



TEXAS TECH UNIVERSITY  
HEALTH SCIENCES CENTER  
School of Medicine™

# Research Plan

December 2007

Texas Tech University Health Sciences Center  
School of Medicine Research Plan  
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# **Texas Tech University Health Sciences Center School of Medicine Research Plan 2007**

## **Statement of Purpose**

The intent of this document is to encourage and support both individual and collaborative research as well as increase external funding for research support within the Texas Tech University Health Sciences Center School of Medicine.

## **Administration Support for Research**

The administration at the TTUHSC SOM will make every attempt to foster and support both clinical and basic research. In addition to the long standing Faculty Seed Grant Program, the SOM has recently put in place several initiatives that will serve to expedite faculty research. The SOM has appointed a Vice Dean for Research whose task is to identify and implement programs that will expedite research for both the clinical and basic science faculty. For example, a Bridge Grant Program has been initiated that will help faculty maintain active research programs when their current funding lapses for one or two cycles. Also, a Clinical/Basic Science Seed Grant Program designed to foster meaningful collaborative research between clinical and basic science faculty in the SOM has been put into place. The SOM has also arranged for partial subsidization of the LARC, reducing animal care costs for faculty by approximately 30%. There are also plans underway to institute a program consisting of Grant Writing Seminars and individual interactions with grant writing specialists for faculty requesting this service. Further plans are being made to significantly enhance the availability of core research facilities within the SOM through the purchase of new state-of-the-art instrumentation. The SOM is also exploring ways to reward productive research programs via the implementation of a basic science salary incentive program and also through the implementation of the partial return of investigator generated indirect costs to funded research programs.

## **Research Enhancement Strategies**

The administration of TTUHSC SOM is committed to supporting and enhancing research programs in basic science and clinical departments. To achieve these goals, the SOM has developed strategies designed to assist in the recruitment of additional faculty and to provide opportunities to enhance the research of the current faculty.

### ***Faculty Recruitment***

The SOM will seek to hire new faculty in basic science and clinical departments. Preference will be given to prospective faculty who either already have NIH funding or who have the potential of obtaining NIH funding in the near future (i.e., scores in the 20th percentile or better on 01/A1 submissions). Individuals who do not fit into these categories (such as highly rated postdoctoral

fellows) should be considered on an individual basis. Recruitment efforts will be supported with the provision of adequate laboratory space and start-up packages that are nationally competitive which will be funded from Tobacco Endowment funds, HEAF funds, UPL Dean's withholding, or departmental reserves. Adequate protected time will be granted to clinical faculty for research work in order to develop preliminary data for grant applications and to conduct funded research. In parallel with these efforts, the use of laboratory space will be optimized and core laboratories will be created.

The SOM is committed to encouraging and enhancing inter-departmental and cross-disciplinary research endeavors. Accordingly, the school has started and will continue to support joint projects by clinical and basic-science faculty. Significant support will be provided for the recruitment of physician-scientists who will receive joint appointments in basic science and clinical departments and the development of translational research programs. Flexibility will be permitted in the allocation of start-up packages between departments that identify promising funded recruits.

### ***Support of Current Faculty***

New grant support programs (bridge funds, basic/clinical research program) for current faculty have been described above. The SOM will support collaboration within existing multi-faculty funded research programs to enhance competitiveness of applications for program and training grants (e.g., Reproductive Biology in Cell Biology & Biochemistry; Membrane Biology in Cell Physiology & Molecular Biophysics). The SOM will develop procedures that ensure that research productivity is considered in the allocation of endowed basic science chairs and research space. The existing thirty-one endowed chairs and their effective utilization related to research will be evaluated. External funding and involvement in research programs will be important criteria for the award and renewal of endowed clinical chairs. The school will also increase its research support programs, including seminars on writing grant proposals, use of grant-proposal consultants and identification of intramural personnel that can help in individual cases.

## **Translational/Collaborative Research**

One of the goals of the SOM is to combine the talents of clinician scientists and basic scientists in the pursuit of translational research. Every effort will be made to encourage and support such interactions. The establishment of a Clinician/Basic Scientist Seed Grant Program was designed to provide resources to foster such collaborations. The SOM has also supported the efforts of the South West Cancer Center in their attempts to bring together clinical oncology and fundamental studies on the mechanisms involved in cancer induction and prevention. The SOM has also initiated a plan to recruit several clinician scientists who have proven track records in research productivity and extramural funding. These clinician scientists are expected to enhance the translational research being performed in the SOM and will be in keeping with the importance of translational research as stated by the Director of the NIH in his Roadmap Initiative. The SOM is also encouraging and supporting the establishment of Research Centers of Excellence and Research Institutes that will highlight areas of excellence and will include the participation of both clinical and basic science faculty.

