CURRICULUM VITAE

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Permanent Resident

Education

1987-1990 **Ph.D. in Chemistry/Biochemistry**,
Advisor: Dr. Wolfgang E. Trommer, University of Kaiserslautern, Germany.

1981-1987 **Diploma in Chemistry** (equivalent to M.S.)
Advisor: Dr. Wolfgang E. Trommer, University of Kaiserslautern, Germany.

Positions

2018-present **Professor**, Department of Cell Biology and Biochemistry, School of Medicine, Texas Tech University Health Science Center (TTUHSC), Lubbock, Texas.

2018-present **Graduate Advisor** for Biotechnology, Graduate School of Biological Sciences, TTUHSC, Lubbock, Texas.

2003-present Member of the Graduate School of Biological Sciences, School of Medicine, TTUHSC, Lubbock, Texas.

2010-2018 **Associate Professor**, Department of Cell Biology and Biochemistry, TTUHSC, Lubbock, Texas.

2003-2010 **Assistant Professor**, Department of Cell Biology and Biochemistry, TTUHSC, Lubbock, Texas.

1998-2003 **Research Assistant Professor**, Department of Biochemistry and Biophysics, University of Rochester, Rochester, NY.

1995-1998 **Postdoctoral Fellow** with Dr. Philippe Gros, Department of Biochemistry, McGill University, Montreal, Quebec, Canada.

1991-1995 **Postdoctoral Fellow** with Dr. Alan E. Senior, Department of Biochemistry, University of Rochester, Rochester, NY.

Scientific Appointments and Professional Memberships

May 2021 Chair and Organizer of a free series of three Gordon Research Conference ***Connects*** virtual meetings on Multi-Drug Efflux Systems

2021 postponed to 2023: Chair of the Multi-Drug Efflux Systems Gordon Research Conference, Galveston, Texas, US

2020 Cystic Fibrosis Trust, Strategic Research Centre scheme, London, UK; ad-hoc reviewer

2019	Vice-Chair of the Multi-Drug Efflux Systems Gordon Research Conference, Lucca (Barga), Italy
2009-2019	Member of the CFTR 3D structure consortium, Cystic Fibrosis Foundation Therapeutics.
2015	NIH Peer Review of the NCI Laboratory of Cell Biology, review panel member
2012	The Wellcome Trust (Molecules, Genes and Cells Grants), London, UK; ad-hoc reviewer
2010	European Science Foundation (ESF); ad-hoc reviewer.
2006-present	Member of the Center for Membrane Protein Research, TTUHSC, Lubbock, TX.
2004-present	Member of the American Heart Association
2003-present	Member of the Biophysical Society
2003-present	Member of the Southwest Cancer and Treatment Center
2003-present	Member of the American Association of Cancer Research

Honors and Awards

2021	Dean's Outstanding Research and Student Mentor Award
2020	Dean Berk's Teacher Pin, School of Medicine, TTUHSC, Lubbock
2018	Dean's Douglas M. Stocco Distinguished Research Award, TTTUHSC, Lubbock
2016	Dean's Unsung Hero Award, TTUHSC, Lubbock
2014	Chancellor's Council Distinguished Research Award, Texas Tech University Systems, Lubbock
2012-2013	South Plains Foundation Award
2005-2008	Jasper and Jack Wilson Foundation, Cancer Research Award
2006	Helen Jones Foundation Award
2004-2005	South Plains Foundation Award
1992-1994	Postdoctoral Research Fellowship from the German Research Society (DFG)
1987-1989	Graduate Scholarship from the Government of Rheinland-Pfalz, and the German Research Society (DFG)

Personal Statement

I am internationally recognized for my work on P-glycoprotein, CFTR and mammalian ABC transporters, and my expertise in protein engineering, enzyme kinetics and protein biophysical studies. I develop expression platforms for purification of highly active, structure-quality proteins, for functional evaluation of mutant proteins, and kinetic analyses of transport substrates and inhibitors. I support protein structure determination by providing functional assessment of co-crystallizing compounds and nanobodies that may reveal specific conformations. I use this information to better understand the multidrug efflux mechanism of transporters at the molecular level.

I have worked for over 20 years with the multidrug transporter P-glycoprotein, and laid some of the groundwork for its structure-function analyses. As a postdoctoral fellow at the University of Rochester, I proposed a model for alternating-site catalysis between the two nucleotide-binding domains. At McGill University, I introduced the *Pichia pastoris* yeast expression system for large-scale purification of wild-type and mutant P-glycoprotein, which allowed me to decipher the biochemical function of key catalytic residues. Since joining the faculty at Texas Tech University Health Sciences Center, I further optimized the P. pastoris system for milligram-scale production of crystallization-quality P-glycoprotein, and with G. Chang and Q. Zhang at the Scripps Research Institute solved its structure, the first-ever X-ray structure of a mammalian ABC transporter (Science

323:1718, 2009). I have also expressed more than 27 other human ABC transporters in *P. pastoris* for mg-scale production of active proteins, and characterized ATPase/transport function of several of these. These studies lead to X-ray structures of the sterol transporter ABCG5/G8 in bicelles, solved in collaboration with JY. Lee and D. Rosenbaum at UT Southwestern (Nature 533: 561, 2015). Creation of fully functional Cys-less and Trp-less P-glycoprotein variants by directed evolution laid the foundations for biophysical studies, enabling positioning of site-specific probes to enlighten the mechanism of association and dissociation of the two nucleotide binding domains, and how this is coupled to ligand binding in the transmembrane domains, and export of drugs.

I have served as an ad hoc grant reviewer for NIH, the Welcome Trust, the European Science Foundation (ESF), and the Cystic Fibrosis Trust. In addition, I have served for ten years as a principle investigator in the CFTR3D Consortium, a close collaboration of eleven laboratories working to obtain high quality protein reagents of the Cystic Fibrosis Transmembrane conductance Regulator (CFTR) suitable for drug screening and evaluation of correctors that ameliorate cystic fibrosis. I have successfully administered projects (e.g. staffing, research protections, budget), collaborated with other researchers, and produced several peer-reviewed publications from each project. I have served as elected Vice-Chair for the 2019 Gordon Research Conference on “Multi-drug Efflux Systems”, and will chair that conference in 2023. To bridge the gap during the Covid-19 pandemic, I have organized a series of three GRC Connects virtual events in 2021.

In my laboratory, I have established a battery of molecular biology, biochemical and biophysical assays to probe structure-function relations in Pgp, CFTR, and recently the sodium-couple citrate transporter (NaCT), a member of the solute Carrier Transporter family (SLC13A5 gene). These include efficient mutagenesis procedures to generate mutant variants, whole cell drug resistance and transport assays for rapid initial screening of function, purification methods that yield very pure and active proteins (ATPase activities are among the highest reported in the field), and differential scanning calorimetry and circular dichroism spectroscopy to asses protein thermostability. I use drug-stimulated ATP hydrolysis extensively, as well as fluorescent ligand binding and transport assays, to evaluate Pgp and CFTR function and their interactions with drugs and lipids, and to validate competitive and synergistic interactions of drugs and other ligands.

Keywords/areas of interest

ABC transporters, Multidrug Efflux pumps, multidrug resistance, P-glycoprotein, cancer drug resistance, Cystic Fibrosis, CFTR, drug binding sites, drug-drug interactions, drug-induced toxicity.

