCORD, JON

Structural features of Dnase1L3 responsible for serum antigen clearance

Jon McCord, Minal Engavale, Elahe Masoumzadeh, Johanna Villarreal, Britney Mapp, Michael P. Latham, Peter A. Keyel, R. Bryan Sutton

Autoimmunity develops when extracellular DNA released from dying cells is not cleared from serum. While serum DNA is primarily digested by Dnase1 and Dnase1L3, Dnase1 does not rescue autoimmunity arising from Dnase1L3 deficiencies. Dnase1L3 uniquely degrades antigenic forms of cell-free DNA, including DNA complexed with lipids and proteins. The distinct activity of Dnase1L3 relies on its unique C-terminal Domain (CTD), but the mechanism is unknown. We used multiple biophysical techniques and functional assays to study the interplay between the core catalytic domain and the CTD. While the core domain resembles Dnase1, there are several key differences between the two enzymes. Dnase1L3 is not inhibited by actin due to multiple differences in the actin recognition site. The CTD augments the ability of the core to bind DNA, thereby facilitating the degradation of complexed DNA to prevent autoimmune pathology. Together, these structural insights will inform the development of Dnase1L3-based therapies for autoimmunity.

School: Graduate School of Biomedical Sciences

MIMUN, KYLE

Metformin modulates central post-stroke pain associated protein expression in primary mouse astrocytes subjected to oxygen-glucose deprivation

Kyle Mimun, Ashrafur Rahman, Sabrina Archie, Sejal Sharma, Thomas J. Abbruscato

Pain after stroke, termed central post-stroke pain (CPSP), is reported in as many as 18% of post-stroke patients, with no viable treatment available to alleviate CPSP due to the lack of sufficient data needed to understand the pain perception pathway in CPSP. Here, we will investigate the pain perception pathways that are activated with stroke. In addition, we aim to find a suitable treatment approach to alleviate stroke patient pain for maximal engagement in post stroke rehabilitation. Previous reports have shown that metformin could be involved in modulating astrocyte activation in the brain, demonstrating its potential involvement in neuroprotection. During stroke, a hypoxic and nutrient deprived condition proliferates in a section of the brain corresponding to the location of the lesion. This may result in the activation of astrocytes, which may then release various pain associated inflammatory markers associated with a prolonged, persistent pain state. In this study, we will utilize the Western blot analysis to examine the expression of CPSP related proteins in astrocytes such as pyruvate dehydrogenase kinase 1-4, nuclear factor kappa B, P38 mitogen-activated protein kinase, glutamine synthetase, glutathione S-transferase, and tumor necrosis factor alpha. These CPSP related proteins will be examined in primary astrocytes exposed to oxygen glucose deprived (OGD) conditions for 2 and 4 hours. In addition, we will also examine the expression of CPSP related proteins in astrocytes pre-treated with metformin 24 hours prior to being exposed to the OGD condition. Using different doses of metformin, we aim to analyze the involvement of metformin in reducing CPSP related protein expression and ultimately the generation of pain. Our preliminary studies have shown that 100 μ M metformin significantly reduces the expression of CPSP related proteins in astrocytes. Thus, we hypothesize that metformin will provide protection of primary mouse astrocytes in the OGD condition.

School: Graduate School of Biomedical Sciences

OCHOLA, DAMIEANUS

Glutaminase inhibition induces replication stress in ovarian cancer cells and inhibition of replication checkpoint causes synthetic lethality.

Damieanus Ochola, Swetha Peddibhotla, Mark Reedy and Komaraiah Palle

Ovarian cancer (OC) is highly aggressive disease and most lethal gynecologic malignancy in women. Although majority of OC patients respond to chemotherapeutic drugs, more than 70% of the patients relapse and die with the chemoresistance. Therefore, novel therapeutics are warranted to prevent chemoresistance and treat the relapsed disease to improve prognosis. Many cancer cells depend on Glutamine as major carbon source and these cells have high Glutaminase (GLS) expression, an enzyme that converts Glutamine to Glutamate. Chemoresistant resistant OC cells have elevated levels of GLS, indication increased dependency on glutamine metabolism. Based on these observations, we postulated that GLS inhibition may attenuate aggressive growth of GLS high OC cells and may sensitize to the agents that can further potentiate these effects. Interestingly, GLS inhibition using a clinical stage drug CB839 caused replication stress and activated DNA damage checkpoint protein 1 (CHK1). These novel findings suggested a role for CHK1 in protecting GLS inhibition induced DNA damage by facilitating timely repair DNA breaks. We then hypothesized that GLS inhibition in combination with CHK1 inhibition may cause synthetic lethality in chemoresistant and GLShigh OC cells. We evaluated the combination of GLS inhibitor CB839 and CHK1 inhibitor Prexasertib. As predicted, CB839 increased CHK1 phosphorylation, which was significantly reduced in CB839 and Prexasertib combination. Furthermore, CB839 and Prexasertib combination was synergistic in cells that expressed high GLS compared to low GLS expressing OC cells indicating the specificity of the combination of these drugs. Additionally, combined treatment of CB839 and Prexasertib showed significantly elevated levels of DNA damage, cell arrest at S phase, replication stress and synergistic OC cell lethality compared to individual drug treatments. Together, our studies identified a novel connection between metabolic DNA damage checkpoint pathways in OC, and proposes a novel synthetic lethality based combination therapy to treat chemoresistant and aggressive OC.

School: Graduate School of Biomedical Sciences

OKIMI, ABIODUN

First report of use of a Modified Specific Gravity Technique to determine viability and quality of Human Embryos

Abiodun Okimi, Audrey Brown, Ashley Rook, Dr. Prien, Dr. Penrose, Dr. Ahamd

Embryo cryopreservation is a commonly used method for preserving tissue due to the easy ability to preserve genetics, transport, and transfer embryos. However, cryopreservation may negatively affect embryo viability for IVF procedures. In this study, the buoyancy of human blastocysts thawed after cryopreservation is measured as another method to determine the viability of embryos used in IVF procedures.

After thaw, individual blastocysts were transferred into the Modified Specific Gravity Device (MSGD) using a micropipette where they traveled through a column of global culture media. After the blastocyst was recovered, diameter of the inner cell mass was measured and the blastocyst was categorized based on hatching and expansion. After incubating again, the blastocyst was dropped a second time and monitored for hatching.

In the initial data collection, blastocyst drop times were evaluated after being thawed and after incubation. There was no significant difference between the drop times for expanded versus non-expanded blastocysts. However, expanded blastocysts had a markedly increased average post-incubation drop time compared to non-expanded. The average drop time for hatched blastocysts both before and after incubation was less than its non-hatched counterpart. In all cases, second drop times were greater than their respective first drop times, however, the magnitude of change in drop time before and after incubation was similar for both hatched and non-hatched blastocysts. There was no significant difference in average diameter for all blastocysts after thaw.

Buoyancy as determined by blastocyst drop times can provide a quantitative measure of embryo viability. Preliminary data shows differences in drop times among hatched and expanded blastocysts. Further studies of a larger scale are necessary to evaluate this means of embryo assessment. Although embryo cryopreservation has been proven to lead successful IVF pregnancies, utilizing extra protocols such as measuring buoyancy, may result in more successful pregnancy outcomes through IVF.

School: School of Medicine

PRATHYUSHA, NAIDU

Ferutinin upregulates BMP2 signaling in dental pulp-derived stem cells (DPSCs) towards the osteogenic differentiation.

Naidu Prathyusha, Daniela Rolph, Hiranmoy Das

Osteoporosis is a systemic metabolic bone disorder causes bone deterioration. Even though many therapeutic treatments are available for osteoporosis, most of them are helping only to slow the loss of bone density. So, it is important to understand the mechanisms underlying and be able to develop novel therapies accordingly. The bone morphogenetic proteins (BMP) are a group of proteins within the superfamily of transforming growth factor-beta (TGF- β) proteins. These proteins and their associated downstream effectors are involved almost in every aspect of osteoblastic differentiation and maturation. Herein, we studied the role of Ferutinin in regulating osteogenesis via the BMP2 pathway and elucidates the effects of ferutinin on structural and functional molecules related to osteogenesis. Dental pulp derived stem cells are self-renewing multipotent cells that are capable of mediating tissue regeneration. Our lab has shown that the phytoestrogen ferutinin activates DPSCs by epigenetically regulating Wnt/ β -catenin signaling. As studies have indicated BMP-2 is known to enhance osteogenic differentiation, and because of the relationship between BMP-2 and canonical Wnt pathway signaling, we intend to develop a potential stem cell therapy using human DPSCs. Our preliminary results demonstrate that the ferutinin promotes expression of BMP2 pathway molecules at the mRNA and protein levels (both western blot and immunostaining). Especially, we observed increased gene expression of BMP2, Runx2, and SMAD 1, 5, and 8. These observations are consistent with previous work from our lab, which found that ferutinin upregulates canonical Wnt signaling in DPSCs. Both Wnt and BMP2 signaling are vital to osteogenesis, and crosstalk between the two pathways has been observed. These findings indicate that ferutinin promotes osteogenesis in DPSCs.

School: Graduate School of Biomedical Sciences

QUAGRAINE, NAANA

Structure Activity Relationship Study and in vitro Analysis of Novel Anticancer Agents for treatment of Triple Negative Breast Cancer

Naana Quagraine, Rayna Bandy, Sadsina Shahi, Nadezhda German

Triple-negative breast cancer (TNBC) is an aggressive subtype of cancer that makes up 15-20% of breast cancer patients. Characterized by the lack of response to estrogen (ER), Human Epidermal Growth receptor 2(HER2), and progesterone (PgR), TNBC remains a challenging therapeutic target. Current generalized anticancer agents on the market are efficacious in their treatment, but continued use can lead to resistance in tumors. As previously published, a novel urea-based compound synthesized in our lab has shown promising efficacy in treating MDA-MB-231 originated TNBC in vitro and in vivo. In this work, we further the structure activity relationship study of our compound, introduce new functional groups into the molecule, and evaluate the anticancer activity of these novel compounds in vitro.

School: Graduate School of Biomedical Sciences

RODRIGUEZ, ANGELA

Ethanol impairs Placental Cysteine/Cystine Transport, which is Mediated by NRF2/ARE Dysregulation, and alters GSH Redox Homeostasis

Angela Rodriguez, Dr. Sambantham Shanmugam, Praneetha Panthagani, Dr. Susan E. Bergeson, Dr. George I. Henderson

Prenatal ethanol (E) exposure is generally considered to be the major single cause of preventable birth defects and developmental anomalies. Exogenous oxidative stress (OS) such as stress, inflammation, or xenobiotics, in the absence of genetic abnormalities have been shown to modify specific gene/molecular patterns or decrease the antioxidant capacity that can adversely amplify reactive oxygen species (ROS) levels and lead to placental dysfunction. NRF2 (NF-E2 p45-related factor 2) is a central regulator of glutathione (GSH) homeostasis and responds to OS, cell growth, metabolism, and drug detoxification. In OS, NRF2 translocate to the nucleus and activates genes involved in GSH synthesis, a major intercellular antioxidant which is virtually present in all systems. The availability of Cysteine (CyS)/Cystine (CySS) within the cell is the rate limiting step in the synthesis of GSH. cystine–glutamate antiporter (xCT) and excitatory amino-acid carrier-1 transporter (EAAC1) transports CySS and CyS into the cell. This study investigates whether E disrupts the interplay between Nrf2/redox pathway dependent GSH synthesis and activation of two transport systems, EAAC1 and xCT in the placental tissue and trophoblast (HTR8) cells. E-elicited oxidative stress in the placenta was measured by increase of malondialdehyde (MDA) and ROS assays. It also reduced xCT activity by ~50% in HTR8 cells. Results from gain-of-function studies prevented E-induced oxidative stress, increased the expression of xCT, EAAC1, and total GSH levels in HTR8 cells. Erastin showed a significant decrease in viability by MTT assay of HTR8 cells in a dose-dependent manner (IC50 ~3 μ M). Further inhibition of xCT by erastin (0.75 μ M) exacerbated the E-induced increase in ROS. Our results indicate that E-induced OS and impaired GSH homeostasis, at least in part, via the dysregulation of NRF2-GSH synthesis. Thus, NRF2 could be a target for optimizing redox homeostasis in E-exposed placenta.

School: Graduate School of Biomedical Sciences

SABU KURIAN, ANNA

The role of macrophages in Sertoli cell immune regulation and transplant survival

Anna Sabu Kurian, Taylor Hibler, Rachel L. Washburn, Kandis Boothe, Gurvinder Kaur, Jannette M. Dufour

While transplants have saved lives, recipients require life-long use of immunosuppressive drugs that can make the recipients susceptible to infections and cancer. We study Sertoli cells (SC), immune privileged testicular cells, as an alternative to immunosuppressive therapy. We have shown that allogenic SC transplants survive an average of 61.7 days without use of immunosuppressive drugs. However, the mechanisms by which SC survive transplantation remain unknown. Macrophages, an innate immune phagocytic cell, are involved in immediate response to foreign tissues such as grafts and can be divided into either cytotoxic M1 or tolerogenic M2 subsets. Additionally, we have previously shown that SC grafts contain macrophages, but their function is unclear. Given that M2 macrophages could be involved in the protection of SC transplants, we hypothesize that macrophages are important for SC graft survival. To explore this, macrophages were depleted in allotransplant recipients using chlorate liposome injections. BALB/C macrophage-depleted mice received a transplant of either primary C57BL6 mouse SC or MSC-1 cells (control non-immune privileged, mouse Sertoli cell line). Immunohistochemistry (IHC) and flow cytometry confirmed macrophage depletion. Grafts were collected at day 20 and survival was determined through IHC using either Wilms' Tumor 1 (SC marker) or Simian Virus 40 large T antigen (MSC-1 marker) staining. In control mice, 100% of the SC grafts survived, while 100% of the MSC-1 grafts rejected. In macrophage depleted mice, SC grafts exhibited 100% survival and, surprisingly, 56% of MSC-1 grafts survived. This indicates that M2 macrophages are not required for SC survival, however, M1 macrophages may be involved in MSC-1 graft rejection. Future experiments will be conducted to further analyze the grafts for macrophage subsets. Understanding the role of macrophages in transplantation is important clinically to aid in the development of treatments that will prolong allograft survival.

School: School of Medicine

SAH, NARESH

Novel fluoropyrimidine-CF10 blocks TS-mediated pro-metastatic activities in CRC

Naresh Sah, Chinnadurai Mani, Komaraiah Palle

Fluoropyrimidine drugs, mainly 5-Fluorouracil, constitute the backbone of combination chemotherapy regimens (e.g., FOLFOX) for treating colorectal cancer and provide a survival benefit for patients with stage II, III, and IV colorectal cancer. We have created a new second-generation nanoscale FP polymer (CF10) that has shown promising anticancer effects in a variety of preclinical models while also having low systemic toxicity. Due to the extension of the polymer with arabinosyl cytidine, CF10 showed enhanced resilience to exonuclease degradation and reduced susceptibility to thymidine antagonism compared to F10. CF10 inhibited thymidylate synthase (TS), increased Top1 cleavage complex formation, and caused replication stress in colorectal cancer cells, whereas identical doses of 5-FU were ineffective. Especially, we found that CF10 inhibits the growth of TS expressing primary CRC organoids as evidenced by reduced spheroid formation. We regulated TS expression using the Tet-on system in HCT-116 cells to further study the role of enhanced TS as a factor in CRC metastatic progression and 5-FU resistance. We observed that TS overexpression promoted cell migration and invasion. Overall, the findings will show that increased TS is a key component in distinguishing more aggressive from less aggressive CRC tumors and that CF10 could be used to treat aggressive CRC tumors.

School: Graduate School of Biomedical Sciences

SANCHEZ VILLALOBOS, CESAR AUGUSTO

A machine learning analysis on a recent human hippocampal transcriptomics dataset elucidates multivariate differentiating genes in Alzheimer's Disease

Sanchez Villalobos, Cesar Augusto; Pierre, Anne. Lawrence, Josh. Pal, Ranadip.

Alzheimer's Disease (AD) is the most common cause of dementia and one of the leading causes of death in the United States. Although neuroscientists have spent considerable effort trying to understand and treat this disease, the molecular mechanisms underlying this disorder remain unclear, which is an obstacle in developing effective treatment strategies. In this novel work, we apply machine learning (ML) algorithms on transcriptomic data obtained for 30 subjects from a publically available dataset from van Rooij et al. (2018). The data consisted of 14564 genes from the hippocampus of 30 brains (20 AD, 10 age-matched controls). We implemented data-driven feature selection algorithms, such as ReliefF and Sequential Feature Selection, to reduce the number of predictors to a set of only 14 genes. Through this analysis, we found KCNIP1 and HHAT to be the most discriminating genes. To our knowledge, these novel results have not yet been reported in the AD literature. One possible explanation for this result is that KCNIP1 is a potassium voltage-gated channel interacting protein linked to epilepsies and heart disorders, but not yet to AD. While this gene plays a vital role in a cell's ability to generate and transmit signals, HHAT catalyzes N-terminal palmitoylation; one disease associated with this is the Nivelon-Nivelon-Mabille Syndrome (NNMS), which could include infantile-onset seizures. Therefore, there is a connection between KCNIP1, linked to epilepsies (a seizure disorder), and HHAT related to a disease that takes form in seizures, suggesting strong mechanistic links between epilepsy and AD. Finally, we implemented a Random Forest (RF) classifier to differentiate between AD and control groups, giving an out-of-bag error of 0%. We conclude that for this dataset, an RF classifier will distinguish appropriately between the AD and control groups, using only a discriminative group of genes from the original dataset.

