Evidence-Based Practice & Research in Healthcare: Encouraging Collaborative Partnerships

Friday, July 24, 2015
The University of Texas at San Antonio (UTSA)
Main Campus, San Antonio, Texas
www.research.utsa.edu/surf/
Evidence-Based Practice & Research in Healthcare: Encouraging Collaborative Partnerships

Friday, July 24, 2015
The University of Texas at San Antonio Main Campus, H-E-B University Center
8:00 A.M. - 5:00 P.M.
TABLE OF CONTENTS

Welcome...................................................................................................................................................06
Institutional Leadership................................................................................................................................
  C. Mauli Agrawal, Ph.D., P.E..................................................................................................................07
  Debra M. Niemeyer, M.S., M.A., Ph.D., DAF (USAF Ret).........................................................................08
  Andrea Giuffrida, Ph.D..........................................................................................................................09
  Major General (USAF Ret) Byron C. Hepburn, M.D............................................................................10
The University of Texas at San Antonio.......................................................................................................11
The University of Texas at San Antonio Health Science Center.................................................................12
Conference Team and Appreciation............................................................................................................14
Schedule at a Glance....................................................................................................................................15
SURF Information........................................................................................................................................16
Symposium Schedule....................................................................................................................................16
Morning Oral Presentation Schedule...........................................................................................................17
Afternoon Oral Presentation Schedule.........................................................................................................18
Poster Session.............................................................................................................................................19
Symposium Abstracts.................................................................................................................................24
Morning Oral Presentation Abstracts............................................................................................................30
Afternoon Oral Presentation Abstracts.........................................................................................................54
Poster Presentation Abstracts......................................................................................................................69
Poster Room Layout....................................................................................................................................161
HUC and UC Maps......................................................................................................................................162
WELCOME to the inaugural San Antonio Military Health System and Universities Research Forum (SURF). On behalf of the leadership at The University of Texas at San Antonio (UTSA), we are excited that you are here. Whether you are a researcher, student or community partner, we invite you to fully engage in today's learning activities as well as to seek out new and innovative ideas and collaborations.

San Antonio serves as a unique leader in healthcare research through military and academic institutions like UTSA, the San Antonio Military Health System (SAMHS), and The University of Texas Health Science Center at San Antonio (UTHSCSA). SURF was created to showcase the work of local trainees, faculty, staff and students from multiple disciplines within these organizations and beyond.

With the theme "Evidence-Based Practice and Research in Healthcare: Encouraging Collaborative Partnerships," forum participants are encouraged to present and share their research, earn CME/CNEs, and to connect with scholars from SAMHS, academic institutions across the state, and local health providers for future education and research collaborations.

We are grateful for the contributions and participation of all attendees and anticipate that this event will prove beneficial in your endeavors.

Sincerely,

Ricardo Romo
President
Dr. Agrawal is the Vice President of Research at UTSA. He holds the Peter Flawn Professorship in Bio-medical Engineering. Prior to joining UTSA in 2003, he worked at the University of Texas Health Science Center at San Antonio. Before that he served on the faculty at Duke University. He obtained his Ph.D. from Duke University, MS from Clemson University, and a B. Tech. from IIT-Kanpur, India.

Prior to his latest appointment he served as the Dean for the College of Engineering (COE) at UTSA. During his 8-year tenure as the dean, the COE experienced a 40-50% increase in both student enrollment and faculty size, and a 400% rise in research funding. He was instrumental in establishing the Texas Sustainable Energy Research Institute at UTSA and helping it receive a $50m pledge of support from CPS Energy.

In addition to his experience on the editorial boards of various scientific journals, he serves on the following non-profit boards: Board of Trustees, Southwest Research Institute, Clemson University’s College of Engineering Advisory Board, United Way’s Master’s Leadership Program, Biomed SA, Texas Research Park Foundation, and the San Antonio Medical Foundation.

During his professional career, Dr. Agrawal has authored more than 300 scientific publications, 18 patents and a textbook on biomaterials (2014). He is an International Fellow of Biomaterials Science and Engineering, a Fellow of the American Institute for Medical and Biological Engineering and was elected the 2006 national President of the Society for Biomaterials.

His bioengineering research group has been responsible for the launching of three companies in San Antonio. In 2007, he was awarded the UT System’s Chancellor’s Entrepreneurship and Innovation Award, and the Healthcare Hero Award by the San Antonio Business Journal. He is the 2010 recipient of the Julio Palmaz award for Innovation in Healthcare. He was appointed by Governor Rick Perry to serve (2008-2011) on the Advisory Board for the Texas Emerging Technology Fund.
Dr. Debra (“Deb”) Niemeyer is the 59th Medical Wing Chief Scientist, Joint Base San Antonio, and Scientific Advisor to the Air Force Surgeon General; serves as the technical authoritative liaison to Headquarters Air Force and Department of Defense, and representative to federal governance/policy bodies.

The wing is the Air Force’s largest medical facility with over 6,000 staff providing deployed and in-garrison health care delivery, graduate medical education, specialty training, and clinical research. Dr. Niemeyer is responsible for high-level collaborations with other agencies, academia and industry. She works directly for the 59 MDW Commander at senior executive levels to advance modernization efforts, oversees the wing’s research portfolio and modernization roadmap.

She directs resources, and advises on research integration into the San Antonio Military Health System, Major Commands, Service and Joint medical programs, strategic plans and investment strategies, and guides local assets in support of Joint/multi-agency research.

As Scientific Advisor, she provides specialty consultation, represents the Air Force at meetings, and serves as liaison to the Air Force Chief Scientist who advises the Secretary and Chief of Staff of the Air Force. Dr. Niemeyer was commissioned in 1981 through Air Force ROTC. She directed clinical, operational and applied research laboratories around the world, was a first responder to and consultant for anthrax releases post-911, and served in special duty and headquarters assignments. She retired in June 2008, and accepted her current position, August 2008.
Dr. Andrea Giuffrida is Vice President for Research and Professor of Pharmacology at The University of Texas Health Science Center at San Antonio (UTHSCSA). He received his Ph.D. in Biology from the University of Catania (Italy), and worked as postdoctoral fellow at the University of Siena (Italy) and the Neuroscience Institute in San Diego (USA) before joining the Department of Pharmacology at UTHSCSA.

Dr. Giuffrida has provided important breakthroughs to the neurobiology of the endocannabinoid system, which have been published in high-impact journals, including Nature and Nature Neuroscience. His research interests focus on the role played by the endocannabinoid system in psychomotor disorders characterized by dopaminergic dysfunction, such as schizophrenia and Parkinson’s disease.

Dr. Giuffrida also worked as an AAAS Science & Technology Policy Fellow in the Office of Science Policy at the National Institutes of Health (NIH) in the Office of the Director of the National Institute of Neurological Disorders and Stroke. He serves on the editorial boards of International Journal of Neuropsychopharmacology and Pharmaceutical Regulatory Affairs.
Major General (USAF Ret) Byron C. Hepburn, M.D., is the director of the Military Health Institute at the University of Texas Health Science Center at San Antonio. In this role, he strengthens the University’s DoD and VA collaborations with the goal of improving the health and well-being of military personnel, veterans and their families through innovative medical research, health education and clinical care. He also holds the titles of professor of family and community medicine, assistant dean for military health in the School of Medicine and associate vice president.

Dr. Hepburn had a distinguished military career of 38 years. He served as the first Director of the San Antonio Military Health System and commanded the 59th Medical Wing, Wilford Hall Ambulatory Surgical Center, Joint Base San Antonio-Lackland, Texas, the Air Force’s largest medical wing composed of 6,000 military, civilian, contract employees, residents and students. Previously, he served as Deputy Surgeon General, where he directed all operations of the Air Force Medical Service, a $5.1 billion, 43,000-person integrated health care delivery system serving 2.4 million beneficiaries at 75 military treatment facilities worldwide.

Dr. Hepburn is a distinguished graduate of the U.S Air Force Academy and earned a Master of Arts degree in European Studies for his work at the University of Geneva, Switzerland. He also graduated from the Uniformed Services University of Health Sciences School of Medicine and completed a residency in family practice. He was one of only 15 Air Force pilot-physicians and was a command pilot with more than 3,000 flight hours on the T-37, T-38, C-9A and C-17A aircraft. Dr. Hepburn is an honored recipient of the Mackay Trophy for his participation in the USS Cole medical evacuation mission, and was deployed to Afghanistan in 2001 in support of Operation Enduring Freedom.
Top-Tier Research
Ongoing research in neuroscience, biochemistry, pharmacology, microbiology, data analysis and advanced visualization are leading UTSA researchers to breakthroughs in brain health, vaccine development and regenerative medicine.

Breakthrough Discoveries

Top-Tier Partners
UTSA's partnerships with the military, government, industry, academia and other key collaborators in the United States and abroad are propelling interdisciplinary solutions to combat today's most pressing global health challenges in clinics, in hospitals and on the battlefield.

Top-Tier Technology
UTSA researchers are developing novel ways of preventing and treating disease at the Kleberg Advanced Microscopy Center, which includes one of the most advanced transmission electron microscopes in the world, and core facilities in biophotonics, nanotechnology and human health, proteomics and high-throughput screening.

Learn more about UTSA's research initiatives in integrated biomedicine at research.utsa.edu
We make lives better. Every day.

Remarkable discoveries are being made at the UT Health Science Center. Recently, our researchers found a compound that curbs the effects of Alzheimer’s in mice, increasing their life span up to 38 percent. Results of this breakthrough are now being studied in clinical trials — as new hope awaits thousands of patients and their families who search for it every day. Find out more at WeMakeLivesBetter.com.
CONFERENCE TEAM
Bernard Arulanandam, UTSA
Lucia E. More, USAF, BSC
Jaclyn Shaw, UTSA
Victor Sylvia, SAMHS
Diane Elizondo, UTSA

REVIEWERS
Michael Baumann, UTSA
Eboniece Cason, SAMHS
Patricia Chalela, UTHSCSA
TienCheng (Arthur) Chang, UTHSCSA
William Cooke, UTSA
Rishein Gupta, UTSA
Lisa Lott, SAMHS
Stanton McHardy, UTSA
Lucia More, SAMHS
Ruth Morris, UTHSCSA
John D. Myers, UTHSCSA
Christopher Navara, UTSA
Matthew Reilly, UTSA
Jaclyn Shaw, UTSA
Rebekah Smith, UTSA
Victor Sylvia, SAMHS

CONTINUING EDUCATION UNITS COORDINATORS
Lola Casby, SAMHS
Michelle R. Mandy, SAMHS
Gary Schofield, SAMHS
Dr. David Stamper, SAMHS

SPONSORSHIP APPRECIATION
Institute for Integration of Medicine and Science (IIMS)

SPECIAL THANKS
Faithful Alabi, UTSA
Marian Bownds, UTHSCSA
Dorian Brown, UTSA
Karina Patino Guzman, UTHSCSA
Sarah Hada, UTSA
Abril Herrera, UTSA
Jill Hinrichs, UTSA
Roseanne Hurst, UTSA
Embler Igwe, UTSA
Mark Jonse, UTSA
Beth Manning, UTSA
Abigail Marquez, UTSA
Lauren Moore, UTSA
Laura Rivas, UTSA
Angelika Rocha, UTSA
Crystal Smith, UTSA
Rebecca Smith, UTSA
Victor Smith, Jr., UTSA
Eddie Summerville, UTSA
Tre Taylor, UTSA
Jason Vasquez, UTSA
Brian Willeford, UTSA

All the volunteers who supported SURF
### Schedule at a Glance

<table>
<thead>
<tr>
<th>Time</th>
<th>Location</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 A.M. – 8:00 A.M.</td>
<td>H-E-B University Center Galleria</td>
<td>Registration</td>
</tr>
<tr>
<td>8:00 A.M. – 8:20 A.M.</td>
<td>Ballroom (HUC 1.104 &amp; 1.106)</td>
<td>Opening Remarks</td>
</tr>
<tr>
<td><strong>8:30 A.M. – 9:45 A.M.</strong></td>
<td><strong>Ballroom (HUC 1.104 &amp; 1.106)</strong></td>
<td><strong>Symposia</strong></td>
</tr>
<tr>
<td></td>
<td>Bexar (HUC 1.102)</td>
<td>Symposium One</td>
</tr>
<tr>
<td></td>
<td>Hidalgo (HUC 2.214)</td>
<td>Symposium Two</td>
</tr>
<tr>
<td>10:00 A.M. – 12:00 P.M.</td>
<td><strong>Ballroom (HUC 1.104 &amp; 1.106)</strong></td>
<td><strong>Morning Oral Presentation Sessions</strong></td>
</tr>
<tr>
<td></td>
<td>Bexar (HUC 1.102)</td>
<td>Focus Area: Pre-Hospital, Emergency, Trauma and Critical Care</td>
</tr>
<tr>
<td></td>
<td>Ballroom (HUC 1.104 &amp; 1.106)</td>
<td>Focus Area: Military and Veteran Public Health and Wellness</td>
</tr>
<tr>
<td></td>
<td>Pecan (UC 2.01.26)</td>
<td>Focus Area: Regenerative Medicine</td>
</tr>
<tr>
<td></td>
<td>Hidalgo (HUC 2.214)</td>
<td>Focus Area: Behavioral Health</td>
</tr>
<tr>
<td></td>
<td>Mesquite (UC 2.01.24)</td>
<td>Special Session: Hearing Health–Policy, Practice and Collaboration</td>
</tr>
<tr>
<td>12:00 P.M. – 1:00 P.M.</td>
<td>Ballroom (HUC 1.104 &amp; 1.106)</td>
<td>Lunch</td>
</tr>
<tr>
<td></td>
<td>Lunch tickets will be provided to all registered guests at the registration table.</td>
<td></td>
</tr>
<tr>
<td><strong>1:00 P.M. – 3:00 P.M.</strong></td>
<td><strong>Travis (HUC 2.202)</strong></td>
<td><strong>Afternoon Oral Presentation Sessions</strong></td>
</tr>
<tr>
<td></td>
<td>Harris (HUC 2.212)</td>
<td>Focus Area: Community Public Health and Wellness</td>
</tr>
<tr>
<td></td>
<td>Bexar (HUC 1.102)</td>
<td>Focus Area: Scientific Other</td>
</tr>
<tr>
<td><strong>3:00 P.M. – 4:30 P.M.</strong></td>
<td><strong>Ballroom (HUC 1.104 &amp; 1.106)</strong></td>
<td><strong>Poster Session</strong></td>
</tr>
<tr>
<td></td>
<td>Poster Session and Afternoon Refreshments</td>
<td></td>
</tr>
<tr>
<td>4:30 P.M. – 5:00 P.M.</td>
<td>Ballroom (HUC 1.104 &amp; 1.106)</td>
<td>Closing Remarks</td>
</tr>
</tbody>
</table>
**Free WiFi**

AirRowdy is the UTSA wireless network. It is available from any building at UTSA and can be used by UTSA students, faculty, staff, and guests. Open a Web browser (Safari, Firefox, etc.). You will be automatically connected to the appropriate AirRowdy login. Guests can access the internet using the AirRowdy_Guest page.

**Twitter**

Tweet what is happening at SURF using the hashtag #SASURF2015.

**Earning SURF Continuing Education (CME/CNE) Credits or a Certificate of Attendance**

SURF participants can earn continuing education credits (CME—Continuing Medical Education or CNE—Continuing Nursing Education) or receive a certificate of attendance. Physicians can receive up to 5.5 AMA/PRA category 1 credits; nurses can receive up to 5.5 ANCC category 1 credits; and non-physicians/nurses may receive a certificate of attendance. Instructions are provided at the registration table.

For more information contact:
- Army CNE Planner, Gary Schofield, at gary.l.schofield.civ@mail.mil or 210-916-2222
- Army CME Planner, Dr. David Stamper, at david.h.stamper2.civ@mail.mil or 210-916-3745
- Air Force CNE Planner, Dr. Lola Casby, at lola.casby.1.ctr@us.af.mil or 210-292-9058

**SYMPOSIUM SCHEDULE**

8:30 A.M. – 9:45 A.M. · Symposium abstracts begin on page 24.

**Symposium One - Ballroom (HUC 1.104 & 1.106)**

*Progress in the Treatment Of PTSD in Post-9/11 Active Duty Service Members:*
A Mini-Symposium of Results from the South Texas Research Organizational Network Guiding Studies on Trauma and Resilience (Strong Start) · **Moderator:** John Roache · **Presenters and Panel Members:** Katy Dondanville, Amy Ramage, Juan C. Aguilera, Brian Creasy, Kristi Pruiksma, & Alan Peterson

**Symposium Two - Bexar (HUC 1.102)**

*Translating Evidence to Bedside Practice at a Military Treatment Facility*
**Moderator:** Col Lori Trego · **Presenters and Panel Members:** MAJ Dave Allen, MAJ Tanesha D. Lindsay, Maj Renée I. Matos, 1LT Joshua Goldberg, Ms. Ann Marie Lazarus, & Ms. Darlene Deters

**Symposium Three - Hidalgo (HUC 2.214)**

*United States Air Force Personalized Medicine Program Panel:*
Representative Research at the 59th Medical Wing – San Antonio Military Medical Center · **Moderator:** Dr. Debra Niemeyer · **Panel Members:** Col Mark True, Dr. Sandra Valtier, Dr. Lisa Lott, Dr. Victor Sylvia, Maj Rebecca Burson, Maj Adam Willis, & Ms. Michele Tavish
Focus Area: Pre-Hospital, Emergency, Trauma and Critical Care - Bexar (HUC 1.102)

Presentation One
A Prospective, Randomized Trial of Coagulation Parameters in Hydroxocobalamin Versus Hydroxyethyl Starch Compared to No Treatment for Class III Hemorrhagic Shock in Yorkshire Swine • Normalynn Garrett, Lt Col Vikhyat Bebarta, Maria Castaneda, & Susan Boudreau

Presentation Two
Automated Infusion Pump Software (AIPS) Design to Control Blood Pressure • “Bill” Hao Wu, Ali Seifi, & Sos Agaian

Presentation Three
Mitochondrial Damage Associated Molecular Patters (DAMPs) And Gamma Delta T-Cells: Potential Effectors In The Wound Healing Response • Meenakshi Rani, Qiong Zhang, Travis L. Holloway, Salvador Sordo, & Martin G. Schwacha

Presentation Four
When Pigs Fly—Sus Scrofa Domestica as an MRI Model for Hypobaric Non-Hypoxic Exposure Effects Upon the Brain • Jeremy Bernot, Bradley Carra, Paul Sherman, Derek Mathis, and Peter Kochunov & Stephen McGuire

Focus Area: Military and Veteran Public Health and Wellness - Ballroom (HUC 1.104 & 1.106)

Presentation One
Utilization of VA, Military, and Community-Based Care Among OEF and OIF Veterans with PTSD • Michael Mader, Mary Bollinger, Elizabeth K. Haro, Mary Jo Pugh, Hector A. Garcia, Jacqueline A. Pugh, & Erin P. Finley

Presentation Two
Preoperative Simulation Education for Veterans Reduces Anxiety, Increases Knowledge and Satisfaction • Bonnie Haupt

Presentation Three
PTSD Care Practices and Education Preferences Among Community-Based Prescribers and Psychotherapy Providers in Texas • Erin P Finley, Polly H. Noel, Shuko Lee, Elizabeth K. Haro, Hector A. Garcia, Mary Jo Pugh, & Jacqueline A. Pugh

Focus Area: Regenerative Medicine - Pecan (UC 2.01.26)

Presentation One
Locally Administered Immunomodulation for the Maintenance of Vascularized Composite Allotransplants • Lin Wang, Sharon Lawson, Anton Fries, & Michael Davis

Presentation Two
TSPAN8 Expression Distinguishes Spermatogonial Stem Cells from Progenitors Among Neonatal Mouse Undifferentiated Spermatogonia • Brian P. Hermann, Thu Nguyen, Kazadi Mutoji, Christopher B. Geyer, Amy Kaucher, John R. McCarrey, & Jon M. Oatley

Presentation Three
Identification of a Novel Therapeutic Target for Treatment of Gastrointestinal Colonization with Multi-Drug Resistant Acinetobacter Baumannii • Patrick Ketter, M. Neal Guentzel, Rishein Gupta, Jieh-Juen Yu, James Chambers, & Bernard Arulanandam

Presentation Four
Hydrogen Sulfide Delays Onset of Acute Rejection in Porcine VCA Model Hydrogen Sulfide Delays Onset of Acute Rejection in Porcine VCA Model • Sharon D Lawson, Capt Lin C Wang, Charles Anton Fries, & Lt Col Michael Davis

Focus Area: Behavioral Health - Hidalgo (HUC 2.214)

Presentation One
Collaboration with Community Mental Health Service Providers: A Necessity in Contemporary Schools • Victor Villarreal, & Felicia Castro-Villarreal
Presentation Two
The UTHSCSA Transitional Care Clinic: State of The Art Care, Training, and Research • DI Velligan, MM Martinez, M Soucy, M Fredrick, & DR Roberts

Presentation Three
Nurse Initiated Therapeutic Music on an Inpatient Surgical Ward • LT. Svetlana Taylor, Juan Mendoza, & Ann Marie Lazarus

Special Session: Hearing Health—Policy, Practice and Collaboration - Mesquite (UC 2.01.24)

Presentation One
The Epidemiology of Hearing Injuries, Noise Exposure and Hearing Loss in the Military • David Gimeno, Jose A. Betancourt, David L. Tucker, Kristina W. Whitworth, Natasha S. Gorrell, Tanisha L. Hammill, MAJ Andrew J. Senchak, & Col. Mark D. Packer

Presentation Two
The Defense Hearing Center of Excellence Overview • Colonel Mark Packer

Presentation Three
The Department of Defense Hearing Center of Excellence (HCE) Auditory Fitness for Duty (AFFD) Collaborative Research Working Group • Major Kwame Curtis

Presentation Four
The Department of Defense Hearing Center of Excellence (HCE) Pharmaceutical Interventions in Hearing Loss (PIHL) Collaborative Research Working Group • Mark Packer & Tanisha L. Hammill

Focus Area: Pre-Hospital, Emergency, Trauma and Critical Care - Travis (HUC 2.202)

Presentation One
En Route of Parental Opioids, Ketamine, and Epidural Analgesia to Treat Pain in Patients Transported Out of the Combat Theater by US Air Force Critical Care Air Transport Teams (CCATT) • Stephanie Russell, Alejandra Mora, Victoria Ganem, & Vikhyat Bebarta

Presentation Two
A Culture Change for Hospitals and Caregivers: Postpartum Hemorrhage as a Trauma and Utilization of Compression Sutures to Reduce Peripartum Hysterectomy • Richard Meter, Karla Davila, & Kathy Porter

Presentation Three
Acute Traumatic Coagulopathy on the Contemporary Battlefield: Impact of Traumatic Brain Injury on Coagulation, Blood Transfusion Requirements and Survival • COL Robert Gerhardt & MAJ James A. Falcon

Presentation Four
Microstructural Features Correlate with Improved Clot Strength Of Cold-Storage Platelets • Prajeeda Nair, Shaunak Pandya, Kristin Reddoch, Shatha Dallo, Heather Pidcoke, Andrew Cap, & Anand Ramasubramanian

Focus Area: Community Public Health and Wellness - Harris (HUC 2.212)

Presentation One
Increasing Low Sodium Options in the Workplace: San Antonio’s Sodium Reduction Initiative (Cafeteria) • Erica T. Sosa, Sara Ullevig, & Ellen Spitsen

Presentation Two
The Witte Museum’s H-E-B Body Adventure: Transforming Health through Civic Engagement and Data • Bryan Bayles, Thomas L. Schlenker, John Berlanga, & Anil T. Mangla
Presentation Three
Tuberculosis Prevention and Care Services for Bexar County – A Collaborative Approach • Tommy Camden

Presentation Four
Latino fathers: What is Their Role in the Sexual Education of Their Children? • Viviana Rojas, Thankam Sunil, & Shamshad Khan

Focus Area: Scientific Other - Bexar (HUC 1.102)

Presentation One
Eosinophil Medicated Brain Pathology During Murine Neurocysticercosis • Pramod K. Mishra, Qun Li, Luis E. Munoz, Elizabeth G. Morris, Judy M. Teale, & Astrid E. Cardona

Presentation Two
A Numerical Estimate Of Visual Incapacitation Due To Primary Blast Exposure • Matthew Reilly, Walter Gray, William Sponsel, Randolph Glickman, Brian Lund

Presentation Three
Identification of Predictive Disease-Specific Protein Biomarkers for Clinical Relapses and Treatment Efficacy of Multiple Sclerosis • Itay Raphael & Thomas G. Forsthuber

Presentation Four
Protective Efficacy of Chlamydial-Protease-Like Activity Factor Against Genital C. Trachomatis Infection in Guinea Pigs • Rishein Gupta, Shradha Wali, Jieh-Juen Yu, Gopala Krishna Lanka Kaundinya, James P. Chambers, Neal M. Guentzel, & Bernard P. Arulanandam
Poster #11
A Prospective Observational Study of Medical Toxicology Consultation in a US Combat Theater • Maj Joseph K. Maddry, LtCol Vikhyat S. Bebarta, & Maj Daniel J. Sessions

Poster #12
Blood Administration during Critical Care Air Transport Team (CCATT) Evacuation out of Theater Is Associated with Adverse Hemodynamic Events Regardless of Pre-Flight Hemoglobin Levels • Jennifer A. Becerra, Alejandra Mora, Victoria Ganem, & LtCol Vikhyat S. Bebarta

Poster #13
Prehospital and En Route Cricothyrotomy Performed in the Combat Setting: A Prospective, Multicenter, Observational Study • Edward B. G. Barnard, Alicia T. Ervin, Robert L. Mabry, & Vikhyat S. Bebarta

Poster #14
Effects of Combined Exercise on Cognitive Function and Plasma Amino Acid in Female Elders • Nan Hee Lee, Chung Moo Lee, & Sukho, Lee

Poster #15
Pre-Hospital En Route Care and Life-Saving Interventions of Traumatically Injured Combat Patients Transported by Medevac from the Point of Injury • Lauren Reeves, Crystal A. Perez, & Joseph K. Maddry

Poster #16
Preliminary Analyses of the Reliability and Correlates of the Revenge Attitudes Inventory-24 • Melina Acosta, Casey Szajnecki, & Augustine Osman

Poster #17
Analysis of Medevac Providers and Procedures Performed En Route from Point of Injury to a Military Treatment Facility in Combat • Alejandra Mora, Crystal Perez, & Maj Joseph Maddry

Poster #18
A Randomized Trial of Intravenous Hydroxocobalamin Compared to Whole Blood for Hemorrhagic Shock Resuscitation in a Prehospital Swine Model • LtCol Vikhyat Bebarta, Normalynn Garrett, Maria Castaneda, & Susan Boudreau

Poster #19
The Effect of the Biomodulator on the Biopsychosocial Secondary Sequelae of Chronic Low Back Pain in Active Duty Military Service Members • Ann Nayback-Beebe, Sonya M. Arzola, Laura Feider, Angela Simmons, & Brandon Goff

Poster #20
Isopropyl Alcohol Nasal Inhalation Intervention of Nausea in the Emergency Department: A Randomized Placebo-Controlled Human Trial • Sue L. Love, Kenneth L. Beadle, Antonia R. Helbling, & Curtis J. Hunter

Poster #21
Effects of Elevated Pressure and High Glucose Concentrations on Select Eye Cell Functions • Kristen A. Hamalainen, Marissa E. Wechsler, Rena Bizios, & Matthew A. Reilly