## Appendix

### Examples of Current Research Centers, Consortia, Collaborations, and Projects - 2007

#### 1) Cancer Research Group

The Texas Tech Cancer Research Group coordinates interactions and collaborations between cancer researchers on all TTUHSC and TTU campuses. The group currently has more than 80 faculty members in basic science and clinical departments. The group coordinates a monthly seminar series featuring external and internal speakers, an annual symposium and has provided seed grant funding and research fellowships to several members over the past decade. Current areas of focus include the development of a clinical research network in collaboration with the Mary Crowley Cancer Center for which \$4.8m have been allocated by the state legislature and the development of proposals for funding from the state cancer research initiative, which will provide \$3bn for cancer research in Texas over a ten year period. Recruitment efforts are focusing on a clinician scientist to assume leadership of the Cancer Research Group and additional clinicians and basic scientists to bolster current programs. The group is in the process of developing a tumor banking system that will provide materials for clinical and translational research projects. Directors: E. Cobos, M.D.; J. Cordero, M.D.; S. Williams, Ph.D.

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#### 2) TTUHSC Laura W. Bush Institute for Women's Health (LWBIWH)

The objective of the TTUHSC LWBIWH is to promote research and education impacting the health and wellbeing of women and their families. The emphasis is on the fact that some diseases progress differently in women compared to men. Gaps in knowledge about women's health will be addressed through a) community education in partnership with UMC Health System; b) NIH funded investigators working to develop collaborative efforts across departments and schools; c) medical education and local outreach with an emphasis on heart disease, breast and gynecologic cancer, pregnancy, osteoporosis and sports related injuries. NIH funding to individual principal investigators, local funding from UMC Foundation and TTUHSC School of Medicine, and local philanthropists. Lubbock Director: Beverly S. Chilton, Ph.D.

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**3) Center for Cardiovascular Disease and Stroke**

The objectives of the CCDS, in line with HRSA goals, are to a) support basic and clinical research related to cardiovascular function and disease through seed grants that can generate future extramural funding, b) obtain needed demographic/epidemiological data on heart disease in Hispanics that can lead to better outcomes, management practices and address healthcare disparity issues in this underserved region and c) educate current and future healthcare providers and lay public about cardiovascular disease issues. Original funding was from HRSA, current funding is provided by the Dean of the School of Medicine. Director: L.O. Lutherer, M.D., Ph.D., Cell Physiology and Molecular Biophysics.

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**4) The Contribution of Bacterial Biofilms to Non-Healing Diabetic Wounds**

Diabetic wounds are more susceptible to debilitating bacterial infections than non-diabetic wounds. The impaired healing properties of these wounds significantly increase the rates of lower extremity amputation in diabetic patients. In turn 50% of lower extremity amputation diabetic patients will die within the 18 months following amputation. Therefore newer treatment options for bacterial infections in wounds of diabetics are desperately needed. We hypothesize that bacterial biofilms, or communities of bacteria that reside in a tough protective shell, contribute to the severity and antibacterial resistance of diabetic wounds. If true, new treatments focused on disrupting bacterial biofilms in wounds may be useful combination therapies for current diabetic wound treatments. Revised Proposal is currently in review at American Diabetes Association. Director/PI: PI- Kendra Rumbaugh, Surgery; Co-PIs- John Griswold, M.D., Surgery, and Abdul Hamood, Ph.D., Microbiology & Immunology.

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**5) Efficacy of Gallium in *Pseudomonas aeruginosa* biofilm-infected wounds**

The goals of the experiments described in this proposal are to determine the efficacy of gallium in murine models for *Pseudomonas aeruginosa* biofilm-infected acute burn wounds and diabetic chronic wounds. Currently funded by Titan Pharmaceuticals, Inc. Director/PI: PI- Kendra Rumbaugh, Ph.D., Surgery; Co-PIs- John Griswold, M.D., Surgery, and Abdul Hamood, Ph.D., Microbiology & Immunology.