Manuscript Reviews for Journals

Biochemistry
Biochimica et Biophysica Acta, Biomembranes
Biophysical Journal
British Journal of PharmacologyCancer Chemotherapy and Pharmacology, AACR
Cell Press Structure
Chemical Reviews
Enzyme and Microbial Technology
FEBS Letters
Journal of Biological Chemistry.
Journal of Lipid Research
Journal of Molecular Biology
Journal of Pharmacology and Drug Metabolism
Journal of Proteome Research
Molecular Cancer Therapeutics, AACR
PLOS
PLoS ONE
PNAS

Reviews for Funding Agencies

Cystic Fibrosis Trust, Strategic Research Centre scheme, London, UK
European Science Foundation (ESF)
NIH Peer Review of the NCI Laboratory of Cell Biology, review panel member
The Wellcome Trust (Molecules, Genes and Cells Grants), London, UK
US-Israel Binational Science Foundation
School of Medicine Seed grants (internal)
School of Pharmacy Seed grants, TTUHSC, Amarillo, TX

Consultant to government agencies, private industry, or other organizations

Chair and organizer of a series of three GRC Connects virtual events on Multi-Drug Efflux Systems in 2021 to bridge the gap until we can meet again in person in 2023
GRC Connects: Multi-Drug Efflux Systems (1 of 3).

Chair and organizer of the 2023 Gordon Research Conference on Multi-Drug Efflux Systems entitled "Pharmacological Interventions Targeting the Mechanisms and Regulation of Transporters for Advancing Health Worldwide", March 28 – April 2, 2021 at Hotel Galvez, Galveston, TX. The Chairs organize the meeting, select speakers, apply for grants from NIH and private sources, and raise funds to support travel and registration of young researchers and faculty.

Cystic Fibrosis Foundation Therapeutics (CFFT), Regular, **CFTR3D Consortium member**, March 2009 - 2018. The consortium discussed research in biweekly phone calls, and held in-person meetings twice a year. The Committee was advisory to the CFFT board and met with industrial partners to advice on advancements in new technology for drug discovery and mode of action evaluation of potentiator and corrector drugs.

Vice-Chair of the 2019 Gordon Research Conference on Multi-Drug Efflux Systems entitled "Translating Multifaceted Molecular Mechanisms into Pharmacological Interventions for Advancing Global Health", April 28 – April 2, 2021, Renaissance Tuscany Il Ciocco, Lucca (Barga), Italy. The Vice Chairs assist with selection of speakers, grant applications, fund raising and poster evaluation.

TEACHING (35% effort)

Teaching and Training Experience

During the past 10 years, I have taught in a total of one School of Medicine (SOM) and 20 Graduate School of Biomedical Sciences (GSBS) courses. My teaching load has averaged 2 - 4 lecture hours per year for the SOM, and 30 hours per year for the GSBS, but increased to 40 countable lecture hours in the past three years (see Table below). As part of this effort, I was the course director for the Core IV seminar series for the past 3 years and co-director since 2014 (see Educational Administration), as well as director for the Laboratory Methods for Biotechnology students since 2019. I have co-directed Research in Biotechnology, Biotechnology Report/Final Report, and Laboratory Methods (Rotations) for the past year. In my function as Biotechnology Graduate Student Advisor (since 2018) have conducted monthly virtual meetings to guide our 20 students, provide advice on course work, and encourage social interactions during the pandemic. My student evaluations have been constantly above average and in 2019 I received Dean Berk's "Teacher" pin for effectively delivering of course content to medical students. I have been a member of the Core Curriculum Coordination Committee since 2014. As Chair (2019-2021) I organized monthly meetings with course directors and staff to discuss our student's academic

performance and helpful interventions, and also communicated updates on Covid-19 guidance during the 2020/2021 semesters. In addition, I have mentored 5 PhD students, 8 Biotech and 1 MBA Master's students, and 9 Postdocs. I have served on 14 PhD student committees, 2 MD/PhD and 12 Master's student committees. Furthermore, I have supervised 8 medical research technicians and 24 undergraduate students. I have enjoyed connecting High School students to science at the HSC (see educational activities for the lay public).

Lectures taught at TTUHSC:

Summary of Annual Scheduled Teaching (contact hours given for Fall/Spring 2020/21)

Course Prefix and Number	Course Name	School	Lecture contact hours	Number of students enrolled
GANM 5510	Biology of Cells and Tissues (Block II)	SOM	2	220
GSBS 5471	Core I: Molecules (General Biochemistry)	GSBS	6	20
GSBS5174	Core IV: Biomedical Seminar Series, **Director**	GSBS	16	21
GSBS 5099	Core V: Introduction to Biomedical Research	GSBS	1	4
GBCM 6333	Advanced Protein Biochemistry	GSBS	15	3
GBTC 5340	Biology of Cancer	GSBS	2	not offered
GBTC 5020	Biotechnology Laboratory Methods, **Co-Director ***	GSBS	1	11
GBTC 5350	Laboratory Methods (Rotations), **Co-Director ***	GSBS	3	11
GBTC 5098	Techniques in Biomedical Research, **Co-Director ***	GSBS	1	8
GBTC 5199/5299	Biotechnology Report/Final Report, **Co-Director ***	GSBS	2 Spring, 1 Fall	11
GBTC 7000	Research in Biotechnology, **Co-Director ***	GSBS	3-9	11

* See also Education Administration

Other Lectures taught:

GBTC 6202 Biomedical Informatics (2010-2013, 2 hours)
GBTC/BTEC 6301 Biotech course (2006-2010, 4 hours)
GBCH 5421 General Biochemistry Graduate Course, now Core I (2006-2010, 6 hours)
GBCH 6222 Problem Solving (2007-2009, 2 hours)
GBCH 6335 Special Topics course (2009, 10 hours)

Other Teaching (see also Education Administration): Small group conferences, and laboratories for undergraduate students, medical students, graduate students, and residents and fellows, and other students

GBCM 7101 Seminar Course, Co-Director (2012-2020, 15-20 hours)
GBTC 6001 Biotechnology Internship (2018-2019, 4 hours)
GBTC 5298 Biotechnology Internship Report (2018-2019, 4 hours)

GTNP 7000 001 Research (enrolled: 7, Fall 2020)
GBCM 8000 001 Doctoral Dissertation (enrolled: 2, Summer 2020)

Coaching:
As **Graduate Advisor for Biotechnology**, I coached 10 first-year and 11 second-year students in 2020. I first get to know students during the application screening and interview process as a member of the Biotech student selection committee. I contact admitted students and facilitate paid student assistant positions in faculty labs for those students needing part time jobs (Biotech Master's students are not paid in the first two semesters); this includes advisory sessions on selecting a faculty mentor and available projects. I meet 1st year students during Core IV seminar review sessions throughout the fall semester and usually arrive 20 min early to chat with students on daily issues. As a member of the Core Curriculum Coordination committee, I monitor student's academic performance, instigate sessions on Expert Skills learning methods for all students, and help struggling students get back on track. Together with director Susan Bergeson, I give updates on student performance and communicate pertinent issues at our Biotech Program Quarterly meetings and at Graduate Council. I respond to emails within a day and keep an open door policy.

Some of the advisory hours that are countable are as follows:
New student orientation for Biotechnology, August 17, 2020: 2 hours
On demand counseling sessions on curriculum issues (struggling students): on average two 20 min sessions for select 1st year students, ~3-4 students, total ~2.5 hours
1st year Biotech student scheduled individual advising sessions (~30 min each per student in mid-November, 10 students) to help them register for spring classes and electives, and choose two faculty labs for spring rotations which could give them a potential match for their 2nd year internship. 5 hours

2nd year Biotech student scheduled individual advising sessions (~30 min each per student in mid-November, 11 students) to help them register for missing electives and keep them on track for graduation. 5.5 hours

Biotech Connect: A monthly virtual Zoom meeting with all 1st and 2nd year students to provide advice on course work and address student's wellbeing, particularly during the pandemic. Ten one hour sessions, for a total of 10 hours

Course Directorship: Number of courses: 7

Course Prefix and Number	Course Name	School	organizing, scheduling, and contact hours	Number of students enrolled
GSBS 5174	Core IV: Biomedical Seminar Series, **Director**	GSBS	see below	21
GBTC 5020	Biotechnology Laboratory Methods, **Co-Director**	GSBS	see below	10
GBTC 5350	Laboratory Methods (Rotations), **Co-Director**	GSBS	see below	3
GBTC 5098	Techniques in Biomedical Research, **Co-Director**	GSBS	see below	3
GBTC 5199/5299	Biotechnology Report/Final Report, **Co-Director**	GSBS	9 direct contact hours	11

GBTC 7000	Research in Biotechnology, **Co-Director**	GSBS	see below	11

GSBS 5174, Core IV: Biomedical Seminar Series: Organizing a seminar course takes about 80 emails to department chairs and faculty to schedule seminar speakers, ask for presentation materials and coordinate events. I usually start in April to have a syllabus ready by August. Last year my co-director helped organize 2 of the 7 events.