Poster #22
Use of Pet Therapy in an Inpatient Behavioral Health Setting • Lt Kelly N. Lonergan

Poster #23
Herpes Simplex Virus Seroprevalence and Seroconversion among Active Duty United States Air Force Members with HIV Infection • Jared Cohen, Amanda Sellers, T.S. Sunil, Peter Matthews, & Jason Okulicz

Poster #24

Poster #25
Potential Biomarkers and Stevens Johnson Syndrome, Toxic Epidermal Necrolysis • CPT Amanda J. Laska, LtCol Marie J. Han, & Maj Thomas M. Beachkofsky

Poster #26
Differentiation of Adult Human Mesenchymal Stem Cells Exposed to Alternating Electric Current at the Population and Single-Cell Levels • Marissa E. Wechsler, Brian P. Hermann, & Rena Bizios

Poster #27
Building A Healthy Temple Cancer Primary Prevention Program amongst Hispanics • Summer Wilmoth, Lauren Correa, Elena Martinez, Meixia Pan, Raymundo Mendoza, Deborah Parr-Ramirez, Luz-Myriam Neira, Erica Sosa, Zenong Yin, & Meizi He

Poster #28
A Systematic Review of Executive Level Leadership Competencies in Chief Nurse Executives/Officers • David Allen, Sonya Arzola, & Susan J. Appel

Poster #29
Prevalence and Impact of Anemia on Basic Trainees in the U.S. Air Force • Kathryn E. Myhre, Bryant J. Webber, Thomas L. Cropper, Juste N. Tchandja, Dale M. Ahrendt, Christopher A. Dillon, Roy W. Haas, Samantha L. Guy, Mary T. Pawlak, & Susan P. Federinko

Poster #30
Comparison of Pachymetry Measurements between the Alcon Wavelight EX500 and Sonogage Corneo-Gage Plus Platforms • Timothy Soeken, Douglas Apsey, James Townley, Roy Haas, & Matthew Caldwell
Poster #31
Tinnitus and Vestibular Dysfunction in Iraq and Afghanistan Veterans: Prevalence and Associated Comorbidities • Alicia A. Swan, Carlos A. Jaramillo, Blessen C. Eapen, & M.J. Pugh

Poster #32
Promoting Vascularization of Synthetic Grafts for Bone Tissue Regeneration • Rebekah Rodriguez, Laura Gaviria, Joo Ong, & Teja Guda

Poster #33
We Leap: A Community Training Program for Future Healthcare Professionals • Kavina Patel, & Farhan Ahmad

Poster #34
PTSD Does Not Discriminate! A Unique Simulation in OB! • Jackie Riley-Baker, & Bertha E. “Penny” Flores

Poster #35
Do Spermatogonial Stem Cells Need Sertoli Cell-Derived Gdnf Production for the Maintenance of Spermatogenesis in the Adult Mouse Testis? • Jennifer M. Mecklenburg, Marilyn Cisneros, Edward M. Eddy, & Brian P. Hermann

Poster #36
Regulation of GDNF Responsive Genes by PLZF and SALL4 in Mouse Spermatogonial Stem Cells • Dawn L. Lovalace, Zhen Gao, Kazadi Mutoji, Jianhua Ruan, & Brian P. Hermann

Poster #37
Triple Negative Breast Cancer Responds to a Single Dose of Photodynamic Therapy • Nuha B. Kadri, Nizar I. Alyassin, Justin A. Avila, Aryana J. Cruz, Louis J. Cruz, Steve D. Holliday, Zachary S. Jordan, Cameron A. Ruiz, Jennifer L. Watts, & Matthew J. Gdovin

Poster #38
Betanectin C—Terminal Cleavage: Understanding the Pathology Underlying Diabetic Complications in Human Renal and Ocular Systems • Behnam Dorraji, & Richard G. LeBaron

Poster #39
Effect Free Radicals on Associative learning in Caenorhabditis Elegans • Robert Garcia, & Edwin Barea-Rodriguez

Poster #40
Single Growth Factor Release from Pla-Based Microparticles for Osteoprogenitor Cell Recruitment • Laura Gaviria, Teja Guda, & Joo L. Ong

Poster #41
Traveler Demographics, Characteristics of Travel, Personal Protective Measure Use, Mosquito Exposure, and Chikungunya Seroconversion during the Outbreak in the Americas • David A. Lindholm, Edward M. Grant, Todd Myers, Kalyani Telu, Mary Fairchok, Anuradha Ganesan, Mark D. Johnson, Anjali Kunz, David R. Tribble, Tahaniyat Lalani, & Heather C. Yun

Poster #42
Teen Pregnancy Prevention: An 1115 Medicaid Waiver Approach • Olivia Thornton, & Mario Martinez

Poster #43
Interpenetrating Collagen-Fibrin Hydrogels for Skeletal Muscle Regeneration • Sarah J. Stagg, Beth E. Pollot, Christopher R. Rathbone, Anson Ong, & Teja Guda

Poster #44
Fabrication of Contact Lens for Integrated Photoacoustic Ophthalmoscopic Detection • Andre Childs, Hao Li, & Dani Lewitess

Poster #45
Hydroxyapatite-Carbon Nanotube (Ha-Cnt) Composite Scaffolds for Bone Tissue Engineering • Sergio Montelongo, Alice Hsieh, & Teja Guda, Anson Ong

Poster #46
Texas Somali Refugees Beliefs in Health, Illness and Help Seeking Behavior • Raege Omar

Poster #47
Head Start and Pre-K for San Antonio School Located Influenza Vaccinations in Bexar County • Clark Petty, & Anil Mangla

Poster #48
Can Collagen/Ha Scaffolds Produce Greater Bone Regeneration with 1/5th Clinical Rhbmp-2 Dosages? • Teja Guda, Stephanie Shiels, Joseph J. Pearson, Suyash Karajgar, Mark Appleford, Joseph Wenke, & Joo L. Ong

Poster #49
The Vast Spectrum of Silk Scaffold Properties • Joseph J. Pearson, Teja Guda, & Joo L. Ong

Poster #50
Predicting Fracture Risk Following Local Bone Injury • Suyash Karajgar, Marcello Pilia, Christopher Rathbone, & Teja Guda

Poster #51
Psychometric Analysis of the Relationship between Trauma and Resiliency • Casey Szajnecki, Melina Acosta, & Augustine Osman

Poster #52
Architectural Gradient Scaffolds for Subchondral Restoration • Diana Castillo, Sergio Montelongo, Teja Guda, & Joo Ong

Poster #53
Novel Subnetwork Alignments Reveal Network Components Involved in Pathogenesis in the Malaria Parasite • Hong Cai, Timothy G. Lilburn, Changjin Hong, Jianying Gu, Rui Kuang, & Yufeng Wang
Poster #54
SES Effects on Health Status of GWOT Veterans and their Civilian Counterparts: Laying the Groundwork • Sharon Goodwin

Poster #55
Acute Ischemic Colitis and Portal Vein Thrombosis in a Young Female Smoker on an Oral Contraceptive • John Hunninghake, Brian Murray, Pedro A. Manibusan Jr., Scott McNear, Willis Kann, & John Gancayco

Poster #56
Risk Factors Associated with Decline in Adult Obesity – Bexar County, Texas 2010 – 2012 • Thomas Schlenker, Anil T. Mangla, & Nhiem Luong

Poster #57
Military-Connected Families and the Deployment Cycle: An Overview of What Counselors Need to Know • Jessica Lloyd-Hazlett, & Shanta’ Atkinson

Poster #58
Building a Platform to Showcase the Hidden Talents of Patients • Anisha Guda, & Sammar Ghannam

Poster #59
Boundless Cart • Robert Trevino

Poster #60
Derivation and in Vitro Expansion of Retina Progenitors from Pluripotent Stem Cells • Alberto Muniz, & Tiziano Barberi

Poster #61
Central Nervous System Polypharmacy in Iraq and Afghanistan War Veterans: Prevalence and Risk of Overdose and Suicide-Related Behavior • Kangwon Song, Garen A. Collett, Carlos A. Jaramillo, Jennifer S. Potter, Erin P. Finley, & Mary Jo Pugh

Poster #62
Expression of Heterologous Antigens on Francisella Novicida Surface Proteins to Develop a Biodefense Vaccine • Cory Nguyen, Xhavit Zogaj, & Karl E. Klose

Poster #63
Evaluation of the Efficacy the iTClamp® for Hasty Compressible Hemorrhage Control Versus a Tourniquet During “Care Under Fire” • Roland Paquette, Ryan Bierle, Craig Cooley, Kevin King, Rosemarie Ramos, David Wampler, Joel Michalek, & COL Robert T. Gerhardt

Poster #64
In Vitro Comparison of Poly(Methyl methacrylate) and Calcium Sulfate as Carriers for the Local Delivery of Gallium (III) Nitrate to Infected Surgical Sites • Rebecca A. Garcia, David J. Tennent, David Chang, Joseph C. Wenke, & Carlos J. Sanchez Jr.

Poster #65
The Effects of a Photo Isomerizing Compound Treatment of Drug-Resistant Cell Lines • Justin Avila

Poster #66
Nitrile Gloves Prevent the Compressor from Detecting a 360 Joule Defibrillation in a Sham Controlled Cadaver Hands on Defibrillation Study • Col David Wampler, Chetan Kharod, Scotty Bolleter, Alison Burkett, Caitlin Gabehart, & Craig Manifold

Poster #67
A Novel Mechanism that Promotes Diabetes Complications in the Renal and Ocular Systems • Robert J. Moritz, Fate Rezapoorn, Brandi S. Betts-Obregon, Albert A. Mondragon, Andrew S. Mendiola, Kalpana Parvathaneni, Mary M. Navarro, Hong Seok Kim, Chi Fung Lee, Clyde Phelix, Reto Asmis, Andrew Tsin, & Richard G. LeBaron

Poster #68
Health Literacy: A Health Disparity of the 21st Century • Rhonda Andrew, Carmen Cardenas, Stephanie George, Swetha Gogu, Kimberly Farias, Nicole Michael, Mercedes Rodriguez, Bianca Stimson, & Seshidar Tekma

Poster #69
Public Health Surveillance for Pertussis in Bexar County, 2011-2014 • Rita Espinoza, Donnie Diaz, & Anil T. Mangla

Poster #70
Testing the Gate Hypothesis for Seizure Development: Muscarinic Receptor Modulation of Input/Output through the Dentate Gyrus • Kael McInnis, Jessica Perkins, Robert Brenner, Mark Shapiro, & David Jaffe

Poster #71
Generation of Polyclonal Antibodies of Resistance Cassettes Used to Study Borrelia Burgdorferi Mutants • Sean Vargas, Samantha Valdez, & J. Seshu

Poster #72
Schistosomesidal Oxamniquine Derivative Drug Activity against Human Schistosomiasis • Stacey R. Stahl, Alexander B. Taylor, Xiaohang Cao, Stephen P. Holloway, P. John Hart, Stanton F. McHardy, Timothy J. C. Anderson, & Philip T. LoVerde
Poster #73

In Vitro Antimicrobial Activities of Gallium (III) Compounds Against Multidrug-Resistant Isolates of Acinetobacter Baumannii • David Chang, Rebecca A. Garcia, Kevin S. Akers, Clinton K. Murray, Joseph C. Wenke, & Carlos J. Sanchez Jr.

Poster #74

Role of Hypothetical Membrane Proteins in the Pathophysiology of Lyme Disease • Tamara Williams, Sean Vargas, & J. Seshu

Poster #75

Implementation of Using a Parameter Pal Badge on a Medical Telemetry Ward • LT LeeAnna Daniel, SrA Chelsey Gillespie, A1C Zachary Ferguson, Mrs. Jennifer Van Nostrand, Mrs. Courtney Taylor, Lt Athena Ra Gonzalez, & Mrs. Ann Marie Lazarus

Poster #76

Syphilis in Bexar County: Developing a Criterion for Prophylactic Treatment in a City Clinic • Cameron Warner, Cara Hausler, John Berlanga, & Anil Mangla

Poster #77

Validation of a Novel Measure of Sleep Disturbance in Iraq/Afghanistan War Veterans • Catheryn A. Orihuela, & Mary Jo Pugh

Poster #78

Congenital Heart Disease: Collaborating for Improved Care • Elaine Maldonado, & Jamie Archambault

Poster #79

Texas Medicaid 1115 Waiver: Innovative Public Health Financing • Theresa Medina

Poster #80

Live Attenuated Francisella Novicida Vaccine Protects Against Francisella Tularensis Pulmonary Challenge in Rats and Non-Human Primates • Ping Chu, Aimee L. Cunningham, Jieh-Juen Yu, Jesse Q. Nguyen, Jeffrey R. Barker, C. Rick Lyons, Julie Wilder, Michelle Valderas, Robert L. Sherwood, Bernard P. Arulanandam, & Karl E. Klose

Poster #81

Novel Drug Target for Treating Alzheimer’s Disease: Mitochondrial Pyruvate Carrier • Clyde F. Phelix, Stanton F. McHardy, & George Perry

Poster #82


Poster #83

Lipoproteins Hyper-Expressed from Mutant Strains of Borrelia Burgdorferi Confer Protection in the Mouse Model of Lyme Disease Following Tick Challenge • Trever C. Smith II, Ying-Han Lin, Sean Vargas, & J. Seshu

Poster #84

Non-Metabolizable Sugars Affect Biofilm Formation in Eskape Pathogens • Linda Letti Lopez & J. Seshu

Poster #85

The Association between Maternal Education & Low Birth Weight • Ashley I. Pollock, & Cedric A. Taylor
SYMPOSIUM ABSTRACTS
PROGRESS IN THE TREATMENT OF PTSD IN POST-9/11 ACTIVE DUTY SERVICE MEMBERS: A MINI-SYMPOSIUM OF RESULTS FROM THE SOUTH TEXAS RESEARCH ORGANIZATIONAL NETWORK GUIDING STUDIES ON TRAUMA AND RESILIENCE (STRONG START)

www.strongstar.org

The South Texas Research Organizational Network Guiding Studies on Trauma and Resilience, or STRONG STAR, is a multidisciplinary and multi-institutional research consortium funded by U.S. Departments of Defense (DoD) and Veterans Affairs (VA) to develop and evaluate the most effective early interventions possible for the detection, prevention, diagnosis, and treatment of combat-related posttraumatic stress disorder (PTSD) and related conditions in active-duty military personnel and recently discharged veterans. The more than 125 researchers and clinicians working with STRONG STAR are conducting a broad array of clinical, exploratory, and preclinical trials and utilizing specialized research cores to assess novel delivery methods of evidence-based PTSD treatments. These delivery methods have been specially adapted to meet the unique needs of military and VA populations. Simultaneously, STRONG STAR is striving to learn more about the biological factors involved in PTSD development and recovery; the influence of co-occurring physical and psychological ailments; and the interaction of cognitive-behavioral therapies and pharmacologic treatments.

List of Speakers

John D. Roache, Ph.D.
Professor of Psychiatry and Pharmacology | Chief, Psychiatry Division of Alcohol & Drug Addiction
Deputy Director | STRONG STAR PTSD Research Consortium | Director, FIRST Program of the Institute on the Integration of Medicine & Science (IIMS) | roache@uthscsa.edu

Katy Dondanville, Psy.D., ABPP
Assistant Professor-Research | Division of Behavioral Medicine | Department of Psychiatry
UT Health Science Center at San Antonio | Director of Research
Chief of Psychology- Fort Hood Site, STRONG STAR Research Consortium | dondanville@uthscsa.edu

Amy Ramage, Ph.D.
Research Instructor | Research Imaging Institute (RII) | Department of Psychiatry
UT Health Science Center at San Antonio | ramage@uthscsa.edu

Juan Carlos Aguilera, B.S. & B.A
Research Coordinator | STRONG STAR PTSD Research Consortium | University of Texas Health Science Center at San Antonio
Office: 210-562-6737 | AguileraJ@uthscsa.edu

Brian Creasy, Ph.D.
Licensed Clinical Psychologist | Warrior Resiliency Program | brian.a.creasy.civ@mail.mil

Kristie E. Pruiksma, Ph.D.
STRONG STAR Multidisciplinary PTSD Research Consortium (www.strongstar.org) | Psychologist- Ft. Hood Site
Assistant Professor | Department of Psychiatry, UT Health Science Center at San Antonio | Pruiksma@uthscsa.edu

Alan L. Peterson, Ph.D., ABPP
Professor and Chief | Division of Behavioral Medicine Aaron and Bobbie Elliott Krus Endowed Chair in Psychiatry
Department of Psychiatry | UT Health Science Center at San Antonio | Director, STRONG STAR Consortium Director Consortium to Alleviate PTSD | Deputy Chair for Military Collaboration | Research Health Scientist
South Texas Veterans Health Care System Professor | Department of Psychology | The University of Texas at San Antonio | petersona3@uthscsa.edu
Background: The U.S. Army Nurse Corps model for the Center for Nursing Science & Clinical Inquiry (CNSCI) brings Nurse Scientists (NS) and Clinical Nurse Specialists (CNS) together to utilize evidence-based methodologies to inform nursing practice. The NS and CNS have different roles, as the NS creates new evidence and the latter translates the evidence to improve clinical processes and outcomes, and their collaboration produces a synergistic effect. This enhanced capacity to conduct research or translate existing research to practice ensures that nursing policies and procedures are developed utilizing the best and most current evidence.

Materials & Methods: SAMMC fully embraced the CNSCI model in 2012, assigning a full time CNS to the CNSCI to direct the EBP program and manage the CNSs. Together, the NSs and CNSs enhanced the culture of EBP by providing education on research and EBP through classroom and one-on-one instruction to nursing personnel. This culture encourages nursing personnel to identify clinical problems and incorporate practice changes to improve patient care. When nurses generate clinical questions, CNSCI employs a team of a NS and a CNS to help the nursing personnel determine an evidence-based solution to the clinical problem. The team decides that either the proposed solution can be translated to bedside practice, or it needs to be further investigated. The skills of the CNS are called upon to guide the EBP project, or the NS stand ready to assist the team to generate a research question. Additionally, a completed EBP project regarding the SAMMC Rapid Response Team will be discussed to demonstrate how the process works to improve patient outcomes.

Results: Since 2013, there were over 100 EBP projects that have been conducted or are ongoing in the facility. Various nursing units have conducted unit-specific EBP projects in areas including but not limited to falls awareness, Rapid Response Teams, and Animal Assisted Therapy that have demonstrated an improvement in nurse sensitive outcomes. Many of these have been adopted facility wide as best practices as well as being presented at both the national and local levels.

Conclusions: By identifying specific roles of the Nurse Scientists and Clinical Nurse Specialists while reorganizing them under a CNSCI model, there has been a shift in the nursing culture at SAMMC towards EBP, evident by the increase in the number of EBP projects generated. Nursing personnel were able to positively affect patient outcomes by employing the most current evidenced-based practices into the facility.
Brooke Army Medical Center
Center for Nursing Science & Clinical Inquiry Panel

Moderator:
COL Lori Trego, PhD, CNM, ARNP
Chief, Center for Nursing Science & Clinical Inquiry

Presentation 1
Translating Evidence To Bedside Practice At A Military Treatment Facility
Major Dave Allen, DNP, CCRN, CNS; U.S. Army Nurse Corps

Presentation 2
Rapid Response Team
Major Tanesha D. Lindsay RN, CCRN; U.S. Army Nurse Corps, and
Major Renée I. Matos, MD, MPH, FAAP; U.S. Air Force Medical Corps

Presentation 3
Using Evidence to Improve the Discharge Process to Decrease Turbulence during Peak Hours of Admissions
1LT Joshua Goldberg, BSN, RN; U.S. Army Nurse Corps

Panel Discussion with Clinical Nurse Specialists
Major Dave Allen, DNP, CCRN, CNS; U.S. Army Nurse Corps; Deputy for Evidence Based Practice
Ms. Ann Marie Lazarus, MSN,CNS,RN, DoD Civilian Nurse; CNS for Medical Nursing
Ms. Darlene Deters, ARNP, MSN, CCRN, DoD Civilian Nurse; CNS for Critical Care Nursing

The view(s) expressed herein are those of the author(s) and do not reflect the official policy or position of Brooke Army Medical Center, the U.S. Army Medical Department, the U.S. Army Office of the Surgeon General, the Department of the Army, the Department of the Air Force and Department of Defense or the U.S. Government.
The United States Air Force’s Personalized Medicine Program at the 59th Medical Wing (59MDW) seeks evidence to support the utilization of genetics, pharmacogenomics and proteomics for optimizing prevention, diagnosis, early intervention and treatment strategies. Panel members will describe several ongoing analyses providing evidence for the integration of personalized data into clinical decision-making, especially during the prevention and treatment of common yet complex disorders. Representative research in the program areas of Chronic Diseases, and Behavioral and Psychological Health will be presented. Studies of Chronic Diseases elucidating genetic epidemiology of Type 2 Diabetes Mellitus in the Military Health System (MHS) population provide evidence of single nucleotide sequence variation associated with an enhanced risk of future Type 2 Diabetes Mellitus. The ability to identify genetic markers and identify appropriate lifestyle interventions, far in advance of actual disease onset, has great potential to reduce disease burden and preserve the military readiness mission. Further evaluation of the utility of genetic variation is in progress based on pharmacogenomic therapeutic strategies specifically aimed at delaying diabetes progression. The development of pharmacogenomics-driven predictive risk profiles will result in improved management of patients with complex diseases.

This program also includes research to advance our understanding the effects of gene-environment interactions for tailored treatments based on individual, social, operational and environmental risk and protective factors, such as those associated with social-occupational impairment, and resiliency. Using repeated measurements of outcome variables between risk and protective factors that contribute to resiliency and psychological health over time, studies in Behavioral and Psychological Health are designed with a long-term goal of providing actionable recommendations regarding strategies for promoting and maintaining the health and readiness of MHS personnel across the deployment cycle.

The 59MDW Center for Advanced Molecular Detection (CAMD) maintains a genetic marker research data and tissue repository for ongoing studies and future analysis. The CAMD Repository of biological samples is predominantly comprised of specimens collected under Institutional Review Board approved protocols from consented subjects within the MHS, including Active Duty military, DoD beneficiary and Basic Military Trainee populations during Clinic visits. The Repository provides an opportunity for storage of specimens and data for future research to improve military patient health and medical care.
Panel members will engage in discussion with attendees and address questions regarding personalized medicine and health research driving innovations in the care we provide our warfighters, their family members, wounded warriors and beneficiaries.

Panel Chair:
Debra Niemeyer, MS, MA, PhD, DAF, 59th Medical Wing Chief Scientist

Panel Members (based on availability):
- Col Mark True, 959th Medical Group, San Antonio Military Medical Center, Joint Base San Antonio-Fort Sam Houston, Texas
- Dr. Sandra Valtier, 59th Medical Wing Chief Scientist Office Director, Center for Advanced Molecular Detection, Joint Base San Antonio-Lackland, Texas
- Dr. Lisa Lott, 59th Medical Wing Chief Scientist's Office Science and Technology Division
- Dr. Victor Sylvia, 59th Medical Wing Chief Scientist's Office Science and Technology Division
- Maj Rebecca Burson, MD, 959th Medical Group, San Antonio Military Medical Center, Joint Base San Antonio-Fort Sam Houston, Texas
- Maj Adam Willis, MD, 959th Medical Group, San Antonio Military Medical Center, Joint Base San Antonio-Fort Sam Houston, Texas
- Ms Michele Tavish, 959th Medical Group, San Antonio Military Medical Center, Joint Base San Antonio-Fort Sam Houston, Texas
MORNING ORAL PRESENTATION ABSTRACTS
Focus Area: Pre-Hospital, Emergency, Trauma and Critical Care
A PROSPECTIVE, RANDOMIZED TRIAL OF COAGULATION PARAMETERS IN HYDROXOCOBALAMIN VERSUS HYDROXYETHYL STARCH COMPARED TO NO TREATMENT FOR CLASS III HEMORRHAGIC SHOCK IN YORKSHIRE SWINE

Normalynn Garrett, CRNA, PhD; Lt Col Vikhyat Bebarta, MD, Director; Maria Castaneda, MS; and Susan Boudreau, BSN
CREST Research Center, San Antonio Military Medical Center (SAMMC)

Background: Hydroxyethyl starch has been used extensively for fluid resuscitation in hemorrhagic shock since research suggests it ameliorates coagulopathies associated with high volume crystalloids. However, recent studies report that hydroxyethyl starches may be associated with adverse outcomes, including renal injury and coagulopathies. Thromboelastography (TEG) is a common tool for evaluating coagulopathies.

Objective: To compare coagulation parameters in animals that have had 30% of their blood volume removed (Class III hemorrhagic shock) and treated with intravenous hydroxocobalamin (HOC), hydroxyethyl starch (Hextend®), or no fluid (control).

Methods: 28 swine (45-55kg) were anesthetized with isoflurane in oxygen, FIO2 0.21 approximating room air, intubated, and instrumented with continuous femoral and pulmonary artery pressure monitoring. Animals were hemorrhaged, using a modified Frankel model, as performed in our previous studies. Five minutes post hemorrhage they were randomly assigned to receive 150 mg/kg IV HOC in 180 mL saline, 500 mL Hextend® or no fluid and monitored for 60 minutes.

Results: There were no significant differences in coagulation parameters (PT, PTT, platelet count, and TEG) among groups at baseline or at hemorrhage. Coagulation markers in hydroxocobalamin vs. control groups were not significantly different from each other; however, at 30 minutes after bleeding and through the remainder of the observation period, coagulation markers were different (p<0.05) from the Hextend® treated group [mean 60 minute PT hydroxocobalamin 14.6 (SD ± 0.5) vs. control 13.6 (SD ± 0.5) vs. Hextend® 16.1 (SD ± 4.8) sec; platelet count 329 (SD ± 63) vs. 359 (SD ± 76) vs. 228 (SD ± 59) 109/L]. TEG analysis showed longer clotting (K) times (p<0.05) for the Hextend® treated group at 30 minutes 1.8 (SD ± 0.4) mm compared to the other groups [HOC 1.5 (SD ± 0.3 ) vs. control 1.2 (SD ± 0.2) mm], but by 60 minutes there was no difference in TEG K values between the HOC and Hextend® treated groups. At 60 minutes TEG K values for the HOC and Hextend® groups were significantly longer compared to control (p<0.01). There were no significant differences in TEG R or angle.

Conclusion: Administration of intravenous Hextend® adversely affected measures of coagulation as compared to the intravenous administration of HOC or no fluid arms in our model swine model of severe hemorrhage.
AUTOMATED INFUSION PUMP SOFTWARE (AIPS) DESIGN TO CONTROL BLOOD PRESSURE

“Bill” Hao Wu, B.S.¹, Ali Seifi, M.D.², & Sos Agaian, Ph.D.³

¹Department of Biomedical Engineering, The University of Texas at San Antonio; ²Neuro Critical Care, Department of Neurosurgery, The University of Texas Health Science Center at San Antonio; ³Department of Electrical Engineering, The University of Texas at San Antonio

Background: The care of critically ill patients has in recent years become more demanding for medical teams and grown steadily in complexity. One of the most useful electronic devices in the ICU is an infusion pump. Automated infusion pumps are capable of adjusting the rate of infusion with computerized algorithms using patient’s physiological data in real time, thereby reducing human errors and related hemodynamic alterations, and resulting in better patient care and safety. When there are persistent difficulties in maintaining stability of pressure by manual control of infusion, such as when transferring injured soldiers from battlefield or during natural disaster mass casualty events, there is not enough manpower to control the infusion rate of medications to the patients. The excessive time required to monitor and adjust the rate of infusion pump prompted us to investigate the feasibility of applying automatic control techniques in the clinical setting.¹⁻⁶

State of Art: Modern infusion pump systems offer wireless network communication to a centralized server for data connectivity and library updates, use of Radio Frequency Identification (RFID) tags, and incorporation of a barcode medication administration (BCMA) system.⁷⁻⁸ Current products, however, still required caretaker intervention to adjust the infusion rate of any medication. The primary aim in this project is to design an Automated Infusion Pump Software (AIPS) to administer medications, which are in use for hypotensive and hypertensive critical conditions.