School: Graduate School of Biomedical Sciences

SPONTARELLI, KERRI

Heterozygous ATP1A1 knockout mice do not develop neuropathies

Kerri Spontarelli, Ryan Sweazey, Alexandria Padro, Jeannie Lee, Tulio Bueso, Roberto Hernandez, Jongyeol Kim, Jeremy Bailoo, Pablo Artigas

Charcot-Marie-Tooth disease (CMT), one of the most common heritable diseases effecting the peripheral nervous system, presents with distal muscle atrophy and weakness, loss of sensation, absent reflexes, and pes cavus. The pathology of CMT is impaired propagation of action potentials through peripheral axons, with two major types being due to demyelination (CMT1) or axonal degeneration (CMT2). CMT has been linked to mutations in over 90 genes, including ATP1A1, the gene encoding the $\alpha 1$ subunit of the Na⁺/K⁺-ATPase (NKA). The NKA hydrolyzes ATP to export three Na⁺ and import two K⁺ across the cellular membrane, establishing the electrochemical gradients required for normal resting and action potentials, as well as secondary active transport. The NKA is an $\alpha\beta$ heterodimer, the catalytic α subunit has 4 major isoforms with $\alpha 1$ being expressed in all tissues. It has been proposed that the CMT-producing ATP1A1 mutations are loss-of-function mutations. Here we evaluated heterozygous ATP1A1 knockout mice, ATP1A1^{+/-}, to test the hypothesis that haploinsufficiency would suffice to cause disease as the mice age, mimicking observations in families with mutations with low penetrance. We used a combination of behavioral analysis, mouse electromyography, nerve histology, neuromuscular junction immunohistochemistry in both wild-type and ATP1A1^{+/-} mice. The behavioral tests chosen evaluate strength, coordination, balance, and endurance, with loss of strength being the most obvious CMT2 symptom. Mice were evaluated at 1, 3, 6, 12, and 18 months old. No significant differences were found between WT and heterozygous mice across the whole life span. Our results demonstrate that the pathophysiology of ATP1A1-driven CMT probably require more than simply haploinsufficiency (at least in mice). We are currently developing methods to study the expected dominant-negative effects of the neuropathy causing mutations to understand the disease mechanism underlying each mutation.

School: Graduate School of Biomedical Sciences

SYED, MOSHARAF MAHMUD

Dysregulated Glucocorticoid Signaling is Associated with Vitamin A Deficiency in Alzheimer's Disease

Mosharaf Mahmud Syed, Anne Pierre, J. Josh Lawrence

Alzheimer's Disease (AD) is a neurodegenerative disorder impacting ~5.8 million people in the United States. AD is the 6th leading cause of death and estimated to be the 3rd cause of death among the elderly population. The incidence of AD doubles every 5 years, projected to expand to 14 million people by 2060, with annual costs of >\$500 billion. Therefore, it is of utmost importance to determine molecular causes. There is increasing evidence linking Vitamin A/retinol (VA) deficiency in AD. All-trans retinoic acid (ATRA) is the bioactive derivative of VA. Previous studies suggest that VA improves symptoms of AD and its progression in vitro and in vivo – inhibition of amyloid fibril formation and reduction of proinflammatory cytokines/chemokines. Moreover, VA deprived mice exhibit impaired learning. In this study, we investigated the most dysregulated ATRA-sensitive pathways in the human hippocampus in AD. We performed an in silico experiment via Ingenuity Pathway Analysis (IPA) from the publicly available human AD hippocampal transcriptomic data generated by van Rooij and colleagues (2019) using 673 ATRA-sensitive genes. The top canonical pathway was glucocorticoid receptor (GR) signaling ($p=4.86E-34$). The most dysregulated ATRA-sensitive gene was UQCRC2 ($p=6.51E-16$), which was downregulated in complex III located within mitochondria. A total of 36 genes, including NDUFA genes, in the Mitochondrial Dysfunction pathway were dysregulated ($p=2.27E-21$), further linking ATRA deficiency to mitochondrial dysregulation in human AD. Several previous studies have implicated the importance of dysregulated GR signaling in AD. Finally, our IPA analysis highlighted that the top Upstream Regulator was tretinoin (ATRA itself), validating the ATRA sensitivity of our enriched gene set and the regulation of the GR pathway. Our study provides a wealth of new knowledge regarding interactions between ATRA availability, GR signaling, and mitochondrial function. Understanding these pathways can help identify novel therapeutic strategies for AD.

School: Graduate School of Biomedical Sciences

THOMPSON, JEFFREY

New Musculoskeletal Ultrasound Methodology to Measure Cervical Disc Height is Reliable and Valid

Jeffrey A. Thompson, DPT, ScD (c); Phillip A. Page, PT, ATC, PhD; Troy L. Hooper, PT, LAT, ATC, PhD; Stéphane Sobczak, PT, MSc, PhD; Kathleen M. Rosendahl-Garcia, BSc; Jean-Michel Brismée, PT, ScD

Cervical degenerative disc disease (DDD) is associated with abnormal stress, neck pain and disability, and intervertebral disc (IVD) height loss. Cervical DDD is most prevalent in the lower cervical spine at C4-5, C5-6 and C6-7. The IVD height is an indirect measurement of IVD hydration and IVD health. The purpose of this study was to determine inter-rater reliability and validity of musculoskeletal ultrasound (MSU) in measuring anterior cervical IVD height compared to magnetic resonance imaging (MRI) at C4-5, C5-6 and C6-7 spinal segments.

Phase I and II obtained ten MRI and MSU images each of anterior cervical IVD height measurements to determine inter-rater reliability. Inter-rater reliability was assessed using intraclass correlation coefficient (ICC_{2,3}) at each segment using the mean of three measurements for analysis. Phase III assessed validity of 20 subjects MSU compared to MRI measurements using Bland-Altman Analysis.

Phase I: MRI interrater reliability was found to be excellent between raters for all cervical spine segments at or above .91 (95% CI .66 -.98). Phase II: MSU interrater reliability was good between raters for all cervical spine segments at or above .72 (95% CI .46 -.88) with maximal measurement error between raters was $\leq 0.41\text{mm}$ (7.5%). Phase III: No significant difference or proportional bias were found between MRI and MSU measurements ($\alpha \leq .05$). The average measurement error was at or less than 0.17mm (4%).

Measurements for both MRI and MSU anterior vertebral disc height demonstrated a high degree of interrater reliability. Validity of MSU compared to MRI was acceptable for measuring anterior vertebral disc height with no significant difference or proportional bias. The novel MSU techniques described are reliable and valid in measuring anterior IVD height. Future studies will benefit from this technique to measure IVD behaviors in the cervical spine.

School: TTUHSC - Lubbock

TRAN, NGHI

LIPIDS MODULATE THE DRUG-STIMULATED ATPASE ACTIVITY OF THE MULTIDRUG EXPORTER P-GLYCOPROTEIN

Nghi Tran, Joachim Weber, Ina Urbatsch

P-glycoprotein (Pgp) exports hundreds of chemically unrelated, hydrophobic compounds out of cells. Since Pgp can greatly affect bioavailability, pharmacokinetics and efficacy of therapeutic drugs, there is great interest in understanding the mechanism by which drugs are extruded. Pgp is an ABC transporter with two nucleotide binding domains (NBDs) that bind and hydrolyze ATP, leading to extensive conformational changes across the transmembrane domains (TMDs) that result in substrate translocation across the cell membrane. Despite decades of biochemical/biophysical studies, the mechanism by which the NBDs control these conformational changes, and how this is linked to drug binding in the TMDs, and ultimately export of the drugs is still controversial. Our recent X-ray structures of Pgp identified hydrophobic and aromatic amino acids that contribute to binding of different inhibitors to the drug-binding site. In this study, we test the hypothesis that lipid composition modulates the activity of Pgp reconstituted into liposomes or nanodisc. Our general approach is to test varieties of synthetic lipid mixtures containing (POPC) and (POPE) supplemented with cholesterol for reconstitution and monitor the verapamil-stimulated ATP hydrolysis activity. Using purified protein reconstituted in a lipid bilayer nanodiscs, we present first results of Pgp interactions with the antihypertensive drug and calcium channel blocker verapamil. The impact on the substrate binding and translocation mechanisms of Pgp will be discussed.

School: Graduate School of Biomedical Sciences

UPPALA, SHREYA

Investigating levels of SARS CoV-2 ACE2 receptor and TMPRSS enzymes in postmortem brain tissues from Alzheimer's, Huntington's, stroke and diabetes patients

Shreya Uppala, Jocelin Loewen, Erika Orlov, Razelle Alvir, Murali Vijayan, Hemachandra Reddy

The purpose of our study is to assess the levels of angiotensin-converting enzyme 2 (ACE2) and transmembrane protease serine 2 (TMPRSS) by utilizing post-mortem brain models of Alzheimer's disease (AD), diabetes, and stroke patients. The SARS CoV-2 virus, commonly known as COVID-19, has been the cause of a global outbreak since the first reported case in China in late 2019. The virus is spread directly person-to-person via respiratory droplets and utilizes receptors such as the angiotensin-converting enzyme 2 to enter host cells and then primed by the enzyme TMPRSS. COVID-19 is most known for the severe respiratory distress it can cause, most often affecting individuals who are older as well as those with other comorbidities, such as Alzheimer's, Huntington's, diabetes, obesity, and stroke. Additionally, neurological manifestations have also been reported in those infected with the virus. These include neurodegenerative disorders which have correlations to both ACE2 and TMPRSS levels, also suggesting a connection to increased susceptibility to SARS CoV-2. Our investigation makes use of postmortem human brain models that have AD, diabetes, or strokes to understand the correlation between these comorbidities and levels of ACE2 and TMPRSS. We found that both ACE2 and TMPRSS levels were increased in postmortem brain tissues with AD, diabetes, and stroke when compared to brain tissues with healthy control subjects. These observations suggest that ACE2 and TMPRSS levels are increased with disease progression in AD, diabetes, and stroke patients, which also indicates an increased susceptibility to contracting COVID-19.

School: School of Medicine

VILLARREAL, JOHANNA

Defining the DNA Binding Mode of Dnase1L3 and Modifying the Enzyme to be Used as a Therapeutic

Johanna Villarreal, Minal Engavale, Jon McCord, Brittany Mapp, Dr. Peter Keyel, Dr. Bryan Sutton

According to the Lupus Foundation of America, systemic lupus erythematosus (SLE) affects more than 1.5 million Americans. Common SLE treatments, including hydroxychloroquine, can cause severe side effects with long-term usage. Because of this, new treatments are needed. The SLE inflammatory response is characterized by the formation of autoantibodies against dsDNA. Nucleic acid autoantibodies can lead to the formation of immune complexes (ICs), which accumulate in the kidney and result in lupus nephritis. Dnase1L3 degrades common antigenic DNA complexes and is a potential therapeutic for SLE. However, purified Dnase1L3 is too small to be considered for enzyme replacement therapy. To extend the circulation time and to minimize the risk of antibody formation towards Dnase1L3, one approach would be to increase the overall size of the enzyme with PEG (polyethylene glycol) attached to specific sites via cysteine/maleimide chemistry. We aim to test the activity of these PEGylated mutants to ensure it retains wild-type activity. We also aim to structurally characterize the binding between Dnase1L3 and DNA to better understand the mechanism of action and how it differs from Dnase1. Overall, we seek to better understand how recombinant Dnase1L3 can be used as an effective therapeutic agent for the treatment of SLE.

School: Graduate School of Biomedical Sciences

VINTIMILLA, ANTONIO

Central Fatigue Effects on Neck Strength, Endurance, and Joint Position Error

Antonio Vintimilla, Phil Sizer, Troy Hooper, C Roger James, Jeegisha Kapila, Hocheng Lu, Karthick Natesan

Neck neuromuscular function may play an important role in concussion prevention and management. Neck muscle strength and endurance are significant concussion predictors in males and females. Sport-related head injuries often occur in a fatigued state however, effects on neck muscle function are not well understood. In a centrally fatigued state, it is unlikely that the cardiovascular system can keep up with the added head-and-neck demands. This interaction is important due to potential implications in head injury. Fatigue may further compromise these variables causing an even increased concussion risk and impaired recovery.

This study purposes to determine central fatigue effects on cervical joint position error neck muscular strength, and neck flexor endurance in normal and concussion history individuals.

Group testing was done using a single factor, within-subjects repeated measures design. An additional multiple single-subject design was done on concussion history participants. 19 healthy and five concussion history males and females ages 18-50 years Participants were tested on joint position error, neck flexor endurance, and isometric neck muscle strength before and after central fatigue. Joint position error in degrees, neck flexor endurance in seconds, and isometric neck muscle strength in newtons.

There was a significant difference for constant ($p = .0027$, Cohen's $d = -0.35$) and absolute JPE ($p < 0.001$, Cohen's $d = -0.47$), neck flexor endurance ($p < 0.001$, Cohen's $d = 0.95$), and neck muscle strength into flexion ($p = 0.01$, Cohen's $d = 0.21$) pre- and post-fatigue. Concussion history participants demonstrated similar, more exaggerated results.

Neck muscle performance overall decreased following central fatigue in normal and concussion history participants with concussion history participants seemingly more affected. These interactions may contribute to initial concussion injury and reinjury risk. Group studies involving both normal and concussion history participants and should be conducted.

School: TTUHSC - Lubbock

WATSON, CARINA

Ginger root extract improves mitochondrial dysfunction in NP model animals

Carina Watson, Rui Wang, Vadim Yakhnitsa, Julianna Santos, Takaki Kiritoshi, Guangchen Ji, Volker Neugebauer, Chwan-Li Shen

Recent studies explored the potential use of gingerol-enriched-ginger (GEG) in the treatment of neuropathic pain (NP) via the gut-brain axis. Ginger, due to its analgesic and anti-inflammatory effects, serves as a new potential treatment for NP. The amygdala is a key component in the control of the pain response, and several clinical and experimental studies have reported that amygdala nuclei are involved in the regulation of neuropathic pain. Therefore, amygdala and colon tissues will be the focus of this study.

In this study, we investigated the effects of GEG on mRNA expression of genes involved in mitochondrial biogenesis and dysfunction in colon and amygdala tissues of animals with NP.

GEG supplementation would attenuate SNL-induced neuroinflammation by improving mitochondrial dysfunction.

Twenty-eight male Sprague-Dawley rats were divided into 5 groups: Naïve control, sham control, spinal nerve ligation (SNL, pain model, left side), SNL+0.375% (w/w in diet) GEG, and SNL+0.75% (w/w in diet) GEG for four weeks. mRNA was extracted from the colon and amygdala, converted into cDNA, and the target genes' expressions determined via qRT-PCR. Genes analyzed were those involved in mitochondrial function, including NRF2 for mitochondrial biogenesis; DRP1, FIS1, MFN1, and MFN2 for mitochondrial fission/fusion balance; and P62 and PINK1 for mitophagy.

Compared to the sham group, SNL surgery increased the expression of genes involved in mitochondrial function (NRF2, DRP1, FIS1, MFN1, MFN2, P62 AND PINK1) in the colon and the right amygdala tissue. In addition, further supplementation of GEG into the diets of the animals resulted in the attenuation of the elevated gene expression of NRF2, DRP1, and FIS1 in the colon and MFN1, MFN2, P62, and PINK1 in the right amygdala caused by SNL surgery.

Supplementation of GEG into the diet suppressed SNL induced mitochondrial dysfunction in NP animals.

School: School of Medicine

WHITE, ALISA

A Cross-Species Comparison of a Specimen Collection Container Designed to Harvest Oxygen Radical Species

Alisa White, Britany Smith, Melissa Sillivent, Sam Prien, Lindsay Penrose

Several studies demonstrate the detrimental effects of reactive oxygen species on semen quality. As a potential solution, this lab suggests a redesign of the Device for Improved Semen Collection (DISC – known commercially as ProteX+). This novel design holds the potential to reduce the effects of ROS on sperm cell function and to additionally improve semen parameters. In the present study, both human and equine semen samples were collected using the novel device material with the aims of evaluating its ability to harvest ROS and to maintain semen quality.

What are changes in semen quality are observed using the novel device material?

As a natural consequence of the study design to increase ROS generation, all semen analysis parameters decreased over time. Sperm cells stored in the devices with ROS scavenging properties, however, demonstrated relative improvements evidenced by semen parameters at 6, 9, and 12 hrs in the human and equine samples. These samples demonstrated main rapid cell activity, progressive velocity, beat-cross frequency and straightness. The collection of biochemical data for mitochondrial activity, DNA fragmentation, and acrosomes are ongoing and will presented in the future.

Results of this study support that the novel redesign of the ProteX+ system is effective in scavenging free radicals from an aqueous cell culture media. Furthermore, this study suggests that through use of a fixed scavenger system, lowering of harmful ROS to semen samples may be achieved without increased risk of damage to the sperm DNA. Future experimentation is necessary to determine optimum culture conditions for the fixed scavenger system and the full extent of scavenger effects under such conditions.

School: School of Medicine

YANG, MINGXIAO

Exploring novel connections between Dishevelled (DVL) proteins and HER2-positive breast cancer-road to translation

Mingxiao Yang, Fahmida Rasha, Isabel Castro-Piedras, Kathryn Furr, Annie Snitman, Sonia Khan, Luis Brandi, Hafiz Khan, Nusrat Jahan, Michael Melkus, Kevin Pruitt, Rakhshanda Layeequr Rahman

Aberrant Wnt signaling contributes to every stage of tumorigenesis from immunosuppression in the tumor microenvironment to modulating several cancer hallmarks. Dishevelled (DVL)s are the major proteins which relay signals in both canonical (β -catenin dependent) and non-canonical (β -catenin independent) Wnt pathways and help maintain constitutive oncogenic signaling, though little is known about their role in modulating tumor immunity. Previous lab findings demonstrated nuclear localization of DVL proteins is associated with transcription of cancer-associated genes and promotion of in vivo tumor growth. Moreover, our preliminary studies revealed significant positive association between high DVL expression and poor patient survival in different aggressive subtypes of breast cancer including HER2-positive breast cancer. Therefore, we hypothesize: (i) DVL depletion will reduce expression of classic Wnt markers involved in tumor progression in HER2-overexpressed in vitro models of breast cancer and (ii) clinically, high DVL protein expression will modulate markers of tumor immunity such as TIL score, levels of cytotoxic (CD8 α) T-cells, neutrophil/platelet to lymphocyte ratio (NLR, PLR), which result in poor survival outcomes in HER2-positive breast cancer.

First, we identified higher DVL2 protein levels in HER2-positive breast cancer tissues compared to sections from non-cancer and other subtypes of breast cancer. Next, our in vitro results demonstrate DVL2 depletion results in reduced mRNA expression of Wnt target genes such as CYCLIN D1, OCT4, MMP7, and VEGFA. Similarly, live cell proliferation analysis revealed that DVL2 knockdown resulted in reduced proliferation in two HER2-positive cell lines compared to non-targeted controls. Further, immunofluorescence analyses on patient tissues demonstrated that higher DVL2 expression posed a weak negative correlation with %TIL score and %CD8 α levels and a positive correlation with NLR, where high NLR denotes worse cancer prognosis. Though not significant, these results from our pilot study reveal the possible immune regulatory role of DVL2 proteins in HER2-positive breast cancer patients.