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**6) Targeting biofilms to eradicate medical and agricultural bacterial infections**

The goal of the current proposal is the establishment of a multidisciplinary group to test the effectiveness of a novel library of QS inhibitors (QSIs) in disrupting biofilm formation and bacterial virulence in medical and agricultural infections. The P.I.s for this project will be Dr. Guigen Li from the Dept. of Chemistry and Biochemistry at TTU and Dr. Kendra Rumbaugh from the Department of Surgery at TTUHSC. Dr. Li specializes in bioorganic and medicinal chemistry and has been synthesizing QS compounds for 4 years. Dr. Rumbaugh is an expert in the role of QS and biofilms in bacterial pathogenesis. The QSIs will be aimed at inhibiting the QS and biofilm producing systems of both human and plant pathogens and co-investigators from areas including bacterial pathogenesis in plants (Michael San Francisco, Biological Sciences, TTU), bacterial pathogenesis in humans (Abdul Hamood, Microbiology and Immunology, TTUHSC) and molecular signaling in humans (Simon Williams, Cell Biology and Biochemistry, TTUHSC) have been recruited to provide expertise in these areas. These investigators have worked together for several years and co-authored over 15 papers on QS and biofilms.

The goals of these experiments will be to provide compelling data that will lead to extramural funding to market these inhibitors as new generation antimicrobials. As we will target bacteria relevant to both agriculture and infectious disease we plan to seek funding from diverse sources including NIH, NSF and USDA. Submitted for the TTU/TTUHSC joint initiative program. Director/PI- : PI- Kendra Rumbaugh, Ph.D.; Co-PIs- Simon Williams, Ph.D., Cell Biology and Biochemistry, Abdul Hamood, Ph.D. Microbiology and Immunology, Guigen Li, Ph.D., TTU, and Michael San Francisco, Ph.D., TTU.

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**7) Texas Tech Blood Substitute Commercialization Program**

The Texas Tech blood substitute, HemoTech, addresses an increasing, yet unmet demand for safe blood in the US and around the world. It also overcomes many of the medical, logistical and economical concerns associated with red blood cell transfusions. It can be stockpiled, carried and positioned abroad, especially in war, emergencies and disasters, and can be available for administration in life saving quantities within minutes.

HemoTech is an innovative blood substitute developed by leading scientists at TTUHSC. Many blood substitute experts characterize HemoTech as second generation since it is the

only product under testing that addresses all intrinsic hemoglobin toxicity issues that have stymied the commercial development of the first generation products (Baxter, Biopure, Northfield, Hemosol).

HemoTech has been extensively tested in different in vitro and in vivo experimental models in the US and abroad, including proof of medical concept. The results of these studies are favorable, indicating that this novel red cell substitute has vasodilatory activity and can reduce the vasoconstriction that follows hemorrhage, has erythropoietic activities, and produces no adverse nephrotoxic, neurotoxic, oxidative or inflammatory reactions.

HemoTech has entered the regulatory process in the US. TTUHSC and its start-up, HemoBioTech, Inc. are engaged in fulfilling FDA requirements for HemoTech's clinical trials. It is anticipated that the IND application will be completed by 2008. Phase I should begin in late 2008 and be completed in 2009. Funded by HemoBioTech, Inc., Dallas, Texas. PI: Jan Simoni, Ph.D., Surgery.

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#### **8) GTP and Tai Chi for Bone Health: a Pilot Study**

Osteoporosis is a major health problem in postmenopausal women. The **long-term goal** is to develop a new complementary and alternative medicine (CAM) strategy featuring a dietary supplement and a mind-body exercise for alleviating bone loss in postmenopausal women with low bone mass. The primary objective is to test a CAM intervention including green tea polyphenol and Tai Chi exercise for feasibility, and to quantitatively assess their individual and conjugate effects on postmenopausal women with osteopenia. This study is a good example of utilizing the resources and environment of TTUHSC for translational research from animals to humans and of collaborating between basic scientists and clinicians. Funded by NIH/NCCAM. PI: Chwan-Li (Leslie) Shen, Ph.D.

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#### **9) "Aging and Quality of Life in the Southwest: A Comprehensive Competency-Based Program to Strengthen Physicians' Training in Geriatrics"**

As in the nation, health disparities undercut the health and well-being of the multicultural populations of West Texas and the Texas-Mexico Border. Improving the cultural competence of health care providers is critical for spanning the fault lines of the health care divide: ethnicity and acculturation; socioeconomic status; health belief systems; language and intercultural communication; and provider skills, to name but a few. The Patient-Centered Cultural Competence Curriculum proposed by the Texas Tech

University Health Sciences Center School of Medicine (TTUHSC-SOM) will develop and implement curricular activities and training programs to enhance the cultural competence of medical students, residents, faculty and community physicians, and health care professionals to better address the needs and health outcomes of the West Texas and Border populations. The specific aims of the Texas Tech Cultural Competence Curriculum are to: 1) to develop and implement a patient-centered community-based Cultural Competence Curriculum; 2) to improve the cultural competence of faculty, practicing physicians, and allied disciplines in West Texas through a new Cultural Competence Faculty Development and Continuing Medical Education Program; and 3) to disseminate curricular activities, project evaluation reports, and scholarship on the impact of the Cultural Competence Curriculum to West Texans, the NHBLI Coordinating Centers, and the national medical education community through a Cultural Competence Education Network and website, two symposia on Measuring Cultural Competence in Medical Education, and Project publications.