Methods: The project has 2 Phases - the first phase is to design and develop the AIPS in software only, using computer simulated environments (Matlab, xCode) to simulate the external environment. The second phase then tests the functionality of the AIPS by using a setup mimicking hypotension and hypertension and monitoring fine tuning response of the AIPS setup.

Conclusion: Clinical experience shows that automatic control of infusion is safe, effective and is usually superior to manual methods. With an automatic controller, pressure is frequently maintained within a narrow range of a desired value. Automated infusion pumps are capable of adjusting the rate of infusion with computerized algorithms using patient’s physiological data in real time, thereby reducing human errors and related hemodynamic alterations, resulting in better patient care and safety.


References
MITOCHONDRIAL DAMAGE ASSOCIATED MOLECULAR PATTERNS (DAMPs) AND GAMMA DELTA T-CELLS: POTENTIAL EFFECTORS IN THE WOUND HEALING RESPONSE

Meenakshi Rani, PhD¹, Qiong Zhang, MS¹, Travis L. Holloway, MD¹, Salvador Sordo, MD¹, and Martin G. Schwacha, PhD¹,²

¹Department of Surgery, University of Texas Health Science Center at San Antonio; ²US Army Institute of Surgical Research, Fort Sam Houston, TX

Background: Gamma delta T-cells have been shown to be important to the early immunoinflammatory response to injury, independent of infection. This unique T-cell population acts to regulate cell trafficking and the release of cytokines and growth factors. We propose this sterile inflammatory response is in part associated with DAMPs generated by major injury, such as burn, and mediated via toll-like receptors (TLRs). Mitochondrial DAMPs (MTDs) have been shown to activate splenic γδ T-cells. Nonetheless, it is unknown whether MTDs can activate γδ T-cells that reside in skin.

Methods: Gamma delta T-cells were isolated from the skin of naïve male C57BL/6 mice by enzymatic digestion. Mitochondria were isolated from mouse livers and MTDs were generated by sonication and centrifugation. Purified γδ T-cells were incubated with various concentrations of MTDs (0-500 μg/ml) for 24 h and cells and supernatants were collected. T-cells were phenotyped for TLR expression by flow cytometry and the supernatants were assayed for cytokine and growth factor content.

Results: MTDs activated dermal γδ T-cells, as evidenced by a dose-dependent increase in TLR-2 and TLR-4 expression. MTDs also induced the production of inflammatory cytokines (IL-1β, IL-6 and IL-10), chemokines (RANTES) and growth factors (PDGF and VEGF) by γδ T-cells.

Conclusions: These findings support the concept that MTDs released after tissue/cellular injury, such as burn, are capable of activating dermal γδ T-cells. We propose that the activation of this unique T-cell population is central in the initiation of sterile inflammation and also contributes to the subsequent healing processes.
WHEN PIGS FLY - SUS SCROFA DOMESTICA AS AN MRI MODEL
FOR HYPOBARIC NON-HYPOXIC EXPOSURE EFFECTS UPON THE BRAIN

Jeremy Bernot¹, Bradley Carra¹, Paul Sherman¹,², Derek Mathis³, Peter Kochunov⁴, and Stephen McGuire²,⁵

¹Department of Radiology/Neuroradiology, Wilford Hall Ambulatory Surgical Center and Brooke Army Medical Center, Joint Base San Antonio, TX; ²U.S. Air Force School of Aerospace Medicine, Aerospace Medicine Consultation Division, Wright-Patterson AFB, OH; ³Department of Pathology/Neuropathology, Wilford Hall Ambulatory Surgical Center and Brooke Army Medical Center, Joint Base San Antonio, TX; ⁴Department of Psychiatry, University of Maryland School of Medicine, Baltimore, MD; ⁵Department of Neurology, Joint Base San Antonio, TX.

Hypothesis: We postulated repeated exposure to hypobaric non-hypoxic environments will induce subcortical white matter injury in Sus scrofa domestica. The purpose is to prove a valid animal model for further investigation of hypobaric exposure related white matter injury demonstrated in high altitude pilots and aerospace physiology technicians.

Methods: 8 mini-pigs were exposed to 6 eight-hour repeated episodes of non-hypoxic hypobaria following one hour of denitrogenation (100% oxygen prebreathing) over a two week period. The pigs were under general anesthesia and veterinary technician/nurse monitoring. MRI was used pre- and post-exposure as well as four weeks post-exposure for characterization of structural change (3 MRI exams for each animal). Additionally inflammatory serological markers and brain necropsy were performed. 3 additional control group mini-pigs were placed in the altitude chamber and remained at sea level on room air oxygen concentration. Control animals underwent a total of 2 MRI exams, prior to and post sham exposure only. Laboratory data and necropsy were also performed. MRI imaging was performed on a 3 Tesla Siemens Verio magnet. The protocol included six sagittal MPRAGE sequences with TI varying from 766-801, MRS with TE 30 and 135 within the right and left frontal regions, 3D sagittal FLAIR, sagittal T2 FSE, susceptibility weighted imaging, diffusion imaging (55 directions), diffusion tensor Q space imaging, and contrast enhanced echo planar perfusion imaging (approximately 3 hour exam). Necropsy was performed by a veterinary pathologist and the brain specimens were evaluated by a fellowship trained neuropathologist.

Results: The initial two swine experimental group animals experienced fatal pulmonary decompression sickness. After revising the protocol, no FLAIR signal abnormality, hemosiderin deposits, or other structural change was observed in the 8 remaining pigs. A swine anatomic atlas is under construction from the first 10 animal subjects. Analysis of MRS, DTI and perfusion imaging is in process and will be presented. Initial neuropathologic results are not conclusive for evidence of neurologic decompression sickness.

Conclusion: This study demonstrated that swine can survive repeated exposure to hypobaric conditions in a tightly controlled environment; in other words, pigs can fly. However preliminary results suggest this may not be an ideal model for hypobaric exposure related brain injury investigation. Further research is required including the inclusion of more subjects prior to rejecting this as a model for neurological decompression sickness and white matter injury.
MORNING ORAL PRESENTATION ABSTRACTS
Focus Area: Military and Veteran Public Health and Wellness
UTILIZATION OF VA, MILITARY, AND COMMUNITY-BASED CARE AMONG OEF AND OIF VETERANS WITH PTSD

Background: Posttraumatic stress disorder (PTSD) affects nearly one-fifth of veterans of Operations Enduring Freedom (OEF) and Iraqi Freedom (OIF). The Departments of Defense (DoD) and Veterans Affairs (VA) have both invested in making evidence-based psychotherapies (EBPs) for PTSD available nationwide; however, little is known about the choices made by veterans with PTSD as they seek care across the spectrum of VA, military, and community-based settings.

Materials & Methods: We compared PTSD care utilization patterns among Texas OEF/OIF veterans with PTSD, an ethnically, geographically, and economically diverse group. We used a crosswalk of VA administrative data from the OEF/OIF Roster and VETSNET to identify all OEF/OIF veterans in Texas with service-connected disability for PTSD (approximately 27,500). We then randomly selected 1124 OEF/OIF veterans stratified by sex, rurality, and current use of any VA care, who were mailed invitations to participate in an online survey using a modified Dillman method. Respondents were classified into care utilization groups based upon reported care settings for PTSD in the prior 12 months. Responses were weighted to account for sample stratification and for response rate within each strata. Demographics, PTSD severity, preferences, and perceived barriers were determined for each utilization group and compared. A multinomial logistic regression model was used to predict utilization group based on respondent characteristics, with the intent of finding the variables of most importance in determining which care setting a veteran will choose.

Results: Based on responses of 237 veterans, it is estimated that 57% of the subject population received PTSD-related care at VA facilities only in the prior year. Another 9% received PTSD care in either military or community-based settings and 14% received care in both VA and non-VA settings; the remaining 20% reported no professional PTSD care in the prior year. Classification models indicate that PTSD severity, ethnicity, education level, economic factors, and utilization of VA for non-PTSD care are key factors associated with current care-seeking; sex, rurality, and expressed preference for care setting were not significant in determining utilization group.

Conclusion: These findings provide new insight into Veterans’ healthcare-decision-making to aid in targeting mental health care delivery and engagement strategies.

The views expressed in this presentation are solely those of the authors and do not represent the views of the Department of Veterans Affairs or the U.S. Government. The research was supported by the Department of Veterans Affairs, Health Services Research & Development Service (PPO 13-163). Please address any questions to mader@uthscsa.edu
PREOPERATIVE SIMULATION EDUCATION FOR VETERANS REDUCES ANXIETY, INCREASES KNOWLEDGE AND SATISFACTION

Dr. Bonnie Haupt, DNP, RN, CNL, CHSE, VA South Texas Healthcare System

Abstract: Veterans receiving Coronary Artery Bypass Graph (CABG) surgeries have expressed anxieties over a lack of understanding of post-operative care and expectations. This lack of understanding can affect communication, patient experience, satisfaction and overall Veteran outcomes. The presentation will address how a new innovate high-fidelity simulation educational intervention was aimed to evaluate the influence of simulation education on Veterans undergoing CABG surgeries knowledge, satisfaction, anxiety and length of stay.

Background: In the last decade, new research has emerged incorporating advanced technology into patient education sessions that provide an advantage over usual teaching methods. Simulation use as an educational tool has proven successful within many professional disciplines including the aviation, medicine, military and nursing professions. The use of simulation education for patients is the next logical step for advancing the interactive educational tool. The feasibility study explored high-fidelity simulation as an educational method with Veterans undergoing CABG surgery, aimed to evaluate its influence on Veteran knowledge, satisfaction, anxiety and length of stay.

Methods: An experimental pretest posttest design was used with Veterans scheduled to receive CABG surgery to evaluate the influence of a high-fidelity simulation patient education intervention. Kolb’s Experiential Learning Theory was utilized in the development of the educational intervention. Kolb’s Theory focuses on meeting the learning needs of individual learners by incorporating diverse learning methods into educational experiences. The control group received VA established usual CABG pre-operative education. The usual CABG education included an educational session in a clinic environment with the Cardiothoracic APRN in a one-to-one, face-to-face for approximately one hour. The intervention group received usual education information however; the teaching method incorporated a high-fidelity simulation experience, with a mannequin in an educational setting resembling an ICU environment with the researcher for approximately one hour.

Results: The use of a high-fidelity simulation education revealed a significant increase in Veteran knowledge (p = .0001) and satisfaction (p = .03) as well as a significant decrease in state anxiety (p = .02) compared to the control pre-CABG education sessions. Although no significant difference between the groups in length of stay was identified. An independent groups t test indicated that the Veteran participants in the high-fidelity intervention group were significantly older than the Veterans serving in the usual control group (p = .03). Research has identified that patients who are older have longer hospital stays nevertheless the older simulation group discharge dates did not differ significantly from usual group.

Conclusions: This innovative experience explored simulation as an educational method with Veterans undergoing CABG surgery. In hopes of improving patient understanding and outcomes, the findings suggest there is great potential for use of high-fidelity simulation as an educational tool for meeting patients’ individual learning needs.
PTSD CARE PRACTICES AND EDUCATION PREFERENCES AMONG COMMUNITY-BASED PRESCRIBERS AND PSYCHOTHERAPY PROVIDERS IN TEXAS

Erin P. Finley, PhD MPH\textsuperscript{1,2}, Polly H. Noel, PhD\textsuperscript{1,2}, Shuko Lee, MS\textsuperscript{1}, Elizabeth K. Haro, BS\textsuperscript{2}, Hector A. Garcia, PsyD\textsuperscript{1}, Mary Jo Pugh, PhD RN\textsuperscript{1,2}, and Jacqueline A. Pugh, MD\textsuperscript{1,2}

\textsuperscript{1}South Texas Veterans Health Care System;
\textsuperscript{2}The University of Texas Health Science Center at San Antonio.

Background: National health care reforms and the Veterans Choice Act are expected to increase the number of veterans seeking care outside of VA, but little is known about community providers’ attitudes and use of practices for screening, assessment, prescribing and/or psychotherapy in PTSD care. We assessed PTSD care practices and preferences for education and training among community providers across Texas.

Materials & Methods: We invited Texas primary care and mental health providers to participate in a mailed or online survey. Providers were identified using state licensing board rosters, and included all clinical and counseling psychologists with listed email addresses (n=3,986), and stratified samples of psychiatrists, primary care providers, nurse practitioners, social workers, marriage and family therapists, and professional counselors (500 per profession). Eligibility criteria included maintaining an active practice (>1 patient in past year) and working primarily with adults.

Results: 126 eligible prescribers and 505 eligible psychotherapists returned surveys (10.1% response rate). Providers reported treating approximately 4574 veterans with PTSD in the past year. Nearly half of providers (47% prescribers; 49% psychotherapists) were unfamiliar with any clinical practice guideline for PTSD. Approximately one-third of prescribers reported no prior training in appropriate prescribing for patients with PTSD; the majority of psychotherapists reported no prior training in cognitive processing therapy (76%) and prolonged exposure (84%), two recommended evidence-based psychotherapies for PTSD. Providers (82% prescribers; 72% psychotherapists) reported interest in learning more about evidence-based practices in PTSD care.

Conclusion: Although community-based primary care and mental health providers in Texas report treating significant numbers of veterans with PTSD, many lack training in appropriate care practices. Community providers report high levels of interest in increased training in evidence-based practices for PTSD. As growing numbers of veterans seek PTSD care services in community settings, these findings suggest VA has an important opportunity to partner with community providers to ensure veterans receive high-quality care.

The views expressed in this presentation are solely those of the authors and do not represent the views of the Department of Veterans Affairs or the U.S. Government. The research was supported by the Department of Veterans Affairs Quality Enhancement and Research Initiative (RRP 12-509). Please address any questions to finleye@uthscsa.edu.
MORNING ORAL PRESENTATION ABSTRACTS
Focus Area: Regenerative Medicine
Background: Consistent advances in body armor and combat casualty care have resulted in soldiers in current conflicts surviving battlefield trauma after sustaining catastrophic injuries. However, certain injury patterns are not reconstructable by current standards of practice. Specifically, devastating maxillofacial and upper limb injuries often cannot be reconstructed to give adequate functional recovery with current standard reconstructive techniques. Reconstructive transplantation, or vascularized composite allotransplantation (VCA), offers a potential solution to this problem. This technique, however, is currently limited by the requirement for systemic immunosuppression that can confer significant morbidity and mortality. Using porcine models of VCA, we evaluated the efficacy of locally administered immunosuppression to delay rejection in the absence of systemic immunosuppression. Eliminating the need for systemic immunosuppression through donor tissue-specific immunomodulation will unlock the field of reconstructive transplantation.

Methods: Swine with a single swine leucocyte antigen (SLA) mismatch were used in two experiments. First, gracilis myocutaneous flaps were transplanted heterotopically into recipient necks. Group 1 (controls, n=8) received no additional intervention. In group 2 (experimental, n=8), 20μg of drug-eluting microparticles loaded with IL-2, TGF-β, and rapamycin, were injected into subdermal donor tissues. Serum and tissue were collected for 14 days and assessed for rejection based on the Banff scale. The second experiment employed an orthotopic forelimb transplant. Group 3 (controls, n=4) received no additional intervention. Group 4 (experimental, n=4) received an enzyme-responsive, tacrolimus-eluting hydrogel injected into the subcutaneous space of the donor forelimb. Serum and tissue were collected until clinical evidence of limb rejection, or 90 days.

Results: In Group 1, the mean time to grade 1 and grade 4 rejection was 6.4 days (SD=0.52) and 10.5 days (SD=2.6), respectively. In Group 2, grade 1 and 4 rejection were absent at 14 days. Group 3 animals rejected at 6-7 days. In Group 4, two animals were euthanized in the early post-operative period for technical flap failure. The two other animals in Group 4 had no clinical signs of rejection at 32 and 63 days, respectively, but were euthanized for weight loss.

Conclusion: Donor tissue-specific immunomodulation is possible and is evolving. Obviating the need for systemic immunosuppression through the use of locally applied agents will dramatically potentiate the field of reconstructive transplantation by increasing the reliability and safety of these transplant procedures.
TSPAN8 EXPRESSION DISTINGUISHES SPERMATOGONIAL STEM CELLS FROM PROGENITORS AMONG NEONATAL MOUSE UNDIFFERENTIATED SPERMATOGONIA

Brian P. Hermann, Ph.D.¹, Thu Nguyen, B.S.¹, Kazadi Mutoji, Ph.D.¹, Christopher B. Geyer, Ph.D.², Amy Kaucher, B.S.³, John R. McCarrey, Ph.D.¹, and Jon M. Oatley, Ph.D.³

¹Department of Biology, College of Sciences, The University of Texas at San Antonio; ²Department of Anatomy & Cell Biology, East Carolina University; ³Center for Reproductive Biology, Washington State University

Mammalian spermatogenesis is maintained by self-renewal and differentiation of spermatogonial stem cells (SSCs), which produce progenitor spermatogonia that have a finite replicative lifespan and will generate the remaining germ cells in the spermatogenic lineage. SSCs and progenitors together comprise the undifferentiated spermatogonial pool, but no single molecular feature has been shown to distinguish these functionally-distinct cell populations. We previously demonstrated existence of subpopulations of undifferentiated spermatogonia based on gene expression heterogeneity at the single-cell level. Twenty-seven of the 172 examined genes were expressed in a bimodal fashion among Id4-eGFP+ spermatogonia (i.e., present/absent), suggesting they mark two or more discrete cell subpopulations of undifferentiated spermatogonia.

Flow cytometry with antibodies against cell surface proteins (TSPAN8, EPHA2, and PVR) encoded by three of these bimodal mRNAs demonstrated that 29.87 ± 2.57% of Id4-eGFP+ cells were positive for only one of three surface proteins while 30.37 ± 7.09% were positive for two markers. In both cases, PVR staining was predominant. Co-localization of all three markers was observed in 14.44 ± 8.21% of P6 Id4-eGFP+ cells and 25.32 ± 13.03% were triple-negative. Subsequent cell sorting experiments demonstrated that mRNA levels of other bi-modally expressed genes were enriched in TSPAN8 high and EPHA2 high subpopulations of Id4-eGFP+ cells. Further, transplantation studies demonstrated enrichment of SSCs in the TSPAN8-high population of P6 Id4-eGFP+ cells. Together, these studies provide additional support for the notion that there are discrete subpopulations of undifferentiated spermatogonia in the neonatal mouse testis and demonstrate that these subpopulations have differing functional capacities. This information will help identify the elusive SSC in human testes and provide a means of characterizing cells intended for therapeutic SSC transplantation for treating infertility.

This study was supported by NIH grants HD062687 (BPH), HD061665 (JMO), HD072552 (CBG), and GM092334 (JRM), NSF grant 1337513 (BPH), the Max and Minnie Tomerlin Voelcker Fund, the Helen Freeborn Kerr Charitable Foundation, the Robert J. Kleberg, Jr. and Helen C. Kleberg Foundation, and The University of Texas at San Antonio
IDENTIFICATION OF A NOVEL THERAPEUTIC TARGET FOR TREATMENT OF GASTROINTESTINAL COLONIZATION WITH MULTI-DRUG RESISTANT ACINETOBACTER BAUMANNII

Patrick Ketter, MB, MLS (ASCP)\textsuperscript{cm}, M. Neal Guentzel, Ph.D., Rishein Gupta, Ph.D., Jieh-Juen Yu, Ph.D., James Chambers, Ph.D., and Bernard Arulanandam, Ph.D.

Department of Biology, College of Sciences, The University of Texas at San Antonio

Background and Significance: Acinetobacter baumannii is among the most common causes of combat related infections in recent history. Ubiquitous in nature and resistant to desiccation, this organism is also of major concern for nosocomial settings. Furthermore, multi- and extreme-drug resistance, linked to gastrointestinal (GI) colonization, has created difficulties in treatment and control of these infections, increasing risk of sepsis. Recently, studies indicate A. baumannii is capable of degrading secretory IgA (SIgA), the primary humoral immune defense at mucosal surfaces, the mechanism and purpose of which is poorly understood.

Methods: The in vivo contribution of SIgA to bacterial colonization was assessed using WT, IgA-/- and plgR-/- KO mice through in vivo live imaging assays. Using protease and thiol-reductase inhibitors, we examined the mechanism of SIgA degradation by A. baumannii. Intestinal sections collected from WT, IgA-/- and plgR-/- KO mice were used to assess contributions of SIgA and secretory component (SC) to intestinal adherence of this bacterium. Finally, Modulation of A. baumannii mRNA gene transcripts corresponding to proteins involved in disulfide bond reduction were assessed through RNAseq and confirmed by RT-qPCR following SIgA exposure.

Results: In vivo imaging assays revealed WT mice with normal SIgA levels exhibited greater persistence of A. baumannii in the GI track following oral gavage compared to IgA-/- and plgR-/- KO mice. Additionally, degradation of SIgA by A. baumannii was significantly reduced following inhibition of thiol-reductase activity. Intestinal section assays also revealed both the lack of SIgA and inhibition of its degradation by A. baumannii significantly decreased bacterial intestinal adherence. Finally, thioredoxin-A, a gene implicated in immunoglobulin degradation in other bacterial systems, was found to be up-regulated following SIgA exposure by RNAseq and RT-qPCR analyses.

Conclusion: SIgA enhances A. baumannii GI colonization. Additionally, use of a thiol-reductase inhibitor to prevent SIgA degradation by A. baumannii significantly reduces bacterial adherence to the intestinal epithelium indicating a potential drug target to prevent colonization and emergence of additional drug resistance.
Aims: Consistent advances in body armor and combat casualty care have resulted in soldiers in current conflicts surviving battlefield trauma after sustaining catastrophic injuries. Reconstructive transplantation, or vascularized composite allotransplantation (VCA), offers a means for superior functional recovery following devastating maxillofacial and upper limb injuries compared to traditional reconstructive techniques. Here we evaluate the efficacy of hydrogen sulfide (H2S) as a targeted, graft-specific treatment, to mitigate reperfusion injury and delay the onset of acute rejection in a porcine VCA model. Translating these results may reduce dosing requirements for systemic immunosupression, allowing for reduced toxicity and improved applicability of VCA as a reconstructive technique.

Methods: Gracilis myocutaneous flaps were procured from Yorkshire swine and transplanted heterotopically into single swine leucocyte antigen (SLA) mismatched recipients. Group 1 (controls, n=8) flaps received no treatment before transplantation. Group 2 (experimental, n=8) flaps received ex-vivo, intra-arterial infusion with H2S solution (1 mL of 11.6-mg/mL solution per 400 g [weight of flap]). Venous perfusate was collected and reperfused through the artery for 5 cycles before transplantation. Serum and tissue samples were taken for a 14-day survival period, and rejection graded using the Banff scale. Histologic evaluation was blinded.

Results: The mean time to grade 1 rejection for group 1 and group 2 was 6.4 days (SD=0.52), and 8.9 days (SD=2.3, p<0.05), respectively. The mean time to grade 4 acute rejection was 10.5 days (SD 2.6) for group 1, and >14 days for group 2.

Conclusion: In the absence of systemic immunosupression, ameliorating ischemic reperfusion injury with the use of hydrogen sulfide at the time of allotransplantation effectively delays the onset of acute rejection in VCA grafts.
MORNING ORAL PRESENTATION ABSTRACTS
Focus Area: Behavioral Health
COLLABORATION WITH COMMUNITY MENTAL HEALTH SERVICE PROVIDERS: A NECESSITY IN CONTEMPORARY SCHOOLS

Victor Villarreal, Ph.D., & Felicia Castro-Villarreal, Ph.D.

Department of Educational Psychology, The University of Texas at San Antonio

School-based professionals are in a position to provide direct mental health services to youth, and they have become the de facto mental health provider for most children in the U.S. (Green et al., 2013). However, limitations (e.g., limited time, limited resources) restrict the availability and effectiveness of school-based mental health services; thus, collaboration with non-school-based community mental health providers (CMHPs) is oftentimes necessary and is, indeed, considered best practice (Natasi & Varjas, 2008). Collaboration can serve to address the limitations of school-based services; furthermore, it can enhance and complement school-based services.

Purpose and Methods: In this paper, we present results of a survey of the collaboration practices of school psychologists, including (a) collaboration frequency and (b) barriers to collaboration; 254 participants completed the mailed survey. Subsequently, we discuss effective ways to overcome the barriers most frequently reported by participants.

Results: Approximately 34.9% of the participants reported that they never collaborated with CMHPs during the preceding year. Approximately 41.1% collaborated 1-3 times per year; 10.4% collaborated 4-6 times per year; 5.2% collaborated 7-9 times per year; 4.1% collaborated at least twice per month; 3.6% collaborated once per month.

A majority of the participants (67.2%) noted that a barrier to collaboration was that CMHPs were not accessible. Other noted barriers included: inadequate amount of time (48.4%); use of different diagnostic systems (45.3%); parents not consenting to collaboration (37.5%); information obtained from CMHPs was not relevant to their work (26.6%); and lack of knowledge about how to collaborate effectively (17.7%).

Discussion: Results of this study indicate that collaboration between school psychologists and CMHPs is not occurring as frequently as it could; indeed, over one-third of school psychologists indicated that they never collaborated with CMHPs during the previous year. The reported collaboration barriers suggest increased need for cross-disciplinary training about the roles of mental health providers working in different settings, as well as purposeful education on effective collaboration techniques. Our paper discussion focuses on these and other ways to increase and improve collaboration efforts.

This research was supported by a UTSA College of Education and Human Development Faculty Research Award.

References


The Transitional Care Clinic (TCC) at the University of Texas Health Science Center in San Antonio is an outpatient mental health clinic designed to treat patients for up to 90-days post hospital discharge or ER diversion. The TCC is engagement-focused and follows the 13 best practice guidelines for transitional care services established by the Association for Community Psychiatry. The TCC provides rapid access to psychiatric providers, counselors, and care coordinators as well as Cognitive Adaptation Training, an evidence-based, home-delivered treatment using environmental supports such as signs, labels, electronic devices and the organization of belongings to bypass cognitive and motivational impairments that characterize serious mental illness. Patient-centered care is enhanced by a philosophy of shared-decision making and all providers are trained in this model. The TCC is funded by the Methodist Health Care Ministries and the 1115 Medicaid Waiver program.

Our training program prepares psychiatry and psychology residents, medical and nurse practitioner students, as well as social work and counseling students to work deliberatively together in a recovery oriented way to build a health care system that is focused on patient centered care and improving patient outcomes. Faculty and students work together collaboratively and across disciplines, learning each other’s roles, valuing one another’s contributions, and enhancing mutual respect in a non-hierarchic model, developing a shared value system, while fostering a culture supporting patient/family participation and mutual decision making. We focus on developing interprofessional collaborative practice outcomes for our learners as defined by the Interprofessional Education Collaborative Expert Panel (IECEP, 2011) in four competency domains (values and ethics, roles and responsibilities, interprofessional communication, and teams and teamwork). Patient outcomes are enhanced by psychiatric providers working closely with therapists and care managers to inform decision making, create synergy, and facilitate recovery and readiness to transition.