School: School of Medicine

ZABEL, CARSON

Repurposing Pimavanserin Tartrate for the Treatment of Glioblastoma

Carson Zabel, Sharavan Ramachandran, Sanjay K. Srivastava

Glioblastoma is a highly aggressive brain tumor that has a median survival of 15 months. We aim to give a substitute to the current chemotherapeutic drug temozolomide by using the FDA-approved anti-psychotic pimavanserin tartrate (PVT). To uncover the effectiveness of PVT, we did cytotoxicity assays using SRB to determine the percentage of cell survival in a dose-dependent and time-dependent manner. The apoptotic effects were measured using Annexin-V/APC assay. The mechanism of action was determined utilizing Western Blotting. In different glioblastoma tumor cell lines, the IC₅₀ for 24 hours was between 6 μ M and 10 μ M. 48 and 72 hours had an IC₅₀ between 4 μ M and 6 μ M. SF188 glioblastoma cell line had approximately 70% to 80% more apoptotic cells in 10 μ M PVT when compared to control in Annexin-V/APC assay. PVT causes a strong modulation of the PI3K/AKT and MAPK pathways when given in increasing concentration at 48 hours. The level of apoptosis was confirmed through Western Blot as well using apoptotic markers. The preliminary data show the ability of PVT to cause apoptosis of glioblastoma tumor cells in vitro through the AKT and MAPK signaling. For future directions, an orthotopic in vivo experiment in mice by implanting glioblastoma cancer cells intracranially is being planned. And further analyzing the mechanism through which PVT acts will be done through a combination of Western Blot and rt-PCR and determine if PVT acts through serotonin receptors or independent.

School: Graduate School of Biomedical Sciences

BASIC/TRANSLATIONAL RESEARCH YEARS 3+: GRADUATE SCHOOL OF BIOMEDICAL SCIENCES, SCHOOL OF MEDICINE

ARCHIE, SABRINA RAHMAN

Sabrina Rahman Archie, Ali Ehsan Sifat, Heidi Villalba, Sejal Sharma, Saeideh Nozohouri, Yong Zhang, Thomas J Abbruscato

Despite the prevalent perception about electronic cigarette (e-Cig) use as a safe alternative to smoking during pregnancy, growing concern relates to the potential toxic impact on neonatal health, which warrants further investigation. Hence, in this study, we have evaluated the consequences of e-Cig use during pregnancy on postnatal blood-brain barrier (BBB) integrity, neuro-inflammation, and behavioral outcomes. For this, CD1 mice (E5) were exposed to e-Cig vapor (2.4% nicotine) till postnatal day (PD) 7. Weight of the offspring was measured up to PD 90. Nicotine and cotinine concentration in plasma and brain were measured in offspring by LC-MS/MS. The expression level of structural elements of the BBB, tight junction proteins (ZO-1, claudin-5, occludin), astrocyte (GFAP), pericyte (PDGFR β), basement membrane (Laminin α 1, Laminin α 4), NeuN, AQP4 and GLUT-1 were analyzed in offspring using Western blot. Relevant inflammatory markers were quantified in brain at PD 7 and PD 90. Long-term motor and cognitive functions were also evaluated using open field, novel object recognition and Morris water maze test at adolescence and adult age. Reduced body weight was observed in e-Cig exposed offspring at all time points ($P < 0.05$). Plasma concentration of nicotine and cotinine in PD 7 offspring was 3.215 ng/mL and 3.373 ng/mL, respectively whereas in brain, these were 43.72 ng/mL and 1.123 ng/mL, respectively. Significantly reduced expression of tight junction proteins, astrocyte, GLUT-1, and AQP4 were observed in prenatally e-cig exposed offspring ($P < 0.05$). Moreover, higher level of proinflammatory cytokines were found in prenatally e-cig exposed offspring at PD 7. Additionally, prenatally e-Cig exposed adolescent and adult offspring showed impaired locomotor, learning, and memory function ($P < 0.05$). Our findings suggest that prenatal e-Cig exposure induces some long-term neurotoxic effects on neonates by disrupting postnatal BBB integrity, inducing neuro-inflammation and impairing motor and cognitive function. Support: NIH R01DA049737

School: Graduate School of Biomedical Sciences

BARTHEL, DEREK

Dental Pulp-derived Stem Cells Mitigate Damage to Astrocytes Caused by Astrogliosis

Derek Barthels, Saeideh Nozohouri, Heidi Villalba, Yong Zhang, Thomas Abbruscato, Hiranmoy Das

Astrocytes are associated with the complication of a number of central nervous system (CNS) conditions, including physical traumas such as stroke and spinal cord injuries, and chronic disorders such as Alzheimer's disease and Parkinson's disease. Astrogliosis (gliosis) is designed to be a mechanism that limits damage from trauma, but when it runs rampant, it can impair the healing process in the CNS. Better regulation of the gliosis process could help mitigate further injury in the aftermath of acute trauma and may be able to help prevent long-term dysfunction seen in neurodegenerative disorders, as one astrocyte domain can affect up to two million neural synapses. Herein, we show the protective effects of dental pulp-derived stem cells (DPSCs) in a co-culture above astrocytes in an in vitro model of induced gliosis. Immunocytochemistry shows the mitigation of reactive oxygen species (ROS) production in astrocytes by DPSCs as well as the preservation of mitochondrial structural integrity and function. The preservation of original astrocyte morphology, which changes dramatically while the cells undergo gliosis, is also observed when co-cultured with DPSCs. Immunofluorescent stains also show a suppression of autophagy-related proteins, which serve as indices of overall cell health. Additionally, we demonstrate using quantitative real-time PCR (qPCR) the decreased expression of these autophagy genes as well as gliosis-related genes in astrocytes after being co-cultured with DPSCs. We posit that DPSCs and their secretions provide a signaling microenvironment that is conducive to astrocyte health and recovery. These studies also demonstrate some of the potential of adult human stem cell transplants as an effective future treatment strategy for acute CNS injuries and chronic disorders.

School: Graduate School of Biomedical Sciences

BASS, KEVIN

GPR81 and GPR109A ligands each exert an independent and additive immunoregulatory role in the gastrointestinal tract

GPR81 and GPR109A are evolutionarily and functionally closely related receptors found throughout the body's tissues but especially in immune cells and the gastrointestinal tract. GPR81's endogenous ligand is lactate, while GPR109A's are butyrate and beta-hydroxybutyrate. Studies have shown that each of these receptors plays an important role in suppressing inflammation in the gastrointestinal tract and preventing carcinogenesis. However, because such receptors are so closely related, it is not clearly known whether their function is redundant or additive. Through a series of experiments using wild-type, GPR81 knockout, GPR109A knockout and GPR81-GPR109A double knockout mice, we show that the impact of these two receptors on gastrointestinal immunoregulation is additive, not redundant. We propose a set of mechanisms and experiments to test them to further elucidate the functional relationship between these receptors and commensal tolerance in the gut.

School: Graduate School of Biomedical Sciences

BURROW, TREVOR

The Brain Penetrant ATM Inhibitor AZD1390 Enhanced Radiation Therapy in Rhabdomyosarcoma

Trevor Burrow, Shawn Macha, Balakrishna Koneru, C. Patrick Reynolds

Rhabdomyosarcoma (RMS) is the most common pediatric sarcoma, with approximately 350 cases diagnosed annually. Traditionally, RMS cases were classified as embryonal rhabdomyosarcoma (ERMS) or alveolar rhabdomyosarcoma (ARMS), as they are mechanistically distinct; however, recent studies have demonstrated that FOXO1 fusion status plays an overarching role in the clinical outcomes of RMS and should be considered within risk stratification of the ERMS/ARMS subgroups. Although treatment regimens and risk stratification differ between the US and Europe, radiation therapy (RT) plays an essential role in both strategies. It has been shown that curative intervention relies heavily on local control through surgical resection, chemotherapy, and RT. Clinical outcomes have been linked to responsiveness to RT; thus, drugs that enhance RT are of therapeutic interest. As ATM kinase inhibitors are known to be radiosensitizing agents, we sought to enhance RT using the clinical stage ATM kinase inhibitor AZD1390 in RMS. Using a RadSource 2000 X-ray irradiator, we delivered clinically equivalent doses of RT in combination with AZD1390 in vitro and in vivo. Our results show RT is enhanced when combined with the ATM kinase inhibition of AZD1390. If confirmed by additional pre-clinical data, these results will support a clinical trial of AZD1390 + RT in RMS.

School: Graduate School of Biomedical Sciences

DUTTA, SAYANIKA

TBX2 promotes Prostate Cancer bone-metastatic phenotype in Prostate through exosomal microRNA-375-3p

Sayanika Dutta, Girijesh k Patel, Hamed Khedmatgozar, Manisha Tripathi, Srinivas Nandana

Bone is the preferred site of metastasis in about 80% of advanced prostate cancer (PCa) patients. However, the molecular mechanisms that drive bone metastatic PCa are not well understood. We have previously reported that TBX2 drives PCa bone metastasis via a cell-intrinsic manner. In this study, we sought to investigate if TBX2 drives PCa bone remodeling, a vital step in PCa metastatic progression, via an exosome-mediated manner.

In this study we used techniques like exosome isolation, Next generation sequencing (NGS), qRT-PCR, Western Blot, Wound Healing Assay

TBX2 drives PCa bone remodeling/colonization in an exosome-mediated manner.

When compared to the exosomes derived from control (PC3Neo cells) by unbiased NGS of exosomes from TBX2 blocked PC3 human PCa cells, it identified miR-375-3p as the top-most upregulated miR in PC3TBX2DN cells. Further in silico analysis indicated that miR-375-3p binds to the 3' UTR of RBPJ, a key regulator of Notch signaling - a known driver of PCa metastasis. Further, blocking TBX2 (DN) decreased the proliferation and migration of human PCa cells in an exosome-mediated manner. We demonstrated that abrogated metastasis in a mouse model caused by blocking endogenous TBX2 (DN) is associated with upregulation of cell-intrinsic miR-375-3p; and downregulation of RBPJ. Also blocking TBX2 (DN) in PCa cells reduces osteoblast differentiation/ bone remodeling in an exosome-mediated manner. Thus our results strongly point to miR-375-3p as a critical intermediate in TBX2 upregulation of RBPJ. We also observed that TBX2 is positively associated with RBPJ in PCa patient samples; and miR-375-3p is downregulated in urinary exosomes from PCa patients with bone metastasis.

Our studies indicate that: 1) TBX2 upregulates RBPJ, a regulator of canonical Notch signaling, via downregulation of the repressive miR-375-3p, thereby leading to the derepression/increase in RBPJ, 2) TBX2/miR-375-3p/RBPJ drives PCa bone remodeling in an exosome-mediated manner

School: Graduate School of Biomedical Sciences

GAIKWAD, SHREYAS

Bioprinted pancreatic cancer-on-chip model for anti-cancer studies

Shreyas Gaikwad, Sanjay K Srivastava

Pancreatic ductal adenocarcinoma (PDAC) has a complex tumor microenvironment (TME) with multiple factors governing the tumor progression. Factors such as the mechanical stiffness of the tumor play an important role, especially in solid tumors like PDAC. The presence or absence of multiple cell types such as cancer-associated fibroblasts and immune cells also play a critical role in tumor growth and response to chemotherapies. Conventional techniques use two-dimensional techniques which fail to mimic the complex PDAC TME. In the current study, we developed the first-ever bioprinted model of PDAC using an extrusion bioprinter. Our model closely mimics some important hallmarks of PDAC. We developed a specialized bioink that closely mimics the stromal desmoplasia of PDAC. The bioink is derived from human tissues and this makes it a true replica of the actual in vivo environment. We bioprinted various tumor models using several human PDAC cell lines and established the effect of bioink on the post-print viability and also monitored the proliferation of PDAC cells. We characterized the tumor model as a platform for chemotherapeutic drug screening, radiotherapeutic screening and established it as a platform for immuno-oncology studies. In the current study, through extensive characterization, we have established a first-of-its-kind bioprinted PDAC model using a novel human tissue based bioink.

School: Graduate School of Biomedical Sciences

HERNANDEZ, SARAH

Development of Site-Specific Photo-Crosslinking in Human Cell Lysate

Sarah Hernandez, Elena B. Tikhonova, Andrey L. Karamyshev

Site-specific photo-crosslinking is a technique used to study protein interactions during translation at the ribosomes. Currently, this technique is only developed in conjunction with protein synthesis in wheat germ or rabbit reticulocyte lysates. Here, we developed a detailed protocol for the synthesis of proteins in vitro combined with site-specific photo-crosslinking in lysate derived from HeLa cells, utilizing the IRES element from the Hepatitis C virus (HCV) and the model proteins, nanoluciferase (Nluc) and preprolactin (PPL). This protocol encompasses how to prepare constructs for translation, generation of lysate from HeLa cells, in vitro translation, and site-specific photo-crosslinking. Generation of lysate from HeLa cells allows for the modification of translational machinery using well-established techniques for genetic manipulation. Combined with site-specific photo-crosslinking, modified lysate allows for a relatively fast method to identify translational machinery involved in the synthesis of specific proteins of interest. Using this combination of techniques, we showed the interaction of PPL with SRP54 in HeLa cells, demonstrating that this method can be used to identify essential interacting partners. Overall, this protocol is a powerful tool used to study both basic translational machinery and the translational co-factors required for individual proteins.

School: Graduate School of Biomedical Sciences

HIBLER, TAYLOR

Sertoli cells: Unlocking the Secrets of Transplant Survival on one Treg at a Time

Taylor Hibler, Gurvinder Kaur, Jannette Dufour

Currently, the immunosuppressive drugs used to prolong transplant survival put patients at risk for microbial infections and cancer. To negate these risks, our lab looked to an unlikely source to see if we could discover an alternative method of protection: the testes. Late-stage sperm develop after the onset of puberty and are viewed as foreign by the immune system; however, they are not destroyed. They owe their continued survival largely to Sertoli cells (SC), which provide both a physical and immunological barrier against inflammatory response. Our previous studies have shown that SC can survive allotransplantation for more than 100 days without immunosuppressive drugs; however, the exact mechanism of protection remains unknown. Transplant literature suggests that T regulatory cells (Tregs), a suppressive subset of T cells, play a critical role in transplant survival. We hypothesize that SC promote graft survival through induction of Tregs. To test this, the T cell populations of day 20 SC grafts were analyzed through immunohistochemistry and flow cytometry and compared to a rejecting control. The data revealed that SC grafts had a significantly higher presence of both CD4+ and CD8+ Tregs. To determine if Tregs were critical for SC tolerance, mice depleted of Tregs were transplanted with SC allografts. Controls included mice treated with a control antibody (not depleted of Tregs) and transplanted with allogeneic SC. We found that 57% of SC grafts survived in Treg depleted mice and, interestingly, the mice with surviving grafts were able to induce or generate Tregs after the initial depletion. These results indicated that Tregs are critical in SC graft survival and immune protection, and that SC may be able to induce or generate Tregs to protect themselves.

School: Graduate School of Biomedical Sciences

ISLAM, MD. RAKIBUL

Impact of co-encapsulated alendronate-doxorubicin liposomes on tumor immunologic milieu in murine fibrosarcoma model

Md. Rakibul Islam, Patricia Back, Jalpa Patel, Hilary Shmeeda, Savanna Stevens, Alberto A. Gabizon, Ninh M. La-Beck

Background: A major mechanism of resistance to anti-cancer therapies is immunosuppression in the tumor microenvironment (TME) mediated by myeloid and T-regulatory cells. We postulate that co-encapsulating alendronate with doxorubicin in pegylated liposomes (PLAD) will favorably modulate the TME and increase the efficacy of doxorubicin since alendronate abrogates the activity of myeloid cells and liposomes target drug delivery to tumors. Methods: WEHI-164 fibrosarcoma cells were implanted in 8-10 weeks-old male balb/c mice. Animals were randomized to PLAD, pegylated liposomal doxorubicin (Doxil), or free doxorubicin (FDox) at 8 mg/kg of doxorubicin (n=9/group), or dextrose (vehicle) or pegylated liposomal alendronate (PLA) at 3.28 mg/kg alendronate (same dose as PLAD) (n=5/group). Five days post-treatment, animals were euthanized, and tumors were processed for flow cytometric analyses. Results: PLAD and Doxil decreased M2-polarized macrophages, T-regulatory cells, and CD4/CD8 ratios in tumors, while activated natural killer cells were increased compared to the control. PLA decreased M2-polarized macrophages but did not have any impact on T-regs, while FDox had the opposite effect. Doxil and PLAD significantly increased uptake of doxorubicin in macrophages and other myeloids, compared to FDox. These effects were greater with PLAD than Doxil. Conclusion: Co-delivery of doxorubicin and alendronate remodeled the TME towards an immune-permissive milieu. Ongoing studies will determine the anticancer efficacy of PLAD.

School: Graduate School of Biomedical Sciences

KATZ, COURTNEY

Polymer Nanodiscs for Efficient Delivery of Doxorubicin at Tumor Sites

Courtney Katz, Jitender Bariwal, Hairong Ma, Hongjun Liang

Polymer nanodiscs (PNDs) have opened new avenues and possibilities for drug delivery and membrane protein studies. PNDs offers several advantages as compared to lipid nanodiscs (LNDs), such as improved stability, uniform size distribution, and biocompatibility without immunogenic reactions. Similar to LNDs, PNDs are spontaneously assembled from detergent-solubilized amphiphilic block polymers and membrane scaffold proteins (MSP) when detergents are selectively removed. We have designed a biocompatible and biodegradable amphiphilic block co-polymer, methoxy-polyethylene glycol-b-poly lactide (mPEG-b-PLA). Subsequently, mPEG-b-PLA was functionalized with 4-formylbenzoic acid, and doxorubicin (DOX) was conjugated to the polymer through a pH sensitive Schiff bond linkage (mPEG-b-PLA-DOX). DOX was chosen as a model chemotherapeutic agent due to the well-known characterization of the drug and the Schiff bond linkage was designed to allow efficient release of DOX at the tumor sites because the tumor microenvironment is more acidic than that of healthy tissues. In our preliminary studies, we have confirmed that the mPEG-b-PLA-DOX self-assembles with MSPE3D1, a MSP variant, into PNDs with a uniform size of ~12.0 nm. The association of DOX-loaded polymers and MSPs into PNDs was also confirmed using gel filtration chromatography that detects MSP and DOX by the coupled UV-Vis and fluorescence spectroscopy detectors, respectively. The DOX loaded PNDs show pH sensitive release in in-vitro drug release assays. Studies of the cytotoxicity of DOX loaded PNDs against HEK 293 and MCF-7 cells are underway. For future studies, the DOX-loaded PNDs may be adapted to target different forms of cancers.