An interdisciplinary Health Disparities Project Team will develop curricular activities targeting cardiovascular, pulmonary, hematological, and sleep disorders with known health disparities in our region--hypertension, asthma, sickle cell anemia, and obesity/sleep disorders. A Health Disparities Advisory Board will help anchor this curriculum to new knowledge about health disparities from the ultimate arbiters of culturally competent care, the patients and the community. This Curriculum will be embedded in the first new undergraduate program at the TTUHSC-SOM in 30 years. The Curriculum features a variety of learning exercises in all 4 years, such as taking patient life histories in the community, learning medical Spanish, serving as patient navigators, and analyzing cases of cultural mismatch or health inequities. An intensive Project evaluation program is planned. Funded by NIH National Heart Lung Blood Institute. PI: Lynn Bickley, M.D., Internal Medicine.

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### **10) Peroxidases and Neurodegeneration.**

We have recently obtained convincing evidence that the peroxidase activity of Cu,Zn-superoxide dismutase is the culprit causing neurodegeneration in amyotrophic lateral sclerosis (Lou Gehrig's disease). This is the first time that a target for therapeutic intervention has been identified for ALS. We are planning to confirm our finding with animal experiments and at the same time to develop suicide inhibitors for this enzyme activity. We also plan to investigate if a similar mechanism is operative in Alzheimer's and Parkinson's disease. Co-Pis: Johannes Everse, Ph.D., Cell Biology and Biochemistry, and Penelope W. Coates, Ph.D., Cell Biology and Biochemistry.

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### **11) Study of 25-hydroxycholesterol in patients with endometriosis**

Endometriosis is a condition where endometrial cells attach to pelvic and abdominal organs causing severe pain and infertility. When women enter menopause, estrogen levels fall and the symptoms of endometriosis commonly subside indicating that maintenance of this ectopic tissue is primarily under the control of estrogen. Unlike the normal endometrium, endometriotic cells themselves produce estrogen, which accumulates within the peritoneal fluid thereby augmenting the actions of ovarian derived estrogens. We have found that peritoneal macrophages secrete 25-hydroxycholesterol (25-HC), an oxysterol that is efficiently converted to estrogen in cells that possess the appropriate steroidogenic enzymes (for example endometriotic tissue). Therefore it seems possible that peritoneal macrophage-derived 25-HC represents a significant source of substrate for estrogen production by endometriotic tissue and thereby may play an important role in the maintenance of endometriosis. Because endometriotic tissue attracts numerous macrophages into the peritoneal cavity, it is hypothesized that levels of 25-HC may be elevated in peritoneal fluid of patients with endometriosis. We propose to test this hypothesis by comparing levels of 25-HC in peritoneal fluid of endometriotic patients to those in the non-affected population. The number of macrophages per unit volume will also be measured to determine if putative differences in 25-hydroxycholesterol levels are due to an increase in the number of macrophages or an increase in production per macrophage. The number of 25-hydroxylase transcripts/macrophage will also be determined as an initial approach to understand the mechanism through which putative changes in 25-hydroxycholesterol levels may be mediated. Positive results from these studies would provide a sound foundation to build a revised application to the NIH concerning the mechanisms mediating altered levels of 25-hydroxycholesterol in patients with endometriosis. The long-range significance of these studies is that a new mechanism may be identified at which new treatments for endometriosis may be targeted. Application submitted to the Laura Bush Women's Health Institute. Co-PIs: Jim Hutson, Ph.D., Cell Biology and Biochemistry, and Moss Hampton, M.D., OB/GYN, Amarillo.

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### **12) South Plains Alcohol and Addiction Research Consortium (SPAARC)**

The Major Goal of SPAARC is to develop translational, multidisciplinary and collaborative approaches to investigate the connection between cognitive, behavioral, neural connectivity, structural, molecular and genetic predisposition and the human consequences of alcohol and drug use. Major objectives are 1) to initiate active research collaborations through internal and external funded projects; 2) to obtain strong, demonstrable institutional support for our goals, and; 3) to obtain a P20 Center award from NIAAA in the 2008 round of competition.