Finally, the TCC provides ample opportunities for clinical/research collaboration allowing university researchers access to a rich and varied group of individuals with lived experience of mental illness to serve as partners for research and as research participants. The TCC is the site for a funded PCORI (Patient-Centered Outcomes Research Institute) grant focusing on engagement-focused care which examines our unique “limited waiting” group intake process called Access Group and the assistance of a shared-decision making coach to help patients in making decisions about their treatment and communicating their preferences to their provider. The success of the TCC is based upon this tri-fold mission of providing state of the art clinical care, interdisciplinary training and workforce development, and research collaboration. The proposed presentation will detail the research base in each of these three areas, and will include preliminary data from our PCORI research study.
The purpose of this project is to use Nurse Initiated Therapeutic Music as a means to assist in the reduction of pain in postsurgical patients. Individual MP3 music players with pre-loaded music and disposable headphones were provided to patients to use in conjunction with the pharmacological therapy. The purpose of this evidence based project was to provide supplemental methods to reduce pain along with the use of narcotics for pain management. All patients admitted as an inpatient are eligible to participate in this project and are given a brochure to explain the project. Upon discharge, patients completed a Patient Pain Management Satisfaction Questionnaire to track their opinion on how therapeutic music worked as an adjunct to their pain management during their stay and the MP3 players were returned.

Using the Iowa model a focused question was developed and literature review was completed. The ward staff was in serviced on the use of the Nurse Initiated Therapeutic Music project along with the patient questionnaire to be given at discharge post Therapeutic Music. Each week surveys were reviewed and the information was entered in to an Excel spreadsheet.

The results showed a large increase in patient satisfaction was seen after the initiation of the Therapeutic Music being offered to patients. Decreased in PRN narcotics were seen among some of the patients. Of those patients using the MP3 players 98% believed music helped control their pain and had relief in their pain score. Nurse Initiated Therapeutic Music will continue to be offered to all patients as supplemental pain management.

Therapeutic Music is an alternative method for pain management that has been proven to be beneficial with the combination of other pharmacological therapies in decreasing patient’s pain and increasing patient’s comfort level. Therapeutic music leads to greater patient satisfaction with pain management and is a cost effective nursing intervention.

Special thanks to the BAMC Auxiliary whose hard work throughout the years provided the funding for the MP3 players, MP3 chargers and disposable headphones.

The view(s) expressed herein are those of the author(s) and do not reflect the official policy or position of Brooke Army Medical Center, the U. S. Army Medical Department, the U. S. Army Office of the Surgeon General, the Department of the Army, the Department of the Air Force and Department of Defense or the U. S. Government.
MORNING ORAL PRESENTATION ABSTRACTS

Special Session: Hearing Health—Policy, Practice and Collaboration
**THE EPIDEMIOLOGY OF HEARING INJURIES, NOISE EXPOSURES AND HEARING LOSS IN THE MILITARY**

David Gimeno, PhD¹, Jose A. Betancourt, DrPH¹, David L. Tucker, BS², Kristina W. Whitworth, PhD¹, Natasha S. Gorrell, MSPH¹,², Tanisha L. Hammill, MPH⁴, MAJ Andrew J. Senchak³, and Col. Mark D. Packer⁴

¹The University of Texas Health Science Center at Houston, School of Public Health, San Antonio, TX; ²The Geneva Foundation, Tacoma, WA; ³Walter Reed National Military Medical Center, Bethesda, MD; ⁴Department of Defense Hearing Center of Excellence, Joint Base San Antonio, Lackland, TX

**Background:** The incidence and severity of Service-related hearing impairment and noise-induced hearing injury (HINIHI) are very high among Department of Defense (DoD) personnel, as evidenced by the growth of related Veterans Benefit Administration disability compensation payments. Insufficient information exists to quantify the risk of noise on the auditory health of U.S. Active Duty Service Members, or the impact of hearing loss on Military readiness, population health, troop management or health utilization. We will present the latest findings from the DoD Epidemiologic and Economic Burden of Hearing Loss Study (DEEBoHLS) regarding HINIHI rates among active-duty Service Members. DEEBoHLS is a collaborative project between the DoD Hearing Center of Excellence (HCE), The University of Texas School of Public Health (UTSPH), and the Veterans Health Administration.

**Methods:** For the main epidemiological analysis, we included 18-64 year old Active Duty Armed Forces (USAF, USA, USN, USMC, USCG) serving during fiscal years (FY) 2008 to 2012, and who have at least one clinical encounter with selected ICD-9 diagnosis of HINIHI. We will identify cases of HINIHI from direct care and paid provider data sources, and the Defense Occupational and Environmental Health Readiness System – Hearing Conservation database (DOEHRS-HC). The Defense Manpower Data Center will provide data on at-risk denominators by the demographic and job-related characteristics.

**Results:** We will report prevalence and cumulative incidence rates of HINIHI based on several case definitions. We will report rates by demographic characteristics, employment characteristics and occupational category. We will also report on differences in rates by FY. Finally, we will present a comparison with published DoD and civilian rates for comparable case definitions.

**Conclusions:** DEEBoHLS will lay the groundwork for comprehensive epidemiologic studies of hearing outcomes among U.S. military personnel, drawing much needed attention to this critical issue, encouraging initiatives to improve the auditory health and wellbeing of Service Members.

**Funding:** This material is based upon work supported by the Air Force Research Laboratory under Contract No. FA8650-12-C-6358.
In recognition of hearing problems related to military service, the Defense Hearing Center of Excellence (HCE) was legislated by Congress in the Duncan Hunter National Defense Authorization Act for Fiscal Year 2009 (Section 721), Public Law 110-417. The HCE is tasked with heightening readiness and continuously improving the hearing health and quality of life of Service members and Veterans. The HCE accomplishes this through advocacy and leadership in the development of initiatives focused on the prevention, diagnosis, mitigation, treatment, rehabilitation, and research of hearing loss and auditory-vestibular system injury.

The HCE delivers solutions that promote prevention, improve delivery and transition of care, and coordinate the translation of research. The HCE is focused on enhancing readiness and improving hearing health and quality of life for Service members and Veterans. The HCE’s primary responsibilities include:

- Developing a data registry to track hearing loss and auditory-vestibular system injuries across the Armed Forces, and sharing such registry data with the Department of Veterans Affairs (VA).
- Encouraging and facilitating the conduct of research.
- Developing best practices and clinical education.
- Ensuring the coordination and delivery of VA rehabilitation benefits and Services to former Service members.

The HCE has provided a unified voice as a cohesive, large-scale hearing health improvement network. The HCE continues to promote collaboration, facilitate integration, and serve as an advocate for hearing health across DOD and VA health care systems. The HCE engages in joint collaboration with other federal health care organizations, academia, and private sector organizations allowing HCE to deliver solutions and identifying initiatives to meet its congressional mandate. We will discuss HCE’s initiatives highlighting those in the following domains:

- Information Management/Registry Development
- Prevention
- Clinical Care, Rehabilitation, and Restoration
- Research Coordination
- Outreach
The standing total for disabilities of the auditory system for Veterans is 2.12 million (Veterans Benefits Administration, Annual Benefits Report for Fiscal Year 2013). The most prevalent service-connected disabilities for Veterans who began receiving compensation during Fiscal Year 2013 were tinnitus (#1) and hearing loss (#2). It is a significant problem that has been rising annually since 2001 in military and Department of Defense (DoD) noise-exposed civilian populations. The ability to hear and communicate is 1) Critical to Warrior and unit safety; 2) Central to effective command and control; 3) A vital component for mission accomplishment; 4) A key consideration in Force Management: Attrition, retrain, replace. Yet there remains an insufficient validated, evidence-based DoD Auditory Fitness For Duty (AFFD) standard.

The Institute of Medicine (IOM) 2005 study and Government Accountability Office Report 11-114 identified gaps and shortfalls and made recommendations for improvement in DoD Hearing Conservation Programs (HCP). The DoD Hearing Center of Excellence (HCE) is working with Service hearing conservation subject matter experts to address a number of issues, including an integrated approach to create the best standards and promote the best programs and policies for hearing conservation and hearing loss treatment.

The growing prevalence of hearing loss in DoD has made it increasingly important for medical personnel to have access to validated, evidence-based AFFD standards that link operational performance to clinical measures of hearing loss. These standards are needed to ensure that personnel with hearing loss that does not impair mission effectiveness are retained in their current positions, and that those who have hearing loss that has reached the point that they endanger themselves or others are promptly reassigned. This is an extremely important issue for maintaining operational readiness, as hearing loss is a common reason for medical boarding action.

This presentation will discuss the progress of the DoD AFFD Working Group, as well as the relationships with the HCE, other organizations, and personnel associated with AFFD management, requirements generation, funding, training, testing, sustainment, and modernization.

Address queries to Major Curtis via email (kwame.curtis@us.af.mil) or phone (210-292-4100).
Research to develop pharmacologic otoprotective agents to prevent, reduce, or reverse recent onset noise- or drug-induced hearing loss has been ongoing for over four decades. The research methodologies employed across studies of otoprotectant/otorescue agents are disparate, incomparable, and unregulated. The Department of Defense (DOD) Hearing Center of Excellence (HCE) Pharmaceutical Interventions in Hearing Loss (PIHL) working group, serving as the voice for these issues, has brought together experts from across the DOD, Department of Veteran’s Affairs (VA), Food and Drug Administration (FDA), other US Federal agencies, as well as academia, industry and international partners to produce a series of streamlined guidances, through subject matter expert and stakeholder consensus, for research investigators, program funders, professional societies, publishers, and pharmaceutical developers at large.

To accomplish this goal, the PIHL working group, comprised of experts in Otology, Audiology, Pharmacology, Public Health, Occupational Health, Industrial Hygiene, Statistics, Genomics and other related fields across various institutions, have met regularly since the Fall of 2011, growing in number from less than 50 to over 250 members today, to discuss and create these documents through volunteered support and consensus.

Developed products and ongoing initiatives will be discussed in this forum to explore collaborative pathways and methodologies. The intent of this session is to familiarize the participants with the unique evolution of the PIHL working group, and its application as a potential model for local San Antonio collaborations and innovative alliances.

Address queries to Col. Packer (mark.packer@us.af.mil; 210-292-4100) and Maj. Hammill (tanisha.hammill.ctr@us.af.mil; 210-292-5641).
AFTERNOON ORAL PRESENTATION ABSTRACTS

Focus Area: Pre-Hospital, Emergency, Trauma and Critical Care
EN ROUTE USE OF PARENTERAL OPIOIDS, KETAMINE, AND EPIDURAL ANALGESIA TO TREAT PAIN IN PATIENTS TRANSPORTED OUT OF THE COMBAT THEATER BY US AIR FORCE CRITICAL CARE AIR TRANSPORT TEAMS (CCATT)

Stephanie Russell RN BSN, Alejandra Mora BS, Victoria Ganem RN BSN, and Vikhyat Bebarta, Lt. Col, MC

USAF ECRC 59TH MDW/ST USAISR

**Background:** Critical Care Air Transport Teams (CCATT) transport critically injured patients with acute pain. Different analgesics are administered in-flight. Limited data has been reported about analgesic administration en route, and no study has reported analgesic use for CCATT. Our objective was to describe analgesics used by CCATT for awake, critically injured trauma patients during evacuation from a combat setting.

**Methods:** We conducted an IRB approved, retrospective review of CCATT medical records. Inclusion criteria were non-intubated critically injured trauma patients who were evacuated out of theater (2007 -2012) and received analgesics in-flight. Demographics, injury type, analgesics and anesthetics administered, predefined clinical adverse events (respiratory, cardiovascular etc.) were recorded.

**Results:** Of the 531 patients evaluated, 193 were included in this interim analysis. Mean age was 26 (SD±5) years, 97% male, with 68% blast related trauma, 20% penetrating, 10% blunt, and 2% sustained burns and inhalation injuries. Common opioids were morphine (51%), hydromorphone (41%), and fentanyl (14%). Mean morphine equivalent dose per hour was 6.3 mg (SD±8.8). 61% had a PCA and 10% received oral opioids. 3% received ketamine (n=6), 22% had an epidural (n=42), and 7% a regional block (n=13). 12% received a combination of IV opioid and epidural therapy. Incidence of hypoxia was 3% and a significant change in FiO2 (5%). Subjects with morphine are more likely to have a change in systolic blood pressure (9% vs 2%; p=0.04) as compared to those that did not receive morphine. Incidence of other respiratory and hemodynamic events were similar between IV opioids, ketamine, epidural, and regional block.

**Conclusions:** Most awake combat injured patients transported by CCATT received IV analgesics in-flight and half of these received morphine. 22% had an epidural. Hypoxia occurred rarely but patients that received morphine were more likely to develop hypotension.

**Acknowledgements:** DoDTR/JTS, CCATT Pilot Unit, and DoD – Joint Program Committee (JPC6) for funding support.
A CULTURE CHANGE FOR HOSPITALS AND CAREGIVERS: POSTPARTUM HEMORRHAGE AS A TRAUMA AND UTILIZATION OF COMPRESSION SUTURES TO REDUCE PERIPARTUM HYSTERECTOMY

Richard Meter, M.D., Major¹,³, Karla Davila, M.D., Captain²,³, and Kathy Porter, M.D., Lt. Colonel¹,³

¹Department of the Army; ²Department of the Air Force; ³Brooke Army Medical Center, Department of Ob/Gyn

Background: Nationally, morbidity and mortality of postpartum hemorrhage (PPH) has been identified as a significantly preventable entity. Management of post-partum hemorrhage (PPH) has received accelerated national attention in the past 2 years. The 2014 Military Health System (MHS) Review and 2015 Perinatal Quality Initiative of the MHS obstetrics leadership challenges hospitals and providers to maintain leadership in PPH management. Attention is focused on ensuring the American College of Obstetrics and Gynecology (ACOG) PPH Checklist is followed, and the evolving guidelines of the California Maternal Quality Care Collaboration (CMQCC) are used as a detailed guide to management. At the hospital systems level, compliance mandates the institution of protocols that manage PPH as a trauma. At the provider level, guidelines mandate availability of compression suture placement as a last-step preventative measure to prevent peripartum hysterectomy, a skill which appears deficient nationwide.

Methods: Relevant articles in PUBMED are reviewed with respect to fundamental hospital philosophy changes required to meet the guidelines of the ACOG and CMQCC initiatives. A PUBMED search of techniques and risks of compression sutures is reviewed. An instructional case of modified B-Lynch compression suture without hysterotomy is presented.

Results: We present a perspective of the insidious presentation of PPH as the underlying attribute which often delays treatment and motivates the new stepwise recognition and management of PPH as a trauma. Limited cases of compression sutures applied after vaginal delivery are reported with varying risks. A number of techniques are available however success rates are unconfirmed.

Conclusions: Management of PPH as a “Trauma” entreats a culture change in both hospital and caregivers alike. Hospitals must develop a systems management approach with protocols to ensure availability and allocation of personnel, blood bank, and ancillary resources at a level incumbent on any trauma management. Patients identified prenatally to be at high risk for PPH should preferably be referred for care and delivery at tertiary facilities. When risk for accreta or remnant tissue is low, compression sutures without hysterotomy should be considered prior to peripartum hysterectomy. Time from delivery to suture placement and type of compression suture may influence success rates.
Background: Traumatic Brain Injury (TBI) has contributed substantially to morbidity and mortality on the contemporary battlefield, making TBI the “signature injury” of our current conflicts. Clinicians and others continue to seek optimal treatment and rehabilitation regimens for casualties with TBI. Despite this focus, the influence of TBI on overall trauma morbidity, its effect on coagulation and hemodynamic stability remains to be defined.

Objective: Analyze U.S. Combat Casualty records from the Department of Defense Trauma Registry to evaluate the impact of TBI on coagulation and acid-base status, massive transfusion (MT) requirement, and survival.

Methods: Retrospective cohort analysis from September 2007 to June 2011. The independent variable was the Abbreviated Injury Scale (AIS) for head and facial injuries. We selected serious or greater head injury (AIS-HEAD >=3) as our STBI criteria. Other primary variables of interest included a novel index of serum pH divided by INR, massive transfusion (MT) defined as >10 units of any blood products within the first 24 hours, AIS regional scores exclusive of the head, and 30-day survival. We employed descriptive statistics to interpret the sample group, contingency table analysis, and multiple logistic regression to control for Acute Traumatic Coagulopathy (ATC), shock, and AIS.

Results: 8913 cases were available. 4002 (45%) had data that included INR and serum pH. Of excluded cases, 98% were male, average age 26, 98.7% survived, average ISS was 7 (IQR 1 to 8), and less than 2% received MT. Among included cases, 98% were male, average age 26, average ISS was 10 (IQR 2 to 14), average INR was 1.16 (CI95 1.14 to 1.17), 6.2% received MT, and 98.5% survived. There were 425 cases with STBI (AIS-Head >=3) (10.6%). The univariate odds ratio (OR) for mortality was 8.7 (CI95 5.2 to 14.8; x2 = 103.7; df=1; p < .001). Median values and 95% confidence intervals for clinical variables of interest between STBI vs. others follow: INR 1.2 (1.13 to 1.27) vs. 1.10 (1.13 to 1.16); pH 7.37 (7.36 to 7.38) vs. 7.38 (7.38 to 7.39); and MT 16.9% vs. 4.9%, OR 3.9 (2.9 TO 5.4; X2 = 95.2; df = 1; p < .001). After controlling for all other AIS body regions, OR for mortality associated with STBI was 12.6 (CI 95 7.3 to 21.7; X2 = 92.5; df=6; p < .001). After controlling for pH/INR index, the OR for mortality was 3.8 (CI95 2.1 to 6.8; X2= 293.3; df=2; p < .001). After controlling for all other AIS body regions, the OR for MT was 3.4 (CI95 2.3 to 4.9; X2 = 503.9; df=6; p < .001). After controlling for pH / INR index, the OR for MT was 2.6 (CI95 1.9 to 3.6; X2 = 293.3; df=2; p < .001).

Conclusion: In this study, casualties with STBI were independently associated with increased mortality, MT, greater INR, and lower pH, after controlling for other injuries. Earlier resuscitation focusing on optimizing tissue perfusion and oxygenation, and mitigating coagulopathy in similar populations may improve survival outcome.

The opinions or assertions contained herein are the private views of the authors and are not to be construed as official or as reflecting the views of the Department of the Army or the Department of Defense. We gratefully acknowledge the U.S. Department of Defense Trauma Registry, Fort Sam Houston, Texas, for their assistance and contribution of casualty care data for this study.
Microstructural Features Correlate with Improved Clot Strength of Cold-Stored Platelets

Prajeeda Nair, MS1, Shaunak Pandya, PhD1, Kristin Reddoch, BS1, Shatha Dallo, PhD1, Heather Pidcocke, MD/PhD2, Andrew Cap, MD/PhD2, and Anand Ramasubramanian, PhD1

1Department of Biomedical Engineering, The University of Texas at San Antonio; 2Blood Research, USAISR

Functional platelets are critical in hemostasis. At the site of injury, activated platelets generate thrombin that converts soluble plasma fibrinogen to polymeric fibrin clot; and then actively contract the clot to increase the strength in order to stop bleeding. Currently, platelets are stored up to 5 days at room temperature (RT) with gentle agitation. However, RT storage is suboptimal due to progressive loss of platelet function, increased risk of bacterial contamination, poor shelf-life, and transportation logistics. Cold storage (4 °C) of platelets may mitigate these issues, and holds promise as a superior transfusion product. We previously reported that cold-stored platelets form clots with superior mechanical properties when compared to those from RT-stored platelets. Based on our studies, we hypothesize that cold-stored platelets would develop a denser clot microstructure with increased fibrin cross-linking compared to RT platelets.

The clots were prepared from 4μL platelet rich plasma (PRP) with 300,000 platelets /μL by re-suspending apheresis platelets in FFP and the addition of 20 mM calcium. The clots developed from fresh platelets or platelets stored at RT or at 4°C for 5 days were processed by a standard protocol and stained with Osmium tetroxide. Further, the clots were visualized using scanning electron microscopy, and various attributes such as fibrin diameter, density, fiber length and tortuousity were quantified using image analysis. Tortuousity was estimated as a ratio of arc length to the linear distance between two selected points on the fiber. We measured thrombin generation using CAT assay and relative differences in the levels of FXIII through western blots. We estimated the contractile forces generated while clot formation occurred using normal force measurements by cone and plate rheometer. All the experiments were conducted at least in 3 donors. The differences between mean values were compared using one-way repeated measures ANOVA with post hoc Tukey’s for multiple comparisons and the groups were considered to be statistically significant for P-values less than 0.05.

Clots formed from cold-stored platelets have similar morphology compared to fresh platelets and were characterized by thinner fibers compared to RT-stored platelets. RT-stored platelets developed clots with decreased fibrin density, compared to fresh or cold-stored platelets. Cold-stored platelets produced shorter fibrin fibers with less curvature indicating increased clot ligation along with strong taut fibers compared to RT clots. Both RT and cold storage showed elevated thrombin generation compared to fresh platelets, probably due to increased PS exposure on platelet surfaces. There is increased FXIII activity in cold-stored platelets suggesting either increased FXIII binding from plasma or enhanced preservation of platelet FXIII during cold storage.

Our study demonstrates that cold stored platelets form clots with structures that are similar to fresh platelets. The clot architecture of cold-stored platelets was characterized by increased cross-linking, increased fibrin density and uniform fibrin morphology, correlating with greater clot strength. Conversely, RT-stored platelets form clots with less-defined architecture, and hence weaker mechanical strength. Thus, cold-stored platelets may offer superior hemostasis in bleeding patients.
AFTERNOON ORAL PRESENTATION ABSTRACTS
Focus Area: Community Public Health and Wellness
INCREASING LOW SODIUM OPTIONS IN THE WORKPLACE: SAN ANTONIO’S SODIUM REDUCTION INITIATIVE (CAFETERIA)

Erica T. Sosa, PhD MCHES¹, Sara Ullevig, PhD, RD, LD¹, and Ellen Spitsen, BA²

¹Department of Health & Kinesiology, College of Education and Human Development, The University of Texas at San Antonio; ²City of San Antonio Metropolitan Health District

Background: In response to the lack of healthier options in worksite cafeterias, the San Antonio Sodium Reduction Initiative aims to (1) reduce the sodium in meals provided in the cafeteria and (2) increase the number of lower sodium options available.

Materials: The Sodium Practices Assessment Tool (SPAT) survey developed by New York State included questions about sites current procurement policies, nutrition guidelines/standards, and behaviors regarding sodium reduction. The customer satisfaction survey included demographic characteristics, and purchase and satisfaction (from strongly dissatisfied to strongly satisfied) of with food items targeted for the intervention at the worksite cafeteria.

Methods: The City of San Antonio local health department partnered with worksites to conduct a SPAT analysis to assess current sodium-related practices and identify opportunities for increasing and promoting lower sodium options. After menu items were selected to be modified for the initiative, a customer survey was conducted at 4 locations to calculate the percent of customers who ate the targeted foods and their current satisfaction with the food.

Results: SPAT data revealed managers were willing to work with public health staff in providing data regarding food vendors, sodium practices and alternatives to higher sodium products. Surveyed customers (n=378) reported eating several of the higher sodium meals targeted for the sodium reduction initiative. The targeted items were eaten by 17.9% to 51.4% of customers, with most customers reporting that they were “satisfied” or “strongly satisfied” with the items prior to the modifications.

Conclusions: This study highlights the importance of using a multi-level approach to implement and evaluate initiative impacts. Follow up data will be available in a month to examine post-initiative changes.

Funding for this Sodium Reduction evaluation was provided by the City of San Antonio. Thank you for your continued trust and support during the evaluation process.
THE WITTE MUSEUM'S H-E-B BODY ADVENTURE: TRANSFORMING HEALTH THROUGH CIVIC ENGAGEMENT AND DATA

Bryan Bayles, PhD, MPH\textsuperscript{1,2}, Thomas L. Schlenker, MD, MPH\textsuperscript{3}, John Berlanga, MPA\textsuperscript{3}, and Anil T. Mangla, MS, PhD, MPH, FRIPH\textsuperscript{3}

\textsuperscript{1}The Witte Museum; \textsuperscript{2}Department of Family and Community Medicine, The University of Texas Health Science Center at San Antonio; \textsuperscript{3}San Antonio Metropolitan Health District

**Background:** As the most-visited museum in San Antonio, the Witte welcomes an average of 350,000 visitors annually, of which 150,000 are school-aged children and 80,000 visit free during weekly Free Tuesdays. Visitor demographics mirror those of San Antonio with respect to age, ethnicity, and income, earning the Witte the reputation as "the People's Museum." The Witte's new H-E-B Body Adventure powered by University Health System builds on this equity to address the urgent health needs of our community. The Body Adventure introduces peer modeling, physical activity, gaming technologies, and a regionally relatable cultural focus into a four-story, immersive, indoor-outdoor museum environment. The three key themes of Health IQ, Empowerment, and Wellness shape the content of the exhibition components.

**Materials and Methods:** At the heart of the H-E-B Body Adventure is a pioneering system of networked components called the POWERpass. Visitors to the H-E-B Body Adventure sign-in and select one of twelve Buddies to guide them through four stories of immersive activities focusing on physical activity, healthy eating and the importance of relaxation. The POWERPass provides thoroughly engaging and personalized museum experiences. Decades of evidence-based research rooted in Social Cognitive Theory have demonstrated that self-efficacy and social support are critical to sustained health-behavior change. The POWERpass also allows for rigorous evaluation of entirely anonymous aggregate data metrics on a scale never before available for longitudinally assessing our community's health status through a back-end SQL server database. These include zip-code level demographics (age, gender, ethnicity), measured height and weight (BMI), self-reported fruit, vegetable and soda consumption, physical activity and more. This presentation highlights significant findings from the first full year of baseline data collection, including statistical analyses and maps, and describes how these are being used to identify areas of high-need and inform city-wide strategic planning and public health outreach.

**Results:** In the first year alone, more than 168,000 visitors received POWERpass cards, yielding prevalence estimates for many key health indicators on an unprecedented scale (for instance, more than 30,000 records on fruit, vegetable, and soda consumption). In its first year of operation, the Witte has successfully brought together a creative collaborative to change the culture of health in our city that includes the region's largest food retailer, hospitals and clinical care systems; major public and private insurers, City and County government as well as additional cross-sector partners including businesses, schools and foundations.

**Results:** SPAT data revealed managers were willing to work with public health staff in providing data regarding food vendors, sodium practices and alternatives to higher sodium products. Surveyed customers (n=378) reported eating several of the higher sodium meals targeted for the sodium reduction initiative. The targeted items were eaten by 17.9\% to 51.4\% of customers, with most customers reporting that they were “satisfied” or “strongly satisfied” with the items prior to the modifications.

**Conclusions:** In addition to its unique interactive experiences and pioneering data collection, the H-E-B Body Adventure at the Witte Museum is leveraging collaborative, cross-sector partnerships to accelerate community-centered strategies for health and to create a bold national model to ignite health behavior change for family members of all ages.