School: Graduate School of Biomedical Sciences

KELLOGG, MORGANA

Depletion of SRP54 Leads to Inability of the Signal Recognition Particle to Bind Ribosomes

Morgana Kellogg, Elena B. Tikhonova, Andrey L. Karamyshev

Cells produce many different proteins that need to be transported to the organelles or secreted outside of the cells. Many proteins possess signals or “zip codes” that direct them to their localization. These signals either direct protein targeting while the ribosome is still translating mRNA (co-translationally) or after synthesis has been completed (post-translationally). Co-translational targeting to the endoplasmic reticulum (ER) mostly uses the signal recognition particle (SRP) to recognize signal sequences or the transmembrane domains (TMDs) of membrane proteins. SRP is a complex consisting of six protein subunits and one noncoding RNA. The SRP54 subunit is responsible for signal recognition. The loss of SRP54 triggers a quality control process called the Regulation of Aberrant Protein Production (RAPP) leading to mRNA degradation of the secretory proteins. In the current work, we hypothesize that SRP54 loss leads to the inability of SRP to interact with translating ribosomes in human cells. Polysome profiling and SRP subunit detection by Western blots were used to examine this hypothesis. For the first time, we show that the loss of SRP54 causes a shift in SRP subunits from the 80S translating ribosome to the free ribonuclear particle, 40S, and 60S ribosome subunit fractions. These findings were verified by the use of a different technique, differential centrifugation. The data demonstrates that the loss of SRP54 causes the SRP to be unable to bind to ribosomes, thus affecting the SRP-ribosome nascent-chain complex formation and subsequent targeting to the ER, and suggests that SRP interaction with the ribosome is required for secretory protein mRNA protection from degradation. Understanding how the loss of SRP affects protein targeting through the SRP-RNC interaction is vital to deciphering mechanisms of how defects in SRP are involved in many different human diseases.

School: Graduate School of Biomedical Sciences

KHAN, SONIA

RNA-seq and Tumor Infiltrating Lymphocytes as Markers of Tumor Microenvironment Changes after Cryoablation

Melkus MW, Mistretta B, Habrawi Z, Brandi L, Amani, M, Khan H, Jones C, and Gunaratne P, Layeequr Rahman R

Immunological microenvironment and tumor-infiltrating lymphocytes (TILs) in breast cancer are becoming increasingly relevant as new therapeutic targets. This study explored changes in TILs and RNA-seq in breast cancers after cryoablation of low-risk tumors.

Women with ER+, PR+, and HER2- infiltrating ductal carcinomas $\leq 1.5\text{cm}$ (n=5) were treated with cryoablation. Repeat biopsy of tumor bed was performed at 6-month follow-up for pathology, TIL, and RNA-seq evaluation. Sequencing reads were mapped to the human reference genome Hg38 and differentially expressed genes were identified between pre- and post-cryoablation as \geq two-fold changes and a correction p-value of ≤ 0.05 . Log2 fold-change and p-value were input into Ingenuity Pathway Analysis (IPA) Software tool core analysis for canonical pathways, upstream regulators, molecular networks, and regulator effects associated with immune system responses.

All tumors ablated showed no residual disease on mammogram, ultrasound, and MRI at 6 months. Histopathology showed fat necrosis, collagen, foamy histocytes, and lymphocytes. Average TIL scores increased from 4.8% to 5.6% post-cryoablation and did not correlate with tumor size. RNA-seq analysis comparing cryoablation to pre-cryoablation identified 1646 significant differentially expressed genes with 1096 up-regulated and 550 down-regulated. Overall, gene expression associated with immune cell functions was increased. IPA gene analysis showed increased gene expression for some immune canonical pathways and decreases in genes associated with the PD-1, PD-L1 Cancer Immunotherapy Pathway.

RNA-seq analysis revealed considerable differences in the tumor microenvironment with an active immune response at 6-months post-cryoablation. Immune canonical pathways showed gene expression changes associated with tissue damage signaling, leukocyte recruitment, phagocytic tissue damage clean up, increased antigen presentation, TH1 and TH2 T cell immune responses, and decreased adaptive immune resistance enhancing antitumor immunity. Histopathology TIL scores pre- vs. post-cryoablation were not significantly different. Larger sample size is needed to study the clinical relevance of immune response to cryoablation.

School: School of Medicine

KORAC, KSENIJA

Carbidopa, an activator of aryl hydrocarbon receptor, suppresses IDO1 expression in pancreatic cancer and decreases tumor growth

Ksenija Korac, Yangzom D. Bhutia

IDO1 is an immunomodulatory enzyme responsible for tryptophan catabolism. Its expression in immune cells, especially the DCs, has attracted attention because it leads to tryptophan depletion at the immunological synapse, thereby causing T-cell anergy and immune evasion by the tumor cells. Cancer cells also overexpress IDO1. Immunotherapy targeting IDO1 has been one of the focus areas in cancer biology, but lately studies have identified non-immune related functions of IDO1 leading to a paradigm shift with regard to IDO1 function in the context of tumor cells. In this study, we show that PDAC tissues and PDAC cells overexpress IDO1. The expression level is reciprocally related to overall patient survival. We further show that carbidopa, an FDA-approved drug for Parkinson's disease as well as an AhR agonist, inhibits IDO1 expression in PDAC cells. Using athymic nude mice, we demonstrate that carbidopa-mediated suppression of IDO1 expression attenuates tumor growth. Mechanistically, we show that AhR is responsible for carbidopa-mediated suppression of IDO1, directly as a transcription factor and indirectly by interfering with the JAK/STAT pathway. Overall, targeting IDO1 not only in immune cells but also in cancer cells could be a beneficial therapeutic strategy for PDAC and potentially for other cancers as well and that carbidopa could be repurposed to treat cancers that overexpress IDO1.

School: Graduate School of Biomedical Sciences

LIU, XIAOBO

Development of a DSM-V Miniature Porcine Model of Alcohol Use Disorder

Xiaobo Liu, Joshua Willms, Jeremy D. Bailoo, Brittany Backus, Ana Gutierrez, Jackson Driskill, Jordan Sanchez, Angelica L. Rodriguez, Praneetha Panthagani, Susan E. Bergeson

Alcohol Use Disorder (AUD) is a chronic, relapsing, multifactorial condition that impairs one's ability to control alcohol use and is further associated with mental and social impediments. Rodent models have been widely used preclinically for AUD, however, it shares less physiological similarities or behavior relevant to humans compare to swine models, which may limit their translational success in producing therapeutics. Even though some drinking studies have been conducted in minipigs, there is no research establishing tests for the Diagnostic and Statistical Manual of Mental Disorders V (DSM-V) criteria of AUD in swine. Therefore, we hypothesize that the minipigs will develop traits consistent with DSM-V criteria for AUD diagnosis. To test this hypothesis, we have developed tests, with good face validity, to allow us to evaluate the model. In this study, the 11 DSM-V criteria were evaluated in a within-subject design: #1&2: Alcohol consumption and preference was measured by two-bucket free choice; #3&11: Time spend on alcohol and withdrawal symptoms were recorded by video; #4: Craving was measured with short-term deprivation relapse; #5&10: Intoxication and pharmacodynamic tolerance were measured by ladder test agility; #6&7: Behavioral changes were measured by home pen recreation test; #9: Depression was measured by sucrose preference test. Animals were evaluated on each test as alcohol concentration escalated from 2.5% to 10%. Additionally, blood samples were taken to determine the level of intoxication and pharmacokinetic tolerance. Thus far, all five minipigs have shown strong alcohol intoxication, preference, craving, decreased quality of task performance. Two of the pigs have developed tolerance while another two have developed mild withdrawal symptoms. In conclusion, two of the pigs have developed moderate and three severe AUD, as specified by DSM-V criteria. Our model will now serve to test new medications for AUD in future studies.

School: Graduate School of Biomedical Sciences

JARAMILLO-MARTINEZ, VALERIA

PEPTIDE TAGS AND DOMAINS FOR EXPRESSION AND DETECTION OF MAMMALIAN MEMBRANE PROTEINS AT THE CELL SURFACE

Valeria Jaramillo-Martinez, Ina. Urbatsch, Vadivel Ganapathy

Transport proteins mediating solute transfer across the plasma membrane constitute an important group of cell-surface proteins. There are several diseases resulting from mutations in these proteins that interfere with their transport function or trafficking, depending on the impact of the mutations on protein folding and structure. Recent advances in successful treatment of some of these diseases with small molecules which correct the mutations-induced folding and structural changes underline the need for detailed structural and biophysical characterization of membrane proteins. This requires methods to express and purify these proteins using heterologous expression systems. We described experimental strategies for this approach using the solute carrier transporter NaCT (Na⁺-coupled citrate transporter). Loss-of-function mutations in NaCT cause a severe neurologic disease known as early infantile epileptic encephalopathy-25 (EIEE-25). EIEE-25 leads to epilepsy, impaired speech, limited motor skills, developmental delay, and tooth defects in children. NaCT was modified with various peptide tags, including a RGS-His10, a Twin-Strep, the SUMOstar domain, and an enhanced green fluorescent protein (EGFP), each alone or in various combinations. When transiently expressed in HEK293 cells, recombinant NaCT proteins underwent complex glycosylation, compartmentalized with the plasma membrane, and exhibited citrate transport activity similar to the non-tagged protein. Surface NaCT expression was enhanced by the presence of SUMOstar on the N-terminus. The dual-purpose peptide epitopes RGS-His10 and Twin-Strep facilitated detection of NaCT by immunohistochemistry and western blot and may serve as useful tags for affinity purification. This approach sets the stage for future analyses of mutant NaCT proteins that may alter protein folding and trafficking. It also demonstrates the capability of a transient mammalian cell expression system to produce human NaCT of sufficient quality and quantity to augment future biophysical and structural studies and drug discovery efforts.

School: Graduate School of Biomedical Sciences

MARTINEZ-MARIN, DALIA

DVL Post-Translational Modifications Influence WNT-Signaling Responses in Breast Cancer

Dalia Martinez-Marin, Jenna C. Van-Wunnik, Monica Sharma, Isabel Castro, Kevin Pruitt

Dishevelled (DVL) is a crucial component of Wnt-signaling pathways and is vital for other physiological processes. The activation of several Wnt-signaling pathway components by post-translational modifications (PTMs) is tightly regulated, influencing a targets' ability to relay signals and execute cellular responses. PTMs are highly dynamic and reversible, and several PTMs, including phosphorylation, acetylation, methylation, and ubiquitination, have been identified on key Wnt components. Three isoforms of DVL (DVL1-3) encoded by mammalian genes are known. Paralog-specific interactions and functions, coupled with site-dependent availability of DVL isoforms, may play a focal role in defining Wnt-signaling specificity and add selectivity toward distinct downstream pathways. Even though DVL proteins are central mediators of the Wnt-signaling pathway and are versatile regulators of several cellular processes, how DVL paralogs differentially regulate the canonical and non-canonical Wnt-signaling pathway remain largely uncharacterized. We hypothesize that novel DVL PTMs influence the transcription and epigenetic regulation of cancer-associated genes in the canonical and non-canonical Wnt-signaling pathway. We also hypothesize that these PTMs will impact cancer hallmarks, modulate in vivo tumor growth, and influence the number and/or type of immune cells that infiltrate the tumor. Loss-of-function and gain-of-function mutants were generated using shRNA to investigate how aberrant DVL expression effects the different Wnt-signaling pathways. Utilizing R, C++, and Python, we evaluated the role of DVL epigenetic regulation and mRNA regulation of Wnt-associated genes in cell lines by ChIP-sequencing and total RNA whole transcriptome sequencing to identify differentially expressed genes between DVL mutants. Identified genes were then evaluated in DVL PMTmut cell lines using WB and RT-qPCR. Our current study elucidates the crucial role DVL PTMs play in Wnt-pathway signaling.

School: Graduate School of Biomedical Sciences

MARSH, HARRISON

ABNORMAL H-RAS SUPPRESSION AND ACTIVATION IN THE ALTERED LIMBAL BASAL CELLS OF PTERYGIA

Harrison Marsh, Johnathon Kopel, Ted Reid

Epidemiologically UVB causes pterygia. UVB is known to be mutagenic for the p53 and H-ras genes. Previously we found abnormal p53 expression in altered limbal stem cells of pterygia. Our goal was to search for abnormal H-ras expression in these pterygium cells in order to determine the contribution of H-ras to the pathogenesis of this disease and to compare it with H-ras expression in normal limbus epithelium.

Six pterygia (5 primary, 1 recurrent) and 3 normal superior and lateral limbal epithelia were surgically removed and prepared as frozen sections. Cellular H-ras (Ab-1; Calbiochem) was used as the primary antibody, in 1/20-1/40 dilutions, for immunostaining.

Normal limbus epithelium – 3 specimens showed strong staining of their basal cells, weak staining of suprabasal cells, and negative to moderate staining of surface cells. Pterygia migrating altered limbus epithelia – In 5 specimens (4 primary, 1 recurrent) there was weak to negative staining of basal, suprabasal and surface cells. These specimens had a suppressed number of cell layers (suppressed phenotype). One specimen (primary) showed strong staining of basal and surface cells with moderate staining of suprabasal cells and showed a proliferative phenotype.

1) H-ras suppression found in pterygia correlates with a decreased number of cell layers and increased TGF- β (suppressed phenotype); 2) H-ras activation correlates with an increased number of cell layers and possible oncogenic mutations (proliferative phenotype); 3) H-ras activation is of low incidence and is thus not required for pterygia pathogenesis.

School: School of Medicine

MCHANN, MELISSA

Anti-nociceptive effects of ACEA are dependent on sex and dose in cisplatin induced peripheral neuropathy model using both S426A/S430A mice and wild type mice

Melissa McHann, Hailey De Selle, Josee Guindon, Isabelle Castro-Piedras

Chemotherapy induced peripheral neuropathy (CIPN) is a chronic painful experience that has minimal treatment options. Cannabinoids have shown great promise for future treatment of CIPN. Sex differences in pain have been demonstrated by numerous studies and are also found during treatment with cannabinoids. In this study, we used S426A/S430A mutant knock in (KI) mice. These mice have a mutation at the CB1 receptor for GRK and β -arrestin, showing delay in tolerance to cannabinoids. The 426 and 430 serines are turned into alanines preventing GRK from phosphorylating CB1, therefore the CB1 receptor is not desensitized as quickly. We also used wild-type mice that were treated in the same conditions as the KI mice to serve as a direct comparison. The objective of our current work is to find the efficacy of three different doses of the CB1 selective agonist ACEA (0.25mg/kg- 0.75mg/kg) in alleviating chemotherapy-induced peripheral neuropathy using cisplatin (5mg/kg i.p.) in KI and wild-type male and female mice, which was administered once a week for four weeks. Mechanical and cold allodynia was evaluated with the von Frey and acetone tests respectively in KI mice and wild-type mice. The sex differences were evaluated at the different doses of ACEA in respect to efficacy and tolerance. Additionally, we evaluated vaginal smears of the vehicle cisplatin females and all the doses (0.25-0.75mg/kg) females to see if ACEA interfered with the normal oestrous cycle of the female mice. We found that all doses of ACEA had an anti-nociceptive affect in both males and females, with 0.25 mg/kg showing a partial reversal of neuropathy and 0.5 mg/kg - 0.75 mg/kg showing full reversal of neuropathy. We found that there are significant differences between genotype, sex, and dose in terms of efficacy and tolerance. There are also changes oestrous cycle with a predominance of the metestrus-diestrus phases.

School: Graduate School of Biomedical Sciences

MILLER, SARAH

Role of the signal recognition particle in insulin quality control

Miller, Sarah; Tikhonova, Elena; Karamyshev, Andrey

Insulin is a peptide hormone important for maintaining glucose homeostasis. Its precursor, preproinsulin, is targeted to the endoplasmic reticulum (ER) by the signal recognition particle (SRP), an essential ER-targeting factor in mammalian cells. SRP recognizes N-terminal signal sequences in secretory preproteins. Several mutations in the preproinsulin signal sequence are associated with neonatal diabetes or mature onset diabetes of the young. The data obtained in our lab on examples of other secretory proteins demonstrate that certain mutations in the signal sequence lead to the specific degradation of their mRNAs in a protein quality control process called RAPP. We therefore hypothesize that the diabetes-associated mutations in the preproinsulin signal sequence interfere with the insulin nascent chain-SRP interaction and activate RAPP. To test this hypothesis, we used site-specific photo-crosslinking to detect proximity and likely SRP interactions with wild type (WT) preproinsulin and mutant preproinsulins. Our data show a diminished interaction between SRP and preproinsulin with a mutation that decreases the hydrophobicity of the signal sequence. To further test the role of SRP in insulin biogenesis, we expressed WT or mutant preproinsulins in cultured human cells and analyzed mRNA and protein expression by RT-qPCR and immunofluorescence. We predict that mutant preproinsulins that lose their interaction with SRP in vitro will also show decreases in both mRNA and protein expression in cells. This research will provide a possible molecular mechanism in the pathogenicity of these insulin precursor mutations.

School: Graduate School of Biomedical Sciences

MYERS, CAITLYN

Novel Mechanisms of Host Defense in the Epididymis

Caitlyn Myers, Mary Catherine Hastert, Gail A. Cornwall

The epididymis plays a critical role in protecting sperm from invading pathogens that can ascend the male tract, causing inflammation and infertility for years following an infection. The epididymis relies heavily on antimicrobial proteins (AMPs) to defend against these pathogens, but it remains unclear mechanistically how these AMPs function. We previously established that a non-pathological, functional amyloid matrix is in the epididymal lumen that contains CRES and several CRES subgroup members, a family of highly amyloidogenic reproductive cystatins, suggesting it is a complex amyloid structure. Our studies show recombinant CRES amyloid and the epididymal amyloid matrix exhibit potent antimicrobial activity against uropathogenic bacterial strains including *E. coli*, *S. aureus*, and *N. gonorrhoeae*, suggesting important roles in host defense. We hypothesize that CRES amyloid and the epididymal amyloid matrix use multiple mechanisms to protect against pathogens including trapping bacteria and disrupting bacterial membranes. Negative-stain transmission electron microscopy (TEM) showed that CRES amyloid and the epididymal amyloid matrix surround and trap bacteria. Further, a Live/Dead assay and TEM revealed that the amyloids disrupted bacterial membranes in a strain-dependent and structure-dependent manner. Our data also revealed mechanisms of host defense that are new to the epididymis. TEM and Live/Dead assays showed that some bacteria transitioned into unique ghost-like structures (bacteria that have extruded their cytosol and DNA yet still retain an intact and functional membrane) following incubation with CRES amyloid and the epididymal amyloid matrix, revealing an additional means to kill bacteria. Also, CRES monomer and immature epididymal amyloids transitioned into higher-ordered amyloids following incubation with bacteria, suggesting they are dynamic structures that may assemble off bacterial membranes. The shape-shifting properties of CRES and the epididymal amyloid matrix provides inherent plasticity and would allow for a rapid host defense response to a variety of pathogens.