GBTC 5020, Biotechnology Laboratory Methods: We contact faculty to offer diverse biomedical methods experiences in their laboratory. 10 faculty were engaged last year and we required students to choose 8 of them. We keep a record of attendance and grades. Scheduling the methods sections for a small, limited number of students per lab and session was particularly challenging during the pandemic.

GBTC 5350, Laboratory Methods (Spring Rotations) and GBTC 5098, Techniques in Biomedical Research (Summer): We advise students on faculty and lab choices, and help them match with faculty for their 2nd year paid internship.

GBTC 5199, Biotechnology Report, GSBS 5299 Final Report, and GBTC 7000 Research in Biotechnology: 2nd year students present their data in three committee meetings scheduled for November, February/March and the final meeting before April 21. Each committee has one of us Co-Directors to observe procedures are followed, and to report a grade for Fall and Spring semesters.

Trainees (present and past):

Postdoctoral fellows, research associates and visiting scientists: Total 9

Anthony Bui, Ph.D., Research Associate, January 2020 – February 2021.

Ellen Hildebrandt, Ph.D., Senior Research Associate, December 2009 – June 2019 supported by URBATS06XX0, “Purification of full-length CFTR proteins”. She edited a book chapter for Molecular Cloning published in 2012, is fist author on papers published in 2014, 2015 and 2016, and co-authored papers in 2011, 2014, 2014, 2017, 2018 and 2019. She has presented her work

Douglas J. Swartz, a former graduate student, joined my lab as a Postdoctotal Fellow and was awarded a prestigious Postdoctoral Fellowship from the American Heart Association, July 2013 – June 2015. He is now a tenure-track Assistant Professor at Lubbock Christian University and continues to collaborate on research projects. He co-authored a PNAS paper in 2013, was first author in Biosci Rep. in 2014, co-authored a paper in BBA, Biomembranes in 2015, and in J. Biol Chem in 2017, and was first author in Scientific Reports in 2020. He presented posters of his work at national (FASEB, Gordon conference) and international (FEBS) meetings. He joined my lab as a graduate student in 2007, and stayed as Postdoctoral Fellow from December 2012 - July 2015.

Leo Mok, Ph.D., Postdoctoral Fellow from December 2010 – July 2014, supported by RP101073, “Molecular mechanisms of novel inhibitors of the multidrug resistance P-glycoprotein”. He co-authored a paper in J Biol Chem in 2017. He now works as a Transporter biologist at Amgen in San Francisco, CA.

Jiangping Bai, Ph.D., he did a short Postdoctoral fellowship in my lab from January to July 2010 before he took an Assistant Professorship at the Gansu Agricultural University in Lanzhou, China. He returned as a visiting Research Assistant Professor from January to March 2011. He is first author on a publication BBM, Biomembranes in 2011.

Jyh Yeuan Lee, Ph.D., Postdoctoral Fellow, April 2006 – April 2009. He is first author on a JBC publication in 2009, coauthored publications in 2007 and 2010, and was awarded a Postdoctoral Fellowship from the American Heart Association South Central Affiliate in 2009. He continued his work as a Postdoctoral Researcher II with collaborators Drs. Helen Hobbs and Jonathan Cohen at UT Southwestern Medical Center at Dallas. His work has culminated in solving the X-ray structure of the cholesterol transporter ABCG5/ABCG8 in bile acid-lipid bicelles, and was published in Nature 2016.

Hui Mao, M.D., Senior Research Associate, March - September 2009. She worked for a short time on the purification of CFTR, and then followed her husband to the Cedars-Sinai Medical Center Institute in Los Angeles, CA.

Arthi Krishnakunamar, Ph.D., Postdoctoral Fellow, July 2008 – January 2009. She worked for a short time on the purification of CFTR and returned to crystallography in Dr. Mark Greene's lab at the University of Pennsylvania School of Medicine, PA.

Rupeng Zhuo, Ph.D., Postdoctoral Fellow, February 2006 – December 2008. He coauthored a Science paper in 2009, a publication in 2011, and presented Posters at several national meetings (ABC meetings in Bethesda). He is currently a PostDoc at the University of Utah.

Graduate students (Committee Chair, total 9 MS and 5 PhD students)

Valeria Jaramillo-Martinez is a 3rd year PhD graduate student in the Translational Neurosciences and Pharmacology concentration, and started a new project on the SLC13A5 transporter involved in brain epilepsy in my lab. She presented a Poster at the Biophysical Society meeting 2020 in San Diego. She already published a first-author paper in Chemical Reviews, 2021 (Impact factor of >54), is 1st author on an invited Commentary by Biochem J 2021, 1st author on an invited Chapter for Methods in Molecular Biology (2021 accepted), and co-authored an original paper in Biochem J 2020.

Nghi (Skyler) Tran is a graduate student in the Biotechnology Master's program. She started a research project as an hourly worker in September 2020, and continues with her 2nd year internship.

Abdul Shaik, Dissertation Committee Co-Chair (Co-chaired by S. Bergeson and RB Sutton), Biochemistry and Cellular and Molecular Biology, April 2021 – present.

Nicholas Evans is a graduate student in the Biotechnology Master's program. He conducted a research project in the lab December 2019 – May 2020.

Geetha Priya Boligala is a graduate student in the Biotechnology Master's program. She conducted a research project in the lab October 2019 – December 2019.

Past

Courtney Katz, graduated with a Masters in Biotechnology in May 2019, and continues as a PhD students in the Molecular Biophysics Concentration. She presented her work on a Poster at the Annual Center for Membrane Protein Research in 2018, at the Student Research week in 2019, and at the Biophysical Society meeting 2020 in San Diego. She is coauthor on a manuscript to be submitted.

Benjamin Jackson is a graduate student in the Biotechnology Master's program. He conducted a research project in the lab from October 2018 – May 2019, and is coauthor on a manuscript to be submitted.

Bradley Schniers, conducted a research project in the lab from March 2017, and continued during his first year after joining our PhD graduate program in Biochemistry & Molecular Genetics; he is now a member of Yangzom Bhutia's lab.

Bala Meenakshi Purna, graduate with a Ph.D. in Biochemistry and Cellular and Molecular Biology (BCMB), TTUHSC in December 2017. She started in my lab as an intern in June 2011 and graduated with an MS in Biotechnology (TTU track) in May 2012. She joint our Biochemistry and Molecular Genetics (BMG, now BCMB) program as a PhD student to pursue her project on Cystic Fibrosis and was supported by The CH Foundation. She presented her work at the annual North American Cystic Fibrosis Conference in 2014, 2015, and 2016 (national meetings with >3,000 attendees), is first author on a publication in Protein Engineering, Design and Selection (PEDS) in 2017, and is co-author in BBA Biomembranes in 2018.