The H-E-B Body Adventure Powered by University Health System is generously supported by H-E-B, University Health System, Blue Cross Blue Shield of Texas, Susan Moulton, San Antonio Metropolitan Health District, Aetna, the Children’s Hospital of San Antonio\textsuperscript{TM}, the Baptist Health Foundation of San Antonio, Dr. Dacia Napier, Saint Susie Charitable Foundation and Witte Museum members. The development of educational programs for the H-E-B Body Adventure was generously supported by the Semp Russ Foundation of the San Antonio Area Foundation, with initial support from the Genevieve and Ward Orsinger Foundation and a grant from the Beulah M. and Felix J. Katz Memorial Trust, Dan and Gloria Oppenheimer Fund and Valley View Trust of the San Antonio Area Foundation. The H-E-B Body Adventure is made possible through collaborative partnerships with H-E-B, the University of Texas Health Science Center at San Antonio, San Antonio Metropolitan Health District, YMCA of Greater San Antonio, the Culinary Institute of America, the San Antonio Botanical Garden, BioMed SA, The Synergy Studio, and the Pearl Farmer’s Market.
Background: Tuberculosis (TB) continues to be one of the world’s deadliest diseases with an estimated one third of the world’s population infected with TB. We are all susceptible to TB and everyone needs to recognize the connection we have to each other by the air we constantly breathe. TB is a leading killer of people who are infected with HIV and can significantly complicate the treatment of persons with diabetes and substance abuse. Bexar County had 89 cases of TB in 2014 which generated over 11,000 field visits involving Directly Observed Therapy and Contact Investigations surrounding these cases. Increased emphasis on discovering and detecting TB infections in high risk populations, conducting targeted testing, enhancing collaborative partnerships, preventing progression to full blown disease, and ultimately decreasing the impact of Tuberculosis on the Bexar County community continue to be long range goals to positively impact our community.

San Antonio Metropolitan Health District (SAMHD) Tuberculosis Prevention and Care Program co-located on the Texas Center for Infectious Disease (TCID) campus in San Antonio, Texas provides local disease surveillance, investigation, and treatment management for Tuberculosis for people who work, live, or visit within Bexar County.

Medicaid Waiver: The TB Program was awarded a new TB Medicaid 1115 Waiver Grant effective July 2014 in the amount of $1,531,191.00 for FY 14-15. The project focuses on diagnosing latent TB infections and involves improved service provider partnerships with homeless, substance abuse, refugee, diabetic, and HIV high-risk populations. Components include increasing targeted testing for latent tuberculosis infection (LTBI) in high risk populations; providing routine testing for LTBI with interferon gamma release assays (IGRAs); and providing routine treatment of LTBI through a 12 dose, 12 week treatment regimen administered by Directly Observed Therapy (DOT).

Partnerships and Collaboration: Collaboration efforts have been enhanced in recent years with partnerships that better aligns our services with the inpatient services of TCID, enhances training opportunities with the Heartland National TB Training Center also located on this campus, and continues to provide closer collaboration with the Department of State Health Services on issues such as court-ordered management and quarantine to better protect the community.

The San Antonio Metropolitan Health District will enhance our partnerships with two key collaborators on this project to include the University of Texas Health Science Center at Tyler overseeing the Heartland National TB Training Center (HNTC) and the Texas Center for Infectious Disease (TCID). On-going partnerships with health care providers including academic settings, refugee services, HIV high-risk organizations, school systems, hospitals, and agencies assisting homeless, substance abuse, diabetics, and other at-risk individuals continue to develop.

The Tuberculosis Trials Consortium (TBTC): SAMHD for many years has also been engaged with The University of Texas Health Science Center at San Antonio (HSC) participating The Tuberculosis Trials Consortium (TBTC) to conduct programmatically relevant clinical, laboratory and epidemiologic research concerning the diagnosis, clinical management and prevention of tuberculosis infections. Our newest phase 3 national trial, Study 31, focusing on rifapentine-containing treatment shortening regimens for pulmonary tuberculosis begins this Summer 2015.
Several areas in Bexar County, Texas, have high prevalence of teen pregnancy rates and high incidence of sexually transmitted diseases. In 2013, the county recorded 2,590 births among females ages 19 and under, about 50 teen births per week. The latest data from San Antonio Metro Health showed that Bexar County birth rate for females 15 to 19 was 40.1 births per 1,000. Despite recent declines in teen births in Texas, the local teen rate was still 51 percent higher than the national rate of 26.6 (Metropolitan Health District, 2015). These rates vary widely among minority populations; however, Hispanics appear to be the most vulnerable group. Studies suggest that parent-child sexual discussions improve children's sexual attitudes and behaviors. However, studies on teen sexual behavior usually focus on the role of the mother in communicating sexual knowledge to their children. This is especially true among Hispanics partly due to the traditional gender roles that exist in this group. Little is known about Hispanic father's participation in children's sexual education. Our preliminary survey of 207 respondents revealed that while Hispanic male parents considered that it was their role to talk about sex with their children, only a small proportion of them had ever talked to their children about sex. Thus, the lack of literature on this topic, the high prevalence of STDs and teen pregnancy among Hispanics and the urgent need to develop intervention programs lead us to question “Why are Hispanic male parents less likely to get involved in the sex education of their children? The study results advance our knowledge about Hispanic parents’ sex communication with their children and could help promote the development of intervention programs to empower Latino families by involving male parents in the sexual education of their children. This study explores the difficulties Latino fathers encounter in talking about sex with their children. The main emphasis of the research is on how cultural variables, such as acculturation and intergenerational differences in communication affect the father's role in the sexual education of their children. The self-administered questionnaire—in both English and Spanish language—covered several topics such as sources of information for children on sexual knowledge, levels of comfort of male parents in communicating sexual knowledge, frequency and themes of conversation with children, and responses from children. The majority of the respondents was Hispanics (76.8%), immigrants (45%), had less than high school education and had an annual income of less than $25,000. Data was collected in two zip codes of Bexar County with the highest rates of Teen pregnancy.
AFTERNOON ORAL PRESENTATION ABSTRACTS

Focus Area: Scientific Other
Neurocysticercosis (NCC) is the most common parasitic disease of the central nervous system (CNS) and the leading cause of acquired epilepsy worldwide. NCC is caused by the presence of the metacestode larvae of the tapeworm Taenia solium within brain tissues. NCC patients exhibit a long asymptomatic phase followed by a phase of symptoms including increased intra-cranial pressure and seizures. While the asymptomatic phase is attributed to the immunosuppressive capabilities of viable T. solium parasites, release of antigens by dying organisms induce strong immune responses and associated symptoms. Previous studies in T. solium-infected pigs have shown that the inflammatory response consists of various leukocyte populations including eosinophils, macrophages, and T cells among others. Because the role of eosinophils within the brain has not been investigated during NCC, we examined parasite burden and the composition of the inflammatory reaction in the brains of infected wild type and eosinophil-deficient mice (ΔdblGATA1). Using our established murine model of NCC, we observed a time-dependent induction of eosinophil recruitment in infected WT mice, whereas ΔdblGATA1 mice had reduced leukocyte infiltration. However, the frequency of αβ T cells was greater in eosinophil deficient mice, which correlated with an abundant CD8+ T cell response and lessened CD4+ Th2 responses. Notably, although infected ΔdblGATA1 mice exhibited an increased parasite burden, they had reduced tissue damage and increased survival times compared with infected WT mice. These data suggest a detrimental effect of eosinophils in brain tissues during murine NCC. Venues to successfully clear this infection require comprehensive approaches to tightly control the host immune response while eradicating the parasite with minimal damage to the brain tissue.

This work was supported in part by grants from the National Institutes of Health, National Institute of Neurological Diseases and Stroke (NS078501 to JMT/AEC). We thank the Immune Defense Core, and the Research Centers in Minority Institutions Advanced Imaging Center (University of Texas at San Antonio).
A NUMERICAL ESTIMATE OF VISUAL INCAPACITATION DUE TO PRIMARY BLAST EXPOSURE

Matthew Reilly, Ph.D.\(^{1,3}\), Walter Gray, Ph.D.\(^{2,3}\), William Sponsel, M.D.\(^{1,3}\), Daniel Sherwood, MS\(^{1,3}\), Randolph Glickman, Ph.D.\(^{4}\), and Brian Lund, Ph.D.\(^{5}\)

\(^{1}\)Biomedical Engineering, College of Engineering; \(^{2}\)Geological Sciences, College of Sciences; \(^{3}\)The University of Texas at San Antonio; \(^{4}\)Ophthalmology, School of Medicine, The University of Texas Health Science Center at San Antonio; \(^{5}\)US Army Institute of Surgical Research, JBSA Fort Sam Houston

**Background:** Damage to the eye is now the fourth-most common battlefield injury for US soldiers, at least in part due to the increasing use of improvised explosive devices (IEDs). We have recently shown that the blast wave itself can cause significant damage to several ocular tissues including the ciliary body, choroid, retina, and optic nerve (Sherwood et al., Investigative Ophthalmology & Visual Science, 2014;55(2):1124-32). In the present study, this information was integrated into a numerical model which relates the probability of tissue-level damage to the overall incapacitation of the eye.

**Methods:** A multinomial ordinal logistic regression analysis was performed to estimate the probability of mild, moderate, severe, or catastrophic damage to each ocular tissue for a given level of blast insult based on the experimental findings from Sherwood et al. A score of zero was assigned to tissues having no damage, a score of one to tissues having mild damage, and so on up to a score of four corresponding to catastrophic damage. The reflected specific impulse, a metric characterizing the energy content of the shock wave, corresponding to a 50% chance of obtaining a mild, moderate, severe, or catastrophic damage was then estimated. A novel mathematical model describing visual incapacitation was developed to relate tissue-level damage to deficits in optical, neurophysiological, or structural integrity of the eye, then ultimately used to compute a normalized incapacitation score.

**Results:** Mild to moderate damage to the retina, choroid, and optic nerve occurred at the lowest impulse values. The eye was fully incapacitated at specific impulses above 500 kPa-ms, corresponding to ~20 feet from a typical IED, but far below the level required to induce life-threatening injuries.

**Conclusions:** These findings indicate the importance of evaluating ocular health after blast exposure. Significant ocular damage can occur at low levels of blast exposure and could be easily missed if a thorough eye exam is performed.

*The work was supported by the U.S. Army Medical Research and Material Command under Vision Research Program Grant Number W81XWH-12-2-0055. The opinions or assertions contained herein are the private views of the authors and are not to be construed as official views of the Department of the Army or the Department of Defense.*
Despite extensive research, multiple sclerosis (MS) remains a disease that lacks a definitive prognostic test to predict imminent disease relapses. Thus, patients may undergo years of unnecessary treatments. Additionally, current treatments for MS can produce dramatically different outcomes in different individuals and therefore there is a critical need to develop biomarkers for treatment efficacy and resistance. We have recently developed a novel quantitative proteomics method to measure changes in proteome expression over the course of experimental autoimmune encephalomyelitis (EAE). Our statistical analyses indicate a strong correlation to EAE severity and/or clinical-phase. Interestingly, we revealed characteristic CNS-specific protein expression waves prior to the onset of clinical symptoms. We are currently testing whether these characteristic protein expression waves allow us to predict the onset of clinical symptoms and forecast the severity of the disease. Additionally, we have identified changes in the CNS proteome that can be measured in serum during EAE that correlate with the therapeutic efficacy of glucocorticoid treatment. Our studies will provide proof-of-principle for developing homologous human biomarkers that may be useful to predict disease onset and treatment efficacy. Finally, the detected changes in the CNS proteome may provide insights into key mechanisms that contribute to the disease pathology and may be useful to develop new therapeutic targets for MS.
PROTECTIVE EFFICACY OF CHLAMYDIAL PROTEASE-LIKE ACTIVITY FACTOR AGAINST GENITAL C. TRACHOMATIS INFECTION IN GUINEA PIGS

Rishein Gupta PhD, Shradha Wali MS, Jieh-Juen Yu PhD, Gopala Krishna Lanka Kaundinya, James P. Chambers PhD, Neal M. Guentzel PhD, and Bernard P. Arulanandam PhD, MBA

South Texas Center for Emerging Infectious Diseases and Center for Excellence in Infection Genomics, The University of Texas at San Antonio

Background and Significance: *Chlamydia trachomatis* (Ct) is the leading cause of bacterial sexually transmitted diseases worldwide which causes serious sequelae such as pelvic inflammatory disease and infertility when left untreated because of its asymptomatic characteristics. Increasing incidence rates indicate the urgent need for a licensed vaccine for protection against genital chlamydial infection. To this end, our laboratory has comprehensively demonstrated, that intravaginal (*i.vag*) *C. muridarum* (Cm) infection and associated genital pathology in C57BL/6, BALB/c and humanized HLA-DR4tg mice is significantly abrogated/reduced by intranasal immunization/vaccination with recombinant CPAF (rCPAF, chlamydial protease-like activity factor) via antigen-specific CD4+ T cells and IFN-$\gamma$. In the present report, we evaluated the protective efficacy of rCPAF immunization in guinea pigs- a second animal model for genital chlamydial infections.

Methods: Using a vaccination strategy similar to the mouse model, we intranasally immunized female guinea pigs with rCPAF plus CpG deoxynucleotides (CpG; as an adjuvant), and challenged intravaginally with Ct serovar D (Ct-D).

Results: Immunization with rCPAF/CpG significantly reduced vaginal Ct D shedding and induced resolution of infection by day 24, compared to day 33 in CpG alone treated and challenged animals. Immunization induced robust anti-rCPAF serum IgG 2weeks following the last immunization, and sustained in high level 4 weeks post challenge. Upregulation of antigen specific *IFN-$\gamma$* gene expression was observed in rCPAF/CpG vaccinated splenocytes. Importantly, significant reduction in upper genital tract pathology was observed in rCPAF/CpG-immunized guinea pigs compared to CpG-immunized animals.

Conclusions: Taken together, this study provides evidence of the protective efficacy of rCPAF as a vaccine candidate in a second animal model of genital chlamydial infection.
POSTER PRESENTATION ABSTRACTS
PARTNERING WITH FAITH-BASED ORGANIZATIONS TO ENHANCE POSITIVE OUTCOMES FOR HOME-BOUND SENIORS

Linda Moore, Ed.D., MSN, RN, Family & Community Health Systems, School of Nursing, The University of Texas Health Science Center San Antonio

Seniors remaining in their homes, opting out of moving into assisted living communities or nursing homes is more the norm rather than the exception across America. The majority of American seniors reside within their primary residence until their death, eventually succumbing to complex health conditions which render them home-bound. While Healthy People 2020 has developed goals to improve the health, function and quality of life of individuals of all ages who are able to go out to health events and/or other activities, the one group of individuals who are over-looked are those individuals who have become home-bound due to physiological and/or psychological health disparities. The impact of federal health care regulations whereby individuals who are readmitted to inpatient hospitals within a period of thirty days with the same diagnosis lending to higher costs charged to the hospital systems which in turn lead to higher health care costs in general, is potentially a fiscally responsible approach by having health care students making home visits to home-bound individuals.

Thus, this innovative pilot study consisted of initiating a community partnership between a faith-based organization and a single clinical group of students in their final semester of under graduate nursing school. Following the guidelines of Healthy People 2020 of improving quality of life and promotion of healthy behaviors, nursing students made home visits to home-bound seniors who are members of the partnering faith-based organization. The results revealed that all of the home-bound participants expressed unequivocal appreciation to the nursing students coming to their homes and performing physiological assessments as well as health, medication and nutritional education. All participants requested to continue receiving home visits in the future.

This unique clinical pilot experience demonstrated the importance of community engagement of nursing students with home-bound seniors that holistically enriched the lives of both the students and the seniors. By partnering city-wide with churches of all domination as well as city and military leaders (San Antonio Mayor, the District Council Members, Metropolitan Health Director, School Superintendents and District School Nurses as well as the Armed Forces to include the Veterans Administration), the vision of this collaborative clinical application and learning experience for all UTHSCSA Students making home visits to home-bound individuals across the life-span may be realized. As an untapped pioneering clinical application, this concept easily lends itself to replication across America which could demonstrate positive outcomes in terms of health and well-being of home-bound individuals, while at the same time facilitating positive growth and development of future health care providers across the United States. Finally, this type of collaborative-community based initiative may also align with University Quality Enhancement Plans (QEP) as well as Community initiatives, which focus on public health and wellness of vulnerable populations.
EFFECTS OF IN VIVO ISOLATED LOW-LEVEL PRIMARY BLAST OVERPRESSURE IN DUTCH BELTED RABBIT: CORNEAL AND RETINAL TOMOGRAPHIC RESPONSES

Purpose: To determine whether clinically significant ocular trauma can be induced by a survivable low-level isolated primary blast using a live animal model.

Methods: Both eyes of eighteen blast-exposed and five control Dutch Belted rabbits were exposed to various overpressure levels in a large-scale shock tube, and submitted to pre- and post-blast assessments of corneal confocal (immediate and 48-hours post) and retinal ocular coherence (immediate only) tomography. Linear regressions were applied to assess any differences in tissue thickness between eyes exposed to primary blast and control eyes.

Results: Mean thicknesses of the cornea and retina among blast-exposed eyes were significantly greater than those of control eyes, providing new in vivo evidence of tissue damage due to primary blast exposure. We observed an overall increase in retinal thickness with increasing peak pressure with a p-value of 0.00017. Also, an increase in corneal thickness was observed with increasing peak pressure immediately post-blast (p=0.0011) and sustained after 48 hours (p=0.0014).

Conclusions: Survivable primary blast overpressure can produce significant ocular damage in vivo. Clinically and statistically significant changes in corneal thickness arose immediately and were sustained for at least 48 hours, suggesting possible disruption of endothelial function. Inner retinal thickness changes also arose immediately. This finding was consistent with prior experiments using ex vivo porcine eyes (Sherwood et al., IOVS 55:1124-1132, 2014) and computational modeling of blast injuries which support the contrecoup mechanism of injury with the potential to produce long-term peripapillary injuries.
Poster Three

FAILURE PRESSURES OF THREE RHINOLOGIC DURAL REPAIRS IN A PORCINE EX VIVO MODEL

Ryan Lin¹,²,³, Erik Weitzel, MD¹, Philip Chen, MD², Kevin McMains, MD¹, Jacob Majors, MD¹, and Leon Bunegin, BS³

¹Uniformed Services University of Health Sciences and San Antonio Uniformed Health Sciences Educational Consortium, Joint Base San Antonio, TX; ²Department of Otolaryngology – Head and Neck Surgery, The University of Texas Health Science Center at San Antonio; ³Department of Anesthesiology, The University of Texas Health Science Center at San Antonio

Introduction: To determine the failure pressures of three commonly performed repair techniques of 5mm dural defects in a controlled setting.

Materials & Methods: Pig dura ex vivo study. A testing apparatus was fabricated to study failure pressures three different repairs in a porcine model. 5mm dural defects were created and plugged with autologous mucosa/Tisseel, fat-graft, and bath-plug techniques. Saline solution was infused at 30 ml/hr to apply unidirectional pressure to the repair until failure occurred. Five dural repairs were performed for each arm of the trial, totaling 15 trials.

Results: Mean failure pressure of the mucosa/Tisseel repair was 4.3±1.9 cmH2O, for the fat-graft 10.9±4.2 cmH2O, and for the bath-plug at 20.7±2.2 cmH2O. Differences among mean-average failure pressures were statistically significant.

Discussion: The bath-plug showed significantly higher tolerances for pressure than the other two repairs. The bath-plug repair was the only technique which withstood adult physiologic supine CSF pressure.

All listed authors have no financial interest/arrangement of affiliation with one or more organization that could be perceived as a real or apparent conflict of interest in the subject of this paper.

Commercial products mentioned in this presentation are not intended to constitute an endorsement by the U.S. Air Force or any other federal government entity.
INTERRELATIONSHIPS BETWEEN PLATELET ACTIVITY AND THE IMMUNOINFLAMMATORY RESPONSE TO SEVERE INJURY

Martin G. Schwacha, PhD\textsuperscript{1,2}, Rachel S. Morris, MD\textsuperscript{2}, Beverly S. Schaffer, BS\textsuperscript{1}, John B. Lundy, MD\textsuperscript{1}, Heather F. Pidcoke, MD, PhD\textsuperscript{1,2}, and Andrew P. Cap, MD, PhD\textsuperscript{1,2}

\textsuperscript{1}US Army Institute of Surgical Research, JBSA, Fort Sam Houston, Texas; \textsuperscript{2}Department of Surgery, The University of Texas Heath Science Center at San Antonio

Background: Critical injury causes alterations in coagulation and inflammation. Activation of these systems is critical to counteract the initial threats of hemorrhage and infection; however prolonged propagation is associated with poor outcomes. How coagulation and inflammation interact is an area of keen interest. The aim of this study is to correlate changes in circulating inflammatory mediators with coagulation in trauma (ISS>15) and burn patients.

Materials and Methods: Blood samples were drawn from trauma (n=10) and burn (n=10) patients and healthy volunteers (HV; n=10). Coagulation parameters (sCD40L, D-Dimers), cytokines (IL-6, IL-10, IL-17a, TNFα) and inflammatory markers (HSP-72) were assessed.

Results: The subjects were predominately male (85\%) and ~44 years of age. A marked increase in IL-6 and IL-10 was observed in both injury groups, whereas only the trauma group showed an increase in IL-17a and TNFα compared with HV. HSP-72 levels were 3-fold higher in the trauma group, but not elevated in the burn group compared with the HVs. In contrast, sCD40L, a marker of platelet activation, was elevated 10-25 fold, and D-Dimers were elevated 5-8 fold in both injury groups. A strong correlation between IL-17a and sCD40L was observed in the HVs and the burn group (R\textsuperscript{2} > 0.80), but not the trauma group (R\textsuperscript{2}=0.02).

Conclusions: These results show that the post-injury inflammatory response is paralleled by activation of coagulation. However, in trauma patients, a critical interrelationship between platelet activation and the Th-17 response appears to be lacking, which may contribute to coagulopathic complications and warrants further study.
A DESCRIPTIVE ANALYSIS OF TRAUMA PATIENTS EVACUATED BY CRITICAL CARE AIR TRANSPORT TEAM (CCATT) OF THE COMBAT THEATER (2007-2013) : A PRELIMINARY REPORT

Shelia Savell, PhD, RN, & Vikhyat Bebarta, MD, LtCol

USAF ECRC 59th MDW/ST-USAISR

**Background:** CCATTs transport critically injured patients. Limited data has been reported on the patient population, adverse events, and unexpected procedures to provide evidence for clinical guidelines. Our objective was to describe in-flight procedures, hemodynamic status, and events occurring during CCATT transport of trauma patients.

**Methods:** We conducted an IRB approved retrospective review of CCATT records transported out of theater to Landstuhl Regional Medical Center (LRMC) (2007-2013). Demographics, in-flight vitals, hemodynamics, biochemical markers, procedures, and predefined clinical events were collected. Percentages and frequencies reported along with mean±SD.

**Results:** 531 patient records have been reviewed to date; most were evacuated from Bagram (64%) or Balad (22%). 23% of flight records were incomplete. Mean age was 27±7 yrs, 87% US military, and 98% males. 88% were combat related. 8% sustained >20% TBSA burn or inhalation injury. Medications administered were 94% IV analgesia, 62% sedatives, 13% vasopressors (n=13 started in-flight), 4% oral opioids, and 4% paralytics. Patients were on PCA (23%), epidurals (9%), received ketamine (4%), or ketamine/propofol (1%). In addition to maintenance fluids, 27% received resuscitation bolus and 15% blood. 3% received 3% NaCl. 57% were mechanically ventilated, 6% had a tracheostomy, and 89% had chest tubes. Mean FiO2 was 40%. The mean lowest pulse was 88±20, beats per minute (bpm) and highest 105±20 bpm. The mean lowest systolic blood pressure is 111±16 mmHg and highest 135±19 mmHg. Predefined major clinical events were rare or did not occur–neurologic event (n=29); medication reaction (n=1), cardiac event (n=0), and transfusion reaction (n=0).

**Conclusion:** The majority of trauma patients transported from theater by CCATT were administered analgesics and additional resuscitation products in-flight. Most patients were ventilated with stable hemodynamic values. Adverse clinical events were rare.

**Acknowledgements:** DoDTR/JTS, CCATT Pilot unit

**Funding:** Joint Program Committee 6 (JPC6)
Background: The wider use of explosive weapons has led to an increasing number of eye injuries sustained by U.S. military personnel during recent conflicts. This study was undertaken with the dual goals of better understanding the cellular and molecular responses to these injuries, and developing specific diagnostic indicators of ocular injury, by identifying trauma-related biomarkers in the aqueous humor and blood plasma of 23 rabbits subjected to moderate levels of blast overpressure (BOP).

Materials and Methods: Rabbits were anesthetized with ketamine/xylazine and subjected to BOP of 8, 12, and 17 psi, using a pressure-driven shock tube. Samples of aqueous humor (~100 μl) and blood (2 ml) were collected from rabbits before the blast and at 3 h, 24 h, and 48 h post-blast. The samples were analyzed using two Milliplex panels: the human neurodegenerative disorders kit (HND1MAG-39K) and the rat cytokine/chemokine kit (RECYMAG65K27PMX). The panels were selected on the basis of pre-assay cross-species reactivity tests. The panels were assayed using the Luminex xMAP 3D protocol. Statistical analysis by ANOVA was performed to determine significance of biomarker differences pre- and post-blast.

Results: Cytokines and other protein markers that exhibited significant changes, associated with blast trauma, were found in both aqueous (Table 1A) and serum (Table 1B), in particular NSE, NGF-b, MIP-2, GM-CSF, and Phospho-tau (Figure 1). Several of these markers showed concentration changes that were positively or negatively correlated with blast intensity, e.g. NGF-b and MIP-2, respectively. Several of the biomarkers exhibited a progressive increase over 48 h, notably GM-CSF, MIP-2, and GRO/KC.

Conclusions: Molecular biomarkers associated with physical trauma were found in the aqueous humor and serum of animals subjected to BOP. Although some of these biomarkers have been reported after traumatic brain injury; there is little previous data relating these specifically to ocular trauma. In our related studies, we have found injuries to cornea and retina resulting from primary blast, and these tissues may be the source of some of these proteins. Understanding biomarkers associated with ocular trauma may provide the basis for better diagnostic tests and assessment of treatments for blast injury to the eye.
CHARACTERIZATION OF PLATELET ACTIVATION AND MICROVESICLE PHENOTYPE IN RAT MODEL OF TRAUMA AND HEMORRHAGE

Bijaya K. Parida, PhD¹, Nicolas Prat, MD, PhD¹,², Jacopo Chen, MD, MHA, MSc¹,³, Robbie K. Montgomery, MS¹, Xiaowu Wu, PhD¹, Daniel N. Darlington, PhD¹, and Andrew P. Cap, MD, PhD¹

¹Coagulation and Blood Research Program, U.S. Army Institute of Surgical Research, JBSA Fort Sam Houston, TX, USA; ²Current Address: French Armed Forces Institute of Biomedical Research (IRBA) France; ³Trauma & Combat Medicine Branch, Surgeon General’s Headquarters, Medical Corps, Israel Defense Forces (IDF-MC), Ramat Gan, Israel

Introduction: Acute traumatic coagulopathy (ATC) develops after severe injury and hemorrhage and is clinically defined by elevated prothrombin time (PT). Microvesicles (MV) are implicated in the pathophysiology of ATC.

Objective: The purpose of this study was to study platelet activation and characterize MV phenotype in an established rat model of ATC that demonstrates elevated PT after polytrauma and hemorrhage.