School: Graduate School of Biomedical Sciences

NAVARRO, STEPHANY

Gardnerella vaginalis growth is eliminated by a novel narrow-spectrum factor secreted by *Lactobacillus jensenii*

Stephany Navarro, Habib Abla, Gary Ventolini, Jane Colmer-Hamood, Abdul Hamood

Bacterial vaginosis (BV) is the most common vaginal infection in women of reproductive age. While the vaginal microbiota of health women is dominated by lactobacilli, it shifts to favor other bacteria, specifically *Gardnerella vaginalis* (Gv), in women with BV. Lactobacilli produce antimicrobial factors including hydrogen peroxide, lactic acid, and bacteriocins. We hypothesize that besides these factors, lactobacilli and Gv influence each other's growth within the vaginal environment through additional unidentified factors. To assess the interaction of Gv with *Lactobacillus jensenii* (Lj), one of the vaginal lactobacilli, we grew the organisms in transwell co-culture in medium simulating vaginal fluid. Lj significantly reduced Gv growth at 20 h post inoculation (hpi) and eliminated Gv at 24 hpi. Cell-free culture supernatant (CFS) of Lj harvested at 16 hpi did not affect Gv growth while Lj CFS harvested at 24 hpi eliminated Gv growth entirely. Growth of Lj was unaffected by either 16h- or 24h-CFS. Additionally, 24h-CFS did not affect growth of other vaginal lactobacilli (*L. gasseri* and *L. crispatus*), *Enterococcus faecium*, *Staphylococcus epidermidis*, or *Escherichia coli*. Time course experiments using 24h-CFS showed that elimination of Gv began at 2 hpi and was complete by 4 hpi. To rule out hydrogen peroxide and D-lactic acid as the responsible agents, we tested concentrations double that produced by Lj; neither inhibited Gv growth. Fractionation of 24h-CFS using 100-, 30-, 10-, and 5-kDa molecular weight cut off columns revealed that the fraction containing ≤ 30 -kDa proteins retained the inhibitory effect while the fraction containing less than ≤ 10 -kDa proteins had no effect. These results suggest that: 1) a novel 10- to 30-kDa Lj secreted product eliminates Gv and 2) the effect of this factor is unique to Gv.

School: Graduate School of Biomedical Sciences

NGUYEN, HONG-MY

Listeria-based vaccines targeting interferon-stimulated gene 15 (ISG15) for renal cell carcinoma and colorectal cancer

Hong-My Nguyen, Laurence Wood

Both renal cell carcinoma (RCC) and colorectal cancer (CRC) are leading causes of cancer-related deaths in the United States. There is an urgent need to develop new treatment regimen(s) for advanced RCC and CRC patients due to (i) their current 5-year survival rates are below 15% and (ii) the prevalence of resistance to currently available systemic therapies. Immunotherapy is an emerging approach in advanced RCC and CRC. A *Listeria*-based vaccine is an active form of cancer immunotherapy with demonstrated anti-tumor efficacy in several pre-clinical models of cancer and in clinical trials. The *Listeria*-based vaccine is developed from an attenuated *Listeria monocytogenes* (Lm) bacterium which has the unique ability to preferentially infect dendritic cells (DCs), deliver the tumor antigen-of-interest and induce robust cytotoxic T lymphocyte (CTL) responses to eradicate tumors. One such tumor-associated antigen, Interferon-stimulated gene 15 (ISG15), is the first identified ubiquitin-like modifier and has been implicated for its central role in innate immunity against intracellular pathogens. While the anti-viral mechanism of ISG15 is well-established, the protein is recently being explored for its contribution to cancer development. ISG15 expression is highly elevated and significantly associated with unfavorable prognosis in a multitude of cancers including RCC and CRC. Therefore, targeting ISG15 by means of a Lm-based vaccine could be a promising approach in RCC and CRC. Our preliminary studies found that ISG15 is highly upregulated in both murine RCC and CRC cell lines compared to the normal fibroblast 3T3 cell line. The expression of ISG15 is further enhanced after stimulation with IFN- β . In subcutaneous syngeneic mouse models of RCC and CRC, vaccination with a Lm-based vaccine targeting ISG15, Lm-LLO-ISG15, significantly controls primary tumor burden and extends median survival compared to control-treated animals. Our findings suggest that Lm-LLO-ISG15 can be a potential candidate for the treatment of RCC and CRC.

School: Graduate School of Biomedical Sciences

NIA, SIAVASH SHAHBAZI

Selective KOR Antagonists, Novel Candidates For Treatment of Neuropathic Pain

Nia, Siavash Shahbazi; Hossain, Mohammad A; Ji, Guangchen; Obeng, Samuel; Nozohouri, Saeideh; Patel, Dhavalkumar; Kalem, Raja R; Jonnalagadda, Sravan; Sifat, Ali E; Hiranita, Takato; Abbruscato, Thomas J; Trippier, Paul C; Putnam, William; Neugebauer, Volker; German, Nadezhda A

Neuropathic pain (NP) is a chronic condition caused by a lesion or disease of the somatosensory system, including peripheral fibers and central neurons, affecting 7–10% of the general population. The patients with NP generally have low response to analgesics such as NSAIDs or weak opioids such as codeine while more potent opioids such as morphine and methadone are proven efficacious. The use of opioids for the treatment of NP is a double-edged sword. It can result in numerous side effects, particularly opioid dependence. The challenges involved with the use of opioids highlight the need for novel non-opioid therapeutic options for the treatment of NP. Recently, inhibition of Kappa Opioid Receptors (KOR) has been determined as a potential non-opioid therapeutic option for the treatment of NP, lacking the side effects of opioids.

Our lab has designed and synthesized a set of monocyclic, bicyclic, and tricyclic diketopiperazine-based ligands with a varying degree of selectivity between opioid receptor subtypes. Selective kappa opioid receptor (KOR) ligands with the optimal pharmacokinetic profile were tested in-vivo using the spinal nerve ligation (SNL) neuropathic pain model in rats and proved to be effective in the treatment of NP. Considering the chemical novelty, non-opioid pharmacophore, optimal drug-like properties, and in-vivo efficacy of our ligands, we envision that these chemical agents can be developed as pain therapeutics lacking abuse liability.

School: Graduate School of Biomedical Sciences

OLADEJO, MARIAM

Tumoral Endoglin (CD105) regulates the Tumor Microenvironment, Tumorigenicity, and Therapeutic Response in Renal Cell Carcinoma

Mariam Oladejo, Laurence. M. Wood

Endoglin (CD105) is a 180kDa homodimeric transmembrane glycoprotein that serves as an accessory co-receptor for the TGF- β signaling cascade and its signaling facilitates proliferation, cell migration, endothelial cell formation and maturation. CD105 is highly expressed in a multitude of cancers and this elevated expression correlates with tumor progression. Importantly, its expression has a profound effect on the prognosis of highly vascularized cancers such as Renal Cell Carcinoma (RCC), a form of cancer that is highly metastatic and characterized by resistance to therapy. Although CD105 has been largely studied as an endothelial cell marker in various cancers including RCC, the effect of its expression by tumor cells has not been fully elucidated in immunocompetent animals. To study the effect of tumoral CD105 on the progression of RCC, we generated a murine CD105-deficient RCC tumor cell line (Renca-CD105KO). Renca-CD105KO cells have reduced proliferative capacity, reduced stemness, and enhanced sensitivity to chemotherapeutic agents in vitro. Renca-CD105KO cells also have increased potential for early tumor formation in vivo but the progression of these tumors is significantly reduced compared to CD105-expressing RCC tumors in a syngeneic tumor model. Interestingly, while it is established that endothelial cell expression of CD105 is an important mediator of angiogenesis, we found that tumoral CD105 also contributes to neovascularization as seen by a reduction in the hemoglobin content and CD31 mRNA expression in Renca-CD105KO tumors. Further, deletion of tumoral CD105 impacted the tumor microenvironment (TME) by increasing the number of multicytokine-producing CD8⁺ and CD4⁺ T cells and reducing the suppressive nature of the TME. Our current work suggests that tumoral CD105 may mediate responses to not just chemotherapeutic but also immunotherapeutic agents, such as the immune checkpoint inhibitors, a finding that we will explore in the future.

School: Graduate School of Biomedical Sciences

PANTHAGANI, PRANEETHA

Pharmacological characterization of new Alcohol Use Disorder medication

Praneetha Panthagani, Joshua Willms, Ted W Reid, Susan E Bergeson

Alcohol use disorder (AUD) is a chronic and disabling condition affecting 5-10% of the American population. It is characterized by uncontrolled alcohol consumption, development of dependence, and tolerance. Only three drugs have been approved by FDA for AUD: acamprosate, disulfiram and naltrexone. Each have poor clinical compliance and outcomes. Preclinical research has indicated that minocycline was effective in controlling alcohol consumption and reduced withdrawal symptoms. However, the antibiotic activity of minocycline limits use in long-term treatment of AUD. To overcome this drawback, we synthesized modified minocycline analogs (MMAs) that lack antimicrobial activity. MMAs were effective in reducing alcohol consumption in murine and porcine drinking models. The current goal was to begin characterization of pharmacological and safety profiles. Enzymatic degradation studies in the presence of gastric and intestinal digestive enzymes (pepsin, trypsin, and chymotrypsin) indicated that the MMAs underwent only modest degradation. Oral treatment indicated good efficacy, albeit less so than by i.p. Ames test results showed no mutagenicity, and protection against acquired mutations was evident. Stability studies showed strong heat resistance, but photosensitivity with light-induced degradation within 24 hours (consistent with the parent molecule). Mechanism of action in vitro protein binding assay screens were performed for over 132 targets. The drug was found to activate 1 receptor and inhibit 13 receptors and 5 enzymes. Many were previously unknown targets of minocycline. Overrepresentation analysis in Webgestalt showed significant effects (FDR \pm 0.05) on several pathways including substance use withdrawal as a proof of concept. Results indicated that MMAs may have application for treatment of other mental health disorders and pain. Large-scale drug production is planned to perform pharmacokinetic and toxicological evaluation as required by the FDA for investigational new drug approval.

School: Graduate School of Biomedical Sciences

PERVAIZ, IQRA

Modeling Glut1 Deficiency Syndrome at the Human Blood-Brain Barrier In Vitro Using CRISPR-Cas9 Edited Induced Pluripotent Stem Cells

Iqra Pervaiz, Fatema Tuz Zahra, Constantinos M. Mikelis, Abraham J. Alahmad

Glucose represents one of the major energy sources for the central nervous system (CNS). Glucose uptake is mostly occurring across the blood-brain barrier (BBB), via the involvement of glucose transporters (GLUTs). At the BBB, such transport is mostly mediated via GLUT1 also known as solute carrier family 2, facilitated glucose transporter member 1 (SLC2A1). In addition to the importance of glucose for neuron metabolism, there is growing evidence that brain microvascular endothelial cells (BMECs) lining the BBB are highly glycolytic. Yet our current understanding of glucose metabolism at the BBB remains limited. GLUT1 deficiency syndrome (G1D) is an autosomal dominant childhood form of epilepsy affecting GLUT1 activity. It is often characterized by early onset of seizures, gait disorders, and intellectual disability. A major issue is the lack of a robust in vitro model of G1D to understand the pathophysiology of the BBB. The aim of this study is to develop and characterize G1D-BMECs by gene editing using induced pluripotent stem cells (iPSCs). Heterozygous SLC2A1^{+/-} iPSC (IMR90)-c4 were produced by CRISPR-Cas9 method. Such iPSCs were differentiated into BMECs using established protocols. Cell phenotyping, barrier function, glucose uptake, and metabolism were assessed in the system.

SLC2A1^{+/-} iPSCs were viable and showed no significant differences in terms of phenotype or growth, compared to unedited iPSCs. Differentiated SLC2A1^{+/-} BMECs showed similar SLC2A1 expression, at mRNA level to the control, but showed reduced GLUT1 expression at the protein level, as well as reduced glucose uptake. A decreased barrier function was observed in these cells, without any major changes in tight junction complex and glucose metabolism, as well as impaired angiogenesis.

Our data suggest that G1D-BMECs display reduced GLUT1 expression and glucose uptake, reduced barrier tightness, and angiogenesis thus, recapitulating findings documented in vivo. Taken together, our data suggest that G1D-BMECs can be a potential tool to model G1D at the BBB in vitro.

School: Graduate School of Biomedical Sciences

PRESTO, PEYTON

CGRP1 receptor blockade in the amygdala in neuropathic pain: cellular and behavioral outcomes

Peyton Presto, Volker Neugebauer

The amygdala has emerged as a key player in the emotional-affective aspects of pain and pain modulation. The laterocapsular region of the central amygdala nucleus (CeLC) is defined as the “nociceptive amygdala” due to its high content of neurons that process pain-related information. The CeLC is the target of the spino-parabrachio-amygdaloid pain pathway, which is the major source of calcitonin gene-related peptide (CGRP). Changes in CeLC neurons have been observed in pain models and synaptic plasticity in the CeLC has been linked to pain-related behaviors. CGRP has been shown to be involved in peripheral and spinal mechanisms and in pain-related synaptic plasticity in the amygdala. However, the role of CGRP-mediated plasticity in the amygdala in neuropathic pain behaviors remains to be determined. Here we tested the hypothesis that the CGRP1 receptor is involved in neuropathic pain-related amygdala plasticity and that blockade of this receptor can inhibit neuropathic pain behaviors. Sensory and affective behaviors were measured in adult chronic neuropathic rats (4 weeks after spinal nerve ligation, SNL). For blockade of the CGRP receptor, a selective CGRP1 receptor antagonist (CGRP 8-37) was administered stereotaxically into the CeLC by microdialysis. Inhibition of the CGRP1 receptor reduced emotional responses to noxious stimuli (audible and ultrasonic vocalizations) and mechanical hypersensitivity (hindlimb withdrawal reflexes). Tonic aversive aspects of pain relief by CGRP 8-37 were detected in the conditioned place preference (CPP) test. In brain slices containing central amygdala corticotropin releasing factor (CeA-CRF) neurons from neuropathic rats, multiphoton imaging showed that CGRP1 receptor blockade reduced calcium signals evoked by electrical stimulation of presumed PB input. Together these findings may suggest that CGRP1 receptors in the CeLC are involved in neuropathic pain-related plasticity and contribute to nociceptive and emotional-affective pain responses. CGRP1 receptors in the amygdala may serve as a therapeutic target for pain relief.

School: Graduate School of Biomedical Sciences

RAMESH, MALVIKA

Analysis of Cross-Reactive Antigens in Rattlesnake and Fish

Malvika Ramesh, Dr. Tarbox

A 12-year-old male with past medical history of asthma and seasonal allergies presents with anaphylactic symptoms within minutes of eating rattlesnake meat. Patient has no history of allergies and has no prior exposure to rattlesnake meat. Often anaphylactic reactions occur after repeated exposure to allergens making this initial reaction surprising. He recovered after administration of an EpiPen, and allergen testing revealed allergy to fish.

It has been documented in literature fish allergen antibodies often cross react with antigens of other organisms such as chicken or rattlesnake.[1] Thus, it's hypothesized that our patient was sensitized to fish allergens over time and exposure to rattlesnake antigens triggered anaphylaxis due to the cross reactivity between fish antigens and rattlesnake antigens to fish IgE.

The majority fish allergies are due to the muscle protein parvalbumin.[1] This protein has a beta subtype beta parvalbumin which is present predominantly in fish and an alpha subtype which is present in other organisms. [1] Thus, it's suspected an allergy to parvalbumin in fish could predispose an individual to allergic reactions upon exposure to parvalbumin in other organisms.

To test our hypothesis, we propose SDS Page of patient's serum to isolate IgE. Next SDS Page from rattlesnake tissue will identify potential protein allergens and then utilize Western Blot to determine which proteins are allergenic. Also test rattlesnake proteins with IgE to fish parvalbumin to isolate any reactive proteins.

School: School of Medicine

SCHNIERS, BRADLEY

PEPT1 is essential for the growth of pancreatic cancer cells: A viable drug target

Bradley Schniers, Devaraja Rajasekaran, Ksenija Korac, Tyler Sniegowski, Vadivel Ganapathy, Yangzom D. Bhutia

PEPT1 is a proton-coupled peptide transporter that is upregulated in PDAC cell lines and PDXs, with little expression in normal pancreas. However, the relevance of this upregulation to cancer progression and the mechanism of upregulation have not been investigated. Herein, we show that PEPT1 is not just upregulated in a large panel of PDAC cell lines and PDXs but is also functional and transport-competent. PEPT2, another proton-coupled peptide transporter, is also overexpressed in PDAC cell lines and PDXs, but is not functional due to its intracellular localization. Using glibenclamide as a pharmacological inhibitor of PEPT1, we demonstrate in cell lines in vitro and mouse xenografts in vivo that inhibition of PEPT1 reduces the proliferation of the cancer cells. These findings are supported by genetic knockdown of PEPT1 with shRNA, wherein the absence of the transporter significantly attenuates the growth of cancer cells, both in vitro and in vivo, suggesting that PEPT1 is critical for the survival of cancer cells. We also establish that the tumor-derived lactic acid (Warburg effect) in the tumor microenvironment supports the transport function of PEPT1 in the maintenance of amino acid nutrition in cancer cells by inducing MMPs and DPPIV to generate peptide substrates for PEPT1 and by generating a H⁺ gradient across the plasma membrane to energize PEPT1. Taken collectively, these studies demonstrate a functional link between PEPT1 and extracellular protein breakdown in the tumor microenvironment as a key determinant of pancreatic cancer growth, thus identifying PEPT1 as a potential therapeutic target for PDAC.

School: Graduate School of Biomedical Sciences

SHAHI, SADISNA

Novel class of DAT inhibitor for the treatment of addiction

Sadisna Shahi, Md Ashraf-Uz-Zaman, Guangchen Ji, Dalton Tidwell, Linda Yin, Smathorn Thakolwiboon, Jie Pan, Paul C. Trippier, Mirla Avila, Volker Neugebauer, Nadezhda A. German

Dopamine Active Transporters (DAT) is an important recognition site for cocaine and mediates its acute behavioral and reinforcing effects that contribute to abuse liability. In vitro studies have shown that cocaine blocks the uptake of the monoamines like dopamine, serotonin, and norepinephrine, with behavioral effects being attributed mostly to inhibition of dopamine uptake. Thus, compounds that target DAT are viewed as a potential pharmacological treatment of cocaine abuse, addiction, and dependence. Several preclinical studies demonstrate that DAT inhibitors can effectively attenuate cocaine self-administration, whereas drug effectiveness is correlated with DAT occupancy. In addition, recent reports showed selected DAT inhibitors, like modafinil, to reduce the rewarding effects of selected drugs and decrease abuse and addiction liability.