Greg Fendley, PhD student in Cell Physiology and Molecular Biophysics, December 2013 – May 2017, served as Co-Chair. He started in our Biotechnology program and received his MS in May 2013. He continued his work on ABC transporters, co-chaired by Drs. Altenberg and Urbatsch, and is first author on a paper that was accepted for publication in Biochemical and Biophysical Research Communications (BBRC) without revision (!), and co-author on a paper just published in the Journal of Biological Chemistry. He currently pursues a Postdoc at the University of California at Merced near San Francisco.

Narong Sok, M.S. student in Biotechnology since September 2014 and graduate in May 2016. He worked as an Undergraduate Research Assistant in my lab from November 2012 and graduated with a major in Biochemistry from TTU in August 2014. He continued in our Biotechnology program and presented his work at Student Research Week in 2016. He now works as a laboratory technician in Dallas, TX.

Douglas J. Swartz, graduated with a Ph.D. in Biochemistry and Molecular Genetics (BMG), TTUHSC in December 2012. He is first author on three publications and co-authored a PNAS paper in 2013; he presented Posters of his work at national (FASEB, Gordon conference) and international (FEBS) meetings. He joined my lab as Postdoctoral Fellow in January 2013, see above. He currently is an Assistant Professor at Lubbock Christian University.

Anukriti Singh, she started an internship in my lab as a M.S. student in Biotechnology (TTU track in March 2012 and graduated in May 2013. She continued the work in my lab as a Technical Assistant, was promoted to Research Associate in March 2017, and returned to India in July 2017. She co-authored papers in Biosci Rep. in 2014, in J. Biol Chem in 2017, in BBA, Biomembranes in 2017, and Scientific Reports in 2020.

Sri Karan Botta, he graduated with a Master of Business Administration (MBA) at the Raws College of Business, TTU in December 2011. He was an intern in my lab from January-December 2011 and co-authored a paper in 2014. He currently works as an asset manager for a Biotech company in Hartford, CT.

Ryan Fleischman, M.S. in Biotechnology (TTUHSC track) in May 2011. His Poster presentation won 2nd prize at our Student Research Week in 2011. He is now on the technical staff at the Children's Nutrition Research Center in the Texas Medical Center, Houston.

Brandy Harvey Johnson, Ph.D. in Cell and Molecular Biology (CMB), TTUHSC in May 2010. She is first author on two publications. She is now a Professor at the School of Math, Science, and Engineering, Central New Mexico Community College in Albuquerque.

Dorinda (Gaelle) Tchipandi, M.S. in Biotechnology (TTUHSC track) in May 2010. She pursued a Ph.D. in Biotechnology and Engineering at the University of Nebraska Medical Center.

Lindsay Stalcup, M.S. in Biotechnology (TTUHSC track) in May 2005, Biotechnology, Texas Tech University Health Sciences Center. She works in Rapid City, South Dakota.

Graduate student committees (served as member, total 16 PhD, 2 MD/PhD, 12 MS)

Nhi Ngyuen, a Biotech Master student August 2020 – May 2021, is now enrolled in our PhD program.

Nicholas Evans, a Biotech Master student August 2020 – May 2021, is now enrolled in the PhD program at Birmingham, Alabama.

Alyssa Nagle, Biotech Master student, August 2020 – May 2021. She has secured a Technical Assistant position in Houston, TX.

Matthew Dominguez, Chair of the Qualifying Exam Committee 2021, Dissertation Committee Member, Molecular Biophysics August 2020 - present.

Evan Van Aalst, Dissertation Committee Member, Chemistry and Biochemistry, TTU, Lubbock TX, August 2020 - present.

Isaak Scott, former Biotech Master student is now enrolled in our PhD program in Molecular Biophysics, Qualifying Committee Member 2020, Dissertation Committee Member, August 2019 - present.

Past

Bojana Ristic, Dissertation Committee Member, Biochemistry and Cellular and Molecular Biology, June 2016 – August 2020. She returned to her home country Serbia.

Elham Pirayesh, Biotech Master Committee Member, Biotechnology, June 2015 – May 2016, and Dissertation Committee Member, Molecular Biophysics, August 2017 - 2020. She found a well-paying job in Industry.

Manual Ramos, MS, Biotech Master Committee Member, Biotechnology, June 2019 – May 2020. He took the board exam in patenting, and found employment at a well-paying law firm.

Chris Hornback, Biotech Master Committee Member, Biotechnology, June 2018 – May 2019. He currently works as a Technician at the TTUHSC, Lubbock.

Brian Johnson, Biotech Master Committee Member, Biotechnology, June 2018 – August 2019. He conducts his external internship as a Research Technologist II at Northwestern University, Division of Rheumatology.

Faraz Harsini, Biotech Master Committee Member, Biochemistry and Cellular and Molecular Biology, August 2014 – May 2015. He continued his PhD in Molecular Biophysics, and graduated in May 2019. He works at a Biotech company in Austin, Texas.

Ashly Hindle, Ph.D. Dissertation Committee Member, Cell Biology and Biochemistry, December 2012 – May 2019. He currently works as a Postdoc at the TTUHSC, Lubbock.

Courtney Jarvis, PhD, Master's Committee Member, Immunology and Molecular Microbiology, December 2013 – May 2015. He graduate with a PhD in Immunology and Molecular Microbiology, in May 2018. He took a job in a local Biotechnology company.

Mina Ahmadi, Biotech Master Committee Member, Biotechnology, June 2016 – May 2017. She enrolled at the University of Minnesota as PhD student.

Swapneeta Date, Ph.D. Dissertation Committee Member, Cell Physiology and Molecular Biophysics, January 2014 – May 2016. She is currently a PostDoc at Columbia University in New York City, NY.

Zeno Yates, Biotech Master Committee Member, Biotechnology, June 2015 – May 2016. He worked for a year as a Laboratory Technician at the TTUHSC, and then enrolled in our Medical School.

Eric Edwards, Ph.D. Dissertation Committee Member, Biochemistry and Molecular Genetics, November 2012 – 2016, and will graduate with a Master's and an MBA in August 2016. He has accepted a lucrative job at a Biotech company in Ft. Collins, CO.

Michael Holliday, he graduated with the Ph.D. part of his MD/PhD studies in May 2012 and graduated with an M.D. from the SOM, Lubbock in 2014. He received the Achievement Rewards for College Scientists (ARCS) Scholarship, and went on for a residency at St Mary's Hospital, CT.

Rebecca Cooper, Ph.D. in Cell Physiology and Molecular Biophysics (CPMB) from June 2008 to May 2013. She was awarded a predoctoral fellowship from the American Heart Association (AHA) in 2011. She is now a postdoctoral fellow at Harvard University in Boston.

Arup Chakraborty, Ph.D. in the Department of Biological Sciences, TTU, Lubbock in December 2011. He continues as a Postdoc at the National Institute of Health (NCI) in Bethesda.

Jason Cooper, he graduated with the Ph.D. part of his MD/PhD studies in May 2011 and graduated his M.D. with honors in 2013. He was matched to the Massachusetts' General Hospital in Boston, named the # 1 hospital in the US.

Mitesh Sanghvi, Ph.D. in Pharmacology and Neurosciences, TTUHSC, in May 2008. He is currently a PostDoc at the NIH National Institute for Aging.

Shyla Narasimhachar, Ph.D. in CMB at TTUHSC, May 2009. Shyla moved to Houston for a Postdoc position.

Rolando DelAguilla, M.S. in Biochemistry, 2005. He took a BioTech job in Spain.

Medical students

Amanda Pickert, Medical Student Summer Research Program in 2005 and 2006. She graduated with an M.D. in May 2009 and started her residency in Oklahoma in Dermatology. She rejoined my lab from April to May 2009 to keep up her research skills sponsored by the Cardiovascular Center FOAP. She won prizes for poster presentations at our Student Research Week in 2006 and 2007, and co-authored publications in 2007 and 2010.