Methods: Polytrauma in anesthetized Sprague-Dawley rats was induced by damaging small intestines, liver skeletal muscle, and femur as per our previously published methods. Rats were hemorrhaged 40% of their estimated blood volume. No resuscitation was given. Venous blood samples were taken at baseline (BL, before trauma), TP1 (15 min after polytrauma) and TP2 (after hemorrhage, 30 minutes after TP1 and 45min after polytrauma). MV were analyzed in citrated whole blood (WB) samples within 15 minutes of collection. WB was incubated with cocktails of fluorescently labeled antibodies against platelets (APC-CD42d) P-Selectin (PE-CD62P), endothelial cell marker VE cadherin (PerCP-Cy5.5-CD144), leukocytes (V450-CD45), red blood cells (PerCP-Cy5.5-erythroid cell marker) and phosphatidyl serine (PS) (FITC-lactadherin). Isotype matched Ig controls were used to set gate in flow data analysis. Activation status of platelets was monitored by measurement of PS and P-selectin expression on platelet surface. Phorbol myristyl acetate (PMA) was used as positive control for platelet activation. BD TruCount tubes were used to measure absolute concentration of MV and platelets. Data were acquired on a BD FACS Canto II cytometer and analyzed using BD FACS Diva software.

Results/Conclusion: Animals achieved wound hemostasis by TP1. Other than the protocol defined controlled hemorrhage, no other bleeding occurred. There was no significant difference in either the total MV concentration or any of the seven types of measured MV when we compared BL to TP1 and TP2. Also, we did not observe any significant difference in platelet count or activation as assessed by PS or P-selectin expression. These results suggest that activated platelets and prothrombotic MV may have been consumed in clot formation or cleared by the liver or spleen. Further studies will assess the effect of prolonged hemorrhagic shock on MV formation and platelet activation.

This work was funded by MRMC. BKP is the recipient of NRC fellowship.
**Background:** Preoxygenation with intubation improves patient safety by increasing safe apnea time and first pass success. Utilizing high flow non-rebreather mask is an effective means of preoxygenation, with flows above 30 L/min commonly thought to provide FiO2 of greater than 90%. No study has evaluated whether commonly used wall mounted oxygen regulators are capable of achieving these increased gas flows above 15 L/min. This study seeks to evaluate actual gas flow with oxygen regulator at maximal settings in an academic emergency department. The study hypothesis was that oxygen flow regulators in an academic medical institution will produce flows that exceed 60 L/min when the regulator is measured at maximum flow rate.

**Materials and Methods:** The maximal flow rate from wall mounted oxygen regulator was measured using a standardized flow meter in twenty different patient care rooms at an academic emergency department. Measurements were completed by both study investigators. Primary outcome was actual gas flow of oxygen with regulator turned to maximal settings.

**Results:** Of the twenty different resuscitation rooms tested, two regulator types were tested via flow meter: Amvex and Timeter. Ranges of flow varied from 90 to 145 L/min. Mean gas flow was 117.8 L/min. Of interest, Timeter regulators produced flows consistently over 140 L/min at maximum settings, though we only tested two regulators from this brand. Box Plot 1 demonstrates these findings.

![Box Plot 1 - Breakdown of Gas Flow in LPM](image)

**Conclusions:** At our institution, regulators turned to maximum flow rate provided a range of flow from 90 to 145 L/min, with a mean of 117.8 L/min. Studies have demonstrated that flows greater than 30 L/min can produce FiO2 of 90%. When set to maximal flow rate, wall mounted oxygen regulators in our institution routinely exceeded 60 L/min of flow.
MECHANISMS OF ENHANCED THROMBIN GENERATION IN ROOM TEMPERATURE VS. COLD-STORED PLATELETS

Kristin Reddoch, BS¹, Robbie Montgomery, MS², Heather Pidcoke, MD/PhD², Anand Ramasubramanian, PhD¹, and Andrew Cap, MD/PhD²

¹Department of Biomedical Engineering, The University of Texas at San Antonio; ²Blood Research, United States Army Institute of Surgical Research

Cold (4C) storage of platelets reduces bacterial contamination but may increase thrombosis due to increased levels of activation. However, 4C-stored platelets demonstrate better preservation of metabolism and function and could dramatically improve treatment outcomes in severely bleeding patients. It has been previously shown that Day 5-stored 4C platelets are inhibitible with nitric oxide (NO) and prostacyclin (PGI₂) in static aggregation assays and under shear conditions. In this study, we assessed whether thrombin generation in room temperature (RT) and 4C-stored platelets could be inhibited and explored the potential mechanisms governing differences in RT and 4C platelet function after storage for up to 15 days.

Apheresis platelets (AP) were collected from healthy donors (n=4-8) and stored at RT or at 4C in plasma. Measurements were obtained on Day 1 (fresh) and Day 5 of storage, with some experiments extended to 15 days. Thrombin generation, with and without PGI₂, was assessed using a calibrated automated thrombogram (CAT) device. Flow cytometry was used to assess factor V (FV), mitochondrial depolarization, caspase-3/7, -8, and -9 activation, and intracellular free Ca²⁺ using fluorescent DiOC₆, FAM-FLICA kits, and Fluo-4 AM, respectively. Data were represented as mean±SEM, and analyzed by one-way ANOVA. Significant differences between groups were determined as p<0.05 by post-hoc Tukey’s test.

PGI₂ only blocked thrombin generation in fresh AP. 4C AP had higher peak thrombin values (254±28 nM) than both fresh (135±14 nM; p=0.002) and RT (172±16 nM; p=0.02) and a decreased lagtime was observed in 4C AP. FV expression, % total and geometric mean fluorescence intensity (GMFI), was significantly higher in Day 5 4C platelets compared to both fresh (%: p=0.002; GMFI: p=0.02) and RT (%: p=0.03; GMFI: p=0.01). Intracellular free Ca²⁺ levels were increased in Day 5 4C AP compared to both fresh (p<0.001) and RT AP (p<0.001). We observed significantly higher levels of depolarization in 4C AP by Day 5 of storage compared to fresh and RT. At Day 15 of storage, both RT and 4C AP exhibited comparable levels of depolarization. Contrastingly, caspase activation in 4C AP remained low across the 15 day storage duration, while noticeable differences compared to fresh were observed in RT AP after 8 days of storage.

Cold storage of AP induces a calcium leak that leads to mitochondrial depolarization, but not activation of caspases. In addition to increased intracellular free calcium, 4C storage triggers the release of FV which may contribute to faster and increased thrombin generation. The data presented in this study strongly suggests that although cold stored platelets show early signs of mitochondrial damage, the lower temperature prevents full-fledged apoptosis from occurring and better preserves platelet hemostatic function.
A 3-YEAR ANALYSIS AND COMPARISON OF OPIOID PRESCRIBING PRACTICES BY EMERGENCY DEPARTMENT PROVIDERS IN THE MILITARY COMMUNITY FOR CHRONIC PAIN

Victoria J. Ganem, RN BSN, Alejandra G. Mora, BS, and Vikhyat S. Bebarta, Lt Col, MC

USAF En route Care Research Center 59th MDW/US Army Institute of Surgical Research

Background: Chronic pain is a common reason for emergency department (ED) visits. ED providers commonly prescribe opioids; however, rates of opioid misuse have been high in recent years. Previous studies have not described the variability in prescribing habits of ED providers. Our objective is to describe the opioid prescribing practices of providers in a military ED.

Methods: In our retrospective study we evaluated opioid prescriptions from EDs at two military facilities between 2009 and 2012. We queried the outpatient record database to obtain a list of opioid medications prescribed and ICD-9 codes associated with ED visits for chronic pain. We collected provider type, gender, and military status, the number of pills prescribed, medication type, and medication refill status. For statistical analysis we compared the incidence with chi-square or Fisher’s exact tests where appropriate. Wilcoxon test was used for non-parametric continuous variables. Data were reported as mean±SD (median [IQR]). A p<0.05 was considered significant.

Results: Over three years, ED providers wrote 28,298 opioid prescriptions. A total of 449 (1.5%) prescriptions were associated with a visit attributed to chronic pain. Providers were 69% Active Duty (AD), 31% civilian, 81% male, 19% female. 79% were ED physicians, 19% physician assistants (PAs), and 2% unknown. Medications prescribed were 41% oxycodone, 30% hydrocodone, 9% tramadol, 2% codeine, and 18% other (oxycontin, morphine, and hydromorphone). The number of pills prescribed was 26±24; 20[15-30]. Civilian providers were more likely to prescribe an opioid than AD providers (42% vs 27%, p<.0001). Civilian providers prescribed more opioid pills than AD providers (30±29 vs 20±12, p<.0001) and a higher dose per prescription (387±754 morphine equivalents vs 187±275, p<.0001).

Conclusions: In a military ED over 3 years, civilian providers were more likely to prescribe an opioid and prescribed more pills and a higher dose per prescription.

Acknowledgements: Mr. Harold Little, Mrs. Kathy Carey and the ECRC Team
A PROSPECTIVE OBSERVATIONAL STUDY OF MEDICAL TOXICOLOGY CONSULTATION IN A US COMBAT THEATER

Maj Joseph K. Maddry, MD, Emergency Physician/Medical Toxicologist
Director, AF En route Care Research Center 59th MDW/US
Army Institute of Surgical Research
LtCol Vikhyat S. Bebarta, MD
Maj Daniel J. Sessions, MD

Background: Since 2001, US military personnel and physicians providing medical support have been deployed to Afghanistan. Those providers tasked with caring for military personnel in Afghanistan must face the challenge of diagnosing and treating various toxicological and environmental exposures. Availability of substances in the deployed setting differs significantly from substances of abuse stateside. Deployed personnel work in environments that harbor venomous snakes and chemical agents used by opposition forces also pose a threat. The military physician must be prepared to address the above issues with limited resources.

Toxicologists are among the physicians deployed, however there is little information in the literature documenting cases treated by toxicologists in theater. Such information can help guide physician pre-deployment training, the allocation of medical resources, and the development of toxicology observation units abroad; improving the quality of care delivered to patients in the deployed setting.

Methods: Prospective observational study in a military combat hospital over 5 months.

Results: We report on 11 patients directly treated by a medical toxicologist and three by in theater teleconsultation. The three teleconsultation patients were Afghan civilians who consumed methanol during clandestine ethanol production. The remainder of patients were US citizens or military personnel. Five cases were attempts at recreational euphoria, two were self-harm attempts, two were from performance enhancing supplements, and one was an accidental occupational exposure. Methanol was the substance most commonly abused (21%) followed by dextromethorphan, supplements and opiates (Table 1).

Discussion: Similar to the findings in our previous deployment teleconsultation study, toxicology consultations for US soldiers consist mostly of abuse of non-prescription medications and performance enhancing supplements. Military physicians may benefit from further pre-deployment training dealing with the management non-prescription medication abuse.

Conclusion: This is the first study to describe bedside toxicology consults for US combat forces. Although all patients were discharged or transported out of theater in stable condition, the long term outcomes of treated patients should be studied.

Funding: Air Force Medical Service (AFMS)
Table 1:
Categories of xenobiotics treated in the combat theater by medical toxicology

<table>
<thead>
<tr>
<th>Type of Exposure</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methanol</td>
<td>3</td>
<td>21%</td>
</tr>
<tr>
<td>Dextromethorphan</td>
<td>2</td>
<td>14%</td>
</tr>
<tr>
<td>Supplements</td>
<td>2</td>
<td>14%</td>
</tr>
<tr>
<td>Opioids</td>
<td>2</td>
<td>14%</td>
</tr>
<tr>
<td>APAP/doxylamine</td>
<td>1</td>
<td>7%</td>
</tr>
<tr>
<td>Dextroamphetamine</td>
<td>1</td>
<td>7%</td>
</tr>
<tr>
<td>Pine oil</td>
<td>1</td>
<td>7%</td>
</tr>
<tr>
<td>Alcohol withdrawal</td>
<td>1</td>
<td>7%</td>
</tr>
<tr>
<td>Chlorine</td>
<td>1</td>
<td>7%</td>
</tr>
</tbody>
</table>
BLOOD ADMINISTRATION DURING CRITICAL CARE AIR TRANSPORT TEAM (CCATT) EVACUATION OUT OF THEATER IS ASSOCIATED WITH ADVERSE HEMODYNAMIC EVENTS REGARDLESS OF PRE-FLIGHT HEMOGLOBIN LEVELS

Jennifer A. Becerra, MSN, RN, Alejandra Mora, BS, Victoria Ganem, RN, BSN, and Vikhyat S. Bebarta, MD, LtCol

USAF ECRC, 59th MDW/ST. USAISR

Background: To date, a hemoglobin (Hgb) ≥ 9-10 g/dL is recommended prior to air-evacuation for CCATT. Previously we reported long-term patient outcomes with a Hgb >8 g/dL were similar to a Hgb ≤ 8 g/dL. Our objective was to compare in-flight adverse clinical events with a pre-flight Hgb >8 g/dL vs ≤8 g/dL and patients that were administered a blood transfusing during flight.

Methods: We conducted an IRB retrospective review of CCATT medical records to assess in-flight subject hemodynamics, biochemical markers, procedures, and vital signs with incidence of predefined events during evacuation. Subjects were grouped as a pre-flight Hgb>8 g/dL vs ≤8 g/dL. We recorded in-flight blood administration to include number of units transfused. Clinically relevant adverse hemodynamic events were identified and analyzed. We also compared patient events with respect to pre-flight hemoglobin and in-flight blood administration. ANOVAs and Kruskal-Wallis were used for continuous data and chi-square or Fisher’s exact tests were performed as appropriate (p-values) in this interim analysis.

Results: Of 531 abstracted patients, 368 had a pre-flight Hgb>8 g/dL and 46 had a Hgb≤8 g/dL (others had no Hgb recorded). Demographics were similar. Primary injury was blast-related (68%)—17% penetrating and 9% blunt related injuries. Hgb >8 g/dL and ≤8 g/dL groups were similar in percent of ventilated patients, lab values, vital signs, and rates of in-flight clinical events. Hgb >8 g/dL group was more likely to have MAP in normal range than ≤8 g/dL (84% vs 67%, p=0.01). Subjects that received blood were more likely to have adverse temperature measures (p=0.02), poor MAP values (p=0.0005), and more hemodynamic events (p<0.0001) regardless of pre-flight Hgb.

Conclusion: In combat injured patients evacuated by CCATT, adverse in-flight clinical events were similar between low and high Hgb groups. Patients that were transfused blood during flight were likely to have adverse in-flight hemodynamic.

Acknowledgments: DoDTR/JTS; CCAT Pilot Unit, - and DOD – Joint Program Committee (JPC6) for funding support
PREHOSPITAL AND EN ROUTE CRICOTHYROTOMY PERFORMED IN THE COMBAT SETTING: A PROSPECTIVE, MULTICENTER, OBSERVATIONAL STUDY

Edward B. G. Barnard, FCEM1,2, Alicia T. Ervin, RN1, Robert L. Mabry, MD3, and Vikhyat S. Bebarta, MD1

1Air Force En route Care Research Center, US Army Institute of Surgical Research/59th MDW; 2Institute of Naval Medicine, UK; 3Joint Trauma System, Center of Excellence, US Army Institute of Surgical Research

Background: Airway compromise is the third commonest cause of potentially preventable combat death. Surgical cricothyroidotomy (CRIC) is an infrequently performed but life-saving airway intervention. There is limited published prehospital data on prehospital CRIC. The aim of our study was to describe the survival rate and complications associated with cricothyroidotomy performed in the military prehospital and en route setting.

Methods: The Life Saving Intervention (LSI) study is a prospective, IRB approved, multicenter trial examining prehospital combat LSIs. Trained site investigators recorded demographics, vital signs, and LSIs performed. Predefined LSIs included cricothyroidotomies, chest tubes, intubations, and tourniquets. Descriptive statistics or Wilcoxon test (non-parametric) were used for data comparisons.

Results: Of the 1,927 patients enrolled, 34 patients had a CRIC performed (1.8%). Median age for patients with a CRIC was 24 (IQR 22.5-25), 97% male. Mechanisms of injury were blast (79%), penetrating (18%), and blunt (3%); 83% had major head and or facial injuries. Median GCS was 3 (IQR 3-7.5] and 7 patients had GCS > 8. CRIC was successful in 82% of cases. Reasons for failure included left main stem intubation (1), subcutaneous passage (1), and unsuccessful attempt (4). Unsuccessful endotracheal intubation preceded 15% of CRICs. Of the patients who had the provider type recorded (n=24), six had CRICs by a combat medic (pre-evacuation), and 18 by an evacuation helicopter medic. 52% (n=13) survived to hospital discharge. The patients with CRICs had more LSIs than non-CRIC patients (4 versus 2 LSIs/patient, p<0.0011).

Conclusions: In our prospective, multicenter study, evaluating cricothyroidotomy in a prehospital and en route care combat setting, survival was 52%, higher than previously reported. In addition, most cricothyroidotomies were performed by the evacuation helicopter medic rather than the prehospital combat medic.

Acknowledgements: All JC2RT on-site investigators and the Joint Trauma System (JTS), and AFMS for funding support.
EFFECTS OF COMBINED EXERCISE ON COGNITIVE FUNCTION AND PLASMA AMINO ACID IN FEMALE ELDERS

Nan Hee Lee, Ph.D.¹, Chung Moo Lee, Ph.D.¹, and Sukho Lee, Ph.D.²

¹Physical Education, College of Science, Sookmyung Women’s University; ²Counseling, Health & Kinesiology, College of Education, Texas A&M University—San Antonio

Background: Amino acid is the important material for the synthesis of tissues, hormones, enzymes, and neurotransmitters. Abnormal synthesis of amino acid causes a degenerative brain disease. Previous studies have focused on metabolic syndrome, hypercholesterolemia, and exercise-induced fatigue in plasma amino acid. Purpose: 1) To examine the correlation between plasma amino acid and cognitive function, 2) To determine the change of plasma amino acid and cognitive function through regular exercise in female elders.

Materials & Methods: 36 elderly women aged 65 or above (70.1 ± 4.3 yrs) were selected as research subjects. Amino acid was collected from the venous blood (5 ml) and analyzed for plasma level. Their cognitive function was assessed using the Mini-Mental State Examination-Korean version testing (MMSE-K) which is widely used in Korea. The subjects were randomly divided into an exercise group (N=13) and a control group (N=18). Five original subjects were dropped from the study. The exercise group participated in a combined exercise program that was composed of aerobic exercise and resistance training (50-60 min, 3 times/week, 12 weeks), while the control group was directed to maintain their lives in a usual manner. Primary data analytic methods of this study were Pearson’s correlation analysis, regression analysis (stepwise), and independent t-test conducted by SPSS 12.0.

Results: Cognitive function exhibited a positive association with plasma concentration of glutamic acid (r=.387, p<.05) and valine (r=.402, p<.05) in elderly women. In addition, valine was a significant factor affecting on cognitive function according to the result from regression analysis (t=2.408, R²=.162, p<.05). Furthermore, the scores of the MMSE-K and plasma valine level significantly increased after 12 weeks in the exercise group (p<.05).

Conclusion: Concentrations of glutamic acid and valine can be influence variables associated with brain function such as dementia or cognitive impairment. Furthermore, the increase in plasma valine level through exercise may contribute to cognitive function positively.
PRE-HOSPITAL EN ROUTE CARE AND LIFE-SAVING INTERVENTIONS OF TRAUMATICALLY INJURED COMBAT PATIENTS TRANSPORTED BY MEDEVAC FROM THE POINT OF INJURY

Lauren Reeves, BS, Crystal A. Perez, RN, and Joseph K. Maddry, MD

USAF ECRC 59th MDW/ST- USAISR

Background: Traumatically injured patients in combat require immediate care and evacuation to improve survival. Limited research exists on the en route care of patients transported by military health care providers (MEDEVAC) from the point of injury (POI). The objective of our study was to describe the care and response to care (life-saving interventions, complications, adverse events) of combat injured patients who were air evacuated via MEDEVAC from POI to military medical facilities of different levels in Afghanistan.

Methods: We conducted an IRB approved, retrospective review of pre-hospital and MEDEVAC care records of patients who were traumatically injured and air evacuated via MEDEVAC from the POI to the first military medical facility in Afghanistan between 2011 and 2014. Patients killed in action were excluded from this study. Data abstracted included demographics, injury description, provider type, procedures and complications, analgesics administered, and combat theater survival. Percentages and frequencies were reported along with mean±SD; median [Interquartile Range].

Results: 1,022 patient records were reviewed: mean age 25 (SD±5), 98% male, 73% blast related injury, 26% penetrating, 2% blunt, and 6% burn. Transport time was 59±73; 43[32-59] minutes. Pre-hospital providers included Medic 84% (n=855), Paramedic 10% (n=107), and RN/MD 4% (n=38). Procedures performed included CPR 5% (n=46), oxygen support 47% (n=478), intubation 2% (n=22), and cricothyrotomy 2% (n=19). Of the chest procedures performed 4% (n=36) had a chest seal, chest needle 2% (n=34), and chest tube <1% (n=1). Hemostatic interventions included pressure packing 47% (n=484), tourniquets 32% (n=325), and hemostatic dressings 6% (n=87). Forty-nine percent (n=500) had IV access and 6% (n=63) had intraosseous (IO) access. Thirty-nine percent of patients (n=397) received IV fluids. Blood products were administered in 4% (n=39) of patients. Clinical events included pain 79% (n=807), hypoxia 7% (n=72), hypotension 7% (n=75), and tachycardia 11% (n=113). Three percent (n=29) of patients had bleeding that was not controlled by initial interventions. A failed procedure was reported in 7% (n=66) of patients and equipment failure was rare 1% (n=7). Eighty-seven percent (n=892) had at least one documented adverse event. Analgesia was administered to 45% (n=464) of patients: morphine 24% (n=241), fentanyl 20% (n=201), and ketamine 9% (n=92). In-theater survival was 93%.

Conclusions: In this study of 1,022 patients the most frequently performed procedures were IV access, oxygen support, pressure packing, analgesia and fluid administration by military health care providers in the pre-hospital combat setting. Airway, chest procedures, and blood product administration were rare. The most frequently reported complication was pain; hemodynamic instability was rare. Almost half of the patients received an analgesic with morphine being the most common. Findings from the study may be applicable to civilian emergency pre-hospital care of traumatically injured patients.

Acknowledgements: JTS/DoDTR

Funding: Joint Program Committee 6 (JPC6)
Suicide is the second-leading cause of death for 15 to 29 year-olds globally. The current study employed the Revenge Attitudes Inventory-24 (RAI-24), a recently constructed instrument that incorporates revenge in the context of suicide. We sought to examine the reliability and correlates of the three dimensions of the RAI-24. Participants (N=159) responded to a battery of self-report instruments. Reliability tests confirmed that all of the analyzed scales are internally consistent. Independent sample t-tests and Pearson’s correlations revealed that scores on the RAI-24 have strong research utility. Future research should recruit a larger sample, conduct factor analyses, include other assessment instruments, and test clinical samples in an effort to further probe the relationship between revenge and suicide-related behaviors.
Background: In combat zones, rotary platforms of pre-hospital en route care (MEDEVAC) are comprised of military health care providers that perform life-saving interventions to improve survival. The objective of our study was to describe MEDEVAC provider types and identify associations between provider type and procedures performed.

Methods: We conducted an IRB approved, retrospective review of trauma patients who were air-evacuated via MEDEVAC from the point of injury between 2011 and 2014. Data abstracted included injury description, provider type, procedures performed, analgesics administered, and survival to the first military medical facility. Subjects were grouped by provider type: EMT-B/EMT-I (Medic), EMT-P/ Special Ops/PJ (Paramedics), RN/MD/PA (RN/MD). Analyses were performed using chi-square tests for categorical variables and Kruskal-Wallis tests for continuous variables. A p-value < 0.05 was considered significant.

Results: 1000 MEDEVAC records were reviewed by trained abstractors. The providers were Medic 86% (n=855), Paramedic 11% (n=107), and RN/MD 4% (n=38). RN/MD were more likely to use pressure packing (22% Medic vs 18% Paramedic vs 63% RN/MD, (p=0.02)). RN/MD applied more hemostatic dressings (2% Medic vs 2% Paramedic vs 9% RN/MD, (p=0.04)). Chest needle decompression was more likely to be performed by RN/MD (1.5% Medic vs 8% Paramedic vs 13% RN/MD, (p<0.0001)). Chest tube, chest seal, tourniquets, CPR, cricothyrotomies, intubations, IV fluids, blood product administration, oxygen support, spinal stabilization and hypothermia prevention were similarly performed among groups. Vascular access was similar for IV insertion, however the RN/MD group was more likely to insert an IO catheter (5%Medic vs 11% Paramedic vs 13% RN/MD, (p=0.02)). Provider type was not associated with complications such as reported pain, hypoxia, abnormal hemodynamics, or vital signs. Analgesics were similarly administered by each provider type. Survival to discharge from theater was highest in the Medic and RN/MD group (94% Medic vs. 88% Paramedic vs 95% RN/MD (p=0.04)).

Conclusions: In our study of MEDEVAC flights, Medics were the most common provider type. Survival to the initial military medical facility was higher in the Medic and RN/MD group. RN/MD applied more pressure and hemostatic dressings and performed more chest needle decompressions and IO placement. Other procedures were similarly performed across groups. There was no difference in complications between provider types. Findings from this study may be applicable to civilian providers treating traumatically injured patients in the emergency pre-hospital setting.

Acknowledgements: JTS/DoDTR and Joint Program Committee 6 (JPC6) for funding support.
A RANDOMIZED TRIAL OF INTRAVENOUS HYDROXOCOBALAMIN COMPARED TO WHOLE BLOOD FOR HEMORRHAGIC SHOCK RESUSCITATION IN A PREHOSPITAL SWINE MODEL

LtCol Vikhyat Bebarta, MD, Director; Normalynn Garrett, CRNA, PhD; Maria Castaneda, MS; and Susan Boudreau, BSN
CREST Research Center, SAMMC

**Background:** Whole blood (WB) provides the essential components for resuscitation of traumatic hemorrhage and for combat wounding. The recommended ratio of red blood cells, fresh frozen plasma and platelets approaches the reconstitution of WB. However, administration of WB is impractical in the prehospital setting. Furthermore, under conditions of uncontrolled hemorrhage, limiting resuscitation fluid volume reduces the risk of exsanguination. Hydroxocobalamin (HOC) has been shown to improve blood pressure when administered in a small volume and may be an ideal resuscitation treatment prior to the availability of blood.

**Objectives:** To compare mean systolic blood pressure (SBP) over time in animals that have had 30% of their blood volume removed (Type III shock) and treated with intravenous (IV) HOC or WB transfusion.

**Methods:** Twenty swine (45-55 kg) were anesthetized, intubated, and instrumented with continuous femoral and pulmonary artery pressure monitoring. Animals were hemorrhaged a total of 20 mL/kg over twenty minutes. 5 minutes after hemorrhage, animals were randomly assigned to receive 150 mg/kg IV HOC solubilized in 180 mL of saline or 500 mL of WB. Animals were monitored for 60 minutes thereafter. A sample size of 10 animals per group was determined based on a power of 80% and an alpha of 0.05 to detect an effect of size of at least 0.25 difference (1 stdev) in SBP between the groups. SBP and secondary outcome data were analyzed using repeated measures MANOVA.

**Results:** There were no significant differences between IV HOC or WB groups at baseline or at shock (HR 95 vs. 98 bpm; SBP 47 vs. 42 mm Hg; MAP 39 vs. 35, mm Hg). The overall MANOVA model detected a significant difference by time between groups (p<0.05) after treatment. IV HOC was similar to WB with regard to SBP, heart rate, and mean arterial pressure (SBP 75 vs. 80; HR 117 vs. 100; MAP 60 vs. 62) at 60 minutes. However, IV HOC produced a significant decrease in cardiac output (CO) compared to whole blood (4.6 vs. 3.4, p<0.01). Serum pH was not different between the groups.