Recently, our lab has reported a novel class of achiral urea analogs capable of inhibiting DAT with a high degree of selectivity and potency. Favorable pharmacokinetic profile, the ability to cross the BBB in vivo, and metabolic stability prompt us to evaluate the lead compound in the experimental autoimmune encephalomyelitis (EAE) mouse model. We have observed that this compound has lowered neuroinflammation, a pathological marker associated with chronic drug abuse. Here we present the project's status, providing more information on our compound's typical vs. atypical inhibitory properties and its ability to modulate responses to illicit drug exposure.

School: Graduate School of Biomedical Sciences

SHARMA, SEJAL

In vitro evaluation of metformin across the blood-brain barrier

Sejal Sharma, Sabrina Rahman Archie, Yong Zhang, Thomas Abbruscato

Metformin treatment has been shown to exert neuroprotective action during stroke. However, the brain availability and potential interaction with the transporters present at the blood-brain barrier (BBB) is unknown. The BBB expresses solute carrier (SLC) uptake transporters such as organic cationic transporters (OCTs) and efflux transporters such as P-glycoprotein (P-gp). Studies that used intestinal and renal cell lines for metformin's uptake showed the involvement of OCTs (OCT 1-3), plasma membrane monoamine transporter (PMAT), and choline transporter (CHT).

Initially, we evaluated metformin's permeability coefficient value across a co-culture model of mouse brain endothelial cell line (bEnd3) and primary astrocytes. Next, we evaluated metformin's uptake in bEnd-3 cells by using transporters specific inhibitors such as amantadine at 500 μ M (OCT 1 and 2), corticosterone at 150 μ M (OCT 1-3), desipramine at 200 μ M (OCT 1-3 and PMAT) and hemicholinium at 10 μ M (CHT). Furthermore, we explored metformin's interaction with P-glycoprotein (P-gp) in a P-gp over-expressing cell line.

The permeability coefficient (PC) value for metformin was found to be 20×10^{-4} cm/min which supports high permeability across an in-vitro BBB model (n= 5 replicates). The inhibitors, corticosterone, and desipramine significantly reduced metformin's brain endothelial cell uptake, suggesting the involvement of OCT-3 (P<0.05) and PMAT (P<0.005), while amantadine and hemicholinium did not show any significant change. Furthermore, we performed unidirectional flux ratio (UFR) analysis for metformin in presence of cyclosporine, a potent P-gp inhibitor, and the value obtained was 1.24 ± 0.07 (n= 7 replicates). This UFR value suggests that metformin does not interact with P-gp.

We conclude that metformin is permeable across the BBB and uses OCT-3 and PMAT for most of its uptake into brain endothelial cells, and does not interact with the P-gp. For our future studies, we will evaluate metformin transport across the BBB in ischemic conditions.

School: Graduate School of Biomedical Sciences

SNIEGOWSKI, TYLER

Tumor promoting role of SLC38A5 in pancreatic ductal adenocarcinoma

Tyler Sniegowski, Dr. Yangzom Bhutia, Dr. Vadivel Ganapathy

Pancreatic ductal adenocarcinoma (PDAC) is lethal. Based on the Human Protein Atlas database, SLC38A5 is significantly up-regulated in PDAC and correlates with poor patient survival. SLC38A5 is a Na⁺-coupled, electroneutral amino acid transporter that transports glutamine, serine, glycine, and methionine that are essential for glutaminolysis and one-carbon metabolism that the cancer cells are addicted to. Furthermore, SLC38A5 is a c-Myc target and induces macropinocytosis. Thus, it makes sense as to why cancer cells would love to upregulate SLC38A5 as a part of their tumor-promoting gene expression program. Using Real-time PCR and Western blotting, we validated the expression status of SLC38A5 in PDAC cell lines, PDXs, and organoids. Using radiolabeled serine uptake, we also confirmed that the PDAC cell lines not only expressed SLC38A5 but are also functional in these cell lines. Having established the expression and functionality of SLC38A5 in PDAC cells, our next aim was to investigate its tumor promoting role. To achieve that SLC38A5 was silenced in SLC38A5-positive BxPC-3 and HPAF-II cells. After validating the knockdown using Real-time PCR and radiolabeled serine uptake, in vitro assays like the colony formation and transwell invasion assay was performed using the knockdown cells and non-targeting control (NTC). It was interesting to observe that knockdown of SLC38A5 suppressed the colony formation ability as well as the invasion capacity in both the cell lines suggesting the tumor promoting role of SLC38A5. To extrapolate the in vitro data further, subcutaneous xenograft was performed in athymic nude mice. Interestingly, we found that the SLC38A5 knockdown cells grew slower as evidenced by the smaller tumor weight further validating our in vitro data. Our future work involves extrapolating these data in KPC spontaneous mouse model of PDAC and understanding its mechanism of upregulation.

School: Graduate School of Biomedical Sciences

SWEAZEY, RYAN

Characterization of diseases associated with mutations in the Na⁺/K⁺ pump $\alpha 1$

Ryan Sweazey, Pablo Artigas

The Na⁺,K⁺-ATPase (NKA) is an essential membrane protein that establishes Na⁺ and K⁺ gradients across the plasma membrane. A functional NKA enzyme consists of an α and β subunit which is often accompanied by an auxiliary FXYD subunit. The NKA establishes electrochemical gradients by exporting 3 Na⁺ ions out of the cell, in exchange for 2 K⁺ ions, which are used for essential processes such as cell excitability and secondary active transport. The α subunit contains the ion-binding sites and catalytic machinery required for ion transport. There are four isoforms of the α subunit ($\alpha 1-4$) found in humans which have unique distributions and kinetic properties. Mutations in ATP1A1, which encodes the ubiquitously expressed $\alpha 1$ subunit, are associated with certain diseases and manifest with phenotypes unique to the isoform. Charcot-Marie-Tooth syndrome (CMT) and hypomagnesemia accompanied by seizures and cognitive delay (HASAC) are two of the most common diseases associated with ATP1A1 mutations. We aim to characterize the functional characteristics and physiological relevance of specific mutations associated with CMT and HASAC. Using heterologous protein expression of ATP1A1 mutants, we utilized a combination of electrophysiological and biochemical methods to characterize specific disease-related mutations. Current experiments aim to refine the existing knowledge of CMT and HASAC associated ATP1A1 mutations and provide potential future treatments for these debilitating disorders.

School: Graduate School of Biomedical Sciences

VANDERPOOL, EMILY

Staphylococcus aureus as a model pathogen for studying sinusitis in vivo.

Emily Vanderpool, Kendra Rumbaugh

Chronic rhinosinusitis (CRS) is a biofilm-associated inflammatory disease that affects up to 15% of American adults. CRS accounts for one of the highest rates of antibiotic prescriptions in outpatient care, with patients estimated to receive an average of four or more courses of antibiotics per year. While CRS patients seek continual medical management of symptoms, many do not experience relief, resorting to multiple surgical interventions. One of the most commonly identified microorganisms in the sinonasal cavity of CRS patients is *Staphylococcus aureus* (SA). SA is a known biofilm-former, armed with a collection of virulence factors that are thought to contribute to the prolonged inflammatory state of CRS. In this study, we sought to establish a model of SA sinonasal infection that can help identify novel, non-antibiotic strategies for treating CRS. We utilized a murine model of non-invasive intranasal bacterial inoculation to assess the carriage of SA. We hypothesized that nasal inoculation with SA would cause a localized infection ($>10^5$ cfu/g nasal tissue). In our experiments, the number of SA decreased 24 hours post-inoculation, yet SA was recovered after 5 days at the infection threshold of 10^5 cfu/g nasal tissue. Additionally, inoculation of SA into both nares increased the number of bacteria recovered at 5 days post-inoculation. Interestingly, both commensal and inoculated SA were found in the rostral portion of the sinonasal cavity. These results suggest that SA is able to colonize the murine sinonasal cavity. In future experiments, we will investigate SA biofilm formation in our murine model, the chronicity of SA sinonasal infection, as well as the host inflammatory response to SA inoculation to better understand CRS pathology.

School: Graduate School of Biomedical Sciences

WASHBURN, RACHEL

From testes to transplants: Sertoli cell complement inhibitors may be the key to transplant survival

Rachel Washburn, Gurvinder Kaur, Beverly Chilton, Brian Reilly, Jannette M. Dufour

Transplantation treats a wide-range of illnesses and diseases. Almost 107,000 people are on the transplant waiting list, but only 39,000 transplants were performed last year. Seventeen people die each day awaiting a transplant, indicating many patients are in dire need of this procedure. Using pig tissue as xenografts (different species) offers an endless supply of transplantable tissue. Unfortunately, allografts (same species) and xenografts are rejected. Complement, a series of immune proteins that cause cell lysis by creating the membrane attack complex (MAC), is an important component in both allo- and xenograft rejection. Consequently, patients that receive transplants must take harsh immune-suppressing drugs to prevent rejection, which highlights the two primary issues in transplantation: the severe shortage of transplantable tissue and the requirement of toxic immunosuppressants. Sertoli cells (SC), immunoregulatory testicular cells, survive long-term across immune barriers without immunosuppressants. This study utilized allo- and xenograft models to investigate the role of complement inhibition in SC extended survival. SC were resistant to human complement-mediated destruction while control cells were destroyed. Mouse and pig SC were transplanted into mice and rats, respectively, then grafts were collected at various timepoints and analyzed for presence of complement. No complement was observed on mouse SC, and only activation-phase complement (no MAC) was detected on pig SC. This indicates that SC inhibit complement before MAC formation, possibly by expressing complement inhibitors. Bioinformatics analyses of mouse and pig SC identified expression of at least 13 complement inhibitors. These results suggest that SC complement inhibitors may be important for their survival after transplantation. Understanding SC complement inhibition is significant as it will lead to improved allotransplant and use xenotransplant survival with decreased requirement of immunosuppressants, making clinical transplantation more attainable for patients.

School: Graduate School of Biomedical Sciences

LITERATURE REVIEWS

AWKAL, JACOB

Systematic review of COVID-19 autopsies: accelerated hyaluronan concentration as the primary driver of morbidity and mortality in high-risk COVID-19 patients: with therapeutic introduction of an oral hyaluronan inhibitor in the prevention of “Induced Hyaluronan Storm” Syndrome

Jacob Awkal, Michael Mong, Paul Marik

The post-mortem autopsy remains an essential part of both discovering the cause of death (COD) in an individual, but also in advancing the science and treatment of disease. An autopsy serves to discover the COD using a macro/microscopic investigation. Because lung weight is often affected by the COD and the last breath occurs very near if not at death, the evaluation of the lungs serves as one of the key starting points of any COD investigation[3]. A comprehensive search was performed to systematically review reported autopsy findings in COVID-19 patients with respect to lung weights and histologic findings. We then compared these findings with the results of a targeted literature review of hyaluronan in relationship to acute respiratory distress syndrome (ARDS). In total, data from 38 autopsies were identified. From this group, 36 autopsies of COVID-19 patients were selected for detailed review and statistical analysis. The average lung weight of those who were determined to have died as a result of SARS-CoV-2 was 1683g which is approximately 3.2 times the normal lung weight. Hyaline membranes were consistently identified on histologic sections. A review of the literature reveals that markedly elevated lung weights and hyaline membranes have been associated with the pathophysiology of ARDS since 1967. However, the key role of hyaluronan in driving the morbidity and mortality of COVID-19 has heretofore not been fully recognized. We propose that the induced hyaluronan storm syndrome (IHSS), is a model that addresses the perplexing respiratory failure that is the COD. We hypothesize that administration of a repurposed hyaluronan synthase inhibitor (4-methylumbelliferone [4-MU]) to pre-symptomatic, high-risk patients at the time of initial diagnosis or to personnel with exposure in high-risk settings can prevent the progression of COVID-19 and increase favorable patient outcomes.

School: TTU - Dallas

BARRETT, JOEL

SARS-Cov-2 Associated Encephalitis: A Review

Joel Barrett, Ashish Sarangi, Asim Ansari, Wail Amor

COVID-19 predominantly affects the immune and respiratory system however recently there has been increased focus on neurological complications. Encephalitis is an inflammatory condition of the brain that primarily affects the leptomeningeal areas. Encephalitis can lead to worsening outcomes in patients infected with COVID-19 and lead to delirium, ICU admission as well as increase in risk of long-term morbidity and mortality.

Encephalitis related to COVID-19 has been increasing in prevalence especially with introduction of new and emerging variants such as the BA.1 and BA.2 omicron variants. The emergence of encephalitis in the infection course leads to worse outcomes and presents an immune etiology which can be targets for emerging pharmaceutical targets.

Early data suggests hypoxic/metabolic changes produced by intense inflammatory response against the virus triggers cytokine storm and subsequently acute respiratory distress syndrome and multiple organ failure.¹ Hypoxic/metabolic changes result in encephalopathy. The presence of comorbidities predisposes to hypoxic/metabolic changes responsible for encephalopathy. Transient virus spread to the CSF with extremely low titers is contemplated, which makes virus isolation difficult. Another option, which according to experts is the most plausible, is immune-mediated encephalitis: SARS-CoV-2 would produce an immune response and an activation of the cytokine cascade (complement, IL-6, IL-10, TNF, coagulation, etc.) leading to the brain edema and swelling responsible for the clinical condition.²

Due to the increasing incidence of COVID-19, its neurological manifestations are becoming more and more common. There is, therefore, an urgent need to understand and diagnose neurological syndromes as early as possible to optimize treatment.

School: TTUHSC - Lubbock

BAYKOCA-ARSLAN, BUSE

Examining behavioral theories to design an intervention to promote physical activity among school-aged children in rural areas.

Buse Baykoca-Arslan, Theresa Byrd

The purpose of this study is to design a theory-based intervention focused on inadequate physical activity to promote health as well as prevent death, chronic diseases, and disabilities.

Physical inactivity increases mortality causes, doubles the risk of major chronic diseases such as type 2 diabetes and obesity, heart diseases, and hypertension, and increases the risks of different cancer types, osteoporosis, and anxiety and depression (WHO, 2002).

Physical inactivity doesn't have significant ethnic or racial disparities, but rather geographical disparities are highly associated with the problem. Rural areas are more important to implement such an intervention to reduce the incidence and eventually the prevalence of chronic diseases. The priority population of this theoretically driven intervention is school aged children in rural areas.

There have been implemented a variety of interventions focused on physical activity for school-aged children/adolescents. In terms of theoretically based models, Health Belief Model (HBM), Theory of Planned Behavior / Theory of Reasoned Action (TPB / TRA), Transtheoretical Model (TTM), and Social Cognitive Theory (SCT) are the commonly used ones (Glanz et al., 2008). After critical literature reviews, SCT was selected to be most efficient and feasible behavioral theory due to its reciprocal determinism construct.

The intervention is designed for 12 months to be implemented as a school program by including the following sub-constructs are selected: Self-efficacy, outcome-expectations, observational learning, goal setting, incentive motivation, feedback, self-reward, and enlistment of social support. The stakeholders of the program are students, teachers, school administrators, community members, and parents.

Implemented constructs can maintain and foster the desired behavior such as outcome expectations, observational learning, goal setting, incentive motivation, feedback, self-reward, and enlistment of social support. Mid-term and post-intervention measurements will influence the overall success of the intervention.

School: Graduate School of Biomedical Sciences

BROWNELL, DREW

A review on cardiac amyloidosis epidemiology, ethnic variations, pathophysiology, and treatment

Drew Brownell, Dr. Nandini Nair (PI)

Cardiac amyloidosis (CA) is a condition where misfolded proteins form aggregates and deposit in cardiac tissue. Many amyloid proteins have been identified, however, only six cause CA. Immunoglobulin light chain (AL), and wild type (wtATTR) and mutant (mATTR) transthyretin, are the most common CA causes, but serum amyloid A (AA), immunoglobulin heavy chain (AH), apolipoprotein AI (ApoAI), and atrial natriuretic peptide (AANF) all cause CA. Once amyloid infiltrates cardiac tissue it typically presents as restrictive cardiomyopathy, and can have devastating effects including heart failure, arrhythmias, angina, and myocardial infarction.

While CA subtypes can have similar presentations, there are many differences in pathophysiology, disease progression, and outcomes, among other things. AL is the most common systemic amyloid (78%), with ATTR (7%) and AA (6%), and ApoAI and AH being far less common. AANF is the most common CA, but least harmful. AL and mATTR have the worst prognosis, and all subtypes worsen as cardiac infiltrate increases. Among ethnicities, AL and wtATTR have a similar presentation, progression and prognosis, while AA, ApoAI and mATTR vary depending on allele or protein mutation. No ethnic variation data was found for AH or AANF. The pathophysiology of AH and AL is typically from plasma cell dyscrasias. AA arises secondary to chronic inflammatory disorders. ATTR and ApoAI are liver proteins that become aberrant with age (wtATTR) or mutated (mATTR or ApoAI). AANF is a cardiac peptide that forms amyloid with age. AANF treatment is focused on A-fib, ApoAI treatment is supportive, and in AA, the underlying disease is treated. ATTR and AL treatments were historically supportive, but novel therapies targeting ATTR amyloid, and plasma cells have been developed, with others ongoing. This review's aim was to identify the epidemiology, ethnic variations, pathophysiology, and treatment for each CA subtype with emphasis on current, and upcoming therapies.

School: School of Medicine

CHIDDARWAR, VAISHNAVI

Exercise therapy following Traumatic Anterior Shoulder Dislocation injuries: a Systematic Review and Meta-analysis

Vaishnavi Chiddarwar, Dr.Rutger de Zoete, Mr.Cameron Dickson, Dr.Timothy JH Lathlean

Traumatic anterior shoulder dislocations (ASD) are common, and lead to reduced functional capacity and athletic participation. Guidelines recommend criteria driven, graded exercise programs to promote recovery. The most recent evidence synthesis on treatment of ASD completed in 2019 did not fully focus on exercise-based management (EBM). Our aim was to investigate the efficacy of EBM following ASD in promoting functional restoration, and recovery.