Shilo Souza, November 2003 – May 2005, part-time Medical Student Assistant. She won first prize for her poster presentation at Student Research Week in 2005 and co-authored a publication in 2007. She took a Residency in El Paso where she now practices Gynecology.

Undergraduate students

Total of **24** Undergraduate Research Assistants between 2003 and 2013. Kimberly Williams, Sumeet Baghat, Kenneth Scott, Paulina Gonzales, Oscar Gonzales, Brandon Bailey, Mandy Gerek, Christopher Zolasky, Katie Anderson, Ramona Spurbeck, Dixa Bakta, Henry Heiser, Alicia Browder, Dayo Kazeem, Esther Goff, Sumantha Nimma, Nethanji Kumarapathiranalage, Patrick Yu, Kimberly Munoz, Daniel Yates, Narong Sok, José Bonilla, Joshua Thomas, Yu Jung Nam, Joel Zapata.

Currently:

Joel Zapata is an Undergraduate Research Assistant from TTU with a major in Biology and a minor in chemistry. He started a research project in the lab in July 2019, and continues to work part-time during the semester. He has been accepted to the PharmD program at UT Southwestern, Dallas, TX.

Undergraduate Research Assistants typically help for a couple of years with general lab duties such as growth of yeast cultures, membrane preparations and protein purifications before they move on

to graduate studies. Dr. Urbatsch gives them an excellent research experience and their work is acknowledged in many publications.

SABR Students

Esther Goff, Henry Heiser, Christopher Zelasko, Sandya Nair and Delphine Jean.

Technicians/Research Associates

Anukriti Singh, Patina Harrell, Henry Heiser, Trinh YenPhuong, Zhanling Wang, Uma Paramashiva, Lan Wu, and Jeannie Griffin.

Educational activities for the lay public

High School Summer Science Camp, co-Chair of organization committee of inaugural summer camp, July 2017, and co-Chair of organization committee for the 2018 summer camp. Number of participants: 15

Arranged for UIL Science High School Students to attend Student Research Week events March 2016-2018. Number of students participating: 10

Red Bag Tour: Lubbock Cooper High School visit to TTUHSC, Exploring careers in the Health Sciences, January 2018, Number of Participants: 60.

High School visit to TTUHSC, Exploring careers in the Health Sciences, Lubbock Cooper High School, February 2017, Number of Participants: 60.

Organized seminar at Lubbock Cooper High School, Protein Science in Space, October 2015. Number of students participating: 60

Innovations in Education

Chair and organizer of a series of three Gordon Research Conference "Connects" virtual events on Multi-Drug Efflux Systems to bridge the gap during the pandemic and foster scientific interactions between graduate students, postdocs and principle investigators worldwide. The three sessions had more than 100 attendees from North America, Europe, Asia and Australia. Graduate students and postdocs presented their research in 7 min Short Talks followed by 4 min Q&A sessions; principle investigators moderated concluding 30 min networking sessions: May 2021 https://www.grc.org/grc-connects-multi-drug-efflux-systems-1-of-3/default.aspx

Vice-Chair of the **Gordon Research Conference on Multi-Drug Efflux Systems**, entitled "Pharmacological Interventions Targeting the Mechanisms and Regulation of Transporters for Advancing Health Worldwide", elected Vice-Chair and co-organizer, April 2019. **Symposium Chair** on "New Approaches for Understanding the Function of Membrane Transporters". The conference had 150 attendees, mostly graduate students and postdocs. https://www.grc.org/multi-drug-efflux-systems-conference/2019/

High School Student Introduction to the World of Science, Educational Program for Local High School Students, TTUHSC, March 2017 (see also Educational activities for the lay public)

Description: I invited UIL Science students and their coach from Lubbock Cooper High School to attend a seminar by an invited speaker during our GSBS student research week. After the seminar, I took them on a tour of different research labs, including my own, to give them a taste of biomedical research. Attendees: 8

High School Student Introduction to the World of Science, Educational Program for Local High School Students, TTUHSC, March 2016 (see also Educational activities for the lay public)

Description: I invited UIL Science students and their coach from Lubbock Cooper High School to attend a seminar by a Nobel Laureate during our GSBS student research week. After the seminar, I took them on a tour of different research labs, including my own, to give them a taste of biomedical research. Attendees: 10

High School Student Introduction to the World of Science, Educational Program for Local High School Students, TTUHSC, March 2015 (see also Educational activities for the lay public)

Description: Invited a f**ormer Astronaut to give a seminar at Lubbock Cooper High School**, entitled "Protein Science in Space", October 2015. Number of students participating: 60

ACADEMICALLY-RELATED PUBLIC SERVICE (15%)

I have served on 7 committees related to educational administration in the Graduate School of Biomedical Sciences (GSBS), and I am one of three TTUHSC Faculty Senators representing the GSBS. I have served on three TTUHSC committees and three CBB departmental committees. As indicated on pages 2-3, I review manuscripts for several journals, review grants for several agencies including a Peer Review of the NCI Laboratory of Cell Biology at NIH, and I serve as a consultant to the Protein Production core supported by the Cystic Fibrosis Foundation Therapeutics (CFFT).

Educational Administration (see also Course Directorship)

GSBS Biotech **Graduate Advisor** (see also Positions, and Coaching), September 2018 - present

GSBS 5174 **Director of Core IV**: Biomedical Seminar Series, September 2018-present; Co-Director, September 2014-2017

GBTC 5020 **Director of Biotechnology Laboratory Methods**, September 2019-present; Co-Director, September 2017-2018

GBTC 5350 **Co-Director of Laboratory Methods** (Spring Rotations)

GBTC 5098 **Co-Director of Techniques in Biomedical** Research (Summer)

GBTC 5199 **Co-Director of Biotechnology Report**

GSBS 5299 **Co-Director of Final Report**

GBTC 7000 **Co-Director of Research in Biotechnology**

Educational Committees

GSBS **Core Curriculum Coordination Committee**, September 2014-present,

The CCCC is composed of the course directors of the GSBS core curriculum our first-year students take in the fall semester, and faculty representatives from each concentration from both the Abilene and Lubbock campuses. The CCCC has developed and annually reviews a rigorous, relevant curriculum that provides fundamental knowledge relevant to all biomedical sciences concentrations, and closely monitors student performance. We identify struggling students and offer early interventions to help students perform better. During the pandemic last year, we coordinated a mixture of in-person, hybrid and zoom classes that offered flexibility to students and faculty, and kept us all safe!

Chair, September 2019 – July 2021. Elected to coordinate meetings and lead the CCCC discussion.

GSBS **Biotechnology Program Committee Member**, August 2016 - present. Meets quarterly to discuss student's performance and organizational issues.

GSBS **PhD student Selection Committee Member**, December 2015-present. The committee meets most every Friday between late December and early April to discuss applications that we review and score ahead of the meeting, and to interview qualified candidates. Students with little or no research experience are referred to the Biotech Master's program.

This year (2020/2021), we reviewed 39 student's applications, interviewed ~30 students, recommended 18 to the admissions committee who offered admission to all of them; a total of 10 students accepted admission. Last year (2019/2020), we screened and interview a similar number of students but GSBS capped the number of students admitted at 4.

GSBS **Biotech Student Selection Committee Member**, August 2016 - present. The committee meets on demand between January and late May to review and interview applicants. Dr. Bergeson and I review applicants from the TTUHSC Recruit website, schedule and conduct interviews and file our final report with the GSBS. On average, we review about 25+ applications, interview about 18-20 promising candidates and make offers to about 15 students, with a target goal of 10 acceptances for admission to the Master's program.