**Conclusions:** Intravenous HOC was as effective as whole blood transfusion in resuscitation for hemorrhagic shock in a prehospital swine model. Although CO was statistically lower in the HOC group, this may have been due to a higher systemic vascular resistance produced by HOC.
The Effect Of The Biomodulator On The Biopsychosocial Secondary Sequelae Of Chronic Low Back Pain In Active Duty Military Service Members

Ann Nayback-Beebe, PhD¹, Sonya M. Arzola, MS², Dale Glaser, PhD³, Laura Feider, PhD⁴, Angela Simmons, PhD⁵, and Brandon Goff, DO⁵

¹Ft. Belvoir Community Hospital; ²The Geneva Foundation; ³Glaser Consulting; ⁴AMEDD Center & School; ⁵Brooke Army Medical Center

Background: To date, no studies have been identified that examined the effect of Biomodulator treatment on the biopsychosocial secondary sequelae of chronic low back pain (LBP), specifically depression, anxiety, and post-traumatic stress symptom severity.

Methods: This was a prospective RCT pilot study with repeated measures at pre-treatment, post-treatment, and 1-month follow-up for two groups: (1) usual care and (2) usual care plus self-treatment with Biomodulator. Data collected from January 2013 to June 2014. Usual care consisted of medication management if warranted and exercises & education for LBP. Usual care plus self-treatment with Biomodulator consisted of usual care plus using the Biomodulator three times per week at a perceived intensity of a “slight sensation” on mode “Ten-8” for thirty minutes per session for four weeks.

Results: For the 2 x 3 mixed ANOVA (n = 31), a significant interaction was not obtained for depression F(2,58) = .118, p = .889 (η² = .004). Though not significant, there was an overall decrease in mean depression symptom severity scores pre and post-treatment for the Biomodulator plus usual care group (M=4.9, 4.3) and for the usual care group (M=4.7, 4.2). For PTSD, a significant interaction was not obtained F(2,58) = 1.86, p = .165 (η² = .06). Though not significant, there was an overall decrease in mean PTSD symptom severity scores pre and post-treatment for the Biomodulator plus usual care group (M=34.5, 29.3) and for the usual care group (M=29.4, 29.3). For anxiety, a significant interaction was not obtained F(2,58) = 1.43, p = .245 (η² = .047). Though not significant, there was an overall decrease in mean anxiety symptom severity scores pre and post-treatment for the Biomodulator plus usual care group (M=4.8, 4.6) and for the usual care group (M=3.7, 2.8).

Conclusions: Based on these preliminary findings, adjunctive treatment of chronic LBP symptoms with the Biomodulator does not significantly reduce co-occurring depression, anxiety, or PTSD symptom severity when compared to usual care treatment of chronic LBP symptoms. Although not statistically significant, preliminary analyses does reveal decreased mean depression, anxiety, and PTSD symptom severity between pre and post-treatment for both treatment groups. Completion of this study with a more robust sample size is necessary to determine whether this trend is related to treatment or placebo effect.

Acknowledgment of Research Team: Linda Yoder, PhD; Kimberly McConnell, EdD; Alice Inman, PsyD

This research is sponsored by the TriService Nursing Research Program, Uniformed Services University of the Health Sciences; however, the information or content and conclusions do not necessarily represent the official position or policy of, nor should any official endorsement be inferred by, the TriService Nursing Research Program, Uniformed Services University of the Health Sciences, the Department of Defense, or the U.S. Government.

The view(s) expressed herein are those of the author(s) and do not reflect the official policy or position of Brooke Army Medical Center, the U.S. Army Medical Department, the U.S. Army Office of the Surgeon General, the Department of the Army, and Department of Defense or the U.S. Government.
Objectives: To evaluate nausea and vomiting (NV) relief, pain relief, and satisfaction with treatment with nasally inhaled isopropyl alcohol (ISO) vs saline placebo in emergency department (ED) patients before access to traditional antiemetics. We hypothesized all would be better in the ISO group.

Background: ISO has been shown to alleviate NV postoperatively. This study is the first to examine ISO for NV in the ED.

Materials & Methods: Randomized, prospective, blinded placebo-controlled trial in an urban military level-I trauma center ED. Subjects were blinded by masked substance packets and ignorance of the identities of the study substance and placebo. Investigators were blinded by masked packets and by distance from open packets. A convenience sample of 84 patients aged 18-65, able to breathe nasally, English literate, and complaining of NV was enrolled. Exclusions were pregnancy, ISO allergy, use of medications with antiemetic or disulfiram effect, recent URI, or clinical intoxication. Subjects described pain and nausea on an 11-point Verbal Numerical Response Score (VNRS) at 0, 2, 4, 6, and 10 minutes (min). At 0, 2, and 4 min subjects inhaled from the study packet for 60 seconds. A 3-point change on the VNRS was set as significantly different. Patient satisfaction was recorded on a 5-point Likert Scale at the study conclusion.

Results: 80 subjects completed the trial. 4 withdrew. None were excluded after enrollment. No adverse events were noted. 72.9% had significant nausea relief within 4 min of inhalation with ISO vs 4.6% with placebo (p<0.001). 56% had nausea relief at 10 min with ISO vs 2.3% with placebo (p<0.002). Pain relief was not different between groups (p>0.05). 64.8% were satisfied with ISO vs 2.3% with placebo (p<0.001)

Conclusions: Nasally inhaled ISO is a safe and effective treatment for NV in the ED with relief onset by 4 min and persisting through the 10 min study duration.

The opinions expressed are solely those of the authors and do not represent an endorsement by or the views of the United States Air Force, The United States Army, the Department of Defense, or the United States Government.
Elevated blood pressure and blood glucose levels, hallmarks of diabetes, have detrimental effects on various tissues of the eye and contribute to blindness. Effects of this milieu on vascular tissue and its constituent cells remain unknown. The present in vitro study was motivated by such scientific needs and used cellular in vitro models, bioengineering approaches, and biochemical assays to investigate, and compare, select cellular responses of choroidal endothelial cells following exposure to elevated pressure and increased glucose levels simulating conditions in the eyes of diabetic patients.

Bovine choroidal microvessel endothelial cells (BCMEC) were obtained commercially (Vec Technologies), characterized by the vendor, and used without any further characterization in the present study. These cells were cultured under standard cell culture conditions in endothelial cell complete media on tissue-culture plasticware pre-coated with fibronectin for 24 hours before exposure to the experimental conditions tested. These cells were then exposed to conditions simulating those in the eyes of diabetic patients, specifically 25 mm Hg pressure and 30 mM glucose concentration. Controls were cells cultured in parallel under 15 mm Hg in media containing 5 mM glucose and cells under atmospheric pressure in the absence of glucose. Viability of BCMECs was monitored after 1, 3 and 5 consecutive days of culture by staining (using the LIVE/DEAD® assay), visualizing, and counting the cells in situ using fluorescence microscopy. BCMEC proliferation was monitored after days 1, 2, 3, and 5 of culture using the CyQuant cell proliferation assay. Cell counts were reported as “cell density”. Experiments were run in duplicates on three separate occasions. All numerical data were reported as mean value ± standard error of the mean (SEM) and analyzed using the Student’s t-Test method and commercially available software. P values less than 0.05 were considered statistically significant.

The BCMECs remained viable in the controls and under all conditions of pressure and glucose concentrations tested. BCMEC proliferation increased as a function of glucose concentration (in the rage of 5 - 30 mM) under control (atmospheric and 15 mm Hg) and under elevated (25 mm Hg) pressure conditions in sparsely-seeded cultures over the 5 day time course of the experiments. In contrast, and compared to the respective controls, cell proliferation in confluent cultures increased for 2 days and decreased at 3 and 5 days of exposure to pressure (either 15 or 25 mm Hg) in the absence of glucose. Similar proliferation trends were also observed at elevated (25 mm Hg) pressure and in the presence of glucose (either 5 or 30 mM). BCMEC proliferation in confluent cell cultures under atmospheric pressure and in the absence of glucose increased until day 2, but did not change afterwards for the duration of the study. In summary, exposure of BCMECs to elevated pressure and/or high glucose concentrations does not affect cell viability, but is associated with decreased cell proliferation of confluent cultures. The underlying molecular-level mechanisms of the responses of ocular choroidal micro-vascular endothelial cells under conditions which simulate aspects of diabetic retinopathy are subject of continuing research.
USE OF PET THERAPY IN AN INPATIENT BEHAVIORAL HEALTH SETTING

Lt Kelly N. Lonergan, BSN, USAF

The need for supplemental therapy on the SAMMC Inpatient Behavioral Health floor to reduce daily anxiety and stress was identified. The reduction in stress would allow the patients to more fully engage in all treatment activities and improve overall treatment offered. The purpose of this evidence based project was to provide Inpatient Behavioral Health patients admitted to SAMMC with pet therapy at least once a week to reduce anxiety.

Using the Iowa model a focused question was developed a literature review was completed. The Inpatient Behavioral Health staff was trained on the use of Hamilton Anxiety Scale (HAM-A) tools pre and post pet visitation. Each month the HAM-A tools were scored and the results were recorded in Microsoft Excel.

A large reduction in anxiety was noted post pet therapy visitation. On average over the seven months data was collected people reported a 6 point drop in anxiety. Of those participants who reported anxiety prior to pet visitation 100% reported a reduction in anxiety post pet visitation.

Due to the successful results, the pet therapy program has expanded from one dog team to six dog teams over the past year. The pet therapy program will continue to be offered as a supplemental treatment on Inpatient Behavioral Health at SAMMC. The results were presented at the hospital wide UPC meeting and SAMMC Nurse’s week. The process of recruiting dog teams was disseminated.

As Behavioral Health services continues to grow in the military health care system alternative groups and therapies will continue to be researched and integrated into practice. Including alternative therapy’s like pet visitation will individualize each patients care and allow for successful treatment and recovery.

The view(s) expressed herein are those of the author(s) and do not reflect the official policy or position of Brooke Army Medical Center, the U.S. Army Medical Department, the U.S. Army Office of the Surgeon General, the Department of the Army, the Department of the Air Force and Department of Defense or the U.S. Government.
HERPES SIMPLEX VIRUS SEROEPREVALENCE AND SEROCONVERSION AMONG ACTIVE DUTY UNITED STATES AIR FORCE MEMBERS WITH HIV INFECTION

Jared Cohen, MD1, Amanda Sellers, MS2, T.S. Sunil, PhD, MPH2, Peter Matthews, MD3, and Jason Okulicz, MD4

1San Antonio Military Medical Center, Department of Internal Medicine, JBSA Fort Sam Houston, TX; 2Institute for Health Disparities Research, The University of Texas at San Antonio; 3Mike O’Callaghan Federal Medical Center, Infectious Disease Service, Las Vegas, NV; 4San Antonio Military Medical Center, Infectious Disease Service, JBSA Fort Sam Houston, TX

Herpes Simplex Virus (HSV) infection is associated with increased risk of HIV transmission and acquisition. We evaluated longitudinal HSV serology and sexually transmitted infections (STIs) as markers for ongoing high-risk sexual behavior among active duty United States Air Force (USAF) members with HIV infection.

All USAF members diagnosed with HIV between 1996-2012 were included and divided into 2 groups (1996-2004 and 2005-2012). HSV-1/2 serology was evaluated at HIV diagnosis. Longitudinal HSV-1/2 serology and ICD-9 codes for HSV and non-HSV STIs were also examined for those with ≥1 year of follow-up.

Baseline characteristics did not differ between groups. Patients were predominantly male (98.2%) with African Americans (43.4%), Caucasians (44.2%), and Hispanics (8.0%) most common. Median age, CD4 count and viral load at HIV diagnosis were 28 years, 521 cells/uL and 4.37 log10 copies/mL, respectively. HSV-2 seroprevalence at HIV diagnosis decreased from the period of 1996-2004 to 2005-2012 (Table; P<0.01). HSV-2 seropositivity was significantly greater for non-Caucasians (OR 2.19, 95% CI 1.33-3.60) and for HIV diagnosis between 1996-2004 (OR 2.08, 95% CI 1.30-3.33), with a trend observed for those >30 years of age at HIV diagnosis (1.73, 95% CI 0.94-3.18). During a median follow-up of 4.6 years after HIV diagnosis, 130 (32.7%) patients developed non-HSV STIs and 24 (6.1%) patients had new genital herpes diagnoses by ICD-9 codes. HSV-2 seroconversion occurred in 33 of 253 (13.0%) patients after a median of 2.6 years.

Although HSV-2 seroprevalence at HIV diagnosis decreased over time in USAF members, high-risk sexual behaviors were ongoing as evidenced by the high proportion of new STI diagnoses and HSV-2 seroconversions. This study highlights the importance of continued education to reduce high-risk sexual behaviors among HIV-infected patients.
IMPLEMENTATION OF A RAPID RESPONSE SYSTEM: EVALUATING THE EFFECT ON ACTIVATION AND CODE BLUE RATES

Critical deterioration in patients is often preceded by measurable signs of physiological decline during the hours prior to the event. The introduction of a Rapid Response System (RRS) has been shown to decrease mortality and cardiopulmonary arrests outside of the ICU. The purpose of this study was to evaluate the impact of a formal RRS training program with mandatory activation criteria on activation rates, call characteristics, and code blue events.

A quasi-experimental pre-test, post-test design was used to assess outcomes following implementation of a formal RRS at a large military medical center. RRS implementation consisted of a mandatory hour-long lecture, computer-based training, and a marketing campaign with signs/placards available on all medical and surgical wards. The Rapid Response Team (RRT) consisted of a critical care nurse and respiratory therapist with the addition of the patient’s primary nurse and responsible provider. Variables included the rate of RRS calls, reason for call, time and day of call, code blue events outside the ICU/ED/OR, and the final disposition of the call. As part of the training, an emphasis was placed on the mandatory RRS notification for any abnormal parameter. Data was gathered retrospectively (January-August 2014) and prospectively (September-December 2014) with respect to the intervention.

After the RRS training intervention, the average number of calls per month rose from 39 (17 per 1000 discharges) to 123 (58 per 1000 discharges), p<0.001. The mean number of code blue events decreased from 1.5 codes per month to zero per month, p<0.001. Prior to the intervention, 45% of RRS calls were transferred to a higher level of care versus 34% after the intervention, p<0.003. The most common reasons for RRS activation were tachycardia (27%), hypotension (23%), and staff concern (15%). There was no statistically significant difference for RRS activation regarding the day of the week, time of call, or ward location.

Our project demonstrated that a standardized RRS training program increases adherence to the RRS call parameters. Following our intervention, the rate of RRS activations significantly increased with a subsequent significant decline in code blue events and the number of transfers to the ICU. Our project demonstrated that strict adherence to a RRS reduced pulseless cardiac arrests outside the ICU, which has been shown to result in better patient outcomes.
Learning Objectives:
1. Understand the concepts of personalized medicine, pharmacogenomics and translational medicine as it applies to severe cutaneous adverse drug reactions
2. Understand the basics of drug metabolism and the possible impact of genetic variation of genes related to drug absorption, distribution, metabolism and excretion as well as human leukocyte antigen (HLA) variation on adverse drug effects
3. Appreciate how genome wide associated studies such as those we have conducted have the potential to identify biomarkers for increased risk of adverse drug reactions

Introduction: Stevens-Johnson syndrome (SJS) and toxic epidermal necrolysis (TEN) are well-described severe cutaneous adverse drug reactions. While a strong association between Asian ancestry, HLA-B1502, carbamazepine use and SJS/TEN exists, the data are less definitive on genes related to drug absorption, distribution, metabolism and excretion, or ADME, which include the cytochrome p450 enzymes. We have sought to elucidate associations between genetic variants of the cytochrome p450 enzymes CYP2C9, CYP2C19, CYP2D6, HLA-B and UGT in a cohort of patients with SJS/TEN.

Research: We are currently conducting an IRB-approved study of patients with a diagnosis of SJS/TEN admitted to the SAMMC Burn Unit between 2001 and the present. Genetic analysis is being conducted from DNA extracted from formalin fixed paraffin embedded tissue blocks and analyzed using a combination of RT-PCR, Sanger sequencing and Next Generation sequencing. Additionally, new admissions’ blood samples are evaluated with the Roche AmpliChip testing for common variants in CYP2D6/CYP2C19. Using RT-PCR and AmpliChip, we have currently evaluated 51 specimens for the presence of the CYP2C19*2 allele, associated with decreased metabolic activity, and 17 of 51 patients were found to carry either one or two copies of this allele.

Discussion: Currently, there are no reliable genetic markers that predict if patients are at an increased risk of developing SJS/TEN. Genetic variants of ADME genes are reasonable targets for further evaluation. Of the 51 patients analyzed thus far, we have observed an allele frequency of 19% for CYP2C19*2, higher than the 13% allele frequency of CYP2C19*2 seen in the general American population. The impact of this variant allele is uncertain at this time and an association cannot be confirmed given these findings. We are in the process of further evaluating our samples for genetic variants of CYP2C9, CYP2C19, CYP2D6, HLA-B and UGT and hope to share these findings during this meeting.
DIFFERENTIATION OF ADULT HUMAN MESENCHYMAL STEM CELLS EXPOSED TO ALTERNATING ELECTRIC CURRENT AT THE POPULATION AND SINGLE-CELL LEVELS

Marissa E. Wechsler, B.S.¹, Brian P. Hermann, Ph.D.², and Rena Bizios, Ph.D.¹

Departments of ¹Biomedical Engineering and ²Department of Biology,
The University of Texas at San Antonio

Progress in developing clinically-relevant biomedical applications (such as regeneration and repair of damaged bone tissues) using stem cells has been slow because the conditions to generate either the required numbers of undifferentiated cells or lineage-specific cells remain, at best, partially understood. Cells involved in the process of new bone formation include (i) osteoblasts (differentiated, bone-forming cells) and (ii) bone-marrow derived mesenchymal stem cells (undifferentiated, multipotent stem cells, with the potential to differentiate at least into osteoblasts, chondrocytes, and adipocytes upon appropriate stimulation). To date, biochemical compounds (such as bone morphogenetic proteins) have been utilized to promote the differentiation of mesenchymal stem cells into osteoblasts. In contrast, the effects of biophysical stimuli on stem cell functions remain unknown.

For these reasons, the present in vitro study used interdisciplinary approaches and novel laboratory setups to examine and optimize the effects of alternating electric current alone (i.e., in the absence of supplemented exogenous growth factors) to promote the osteodifferentiation of adult human mesenchymal stem cells (hMSCs). Motivation for the study was provided by the physiological milieu: bone and its constituent cells exist, and function, in an environment composed of biochemical as well as biophysical (specifically, mechanical and electrical) stimuli.

hMSCs were cultured on flat, indium-tin-oxide-coated glass (pre-coated with fibronectin) in the absence of exogenous growth factors. A custom-made laboratory set-up was used to expose hMSCs (passage 3-5) under standard cell culture conditions to alternating electric current (sinusoidal waveform, in the ranges of 5-40 μA and 5-10 Hz frequency) for various durations (in the range of 1-24 hours) daily, for up to 21 consecutive days. The cellular/molecular analyses utilized two approaches: (i) at the cell population level; and, for the first time, at the (ii) single-cell level. Quantitative real-time polymerase chain reaction (PCR) was used to determine gene expression in hMSCs at the population and single-cell levels. Genes indicative of the lineage specific osteoblastic pathway (specifically, TAZ, RUNX2, SP7, SPP1, and BGLAP), as well of the chondrogenic (COL2A) and adipogenic (FABP4) lineages were monitored.

Optimal osteodifferentiation of hMSCs was obtained at the cell population level when cells were exposed to a sinusoidal, 10 μA, 10 Hz, alternating electric current for 6 hours daily for up to 21 consecutive days. Under these conditions the mesenchymal stem cells expressed early (TAZ, RUNX2, and SP7), and late (SPP1 and BGLAP) genes indicative of exclusive osteodifferentiation because genes indicative of the chondrocyte and adipocyte lineages monitored were not expressed at all time points tested. The single-cell analysis provided evidence of the heterogeneity of the hMSCs and confirmed expression of genes indicative of the early stages of osteodifferentiation.

In addition to providing fundamental information pertinent to stem cell physiology, the unique biophysical stimulus examined provides a still untapped alternative approach, (which does not require supplemented exogenous growth factors) in order to obtain critically-needed lineage specific differentiated cells (e.g., osteoblasts) for tissue engineering and tissue regeneration applications. In this respect, the present study could have major impact in bioengineering, biotechnology, and in specific therapeutic modalities in the clinical milieu.
BUILDING A HEALTHY TEMPLE CANCER PRIMARY PREVENTION PROGRAM AMONGST HISPANICS

Summer Wilmoth, M.S.1, Lauren Correa, B.S.1, Elena Martinez, B.S., CHES1, Meixia Pan, Ph.D.2, Raymundo Mendoza, B.S.1, Deborah Parra-Medina, Ph.D.3, Luz-Myriam Neira, Ph.D.4, Erica Sosa, Ph.D., MCHES1, Zenong Yin, Ph.D.1, and Meizi He, Ph.D.1

Background: Cancer has become the number one killer among Hispanics, the fastest and largest minority population in the US.1 Poor nutrition, physical inactivity and obesity are leading causes for cancer. Hispanics experience disproportionately higher rates of obesity, lower levels of physical activity and poorer eating habits.2 Although healthy eating and physical activity are a matter of individual choice, social and economic vulnerability may limit Hispanics' ability to live a healthy lifestyle.3;4 In San Antonio, Texas' south and west-sides, approximately 95% of the population is Hispanic; as high as 43% of the residents are obese,5 42% of area households earn less than $20,000 annually, and approximately 54% of residents have an educational level below the 12th grade. Cancer prevention programs for the underserved Hispanic populations should go beyond the traditional health education approach. The majority of Hispanics identify with a Catholic/Protestant faith.6 Faith-based communities have been emerging as important settings for promoting healthy lifestyles. The Body and Soul Program is an evidence-based cancer prevention program for African-American churches utilizing multiple strategies including pastoral involvement, educational activities, church environmental changes, and peer-counseling.7 A 16-church effectiveness study of Body & Soul showed that the intervention group consumed significantly more fruits and vegetables at follow-up than the control group.7 The Body and Soul Program has a great potential to be adopted and implemented in Hispanic churches.

Materials & Methods: Building a Healthy Temple (BHT) is a 4-month program adopting the four pillar model of the Body and Soul Cancer Prevention Program. BHT intervention components include: Health Sermons, Health Bible Study, Nutrition Education and Cooking Demonstrations, Active Living Competition, church health-conducive environmental changes, and Peer Counseling by trained health lay leaders. BHT aims to reduce cancer risk through the promotion of healthy lifestyles amongst Hispanic congregants and community members. The program will be implemented in up to 18 faith-based communities and reach approximately 3600 individuals in San Antonio's low income neighborhoods.

Innovation: The BHT project uses non-traditional venues and approaches for promoting healthy lifestyles among high-risk Hispanics. There are five main innovative features: 1) adopting evidence-based intervention approach; 2) integrating the promotion of spiritual and physical health; 3) using existing infrastructure and social support systems in church settings to deliver programs that facilitate healthful behavioral changes; 4) building community capacity by using the Train the Trainer Model. The trained health lay leaders remain in the community as important human capital to sustain health promotion services and activities; and 5) strengthen partnership among academics, the faith-based community, and key community stakeholders and advocates.
Significance and Impact: The BHT project targets three preventable cancer risk factors, i.e., poor nutrition, physical inactivity and obesity, among Hispanics. The proposed project will lead to the adoption of an evidence-based Body and Soul Cancer Prevention Program appropriate in Hispanic faith community settings. The project has the great potential to be disseminated on a broad scale to meet community needs, impact practice and policy, and ultimately lead to the reduction in cancer risks among underserved Hispanics.

Thank you to our community & academic partners and other funding sources that are helping to get the word out about this program and allowing Building a Healthy Temple to improve the health and well-being of families in our community. These organizations include: San Antonio Food Bank, Mayor’s Fitness Counsel, San Antonio Metropolitan Health District, Texas Diabetes Institute, San Antonio Walks, Iglesia De Dios Central and all of our participating churches, Robert Wood Johnson Foundation, San Antonio Life Sciences Institute, Baptist Health Foundation of San Antonio, and Blue Cross Blue Shield of Texas.

Funding Support: Cancer Prevention Research Institute of Texas

Works Cited:


Background: With more than 3 million members, nursing encompasses the largest segment of the nation’s health care workforce, which uniquely positions the profession at the forefront of healthcare reform. A 2010 report by the Institute of Medicine (IOM) stated that nursing professionals need to play an essential role in the transformation of the United States health care system. Among the key messages of the 2010 IOM report is a call for the nursing profession to produce nursing leaders to change the U.S. Healthcare System (1). The American Organization of Nurse Executives (AONE) is leading the way in the area of executive nursing competencies (2). Widely considered the gold standard in executive nursing competencies, AONE’s competency domains (e.g., Communication and Relationship-Building, Knowledge of the Health Care Environment, Leadership Skills, Professionalism, and Business Skills) will serve as the foundation for competency association for this systematic review. There is very little evidence to validate nurse executive level leadership competencies (3). Hence, the purpose of this systematic review is to identify what leadership competencies have been investigated among Chief Nurse Executives/Officers (CNE/CNO).

Objective: Conduct a Rapid Evaluation and Assessment of the Literature (REAL®) to identify research based studies investigating executive level leadership competencies in CNE/CNO’s

Methods: A systematic review was conducted using the Samueli REAL® framework. The following PICO question dictated the search strategy and selection criteria (What executive level leadership competencies have been investigated in CNE/CNO’s?). Search strategy involved PubMed, CINAHL, & PsycINFO from 2010 to 2015 and limited to articles published in English. Selection criteria included research studies on executive level leadership competencies in the CNE/CNO population. Critical appraisal was conducted using the Center of Evidence Based Management tools and the appropriate version was utilized based on the type of study design (i.e. case studies, survey studies, or qualitative studies).

Results: Implementation of the search strategy generated 611 references (PubMed = 362, CINAHL = 182, PsycINFO = 67). A final eight articles met the selection criteria (4 - 11). Of the eight articles, the review revealed that all competencies investigated were nested in the American Organization of Nurse Executive five competency domains. Limitations include the lack of randomized studies, the lack of homogeneous study designs, insufficient statistical data for calculating effect sizes and the inability to generalize findings. In spite of these limitations, the purpose of the review was to summarize the evidence for executive nursing competencies.

Conclusion: More research is needed on nurse executive competencies to develop a robust body of knowledge for CNE/CNO professional development and in turn have an impact on the U.S. Healthcare System.

Acknowledgement: LTC Angela Simmons, PhD, RN for her mentorship and Misty Carrillo for her search strategy expertise.

The views expressed in this presentation are those of the authors and do not necessarily reflect the official policy or position of the Department of the Army, Department of Defense, nor the U.S. Government.
PREVALENCE AND IMPACT OF ANEMIA ON BASIC TRAINEES IN THE U.S. AIR FORCE

Kathryn E. Myhre¹,³, Bryant J. Webber², Thomas L. Cropper², Juste N. Tchandja², Dale M. Ahrendt¹, Christopher A. Dillon¹, Roy W. Haas², Samantha L. Guy², Mary T. Pawlak², and Susan P. Federinko²

¹Joint Base San Antonio, Fort Sam Houston, TX; ²Joint Base San Antonio, Lackland, TX; ³School of Public Health, The University of Texas Health Science Center—San Antonio Regional Campus

Background: Anemia has been implicated in adverse health outcomes of competitive athletes and military recruits ranging from overuse injuries to degraded physical and cognitive performance.