We retrieved 3125 studies that matched our inclusion criteria from five electronic databases (MEDLINE, Google Scholar, EMBASE, Web of Science and Scopus). Two reviewers screened titles and abstracts, 283 records were eligible for full-text screening. We included 56 studies for qualitative synthesis. Primary outcome measures comprised: recurrence of re-dislocation, and return to pre-injury activities (i.e. work and sport participation). Secondary outcomes included: self-reported measures of pain and quality of life (QOL), strength and range of motion (ROM). Homogenous studies were pooled for meta-analysis.

Rates of recurrent dislocation were lower in shoulders managed with surgery and post-operative exercise-7.7% versus shoulders managed conservatively with exercise (recurrence rate=56%),($p<0.05$). Successful return to activity was greater after conservative exercise-based intervention compared to post-operative exercise ($p<0.05$). The QOL outcomes improved after both conservative and post-operative exercise-based interventions on the following scales: 'Western Ontario Shoulder Index' ($p<0.05$), 'Disabilities of the Shoulder, Arm and Hand' ($p<0.05$), and 'American Shoulder and Elbow Surgeons Score' ($p<0.05$). There was no improvement in: 'Visual Analog Scale' pain ratings, abduction ROM, flexion ROM. However, there was improvement in the internal and external rotation ROM post conservative exercise-based intervention ($p<0.05$). There was an improvement in grip strength and shoulder muscle strength following both post-operative and conservative exercise-based intervention but the changes were not statistically significant.

Exercise improved functional recovery after ASD. The functional outcomes were greater with exercise-based intervention management after surgery, than conservative exercise-based intervention management alone.

School: TTUHSC - Lubbock

DAINES, BENJAMIN

The Impact of Covid-19 on Otorhinolaryngologic Clinical Research Trials

Benjamin Daines, Drew Smith MD, Joehassin Cordero MD

To determine the impact of coronavirus disease of 2019 (COVID-19) on otorhinolaryngologic clinical research trials. Seventeen of the highest impact, peer-reviewed otorhinolaryngology journals according to h5-index were investigated. Clinical research trials published by these journals during the two years prior to the COVID-19 pandemic between January 1, 2018 and December 31, 2019 (pre-COVID-19) and the first two years of the COVID-19 pandemic between January 1, 2020 and December 31, 2021 (post-COVID-19) were obtained. Multiple metrics were assessed for comparison via statistical analysis.

The PubMed pre-COVID-19 search returned 315 eligible clinical research trials out of 8455 publications while the post-COVID-19 search returned 243 eligible trials out of 9961 publications, a 34.5% decrease ($P<0.001$). Fifteen of the seventeen journals measured experienced a relative decrease in clinical research output during the COVID-19 pandemic. Reported data are mean \pm standard deviation. Clinical trials published during the pandemic featured significantly more participants (112.0 ± 151.7 vs 90.0 ± 98.2 , $P=0.025$), significantly more authors (7.1 ± 4.4 vs 6.1 ± 3.6 , $P=0.003$), and significantly fewer citations (2.9 ± 4.7 vs 10.1 ± 13.4 , $P<0.001$) than pre-COVID-19 clinical trials. Otorhinolaryngologic clinical trials related to COVID-19 were cited significantly more (25.8 ± 4.1 vs 2.5 ± 3.6 , $P<0.001$) than other clinical trials published during the COVID-19 pandemic. There were no changes in the three most productive clinical research publishing countries and negligible changes in the subject of interest of otorhinolaryngologic clinical trials.

Otorhinolaryngologic clinical research output has significantly decreased during the COVID-19 pandemic. Despite the pandemic, clinical trials are enrolling more participants and being authored by more people compared to the two years before COVID-19. The country of authorship and topics of clinical trial research have changed insignificantly during the pandemic.

School: School of Medicine

FINE, EMILY

Review of music therapy and maternal speech on pain reduction for neonatal circumcisions

Emily Fine, Rebekah Phillips MD; Christine Neugebauer, MS, MT-BC, LPC; Lara Johnson, MD

Infancy is an optimal time for circumcision due to quick healing time, no sutures, convenience of being in a health facility, and cost-effectiveness at this age. Circumcisions are painful, but current practice includes pharmacologic analgesia through a local anesthetic in addition to non-pharmacological interventions to alleviate pain, such as administering oral sucrose or a pacifier. This project examined whether listening to music or other audible recordings was another non-pharmacological intervention to alleviate pain in neonates undergoing circumcisions. While an infant is too young to describe their pain using language, they can voice their pain through sounds and actions. Aims of the project included exploring methods to measure pain in infants and reviewing previous findings on music, maternal speech, or other recordings reducing pain in neonates. PubMed and Clinical Key were used to identify papers published from 2019-2021 that utilized music therapy and maternal speech for neonatal pain mitigation. This review demonstrated that music and mother's voice help relieve pain in neonates undergoing painful procedures.

School: School of Medicine

HANNON, CRAIG

REVIEW OF SAGES GERD GUIDELINES AND RECOMMENDATIONS

Craig Hannon, Cassandra Mohr, Hailie Ciomperlik, Naila Dhanani, Oscar Olavarria, William Hope, Scott Roth, Mike Liang, Julie Holihan

The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) developed evidence-based guidelines for the management of patients with gastroesophageal reflux disease (GERD). The aim of this study is to evaluate guidelines lacking agreement amongst experts (grades B-D) or lacking support from randomized controlled trials (levels II-III).

Six guidelines were chosen for evaluation. A retrospective review of a multi-center database of patients undergoing fundoplication surgery for treatment of GERD between 2015-2020 was performed. Patients that underwent a concurrent gastrectomy or were diagnosed with pre-operative achalasia were excluded. Demographics, pre-operative, intra-operative, and post-operative variables were collected. Post-operative outcomes were evaluated based on selected SAGES guidelines. Outcomes were assessed using multivariable regression or stratified analysis for each guideline.

A total of 444 patients from four institutions underwent surgery for the management of GERD with a median (interquartile range) follow-up of 16 (13) months. Guidelines supported by our data were (1) mesh reinforcement may be beneficial in decreasing the incidence of wrap herniation, (2) robotic repair has similar short-term outcomes to laparoscopic repair, (3) following laparoscopic anti-reflux surgery, dysphagia has been reported to significantly improve from pre-operative values, and (4) outcomes in older patients are similar to outcomes of younger patients undergoing anti-reflux surgery. Guidelines that were not supported were (1) the long-term effectiveness of fundoplication in obese individuals (BMI >30) has been questioned due to higher failure rates and (2) a bougie has been found to be effective.

Many SAGES GERD guidelines not receiving Grade A or Level I recommendation are supported by large, multi-center database findings. However, further studies at low risk for bias are needed to further refine these guidelines.

School: School of Medicine

HARDER, TAYLOR

Neuromodulator Pain Management After Hand Surgery: A Systematic Review

Taylor Harder, Cameron Cox, Brendan MacKay M.D.

In the United States, surgeons prescribe an average of 2 to 5 times more opioid pills than patients use after upper extremity surgery. On average, 21 to 29 percent of patients misuse the opioids that they are prescribed, and 8 to 12 percent of patients develop an opioid addiction. Hand surgery has been no exception. The opioid crisis has become a present concern in the medical field. In an effort to address these complications, neuromodulators have been considered as alternatives to prescribed opioids. This review focuses on the analgesic effects of neuromodulators, such as gabapentin, duloxetine, and pregabalin, that provide room for less dependence on narcotic analgesics following hand surgery. During the database searches, 1,033 records were identified as a preliminary result. After duplicates were removed, an initial screen of each article was completed which identified records to be removed due to absence of a full-text article. Articles were excluded if they were not either prospective or retrospective, showcased an irrelevant medication (such as tricyclic antidepressants) which are not pertinent to this review, or deemed to be unrelated to the topic. Ultimately, 13 articles were selected. Three different drugs, gabapentin, pregabalin, and duloxetine, were analyzed to compile data on the effectiveness of preventing opioid overuse and addiction following hand surgery. This review identifies strong evidence that perioperative gabapentin administration decreases postoperative pain and lowers opioid dependency. As an adjunct, duloxetine may further decrease postoperative pain and lower opioid dependency. If allergies are present, then a secondary option is to potentially prescribe pregabalin, which may also provide postoperative pain relief. Pregabalin requires monitoring of side effects and dependency. This review creates an opening for further research in the Texas Tech Physicians Orthopedic Hand Center to assess an updated protocol for pain management to reduce opioid dependency.

School: School of Medicine

HOUSEHOLDER, NICHOLAS

A Review of Experimental Cartilage Regenerative Injections for Knee Primary Osteoarthritis

Nicholas Householder, Dr. Mimi Zumwalt, Kofi Agyare, Skyler Thipaphay, Akshay Raghuram, Wooyoung Jang

Primary osteoarthritis (OA) of the knee is the most common physically debilitating disease. The pathology of primary OA begins with structural cartilage damage, which initiates a self-propagating inflammatory pathway that further exacerbates cartilage deterioration. Current standard-of-care for knee primary OA involves treating the inflammatory symptoms to manage pain, enhance patient motility, and potentially slow progressive cartilage loss. This typically involves intra-articular injections of cortisone, an anti-inflammatory steroid, followed by a series of hyaluronic acid (HA) gel injections, which enhance the native cartilage's ability to retain water. The HA hydrogel cushions the knee joint, reducing mechanical stimulation of the inflammatory cascade. Focus on the underlying cellular pathology has prompted researchers to target the biochemical mechanisms of cartilage degradation. Newer approaches focus on regenerating native cartilage. However, such an injection has not yet been FDA-approved. This paper reviews current research on experimental injections targeting cartilage restoration.

In addition to PRP injections, it is clear that the most promising intra-articular injections that will improve treatment of primary OA are: bioengineered advanced-delivery steroid-hydrogel preparations (e.g. Zilretta®), ex-vivo expanded allogeneic stem cell injections (e.g. Stempeucel® & Elixocyte®), genetically-engineered chondrocyte injections (e.g. Tissuegene C®), recombinant fibroblast growth factor therapy (e.g. Sprifermin®), injections of selective proteinase inhibitors (e.g. Roccella®), senolytic therapy via injections (e.g. UBX101® & Navitoclast®), antioxidant therapies through injections (e.g. NRF2®), injections of Wnt pathway signaling inhibitors (e.g. Lorecivivint®), injections of Nuclear Factor Kappa Beta signaling inhibitors (e.g. SLC1®), various potential viral-vector based genetic therapy approaches (such as those utilizing CRISPR/Cas9 and transgenic cells), and RNA genetic technology via injections (e.g. RUNX1®). More prospectively, we may soon see 3D/4D hydrogel-matrix bioprinted injections and induced pluripotent stem cell (iPSC) injections reach human clinical trials.

School: School of Medicine

JOHNSON, RACHEL; AHMED, SARA; AND KLEIN, ANNIKA

From Melancholia to Depression: The Evolution of Diagnostic Criteria

Rachel Johnson, Sara Ahmed, Annika Klein, Taha Jilani, Michelle Onuoha

The current review will discuss the classifications of depressive conditions, how they evolved throughout history, and the manner in which they have varied cross-culturally. Depression is one of the most commonly diagnosed mental health conditions in the 21st century, and its present criteria are detailed in the Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM-5). The literature summarized in this review will be sourced from the archived works of healthcare practitioners beginning with Hippocrates, and it will detail how the depressive criteria has changed. Additionally, this review will consider also consider non-western healthcare practitioners. All sources will be from archived databases or historical book collections. One limitation is that all books must have been originally written in or translated to English in order to be included in this study. Some findings of this review show that historical accounts from Babylon, Egypt, and China often state that mental illnesses were derived from demonic possession, taking a more spiritual explanation. Hippocrates in ancient Greece believed that melancholia simplex (major depressive disorder) came from an imbalance of black bile produced by the spleen. Arab Muslim scholars in the 8th century, such as Ahmed ibn Sahl al-Balkhi and Rhazes, wrote books recognizing behavioral changes and the benefits of psychotherapy. Modern medicine focuses on identifying anhedonia, low moods, and loss of energy among other symptoms as well as recognizing neurotransmitter imbalances in the brain, such as serotonin. This review of historical literature provides insight on how society is able to modify and evolve the modern definitions of various disease states and provides context as to how we developed the current criteria.

School: School of Medicine

JURECKY, JENNA

Depression as a Manifestation and Sequela of SARS-CoV-2 Infection- an Immune Perspective

Jenna Jurecky, Joel Barrett, Ashish Sarangi

The COVID-19 pandemic has had significant consequences on communities, including increasing the prevalence of mental health problems.¹ Depression is a common psychiatric manifestation of a SARS-CoV-2 infection, which may be acute or delayed in onset.^{2,3} Further, there is preliminary evidence of a bidirectional relationship, as evidenced by the treatment of depression and improved SARS-CoV-2 outcomes.⁴ Pathophysiological mechanisms postulated include immune-mediated mechanisms and others (e.g., neurotoxicity and hypercoagulability).² The current review discusses the postulated immune-mediated mechanisms that mitigate a bidirectional relationship between SARS-CoV-2 infection and depression outcomes.

The bi-directional relationship between COVID-19 and depression has been a focus of studies. Infection-triggered perturbation may induce depressive symptoms through an immune-mediated mechanism.

A SARS-CoV-19 infection induces the production of local and systemic production of cytokines, chemokines, and other inflammatory mediators through a cytokine storm.⁵ COVID-19 patients, such as SARS and MERS patients, show elevated Interleukin (IL)-1 β , IL-6, Interferon (IFN)- γ , CXCL10, and CCL2, suggesting activation of T-helper-1 cell function. Moreover, in COVID-19, unlike in SARS and MERS, elevated levels of T-helper-2 cell-secreted cytokines (such as IL-4 and IL-10) were found.⁶ Other immune processes involved may be: neuroinflammation, blood-brain-barrier disruption, peripheral immune cell invasion into the CNS, neurotransmission impairment, hypothalamic-pituitary-adrenal (HPA) axis dysfunction, microglial activation, and indoleamine 2,3-dioxygenase (IDO) induction.⁶ These all represent interaction pathways between immune systems and may contribute to psychiatric manifestations of SARS-CoV-19 infection.

Further research may determine social factors (e.g., social isolation) that are likely contributory.⁷ A body of literature is available that discusses other psychiatric manifestations.^{2,8-10} Further, literature is available that discusses how COVID-19 treatment (e.g., corticosteroids) may contribute to psychiatric manifestations.¹¹ In addition, an exploration into other possible biomarkers could elucidate other pathophysiologic mechanisms. Understanding pathophysiologic mechanisms may confer treatment targets in psychiatric conditions associated with inflammation.

School: School of Medicine

KHARBAT, ABDURRAHMAN

Management of Scoliosis of the Spine: A Systematic Review

Abdurrahman Kharbat, Laszlo Nagy

Background: Scoliosis is an abnormal lateral curvature of the spine that is most often diagnosed in childhood or early adolescence. Normal spine curves occur at the cervical, thoracic, and lumbar regions in the sagittal plane, and serve to position the head over the pelvis and serve as shock absorbers to distribute mechanical stress during movement. Scoliosis is often defined as spinal curvature in the coronal (frontal) plane, but is commonly more complex, often involving the coronal, sagittal, and axial planes. Treatment modalities have evolved in recent years, and a literature review highlights the most innovative procedures and when they are indicated. **Materials/Methods:** We conducted a literature review using PubMed, EMBASE, Scopus, Web-of-Science, and Cochrane and searched following the PRISMA guidelines to include studies of scoliosis treatment. **Results/Conclusion:** We found that a plethora of different tactics can be taken to treat a patient with scoliosis, depending on factors such as etiology of the curve, age at curve onset, rate of curve progression, and skeletal maturity status. Observation is indicated in children with curves that have a Cobb angle between 0-25 degrees. Bracing is indicated between 25-40 degrees, and surgical correction may be indicated for curves greater than 40 degrees, especially if they are continuing to grow. Prior techniques consisted of fusing many vertebral segments, with the remaining mobile segments assuming a greater proportion of the load and stress associated with movements. Adjacent segment disease is a process by which degenerative changes occur over time in the mobile segments above and below the spinal fusion, resulting in painful arthritis of the discs, facet joints, and ligaments. Surgical correction techniques are varied now, and range from posterior, anterior, and minimally invasive to endoscopic and awake spine surgery. These findings help elucidate the great strides scoliosis surgery has made.

School: School of Medicine

LAMEY, PATRICE

A Review of the Evidence for Iatrogenic Opioid Withdrawal Syndrome in Critical Care

Patrice Lamey, Dylan Landis

In an inpatient setting, opiates are vital analgesics and sedatives. Though there is much data concerning outpatient opiate prescribing, dependency, and withdrawal, data on opiate dependency and withdrawal from iatrogenic administration in an inpatient setting remains scarce. Iatrogenic Opiate Withdrawal Syndrome (IOWS) still remains poorly characterized with no diagnostic tools in adult populations, despite the fact that there are multiple diagnostic tools and characterizations in pediatric populations. This review aims to look at the existing literature on IOWS in adult populations, compare it to the pediatric populations literature, and discuss the difficulties of creating diagnostic tools for IOWS in adults. Greater attention and research into developing diagnostic tools for IOWS is recommended in order to reduce the amount of withdrawal symptoms experienced in the hospital setting.

School: School of Medicine

LANDIS, DYLAN

The effect of metformin on glucose metabolism in patients receiving glucocorticoids

Dylan Landis, Alex Sutter

Glucocorticoids have clinically useful anti-inflammatory and immunomodulatory effects, but chronic use of these drugs can cause persistent hyperglycemia, type 2 diabetes mellitus, hepatic steatosis, obesity, and other complications due to their metabolic actions. Conversely, Metformin is a widely used drug for the treatment of type 2 diabetes mellitus with a known ability to lower blood glucose levels. This review focuses on metformin's actions on glucose metabolism and its potential use as a drug to limit the metabolic side effects of glucocorticoid treatment. Glucocorticoids and Metformin seem to act upon similar metabolic regulators in juxtaposing ways. Available data suggest that metformin inhibits complex I of the mitochondrial electron transport chain, crucial gluconeogenic enzymes, and fatty acid synthesis that leads to a significant improvement in glucose tolerance and maintenance of insulin sensitivity during glucocorticoid treatment. Three small randomized control trials have demonstrated that metformin can limit changes in glucose metabolism during treatment with prednisone. These studies reveal a promising potential for metformin use as a therapeutic agent to reduce glucocorticoid-induced hyperglycemia and improve patient outcomes.