GSBS **Graduate Council Representative** for BCMB, March 2016 - present

GSBS **BMG Concentration Committee Member**, April 2013 – August 2015.

GSBS **SACS Accreditation Review Committee**, PN Graduate Program, Nov. 2013 - February 2014.

CBB **Seminar Review Committee Member**, January 2010 – present,
Co-director January 2016 - present.

CBB **Equipment Committee Member**, September 2004 – present,
Chair, June 2016 - present.

CBB **Graduate Program Concentration Committee member** of Biochemistry and Molecular Genetics (BMG), April 2013 - August 2015.

TTUHSC committees

TTUHSC **Faculty Senator for the Graduate School of Biomedical Sciences** (GSBS), September 2019 – present

President's Awards Committee Member, July 2019 – present. Leader of the selection of the President's Excellence in Research Awards in 2020 for which we reviewed and scored 5 applicants.

SOM **Post Tenure Faculty Peer Review Committee Member**, November 2018 - present.

Radiation Safety Committee Member, 2005 - 2015.

Faculty Development Activities Attended

Faculty Leadership Study Group, Lessons, Life and Leadership Seminar Series, Texas Tech University Health Sciences Center, Lubbock, Texas, Number of Credit Hours: 8, September 2016 - April 2017

Faculty Leadership Study Group: Lessons, Life and Leadership Seminar Series for Women Faculty in Academic Medicine September 2015 - April 2016.

SCHOLARSHIP (50% effort)

Peer-reviewed publications (total of 73)

Google Scholar *h*-index: 35

https://scholar.google.com/citations?user=fkvqbPMAAAAJ&hl=en&inst=14654389424412334288

Since joining the faculty at TTUHSC in 2003, I have published 36 peer-reviewed papers that are referenced in NCBI's PubMed. My most accomplished publication is in Science magazine on the structure of the P-glycoprotein multidrug transporter in 2009 that has been cited according to Thomson Reuters' Web of Science more than 1,300 times (>2,000 times in Google Scholar), and is one of the most cited papers in the ABC transporter field. My second most prestigious publication is in Nature, May 2016 on the related human sterol transporter ABCG5/ABCG8 (cited > 100 times). Several other papers are in high impact factor journals such as Chemical Reviews (impact factor of 54), Trends Biochem Sci. (16.6), Nat Commun (11.9), Proc Natl Acad Sci U S A (9.7), Structure (5.0), and Sci Rep. (4.3). For several of these studies my laboratory performed the functional evaluation of the protein interactions with substrates and inhibitors; those are essential to publish protein structure in a high-tier journal. I am the senior author of a book chapter in the well-known laboratory manual "Molecular Cloning," 4th edition by Green and Sambrook. I have published (corresponding author) in reputable journals such as Science Reports (impact factor of 4.3), Biochem J (4.1), BBA Biomembranes (3.5), PLoS One (2.8), and Biochemistry (2.9), and I am co-corresponding author on several recent papers.

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2. Jaramillo-Martinez V, **Urbatsch IL**, Ganapathy V. (Urbatsch is co-corresponding author). Functional Distinction between Human and Mouse Sodium-Coupled Citrate Transporters and Its Biologic Significance: An Attempt for Structural Basis Using a Homology Modeling Approach. Chem Rev. 2021 May 12; 121(9): 5359-5377. doi: 10.1021/acs.chemrev.0c00529. Epub 2020 Oct 11. PMID: 33040525. *Chem Reviews has a Thomson Reuters' Web of Science impact factor of 54.*
3. Higuchi K, Kopel JJ, Sivaprakasam S, Jaramillo-Martinez V, Sutton RB, **Urbatsch IL**, Ganapathy V. Functional analysis of a species-specific inhibitor selective for human Na+-coupled citrate transporter (NaCT/SLC13A5/mINDY). Biochem J. 2020 Nov 13; 477(21):4149-4165. PMCID: PMC7657661.
4. Swartz DJ, Singh A, Sok N, Thomas JN, Weber J, **Urbatsch IL.** Replacing the Eleven Native Tryptophans by Directed Evolution Produces an Active P-glycoprotein With Site-Specific, Non-Conservative Substitution. Sci Rep. 2020 Feb 21; 10(1): 3224. PMCID: PMC7035247
5. Sigoillot M, Overtus M, Grodecka M, Scholl D, Garcia-Pino A, Laeremans T, He L, Pardon E, Hildebrandt E, **Urbatsch IL**, Steyaert J, Riordan JR and Govaerts C. Domain-interface Dynamics of CFTR Revealed by Stabilizing Nanobodies. Nature Communications 2019 June; 10(1): 2636 2019. PMC6572788 *Nat Commun has a Thomson Reuters' Web of Science impact factor of 11.9.*
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7. Zoghbi ME, Mok L, Swartz DJ, Singh A, Fendley G, **Urbatsch IL**, and Altenberg GA. Substrate binding modulates the conformational changes of the nucleotide binding domains of the multidrug transporter P-glycoprotein in a lipid bilayer. J. Biol. Chem. 2017; 292(50), 20412-20424, PubMed ID # PMC5733581. *Urbatsch is co-corresponding author.*

8. Xavier BM, Hildebrandt E, Jiang F, Ding H, Kappes JC, and **Urbatsch IL**. Substitution of Yor1p NBD1 residues improves the thermal stability of Human Cystic Fibrosis Transmembrane Conductance Regulator, Protein Engineering, Design and Selection 2017 Oct 1; 30(10): 729-741. doi: 10.1093/protein/gzx054.

9. Hildebrandt E, Khazanov N, Kappes JC, Dai Q, Senderowitz H, **Urbatsch IL**. Specific stabilization of CFTR by phosphatidylserine. Biochimica et biophysica acta 2017; 1859(2), 289-293, PMCID: PMC5237360. *BBA Biomembranes has a Thomson Reuters' Web of Science impact factor of 3.7.*

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73. Kielkopf CL, Bauer W, **Urbatsch IL.** Bradford Assay for Determining Protein Concentration. Cold Spring Harb Protoc. 2020 Apr 1; 2020(4): 102269. doi: 10.1101/pdb.prot102269.PMID: 32238597

List of published work in My Bibliography (total of 73 publications)
https://www.ncbi.nlm.nih.gov/myncbi/ina.urbatsch.3/bibliography/public/

and Google Scholar:
https://scholar.google.com/citations?user=fkvqbPMAAAAJ&hl=en&inst=14654389424412334288

Book Chapters:

Jaramillo-Martinez V, Ganapathy V, **Urbatsch IL**. Peptide Tags and Domains for Expression and Detection of Mammalian Membrane Proteins at the Cell Surface. Methods Mol Biol. 2021, accepted for publication.

Kiehlkopf C, Bauer W, and **Urbatsch IL**. Expressing cloned genes for protein production, purification and analysis. Invited chapter in Green M and Sambrook J, *Molecular cloning*, 4th edition CSHL Press, July 2012. *This is the well-known Laboratory Manual originally published by Sambrook and Maniatis*

Harvey BH, Lee JY and **Urbatsch IL**. Sitosterolemia, book chapter in Encyclopedia of Molecular Mechanisms of Disease, Lang, F. (Ed.), ISBN 978-3-540-33445-3, Springer, pp1941-1943 (2009).

GenBank submission:
ACCESSION MZ367587,

ACCESSION MZ367588,

ACCESSION JF834158, 3855 bp DNA linear, SYN 02-SEP-2011, Synthetic construct P-glycoprotein gene, complete cds, VERSION JF834158, GI:332693032.