Dr. Peter Syapin has been recommended to serve as administrative director for the proposed P20 Center of Excellence application to the National Institute on Alcohol Abuse and Alcoholism (NIAAA). Funding from NIH, SOM Seed Grant, and TTUHSC Start-Up funds. SPAARC members have been and continue to make a strong effort to gain funds for collaborative projects. Proposals are currently pending with the TTUHSC/TTU Campus Initiative, the Alcohol Beverage Medical Research Foundation, and the Texas State Advance Research Program 2007.

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### **13) West Texas Research Network (WestRN)**

The Mission of the West Texas Research Network (WestRN) is to improve the health of the West Texas community, to improve family physician training, to investigate the translation of scientific discoveries into practical applications, and to contribute to our region's scientific and educational knowledge base through collaborative research and scholarly activities. WestRN links the regional campuses of the Department of Family & Community Medicine at TTUHSC, allowing for the development of multi-site projects that address common issues across campuses and regions, including practice-based primary care research, medical education, and high-quality patient care. As of October 2007, WestRN has undertaken two projects, *Using podcasting to deliver diabetes teaching to family medicine residents*, and *Surveillance of Health in Sentinel Populations 2006*, which have led to six presentations at national scholarly meetings and one article submitted for publication, plus presentation and grant projects generated by WestRN initiatives.

WestRN is primarily supported by the Department of Family & Community Medicine. However, WestRN received a seed grant of \$18,000 from the Texas Tech Center for Cardiovascular Disease and Stroke in 2006 to support the original podcasting initiative. Additional funds to support podcasting efforts have been received from the D.W. Reynolds Foundation, Health Resources and Services Administration (HRSA), and the Lubbock Osteopathic Fund. PI: R. Michael Ragain, MD, Braddock Chair of Family & Community Medicine

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#### **14) International Pain Institute**

The TTUHSC Racz-Messer International Pain Institute is a multidisciplinary institute dedicated to the advancement of pain therapy and the delivery of avant garde treatment for painful conditions. The major goal of the IPI are a) to provide high quality, avant garde pain treatment, b) to provide high quality specialty training in pain medicine and c) to conduct research through collaboration by basic and clinical scientists that advances the scientific foundation and increases treatment options for the treatment of pain.

Major objectives are: 1) to advance the already substantial international reputation of the IPI as a leader in pain therapy and the training of pain specialists; and 2) to conduct research with extramural funding that advances the reputation of the IPI as a leader in the development of new pain therapy. Funding is from private donations, revenue from multi-center clinical trials and discretionary funds generated by academic activities.

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#### **15) Acute Perioperative and Intraoperative Anesthetic care**

The TTUHSC Department of Anesthesiology, Division of Anesthesia care is dedicated to the advancement of perioperative and intraoperative care anesthetic care. The major goals are a) to provide high quality, state-of-the art intraoperative and perioperative anesthesia care b) to provide high quality training in perioperative and intraoperative anesthesia care and c) to conduct research through collaboration by basic and clinical scientists.

Major objectives are: 1) to continue to provide high quality, state-of-the-art intraoperative and perioperative anesthesia care that meets current and anticipated needs of the patient population served; 2) to continue to provide high quality training in perioperative and intraoperative anesthesia care; and 3) to engage in basic and clinical research through interdisciplinary collaboration of basic and clinical scientists that advances patient care. Of particular interest are basic investigations of system and organ functions, investigations of anesthetic requirements for select patient populations (eg. elderly, diabetic) and investigations relative to intraoperative and perioperative pain management. A number of industry sponsored clinical trials are in progress. Because of the diversity of

applicable research and the priority of fostering research in anesthesia, opportunities for funding exist both intramurally and extramurally.

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**16) Center for Membrane Protein Research**

The goal of this Center will be to advance our knowledge of the structure and function of membrane proteins in health and disease. The proposed Center will bring together a group of TTUHSC and TTU investigators interested in the broad field of membrane-protein research. Collaborations between these investigators will enhance the capabilities of participating individuals, improve their individual funding and eventually be conducive to successful applications for Program-Project, Center and Training Grants. Junior faculty and pre- and postdoctoral trainees in the participating laboratories will be integral part of the Center and will benefit from the multidisciplinary expertise of the faculty. The Center members so-far identified include five from Cell Physiology and Molecular Biophysics (CPMB, two Professors, one Associate Professor and two Assistant Professors), one Assistant Professor from Cell Biology and Biochemistry (CBB), one Associate Professor from Pharmacology and Neuroscience (PNS), and two faculty members from TTU, one Associate Professor (Physics) and one Assistant Professor (Chemistry). The two members from TTU have joint appointments in CPMB. Seven of these nine individuals have extramural funding, four of them at the R01 level as P.I.s and one from National Science Foundation. Funding is being sought from the TTUHSC School of Medicine. Director: Luis Reuss, M.D.

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