School: School of Medicine

LE, CHRISTOPHER

Management of Tension Pneumopericardium: Literature Review

Christopher Le, Yana Puckett

A pneumopericardium is a rare condition defined as air or gas located in the pericardial sac. Once enough air accumulates in the pericardial sac, a tension pneumopericardium can occur, resulting in symptoms of cardiac tamponade: hypotension, elevated venous pressure, muffled heart sounds, dizziness, and tachycardia. We provide a summary of treatment of tension pneumopericardium in the last 10 years and of the therapies used to treat pneumopericardium. In addition, we propose a treatment algorithm for modern management of a tension pneumopericardium. A literature search was performed in PubMed to find articles describing the etiology and management of tension pneumopericardium. To be included in this review, studies must be published in English between 2010 and 2020. If a patient with tension pneumopericardium is hemodynamically stable and presents with mild symptoms of fatigue and dyspnea, many physicians will perform a percutaneous placement of an angiocatheter to release air from the pericardium. If the patient suffers pneumopericardium due to a penetrating chest injury, a subxiphoid pericardial window is suggested to prevent future tension pneumopericardium. If a patient is hemodynamically unstable and presents with symptoms of cardiac tamponade, emergency pericardium drainage is required to immediately remove air from the pericardium. If this procedure fails, a selective cannulation of bronchopericardial fistula through pericardial space can be performed as a last resort. Patients with tension pneumopericardium often require emergency pericardiocentesis to avoid negative outcomes. However, depending on the presenting symptoms of the patient, the following treatments can also be used: subxiphoid pericardial window, percutaneous placement of an angio-catheter, and selective cannulation of selective fistula through pericardial space. Future studies will need to be performed to assess the viability of these treatments.

School: School of Medicine

LIN, BENJAMIN

Comparison of adverse events and associated mechanisms across three commonly used balloon-expandable covered-stents: A review of FDA's Manufacturer and User Facility Device Experience (MAUDE) database

Benjamin Lin, Wei Li, MD, MPH

This study compared the device-specific relationships of adverse events (AE) and associated device problems (DP) or patient problems (PP) from three balloon-expandable covered stents commonly used in endovascular procedures: BD Interventional LifeStream, Getinge Atrium iCast, and Gore Viabahn VBX. This is an IRB exempt, retrospective, and observational study using the entire MAUDE database. Investigators compared all reported events for LifeStream, iCast, and VBX (01/24/2011-10/30/2021). AEs were categorized as malfunction, injury, death, or incomplete data. AE, DP, and PP distributions were compared via chi-squared test.

405 eligible AEs were identified for Lifestream, 312 for iCast, and 414 for VBX. Lifestream had the highest malfunction rate(321,79%) compared to iCast(125,40%) and VBX(118,29%). VBX had the highest injury rate(275,66%) compared to iCast(151,48%) and Lifestream(71,18%). iCast had the highest death rate(27,9%) compared to VBX(21,5%) and Lifestream(13,3%). AE differences were found significant by chi-squared test(chi-square=260.8,df=8,p=0.0000). Several DP and PP distributions were found significantly different(chi-square=18.4,df=2,p<0.0001), with the stent with highest DP/PP rate noted. Across specific DP/AEs, Lifestream scored highest in Device Dislodged or Dislocated(245,60%,chi-square=239.7,p<0.0001), Device-Device Incompatibility(83,20%,chi-square=138.0,p<0.0001), and Failure to Advance(25,6%,chi-square=26.7,p<0.0001); iCast in Leak/Splash(15,5%,chi-square=23.1,p<0.0001) and Burst Container or Vessel(11,4%,chi-square=24.8,p<0.0001); and VBX in Partial Blockage(19,5%,chi-square=29.5,p<0.0001), Complete Blockage(31,7%,chi-square=44.2,p<0.0001), Deformation Due to Compressive Stress(18,4%,chi-square=22.7,p<0.0001), Collapse(40,10%,chi-square=65.7,p<0.0001), Premature Separation(17,4%,chi-square=29.4,p<0.0001), and Patient-Device Incompatibility(48,12%,chi-square=79.5,p<0.0001). Across specific PP/AEs, iCast scored highest in Blood Loss(24,8%,chi-square=28.7,p<0.0001), Thrombosis(18,6%,chi-square=25.9,p<0.0001), Renal Failure(21,7%,chi-square=30.7,p<0.0001), and Hemorrhage/Bleeding(13,4%,chi-square=26.6,p<0.0001); VBX in Aneurysm(51,12%,chi-square=71.7,p<0.0001) and Obstruction/Occlusion(93,22%,chi-square=90.6,p<0.0001).

This study represents the most comprehensive report in this field of MAUDE events for these three stent-grafts to date. AE analysis revealed a significantly higher percentage of malfunction in Lifestream, injury in VBX, and death in iCast. DP/PP analysis revealed a higher incidence of delivery-related device dislocation in Lifestream, blood loss in iCast, and vessel blockage/occlusion in VBX. Limitations of this administrative database necessitate further randomized investigation into potential causal relationships between DP/PPs and AEs.

School: School of Medicine

MANAL, NABEELA

Gaisbock Syndrome: A review of contemporary studies, pathogenesis, complications, and possible treatment

Nabeela Manal, Mariam Rizvi, Dr. Kenneth Nugent MD

Gaisbock syndrome is the term ascribed to several conditions initially observed by Felix Gaisbock, MD (from Innsbruck, Tyrol, Austria) in 1905 when he described a group of hypertensive male patients who had high hematocrit levels, normal leukocyte counts, and no splenomegaly. These patients had an overweight, stocky habitus, a plethoric appearance with suffusion of the eyes, tense and anxious personalities, a cigarette smoking habit, vascular disease, headaches, and facial rubor. Later studies identified alcoholism, diuretic therapy, and physical or emotional stress as additional risk factors that might contribute to the onset of this syndrome. This review revisits Gaisbock syndrome based on recent literature and will highlight contemporary studies that have established an association between erythrocytosis and hypertension and associated risk factors. Several mechanisms help explain the pathophysiology underlying Gaisbock's observations, and these include psychiatric disorders resulting in chronic stress, volume contraction secondary to diuretics and hypertension, and obstructive sleep apnea with nocturnal hypoxemia and erythropoietin production. Complications associated with this syndrome include the formation of microthrombi with cerebral infarction; treatment should focus on the management of hypertension and a reduction in risk factors, such as obesity, cigarette smoking, and alcohol use. Gaisbock syndrome involves several clinical disorders, has a complex pathogenesis, and leads to a better understanding of the causes of erythrocytosis during patient evaluation.

School: School of Medicine

MARSCHKE, BRIANNA

Regional Variations in Microbiology and Outcomes of Necrotizing Soft Tissue Infections: A Systematic Review and Meta-Analysis

Brianna Marschke, Erin Morris, Samudani Dhanasekara, Sharmila Dissanaik

Frequency, microbiology, and outcomes of necrotizing soft tissue infections (NSTIs) could vary across the United States (US) due to differences in locoregional and environmental factors. We synthesized the literature from across the regions of the US on NSTIs in a systematic review/meta-analysis.

PubMed, ProQuest, Scopus, and Web of Science databases were systematically searched and screened. DerSimonian–Laird random-effects meta-analyses were performed using ‘meta’ package in R to determine the pooled prevalences. Meta-regression analyses examined the moderator effects of risk factors.

Twenty-seven studies (2,242 total patients) were included in the meta-analysis. The pooled prevalence of polymicrobial and monomicrobial infections were 52.2% and 39.9%, respectively. The prevalence of monomicrobial NSTIs was rising while polymicrobial infections were declining. Meta-regression analysis showed that the majority of polymicrobial NSTIs were Fournier’s gangrene ($p < 0.001$), while monomicrobial NSTIs mostly endured on extremities ($p < 0.001$). The commonest organism in the West and South was *Staphylococcus aureus*, whereas *Bacteroides* spp. in Midwest, and *S. pyogenes* in the Northeast. MRSA accounted for 11.9% of NSTIs, predominantly seen in the South. The overall mortality rate was 17.8% and declined explicitly over the last two decades ($p < 0.001$) without any regional differences.

Advancement in the management of NSTIs may have contributed to the observed decline in NSTI-related mortality in the US. However, the proportion of monomicrobial NSTIs seems to be rising, possibly due to increased comorbidities affecting extremities. Moreover, it is crucial to prioritize the most likely causative organism in patients with NSTIs depending on geographic region. Multi-center observational studies are warranted to confirm our observations.

School: School of Medicine

MCCOOL, HANNAH

Pharmacy Deserts in Texas and How They Contribute to ER Admissions: A Literature Review

Hannah McCool, Andrea Weitz, MD

Over half a million people live in pharmacy deserts in the United States. This refers to areas without pharmacy access within a half-mile radius in urban areas, and 10-mile radius in rural areas. Pharmacy deserts have been identified as a problem within racial and ethnic neighborhoods, lower socioeconomic populations, and the uninsured. These groups not only have decreased geographic access to pharmacies, but also more expensive treatment options for chronic diseases. Within Texas, there are 150 counties without pharmacies, leaving 500,000 people at a geographic disadvantage, and over 4.8 million Texans are living with only one pharmacy in their county. Without access to medications for these chronic conditions, it is shown that the incidence of emergency room visits in urban areas may be as much as 2.7% higher, with a nearly 2.0% higher hospital admission rate (Akinbosoye et al, 2016).

Those who live in pharmacy deserts are also limited by the types and business hours of their closest pharmacies. This is in part due to national chain pharmacies not having storefronts in these areas, but instead, local pharmacies with limited hours. Lower socioeconomic and minority neighborhoods are observed to be in these areas which may contribute to lower medication adherence, and therefore emergency department admissions (Barber et al, 2019). Current research supports that higher medication adherence is associated with a decrease in health care costs for the patient, with a \$38 decrease for each ER visit and an overall decrease of \$226.07 per patient. (Akinbosoye et al, 2016). While the given numbers are affiliated with an urban demographic, UMC Hospital in Lubbock is the only level one trauma center within a 250 mile radius, serving mostly rural communities, suggesting that continuation of research, specifically in West Texas, is needed to analyze pharmacy deserts and their association with emergency room admissions.

School: School of Medicine

PERRY, CODY

Accelerated Surgery in Hip Fracture Patients and the Importance of Managing Comorbidities: A Review of the Literature

Cody Perry, Stephen Rossettie, Dan Hayward, Michael Polmear

Hip fractures are common injuries in the geriatric population, resulting in approximately 300,000 hospitalizations in the United States annually. These injuries are most often managed surgically, with a previous randomized controlled trial, 'HIP ATTACK' showing that accelerated surgery could improve outcomes. Despite the benefits to patients afforded by accelerated surgery, patient comorbidities may require input from multiple medical teams and delay surgical management. The aim of this literature review is to assess the evidence for treating patients who present with hip fractures complicated by comorbidities to unify the co-managing teams and specialists. The search terms "hip fracture" AND "accelerated surgery" were searched in Pubmed, Web of Science, and Embase according to PRISMA guidelines. From obtained articles, medical comorbidities implicated in additional pre-operative evaluation were identified and assessed according to clinical practice guidelines across multiple specialties. Key peri-operative considerations for psychological, cardiovascular, endocrine, and renal pathologies were compiled. Chronic renal failure, congestive heart failure, and atrial fibrillation were among independent risk factors for inpatient mortality. The Short Portable Mental Status Questionnaire score and timed up and go test are highly predictive of mortality as well. A Level I trauma in West Texas implemented early surgical intervention for hip fractures and reduced their average cost of inpatient episode-of-care by 89%, cut readmission rates by 3%, and shortened ED-to-surgery wait time by 47% from the comparative baseline. Hip fracture surgery within 24-48 hours of admission may be associated with better outcomes. It is financially beneficial to have a treatment algorithm that enables hospital systems to expedite surgical intervention for hip fractures. We recommend a practical approach, in which surgery is performed as soon as possible, with prioritization of <24 hours, while being careful to consider medical comorbidities and proper preoperative evaluation with anesthesia, internal medicine, and geriatrics.

School: School of Medicine

REDDY, AKHILA

Residential Radon Exposure and Cancer

Akhila Reddy, Camila Conde, Christopher Peterson, Kenneth Nugent, MD

Radon is an established human lung carcinogen naturally released as an odorless, colorless gas from soil and rocks. It is a major environmental source of ionizing radiation and can cause oxidative damage to DNA, increasing the risk of lung cancer. Although the association between radon and lung cancer is well established, the association between radon and other cancers is not. This review examines the association between residential radon and various non-lung cancers.

Based on reported studies, there is no consistent evidence indicating an association between radon and non-lung cancers, but limited literature, heterogenous study design, and confounding variables preclude definitive conclusions. More research is needed to evaluate the association between residential radon and non-lung cancers, particularly with regard to skin cancer, CNS cancer, and stomach cancer, in which existing literature suggests potential associations with residential radon may exist. However, the literature largely demonstrates that lung cancer is the primary concern associated with residential radon exposure and that non-lung cancers are secondary concerns. These results should be considered in residential radon mitigation efforts.

School: School of Medicine

RIDDLE, EMILY

The Romanticism of Suicide- Discussion of Netflix's "13 Reasons Why"

Emily Riddle, Anastasia Ruiz

Netflix's "13 Reasons Why" was an instant success. Seasons 1 and 2 are ranked as the 6th and 4th most popular English TV shows on Netflix respectively, based off of the hours of viewership in the first 28 days on the streaming platform. In its first 28 days, season 1 garnered 475,570,000 hours of viewership, and season 2 was even more popular, with 496,120,000 hours of viewership. The first season the show was received well by critics, with a score of 77% on Rotten Tomatoes and a score of 76 on Metacritic. Despite the show's initial popularity, there has been a significant amount of controversy surrounding the overall message of 13 Reasons Why.

School: School of Medicine

SARRAMI, SHAYAN

Managing Intraoperative Venous Congestion in Abdominally Based Autologous Breast Reconstruction Utilizing Venae Comitantes Systems

Shayan Sarrami, Michael Carey, Daniel DeSimon, Shayan Izaddoost

Autologous free-flaps have become an increasingly popular breast reconstruction option, utilizing women's own tissue to produce naturally appearing results. Free abdominal flaps, based off the deep inferior epigastric perforator (DIEP), have become the most popular due to its reliability and sufficient volume. However, it has been found that drainage of blood from this area of tissue can depend on dominant flow out of the superficial inferior epigastric vein (SIEV), instead of the deep system. Subsequent ligation of the SIEV results in congestion of the flap, leading to flap death. To prevent this, several surgical techniques have been proposed to supercharge the venous outflow from the flap. Of special interest, is the novel intra-flap anastomosis between the SIEV and the venae comitantes of the DIEP. This allows blood drainage from both venous systems to exit the flap through the DIEP. Additional benefits include increased mobility of the flap and less time in surgery due to this simple but effective anastomosis.

School: School of Medicine

SATHEESHKUMAR, ANUDEEKSHA

A Narrative Review of Guideline-Based Recommendations for the Treatment of Sepsis and Sepsis-Related Conditions

Anudeeksha Satheeshkumar, Dr. Yana Puckett, MD

Sepsis and septic shock are feared diagnoses in intensive care units and emergency departments all over the world due to the high morbidity and mortality rate of both. Sepsis and septic shock require different treatment approaches as well as careful consideration of the demographic characteristics of the patient. Following evidence-based guideline recommendations for treatment of both conditions is highly encouraged. This narrative review article provides definitions of sepsis/septic shock, basic epidemiological trends noticed among U.S. sepsis patients, and summarizes some of the strongest treatment recommendations from evidence-based sepsis guidelines for bacterial sepsis, COVID-19 viral sepsis, sepsis in neonates/infants/children, sepsis in cancer patients, and meningococcal sepsis. Brief suggestions for nutrition therapy in sepsis patients are also provided.

School: School of Medicine

STEPHENS, EMILY

Effects of Repetitive Transcranial Magnetic Stimulation on Intensity and Frequency of Chronic Daily Headaches: a Systematic Review and Meta-analysis

Emily Stephens, Ashley Bassett, Rebecca Hall, Alyssa Rodaniche, Chathurika S. Dhanasekara, Christina Robohm-Leavitt, Chwan-Li Shen, Chanaka N. Kahathuduwa

Chronic daily headaches (CDH), defined as headaches occurring > 15 days per month for > 3 months, affect 4-5% of the population and represent an important cause of disability. Chronic migraine and chronic tension-type headaches are leading causes of CDH. Management of CDH remains a challenge due to limited efficacy of standard prophylactic pharmacological measures. Several studies have reported that repetitive transcranial magnetic stimulation (rTMS) can effectively treat chronic headaches. A systematic review and meta-analysis were conducted to determine the utility of rTMS for immediate post-treatment and sustained CDH prophylaxis.

All procedures were conducted in accordance with PRISMA guidelines. PubMed, Scopus, Web of Science and ProQuest databases were searched for records on rTMS and CDH. Records were systematically screened using predetermined eligibility criteria to include controlled clinical trials that have tested the efficacy of rTMS on populations with CDH in-terms of post- vs. pre-treatment headache frequency and intensity. DerSimonian-Laird random-effects meta-analyses were performed using the 'meta' package in R (4.0.2) to examine the post- vs. pre-rTMS changes in standardized headache intensity and frequency compared to sham-control conditions.

Eleven trials were included with a combined study population of N=299 patients with CDH (rTMS, N=156; Sham, N=145). Patients exposed to rTMS had significantly reduced standardized CDH intensity and frequency in the immediate post-treatment period (Hedges' $g = -0.95 [-1.76, -0.14]$, $p = 0.021$ and $\Delta = -5.07 [-10.05, -0.11]$, $p = 0.045$ respectively). However, these effects were not perpetuated into the follow-up period. Significant between-study heterogeneity was observed, at least partially driven by variations in rTMS protocols.

Despite the clinically meaningful and statistically significant benefits found in the post-treatment period, the prophylactic effects of rTMS on CDH do not appear sustainable with discontinuation. Thus, cost-effectiveness of the routine use of rTMS for CDH prophylaxis remains questionable.

School: School of Medicine

TRINH, KELLY

Post-implantation Depression in LVAD Recipients

Trinh, Kelly; Nair, Nandini

As technology advances, medical devices become more and more accessible and convenient to individual patients. Left ventricular assist devices (LVADs) have become a popular choice for life-saving therapy in patients with heart failure. Though LVAD assists the patient's heart by providing adequate blood flow from the heart to the rest of the body and thus reduce stress on the patient's left ventricle, living with an LVAD requires physical and mental adaptation. Patients may experience psychological distress from living with a chronic disease and a mechanical device; however, multiple factors, including personality, family, community support, can play a crucial role in patient's ability to cope with stress post-implantation. This study analyzes how different age groups and genders affect the levels of depression in LVAD recipients. The goal of this study is to understand psychological impact of LVAD and to provide appropriate resources and supports to individual patients.

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