ACCESSION KP202880, 5610 bp DNA linear, SYN 22-APR-2015, Synthetic construct SUMO*-CFTR.FLAG-EGFP gene, complete cds, VERSION KP202880.1, GI:808035088

Invited Podium Presentations

I have been invited to speak at ten platform presentations at national and international meetings including five Gordon Research Conferences, a Biophysical Society Annual Meeting, a FEBS Special Meeting, the European Cystic Fibrosis Conference, and the North American Cystic Fibrosis Conference (NACFC), and organized two workshops for the NACFC. I was elected Vice Chair for the Gordon Research Conferences on Multi-drug Efflux Systems in 2019, and will Chair that meeting in 2021. Recently, I organized three GRC Connects virtual events (May 2021) to foster communication between graduate students and Postdocs during the pandemic.

2021 Chair and organizer of a series of three **Gordon Research Conference** "***Connects***" virtual events on Multi-Drug Efflux Systems: https://www.grc.org/grc-connects-multi-drug-efflux-systems-1-of-3/default.aspx Each meeting had more than 100 attendees for North America, Europe, Asia and Australia.

2021 (postponed to 2023) Ina Urbatsch, Conference **Chair** and **symposium Chair** "New Approaches for Understanding the Function of Membrane Transporters of the **Gordon Research Conference on Multi-Drug Efflux Systems**, Pharmacological Interventions Targeting the Mechanisms and Regulation of Transporters for Advancing Health Worldwide at Hotel Galvez, Galveston, TX, April 28 – May 2, 2021 – postponed to 2023.

2020 (postponed to 2022) Ina Urbatsch, “Drug binding to distinct sites of the Multidrug exporter P-glycoprotein”. **Invited symposium** speaker at the **Gordon Research Conference** on Ligand Recognition and Molecular Gating, Structure and Dynamics of Ion Channels, G-Protein Coupled Receptors, and Solute Transporters at the Renaissance Tuscany Il Ciocco, Lucca (Barga), Italy, March 15 - 20, 2020. Conference was postponed to 2022.

2020 Ina Urbatsch, “Drug binding to distinct sites of the Multidrug exporter P-glycoprotein”. **Co-Chair** and **invited speaker** of the **Platform**: Membrane Pumps, Transporters, and Exchangers at the **Biophysical Society** 64th Annual Meeting, San Diego, CA from February 15-19, 2020,

2019 Ina Urbatsch, Conference **Co-Chair** and **symposium Chair** “New Approaches for Understanding the Function of Membrane Transporters of the **Gordon Research Conference on Multi-Drug Efflux Systems**, Translating Multifaceted Molecular Mechanisms into Pharmacological Interventions for Advancing Global Health, April 28 – May 2, 2019 at the Renaissance Tuscany Il Ciocco Lucca (Barga), Italy.

2018 Ina Urbatsch, Patrick Thibodeau, **workshop organizers** “CFTR: Structure Function & Dynamics of CFTR Ion Channel” and **workshop speaker** “Functional stabilization of purified human CFTR by NBD1 mutations and by conformation”, 2018 North American Cystic Fibrosis Conference (**NACFC**, Denver, CO, October 2018. *This conference had over 5,000 participants*

2018 Ina Urbatsch, Multidrug Resistance P-glycoprotein: Lipid and drug Interactions, and cooperativity between structural domains. Invited lecturer at the University of Duesseldorf, Germany, July 1, 2018.

2018 Ina Urbatsch, Structural stability of purified human CFTR is systematically improved by mutations in NBD1, and by specific phospholipids. **Invited symposium speaker** at the 2018 **Gordon Research Conference on Membrane Transport Proteins**: From Physiology to Disease, at Sunday River, Newry, ME, from June 10 - 15, 2018.

2017 Ina Urbatsch, Interactions and cooperativity between P-glycoprotein structural domains determined by thermal uncoupling and LRET. **Invited symposium speaker** at the **Gordon Research Conference on Multi-Drug Efflux Systems**, Integrated approaches to understanding the role of multi-drug efflux systems in health and disease, March 26-31, 2017 in Galveston, TX. At the meeting, I judged posters and participated in the Power Hour to help address challenges women face in science**. I was elected co-Chair for the next meeting in 2019, and Chair for 2021.**

2016 Ina Urbatsch, Thermal stabilization of purified CFTR by mutations in the nucleotide binding domains and by specific phospholipids. Poster abstract was selected for **oral presentation** in the **CFTR workshop** 12: Understanding and Stabilizing CFTR Structure. 30th Annual North American Cystic Fibrosis conference (**NACFC**) in Orlando, FL, October 28, 2016. This meeting had over 5,000 attendees.

2016 Jyh-Juan (Eric) Lee "ABCG5/ABCG8: A Structural View on Sterol Transport" “, Invited symposium speaker at the **Gordon Research Conference on Membrane Transport Proteins**, June 12-17, 2016 at the Renaissance Tuscany Il Ciocco Lucca (Barga), Italy. I arranged for my former Postdoc to present our recently solved crystal structure of ABCG5/G8. I judged posters at the meeting.

2016 Urbatsch, I. L., Hildebrandt, E., Purna, B. Generate and test mutations known to promote folding of CFTR, and identify new mutations for their impact on folding and stability of full-length CFTR, Cystic Fibrosis Foundation Headquarters, Bethesda, Maryland, May 2016.

2015 Urbatsch, I. L., Hildebrandt, E., Purna, B. How to achieve stable and pure CFTR, CFTR3D, North American Cystic Fibrosis Meeting, NACFC, Phoenix, AR, October 2015.

2015 Urbatsch, I. L., Hildebrandt, E., Purna, B. How to achieve stable and pure CFTR, Cystic Fibrosis Foundation Headquarters, Cystic Fibrosis Foundation Headquarters, Bethesda, Maryland, May 2015.

2014 Ina Urbatsch, "Directed Evolution of P-glycoprotein Cysteines Reveals Site-specific, Non-conservative Substitutions that Preserve Multidrug Resistance", **Invited symposium speaker** at the **Gordon Research Conference** on Ligand Recognition and Molecular Gating, Structure and Dynamics of Ion Channels, G-Protein Coupled Receptors, and Solute Transporters, March 23-28, 2014 in Ventura Beach, CA.

2014 Ina Urbatsch, "How to stabilize purified CFTR", CFTR3D consortium workshop presentation at the North American Cystic Fibrosis (NACFC) meeting in Atlanta, GA, October 8, 2014.

2014 Ina Urbatsch, "How to stabilize purified CFTR", CFTR3D consortium workshop presentation at the Cystic Fibrosis Foundation headquarters in Bethesda, April 29-30, 2014.

2013 Ina Urbatsch, "How to purified CFTR in active conformation", CFTR3D consortium workshop presentation at the North American Cystic Fibrosis (NACFC) meeting in Salt Lake City, CO, October 17, 2013.

2012 Ina Urbatsch, Patrick Thibodeau, **workshop organizers and workshop speakers**, "The CFTR 3D structure consortium: development of CFTR constructs & biophysical assays to aid structure/mechanism-based CF drug discovery", 2012 North American Cystic Fibrosis Conference (**NACFC**, Orlando, FL, October 2012. *This conference had over 5,000 participants*

2012 Ina Urbatsch, "A Directed Evolutionary approach to building a Tryptophan-free P-glycoprotein for fluorescence drug binding studies" at the **4th FEBS Special Meeting** on ATP-Binding Cassette (ABC) Proteins: From Multidrug Resistance to Genetic Disease, Innsbruck, Austria, March 2012. *This conference had 500 participants*

2011 Ina Urbatsch, "Purification of CFTR from the yeast *Pichia pastoris*", **European Cystic Fibrosis Society Conference** "New Frontiers in Basic Science in Cystic Fibrosis", March 2011, Tirrenia-Pisa, Italy. *This conference had 300 participants*

2011 Ina Urbatsch, "Purification of CFTR from the yeast *Pichia pastoris*", CFTR 3D Structure consortium satellite meeting, North American Cystic Fibrosis conference (**NACFC**), October 2011 in Anaheim, CA.

2011 Invited seminar speaker, University of Rochester Medical Center, Rochester, NY.

2010 CFTR 3D Structure Consortium meeting in Minneapolis, MN.

2009 Invited seminar speaker, John's Hopkins, Baltimore, ML.

2009 CFTR 3D Structure Consortium meeting in Birmingham, AL.

Previously: Oklahoma State University in Stillwater, University of San Francisco, University of North Dakota in Fargo, Drexel University in Philadelphia, University of Rochester Medical Center, Baylor College of Medicine in Houston, and McGill University in Montreal (CA).
In Germany: Goethe University of Frankfurt and University of Kaiserslautern.

Research Support

Ongoing Support:

R01 DK055835 Hwang (PI) 05/20/19 - 04/30/23
NIH/NIGMS
Molecular Pathophysiology of Cystic Fibrosis.
The goal is to define the coupling mechanism between the two nucleotide-binding domains and the channel pore by complementing electrophysiology with evaluation of ATPase activity of CFTR mutant variants that address the gating mechanism.
Role: Collaborator

Pending:

First Submission (Impact Score: 42, Percentile: 34), resubmitted February 2021
NIGMS, 1 R01 GM141216-01 Urbatsch (PI)
Studies of P-glycoprotein drug interactions
The aim of this proposal is to identify single tryptophans in strategic locations within the drug binding sites of P-glycoprotein that can distinguish binding of substrates and inhibitors of this multidrug pump, and can serve to survey binding of clinically relevant drugs.

Not Funded:

1 R01 GM116989-01 (Urbatsch-Altenberg) submitted 03/2016
NIH/NIGMS
Discerning drug interactions in P-glycoprotein.
The goal is to understand polyspecific binding of substrates and inhibitors to P-glycoprotein and how binding at the transmembrane drug binding sites affects conformational changes in the cytoplasmic nucleotide binding sites to power transport using fluorescence and luminescence resonance energy transfer (FRET and LRET).
Percentile score on first submission was 28. Resubmitted March 2016 but did not score.
Role: Multi-PI, contact

Completed Support:

R01 GM118594-01 Zhang (PI) 04/01/16 - 03/31/20
NIH/NIGMS
Studies of P-glycoprotein and drug interactions.
The goal is to define how structural and chemical properties of a ligand affect its interactions with P-glycoprotein (Pgp), to characterize how it reacts to binding of different classes of ligands, and then use the knowledge gained to rationalize chemical synthesis of improved drugs that can evade Pgp transport.
Role: Collaborator

URBATS06XX0 Urbatsch (PI) 03/01/07-08/31/19

Cystic Fibrosis Foundation Therapeutics, Inc.
Purification of active, full-length CFTR proteins
The goal of this project is to improve and tailor detergents and methods for CFTR structural and functional studies, explore sequence variations that exhibit better protein stability, and embark on higher-resolution cryo-EM and nanocrystallography. Progress in these aims can enable studies aimed at defining and refining CFTR drug binding, and can guide drug development to treat a greater number of patients.

South Plains Foundation Urbatsch (PI) 09/01/16-08/31/17
Developing a fluorescent drug binding assay for P-glycoprotein. Seed grant to strengthen aim 1 of below NIH/R01.

The CH Foundation Urbatsch (PI) 01/01/15-12/31/15
Development of New Cost Effective Tools to Facilitate Drug Discovery for Treatment of Cystic Fibrosis.
The aim is to develop technology that allows cost-effective production of large amounts of the CFTR protein to enable structural studies and facilitate drug discovery programs and guide rational drug design.

NIH/R15 GM102928 Urbatsch (PI) 09/23/12-09/22/15
Understanding polyspecific drug binding in P-glycoprotein.
The goal of this proposal is to construct a tryptophan (Trp)-free P-glycoprotein and use single Trp mutants in strategic locations to monitor binding of cancer drugs by Trp fluorescence spectroscopy.

NIH/U54-GM94610 Rees (PI) 09/29/10-06/30/15
TransportPDB: Center for the X-Ray Structure Determination of Human Transporters.
The goal is to purify 300-500 human transporters from *P. pastoris* and crystallize the proteins for X-ray structure determination.
Role: Co-Investigator

13POST17070103, Swartz, D. J. (PI) 07/01/13–06/30/15
American Heart Association Southwest/Central Affiliation,
Observing Drug Interactions with P-glycoprotein through Site-specific Tryptophan Fluorescence, (Postdoc salary support for two years).
Role: Sponsor

RP101073 Altenberg (PI) 06/01/10-05/30/13
Cancer Prevention and Research Institute of Texas (CPRIT)
Molecular mechanisms of novel inhibitors of the multidrug resistance P-glycoprotein.
The goals of this grant was to define distinct conformational states of Pgp using luminescence resonance energy transfer (LRET), and to elucidate how new inhibitors block the ATP hydrolysis cycle of Pgp.
Role: Co-Principal Investigator

South Plains Foundation Urbatsch (PI) 09/01/11-08/30/12
Construction of a Trp-free P-glycoprotein to understand cancer drug binding in a multidrug resistant pump. Seed grant to strengthen aim 1 of NIH/R15.

W81XWH-05-1-0316 Chang (PI) 03/01/05-02/28/10
US Army/DOD
Discovery of Potent Inhibitors for Breast cancer Multidrug Resistance.

The goal of this study was to crystallize P-glycoprotein possibly with bound drugs or inhibitors to elucidate the binding sites and the mechanism of multidrug resistance by P-glycoprotein by x-ray crystallography.
Role: Subcontractor

Cancer Research Grant Urbatsch (PI) 12/08/05-12/14/09
Wilson Foundation, Dallas, TX
Inhibitors of Multidrug Resistance in Breast Cancers.
The goal of this grant was to screen compounds from the NIH repositories for inhibitors of P-glycoprotein.

0465130Y Urbatsch (PI) 07/01/04-06/30/06
American Heart Association, Texas Affiliate
ABC-Binding Cassette Transporters in Sitosterolemia and Arteriosclerosis.
The goal of this proposal was to demonstrate that ABCG5 and ABCG8 are active transporters, which hydrolyze ATP to provide the energy for the transport process, and to test whether cholesterol and plant sterols stimulate the ATPase activity.

Helen Jones Foundation Urbatsch (PI) 01/01/06-12/31/06
Inhibitors of P-glycoprotein: From Natural Products to Chemical Diversity.
The goal of this Seed Grant was to a screen a subset of compounds from the NIH repositories to identify inhibitors of Pgp. This grant was intended to provide supplies for the training of a graduate student in my lab.

03-057-IU-D Urbatsch (PI) 09/01/04-08/31/05
South Plains Foundation
Sterol binding by the twinned ABC transporters ABCG5 and ABCG8.
The goal of this seed grant was to study sterol binding of the ABC transporters ABCG5 and ABCG8 using a photoreactive [3H]-sitosterol derivative.

Seed Grant Urbatsch (PI) 01/01/05-12/31/05
South West Cancer Center, Texas Tech University
Inhibitors of P-glycoprotein.
The goal of this project was to establish methods for the screening of chemical libraries to find inhibitors of multidrug resistance using the ATPase function of P-glycoprotein.

Total external funding 2003-2021:

National (Cystic Fibrosis Foundation Therapeutics, Department of Defense)	**2,637,577**
NIH (National Institute of Health)	**639,141**
Texas (American Heart Association, Cancer Prevention and Research Institute of Texas)	**1,034,543**
External (South Plains Foundation, Helen Jones Foundation, Wilson Foundation, The CH Foundation)	**746,369**
Grant Total	**5,057,630**