Purpose: To investigate the prevalence of anemia among United States Air Force (USAF) basic trainees and to compare physical performance and discharge rates between anemic and non-anemic trainees.

Methods: All USAF basic trainees were screened for anemia between 1 July 2013 and 31 January 2014, at the start of an 8-week basic training program at Joint Base San Antonio-Lackland, TX. Age, sex, body mass index, screening hemoglobin, initial and final USAF physical fitness test scores, and discharge data were collected from all trainees. Those identified as anemic (hemoglobin <13.5 g/dL for males and <12.0 g/dL for females) received additional lab screening, nutritional counseling and oral iron-replacement therapy, if indicated. Mean percent improvement was calculated for all performance parameters from beginning to end of training, and anemic trainees were compared to non-anemic trainees by t-test with Welch modification. Results were stratified by sex and anemia severity and analyzed by post-hoc Bonferroni correction.

Results: Overall prevalence of anemia was 12.6% (N=18,827). Respective prevalence rates of borderline, moderate, and severe anemia were 12.6%, 10.9% and 1.9% for females and 4.8%, 3.8% and 0.3% for males. Mean 1.5-mile run time and push-up and sit-up counts improved significantly from beginning to end of training for both anemic and non-anemic trainees (p<0.001 for both). Trainees without anemia had slightly greater run time improvements than those with borderline and moderate anemia (female: 17.7% vs. 15.2% and 15.1% improvement, p<0.05 for both; male: 14.9% vs. 13.2% and 13.5% improvement, p<0.05 for both). The discharge rate for anemic trainees was 9.0% and for severely anemic trainees was 20.0%, as compared to 5.7% for those without anemia.

Conclusion: Anemia was prevalent among USAF basic trainees. Identification and treatment of anemia may optimize physical performance and decrease the rate of medical discharge.

The study authors would like to thank Dr. James P. McClung at U.S. Army Research Institute of Environmental Medicine for his guidance with development of the manuscript.

The view(s) expressed herein are those of the author(s) and do not reflect the official policy or position of Joint Base San Antonio, the U.S. Army Medical Department, the U.S. Army Office of the Surgeon General, the Department of the Army, the Department of the Air Force and Department of Defense or the U.S. Government.
Purpose: To compare the consistency of intraoperative central corneal thickness (CCT) measurements of the Wavelight EX500 that uses optical low coherence reflectometry (OLCR) to the Corneo-Gage Plus ultrasound pachymetry (USP) device.

Methods: In this retrospective study, 50 eyes of 26 LASIK patients were evaluated. Following LASIK flap creation, each eye was measured by both OLCR and USP immediately prior to flap lifting and then again after flap lifting.

Results: The mean CCT value before lifting the flap was 556.9 micrometers and 557.78 micrometers as measured by the USP and OLCR, respectively. After lifting the flap the USP mean was 440.96 micrometers and the OLCR mean was 441.7 micrometers. Two-sample Kolmogorov-Smirnov test demonstrated that the USP and the OLCR distribution of measurements were the same. A Shapiro-Wilk test of normality could not be rejected. Bland Altman plots showed strong agreement. The correlation between the two tests before flap lifting was 0.98, and after flap lifting it was 0.97, both with a 95 percent confidence interval.

Conclusions: The pachymetry measurements by the OLCR correlated with the USP. The Wavelight EX500 OLCR may be used in place of the USP for measuring CCT.
Background: Auditory and vestibular complaints have a significant impact on quality of life. Tinnitus, or the perception of ringing in the absence of acoustic stimuli, is the most prevalent service-connected disability for Iraq and Afghanistan Veterans (IAV) with compensation over 1 billion dollars per year. Vestibular dysfunction is most commonly characterized by vertigo and dizziness and can significantly impair function and negatively impact quality of life. These conditions have been associated with blast exposure, traumatic brain injury (TBI), and other deployment related occupational exposures and conditions. The purpose of this study was to describe the prevalence of tinnitus and vestibular dysfunction and their associated conditions in a cohort of IAV.

Materials & Methods: This retrospective observational study used data from the national Veterans Health Administration (VA) data repository. After identifying IAV, we used ICD-9-CM codes to identify those who received care for tinnitus or vertigo/dizziness during 2010-2011. We also identified comorbidities that may be associated with these conditions using algorithms validated for use with ICD-9-CM codes. Comorbidities included TBI, posttraumatic stress disorder (PTSD), depression, and conditions associated with these diagnoses (headache, anxiety, memory/attention/cognition, neck pain, insomnia, malaise/fatigue, vertigo/dizziness, tinnitus). Multivariable logistic regression analysis was used to examine conditions associated with tinnitus or vestibular dysfunction.

Results: Among all IAV, 311,400 received VA care in 2010 and 2011. 4.8% of these were diagnosed with tinnitus and 0.8% with vestibular dysfunction. Veterans diagnosed with tinnitus were more likely to have a diagnosis of TBI alone, PTSD alone, TBI+PTSD, headache, and vestibular dysfunction. Veterans diagnosed with vestibular dysfunction were more likely to have a diagnosis of TBI alone, TBI+depression, TBI+PTSD, TBI+PTSD+depression, headache, and tinnitus.

Conclusion: Our results indicate that TBI is associated with both tinnitus and vestibular dysfunction and that PTSD increased the likelihood of these conditions among individuals with TBI. Depression also increased the likelihood of vestibular dysfunction, but not tinnitus in individuals with comorbid TBI. The diagnoses of tinnitus and vestibular dysfunction were associated with each other and with an increased likelihood of headache. Longitudinal studies examining the temporal relationships between tinnitus, vestibular dysfunction, and their comorbidities are needed to better understand how these conditions are related; this may allow for the development of new treatment approaches that improve clinical outcomes and quality of life.

This study was funded by VA Health Services Research and Development (DHI 09-237).
Background: Bone fractures are quite common and while most of these bone fractures heal naturally, severe large open bone fractures do not heal on their own, and a bone graft is needed to help regenerate bone tissue. However, due to a compromised blood supply to the affected area, many of these large traumatic bone injuries do not heal, leading to amputation. Vessel in-growth is a crucial factor in the success of bone regeneration as it provides the nutrient supply, as well as waste removal pathways from the injured area. Hence, a means to promote vascularized bone regeneration is needed. In this study, we evaluate the production of vascular and osteogenic markers in a co-culture model using spatial-temporal variations.

Materials & Methods: Composite scaffolds were prepared by casting 3 mm thick 4 mg/ml collagen hydrogels on 100% crystalline hydroxyapatite discs. Initial experiments demonstrated that Human bone marrow stem cells (hBMSCs) showed an increase in VEGF production on the composite scaffolds at day 7 when seeded alone. In the current study, optimized concentrations of hBMSCs and Human umbilical vein endothelial cells (HUVECs) were seeded in different spatial distributions: hBMSCs loaded without the hydrogel on day 0, then on day 7 HUVECs were added within the collagen hydrogel (Group 1); hBMSCs loaded within the hydrogel on day 0, then 7 days later HUVECs were seeded (Group 2) and hBMSCs and HUVECs loaded within the hydrogel on day 0 (Group 3). Additionally, three ratios of hBMSCs to HUVECs were used (5:1, 1:1, 1:5). Production of vascular markers (vascular endothelial growth factor (VEGF) and Angiogenin) and an early osteogenic marker (ALP) were measured at regular intervals using ELISA and cells were observed using fluorescent microscopy. Groups were compared using 2-way ANOVA across time and Tukey’s test (at p<0.05).

Results & Conclusions: TResults demonstrated that various cell ratios (5:1, 1:1, 1:5) between the hBMSCs and HUVECs had no statistical differences between groups and all groups displayed similar trends. However, when cells were seeded with spatio-temporal variation results displayed varying angiogenic profiles. Delaying the seeding of vascular cells (HUVECs) (Group 1 and 2) increased vascularization, as suggested by an increase in angiogenin, a known potent inducer of neovascularization in vitro. Interestingly, VEGF levels were reduced if hBMSCs were seeded within the gel and the HUVECs were seeded on Day 7 (Group 2), demonstrating how crucial early hBMSC differentiation and vascular infiltration is. All groups had an initial peak of ALP (an early osteogenic marker), which is indicative to osteoblast differentiation. Fluorescent microscopy images showed morphological changes in Group 1.

References

Acknowledgements: Partially funded by NIH/NIGMS MARC U*STAR GM007717 and UTSA College of Engineering.
WE LEAP:
A COMMUNITY TRAINING PROGRAM FOR FUTURE HEALTHCARE PROFESSIONALS

Kavina Patel, & Farhan Ahmad

FAME B.S./M.D. Program, Biology, College of Sciences
The University of Texas at San Antonio

We set out to design a community program that strategically trains future healthcare professionals. The initiative was designed in collaboration with a local non-profit organization called The Patient Institute, which helps patients and their caretakers navigate the healthcare system. Thus began the WE LEAP program, which stands for WEllness Leadership, Ethics, Applied Economics, and Professionalism. Participants of WE LEAP experience interactive presentations, immersive biosimulations, tours of San Antonio’s healthcare facilities, and gain the opportunity to network with experts from each of the respective fields during the summer.

The Patient Institute hopes to educate San Antonio citizens about the role they can play in ensuring quality care, and WE LEAP is a platform to engage young individuals interested in health professions to do so. Evaluations taken before and after WE LEAP sessions in summer 2014 were used to gauge the effectiveness of the program for future implementation.
Educators play an important role in the development of nurses for tomorrow’s patient. Patients are becoming more complex and have multiple diagnosis. Providing students with a multifaceted simulation provides a forum to integrate and develop new knowledge, refine skills, and perfect team member roles in response to caring for a complex patient. As well as allows academia with tools to verify a student's competency level.

**Objectives:**
1. Explain how simulation standards and guidelines can be used to integrate and verify competency using a complex patient.
2. Discuss the merit and benefit of using simulation to teach concepts related to complex patient.
3. Describe the process, development, and value of integrating concepts using simulation, and understand how the effectiveness of the simulation is evaluated.

**Background and Purpose:** For many students correlating theory to clinical can be difficult; when Pharmacology, Behavioral Health, Obstetrics and Research are added to the mix, student’s thinking process becomes compartmentalized. Integrating content from several courses is a must to set them up for success. Over the last two years the 2nd semester Accelerated and Traditional nursing students have been offered the opportunity to participate in a Post-Traumatic Stress Disorder (PTSD) patient experience. This Simulation Base Education (SBE) has been used as a teaching strategy to complement a curriculum and to provide students an opportunity to incorporate understanding of administering patient care to a complex patient. SBE has had positive and lasting results on our nursing students.

**Methods:** Students participate in unfolding simulation scenarios upon completion of the 2nd semester. The unfolding case consists of: 1) admission procedures for a PTSD patient who has just told her fetus has cleft palate to a behavioral health unit, 2) assessment of the patient in a home health environment, and 3) the patient is admitted for delivery of the infant. Through simulation, principals of therapeutic communication, assessment skills, medication administration and evidence based research are evaluated. Participants are provided the opportunity to reflect on the clinical simulation experiences and debrief. All program content will be shared with the audience during the presentation.

**Findings and Conclusions:** A total of two hundred fifty three (N=253) students participate simulation that incorporated a complex patient situation enhancing student learning. Feedback and data continues to be collected to evaluate meeting course objectives; preliminary finding indicate the value and merit of using simulation to teach concepts related to complex patients. An unexpected finding of the program is student's self-confidence and self-esteem has increased. Student feedback and evaluations consistently rated the program 5.0 on a 1-5 Likert Scale. Further data will be collected from subsequent classes.

Address queries to Jackie Riley-Baker (210-269-1959 or rileybaker@uthscsa.edu) or Penny Flores (floresb2@uthscsa.edu).
DO SPERMATOCONIAL STEM CELLS NEED SERTOLI CELL-DERIVED GDNF PRODUCTION FOR THE MAINTENANCE OF SPERMATOGENESIS IN THE ADULT MOUSE TESTIS?

Jennifer M. Mecklenburg¹, Marilyn Cisneros¹, Edward M. Eddy², and Brian P. Hermann¹

¹The University of Texas at San Antonio; ²National Institute of Environmental Health Sciences, Durham NC.

Mammalian spermatogenesis is a complex, multistep process that requires many intracellular signals in order to differentiate spermatogonial stem cells (SSCs) into specialized haploid spermatozoa. To maintain proper fertility, there must be a balance between spermatogonial stem cell self renewal (to sustain a proper stem cell pool), and differentiation to produce the remaining cells in the lineage. Glial cell-line derived neurotrophic factor (GDNF) is a growth factor produced by testicular somatic cells required for SSC self-renewal and maintenance of the stem cell pool. The source of testicular GDNF, however, has been the subject of recent debate. Early work using cultured Sertoli cells demonstrated that these cells produce GDNF. However, recent conditional knockout work demonstrated that GDNF produced by peritubular myoid cells is required for normal spermatogenesis.

To determine if Sertoli cell-derived GDNF is required for spermatogenesis, we are using a conditional Cre/lox knockout strategy to delete gdnf-floxed alleles in Sertoli cells of adult mice. For this purpose, we are crossing mice bearing a Sertoli cell-specific tamoxifen-inducible Cre recombinase (Sox9-CreERT2; Maike Sander, UCSD) with mice harboring two gdnf-floxed alleles and a Cre reporter (Rosa-LacZ). Currently, we are optimizing tamoxifen treatment to maximize Cre efficiency in Sertoli cells. Ultimately, we will use this tamoxifen-inducible Cre to delete gdnf in adult mouse Sertoli cells and observe its effects on steady-state spermatogenesis.
Spermatogonial stem cells (SSCs) maintain spermatogenesis throughout adulthood through balanced self-renewing and differentiating fate decisions, yet little is known about how these fate decisions are controlled. The transcription factors Sal-like 4 (SALL4) and zinc finger and BTB domain containing 16 (ZBTB16, aka: PLZF) are known to be required for normal SSC self-renewal and differentiation. Previous ChIP-Seq studies in undifferentiated spermatogonia identified 4,201 PLZF-bound genes (3,075 binding sites) and 2,591 SALL4-bound genes (3,490 binding sites) of which 1,372 (1,116 binding sites) were bound by both factors. Subsequent gene ontology (GO) analysis of these binding repertoires identified an over-representation of GDNF-responsive genes among those bound by SALL4 and/or PLZF. That is, of the 269 genes shown to exhibit significant mRNA level changes in cultured THY1+ spermatogonia following GDNF manipulations, 92 were bound by SALL4 and/or PLZF (34%) including genes known to be involved in SSC self-renewal and differentiation (e.g., Bcl6b, Etv5, Fos, Foxo1, and Lhx1). To validate our ChIP-seq data and determine the relevance of these binding sites to transcription of putative target genes, we performed siRNA-mediated knockdown of PLZF or SALL4 in cultured THY1+ spermatogonia and measured mRNA levels of target genes. Results of these studies indicated that SALL4 and PLZF are required to maintain the levels of these target genes, suggesting that transcription factor binding to these genes at the positions identified by ChIP-seq activates their transcription. This raises the intriguing possibility that these two transcription factors, SALL4 and PLZF, which are required for normal spermatogenesis, are key mediators of GDNF regulation of SSC function.

This study was supported by K99/R00 grant HD062687 to BPH, the Max and Minnie Tomerlin Voelcker Fund, the Helen Freeborn Kerr Charitable Foundation and The University of Texas at San Antonio.
TRIPLE NEGATIVE BREAST CANCER RESPONDS TO A SINGLE DOSE OF PHOTODYNAMIC THERAPY

Nuha B. Kadri, Nizar I. Alyassin, Justin A. Avila, Aryana J. Cruz, Louis J. Cruz, Steve D. Holliday, Zachary S. Jordan, Cameron A. Ruiz, Jennifer L. Watts, and Matthew J. Gdovin, Ph.D.,

Physiology, College of Sciences, The University of Texas at San Antonio

Background: Breast cancer, though much researched, continues to claim the lives of more than half a million women worldwide each year; triple negative breast cancer (TNBC) accounts for 15-25% of these mortalities. Treatment options for TNBC are limited to a select few chemotherapies, to which the cancer often becomes resistant. Cancer cells maintain a more basic intracellular pH (pHi) than healthy cells, making pH a potential target for treatment. The ability to induce a decrease of pHi, in a focal manner, would allow for treatment of cancers with a poor response to standard treatments.

Materials & Methods: We were able to drop pH in MDA-MB-231 TNBC, leading to apoptosis, using a photosensitizing agent in vitro. This technique was tested in vivo using MDA-MB-231 TNBC cells in mice; cells were injected into the mammary fat-pads of female nude mice. We allowed tumors to grow to 5 mm before phototherapy to induce acidification.

Results & Conclusion: In preliminary data, a significant decrease in the rate of tumor growth and a significant increase in survival were observed. These results show promise for our photoactivated agent as a potential treatment for cancer.

Supported by UTSA Collaborative Research Seed Grant Program Grant awarded to MJG.
Betanectin (BN) is a 68-kDa extracellular matrix protein. We have shown that BN is pro-apoptotic. After BN protein is secreted into the extracellular space, then proteases cleave BN’s C-terminus into small peptides, shifting the 68-kDa BN mass to 60-62 kDa. The part of the C-terminus that is cleaved then induces apoptosis. This finding indicates that BN C-terminal cleavage is required for BN to actually induce cell signaling that results in apoptosis. BN C-terminal cleavage and BN-mediated apoptosis have been implicated in human diseases, including the induction of apoptosis in ocular and renal cells, an unwanted outcome because it promotes nephrology and diabetic retinopathy, respectively. In this abstract we report our preliminary results of a method to document BN C-terminal cleavage, and quantify the extent of cleavage when comparing full-length 68-kDa BN to cleaved BN protein. The methodology is an important step toward the identification of potential clinical agents that block BN C-terminal cleavage. In-house generated, previously characterized anti-BN antiserum will be applied on the blot in order to detect the 68-kDa full-length BN and the ~62-kDa C-terminally-cleaved BN protein bands. Densitometry of the stained BN protein will provide a ratio of full-length BN and cleaved BN. Using a multi-lane apparatus up to 20 different agents will be screened in each assay. Agents found to block C-terminal cleavage are expected to have potential use in diminishing progression of nephrology and diabetic retinopathy.

Acknowledgments: Robert Moritz. MS, UTSA
In order to elucidate the effects of oxidative stress on memory, nematode specimens were treated with different concentrations of hydrogen peroxide (6mM, 10mM). Studies indicate that treatment with exogenous hydrogen peroxide (H$_2$O$_2$) initiates a series of molecular cascades in which free radicals, particularly reactive oxygen species (ROS) are generated (Morgan et al. 2006). Within biological systems free radicals are able to interact with many essential molecular components such as proteins and lipids. These interactions may lead to cellular dysfunction or even cellular death (Klann et al. 2011). Understanding the role of ROS in memory is of great interest because neurodegenerative diseases such as Alzheimer’s and Parkinson’s disease are characterized by learning and memory impairments (Klann et al. 2011). Since Alzheimer’s and Parkinson’s disease both show increased levels of ROS, it may be possible that the memory deficits associated with these disorders are caused by unregulated levels of ROS. We hypothesized that treatment with exogenous H$_2$O$_2$ leads to learning and memory deficits in Caenorhabditis elegans. Unexpectedly, the preliminary data obtained indicates that H$_2$O$_2$ at low concentrations (6mM) may in fact lead to learning and memory enhancement. Although the mechanism of action by which H$_2$O$_2$ affects memory remains unknown, further research can potentially lead to a new generation of nootropics that target molecules located away from the synaptic cleft.
Background: The process of bone repair is orchestrated by multiple events, signaling molecules and growth factors (GFs) such as stromal cell-derived factor-1 (SDF-1α), tumor necrosis factor alpha (TNF-α), and transforming growth factor β (TGF-β), as well as many others1, 2. Therefore, the simultaneous incorporation of multiple GFs into regenerative strategies is very promising. Having unique physicochemical properties, micro and nanoparticles have shown promise in delivering a range of molecules to desired sites in the body. These particles have been widely investigated in many novel multifunctional platforms for cell/tissue-specific targeting, sustained or triggered drug delivery, co-delivery of synergistic drug combinations and spatiotemporal control for drug delivery3,4. Therefore, the use of particles in the delivery of GFs can be tuned to promote timely and effective therapeutics5. The objective of this study was to characterize the release profiles of PLGA microparticles encapsulating TGF-β and PLA microparticles encapsulating SDF-1α and TNF-α. This microparticles will be used to promote bone tissue regeneration by inducing homing signals for human embryonic palatal mesenchymal cells (hEPMs) and human fetal osteoblasts (hFObs).

Materials & Methods: PLA MPs were prepared by dissolving PLA or PLGA in dichloromethane. Each GF (SDF-1, TNF-α, TGF-β or 1x PBS) was added individually to either the PLA or PLGA solution. This solution was added to a poly (vinyl alcohol) (PVA) solution which was stirred overnight to allow solvent evaporation. MPs were collected by centrifugation, washed and lyophilized, and then characterized using scanning electron microscopy. GFs release were measured by adding particles in PBS to concentrator tubes (Vivaspin®6) and kept at 37°C. Media was collected after centrifugation, and MPs were re-suspended in fresh PBS. Each GF was quantified using ELISA assays.

Results: PLGA MPs showed sustained release throughout the 8 weeks, with a maximum release between days 3-5 (46%). In PLA MPs late burst release was observed between days 5-7 for TNF-α (77%) and 7-9 for SDF-1.

Conclusions: Formation of drug incorporated MPs by emulsion-evaporation technique allowed for a combined late burst and sustained release profiles over 8 weeks in vitro. These MPs systems will be studied in combination with osteoprogenitor cells to promote early recruitment and differentiation, and further bone tissue regeneration.

Partially funded by the UTSA-SwRI CONNECT grant and NIH/NRSA/MBRS-RISE 5R25GM060655-15.
TRAVELER DEMOGRAPHICS, CHARACTERISTICS OF TRAVEL, PERSONAL PROTECTIVE MEASURE USE, MOSQUITO EXPOSURE, AND CHIKUNGUNYA SEROCONVERSION DURING THE OUTBREAK IN THE AMERICAS

Background: Chikungunya (CHIKV) has emerged in the Caribbean and Central and South America, infecting more than one million people since 2013 and posing risk to travelers. We describe traveler demographics and personal protective measure (PPM) use, mosquito exposure, and CHIKV acquisition in a military-medical-system cohort.

Materials & Methods: TravMil is a prospective observational study enrolling subjects presenting to 5 military travel clinics. We analyzed surveys and paired sera from travelers to this region between December 2013 and May 2015. CHIKV acquisition was determined by enzyme-linked immunosorbent assay, plaque reduction neutralization test, and polymerase chain reaction.

Results: 277 travelers enrolled (51% male, median age 40 years, 43% active duty [AD]), including 10 who enrolled post-travel. The median trip duration was 10 days. 41% traveled to Mexico/Central America, 31% to South America, and 28% to the Caribbean. 51% traveled on vacation, 29% for missionary work, and 26% for a military purpose; 10% were visiting friends/relatives (VFR). 48% of travelers reported using N, N-diethyl-m-toluamide (DEET) often, 28.5% rarely, and 23.5% never; 11% used permethrin. 64% of travelers reported seeing mosquitoes; 47% reported no mosquito bites, while 6% reported >15 bites.

In a multivariate logistic regression model, AD status (odds ratio/OR 2.6 [1.3-5.4]) and increased frequency of DEET use (OR 3.3 [2.2-5.0]) were associated with seeing mosquitoes. Older age was associated with fewer mosquito bites (OR 0.97 [0.95-0.99]) in a separate multivariate logistic regression model.

Paired sera were available for CHIKV testing in 31 travelers. Three acquired CHIKV; all enrolled as ill returning travelers. All were VFR in the Caribbean and reported DEET use; none used permethrin.
**Conclusions:** Mosquito exposures are common in travelers to CHIKV-outbreak regions in the Americas; AD military and younger travelers may be at higher exposure risk. Self-reported PPM use is suboptimal even after pre-travel counseling. However, CHIKV acquisition was seen only in individuals who enrolled after becoming ill and reported VFR; subclinical illness was not identified in our cohort. Pre-travel counseling should target higher risk groups, including AD military, younger travelers, and those who are VFR.

The view(s) expressed herein are those of the authors and do not reflect the official policy or position of the San Antonio Military Medical Center, the Infectious Disease Clinical Research Program, the Uniformed Services University of the Health Sciences, the Naval Infectious Disease Diagnostic Laboratory, the Madigan Army Medical Center, the Walter Reed National Military Medical Center, the Naval Health Research Center, the Naval Medical Center Portsmouth, the US Army Medical Department, the US Air Force Office of the Surgeon General, the US Army Office of the Surgeon General, the US Navy Office of the Surgeon General, the Department of the Air Force, the Department of the Army, the Department of the Navy, the Department of Defense, or the US Government.

**Funding:** Infectious Disease Clinical Research Program, Uniformed Services University of the Health Sciences, Bethesda, MD
TEEN PREGNANCY PREVENTION: AN 1115 MEDICAID WAIVER APPROACH

Olivia Thornton, M.D./M.P.H. Candidate¹, & Mario Martinez, M.B.A.,
Project WORTH Program Manager²

¹School of Public Health, The University of Texas Health Science Center at Houston;
²San Antonio Metropolitan Health District

Background: In 2013, over 2,500 females aged 10 to 19 gave birth in Bexar County. Over 500 of these teen mothers already had at least one child. Teen childbearing in Bexar County during 2013 was estimated to cost $58 million. In 2013, the Bexar County teen birth rate for females ages 15 to 19 was 51% higher than the national rate. To decrease these high rates of teen births, the San Antonio Metropolitan Health District's Project WORTH (Working on Real Teen Health) programs expanded prevention education and initiated new services for adolescents through federal 1115 Medicaid Waiver funding. Initiatives include evidence-based prevention education for teens, case management for teen mothers, providing long acting reversible contraceptives (LARC) for female teens, and provider education on the Adolescent Medical Home (AMH) model.

Materials & Methods: Pregnancy prevention education was provided to teens between November 2013 and June 2014. Over 2,400 students received evidence-based education in over 20 middle schools in Bexar County. The teen pregnancy prevention education curricula were evaluated using pre and post surveys. Case management was provided to 100 teen moms either in their third trimester of pregnancy or parenting a child under the age of two using the Parents as Teachers (PAT) program curriculum. Clinical services were provided to teens through University Health System (UHS) clinics and the Metro Health Teen Clinic from March 2014 to September 2014. A satisfaction survey was distributed to patients at the Metro Health Teen Clinic. Training sessions on the AMH model, which encourages a team-based approach to preventative adolescent health services, were offered to healthcare providers in OB/GYN practices from March 2014 to September 2014 after a needs survey indicated that 67% of providers were interested in evidence-based adolescent medical care. Pre and post surveys were distributed to the 201 providers that received at least two trainings.

Results: Pre to post surveys concluded that the teen pregnancy prevention education helped students understand peer pressure. In the post surveys, 63.3% of students intended to remain sexually abstinent and 77.3% indicated that they would use condoms if they did choose to have sex. While enrolled in the PAT program, 99% of participants remained pregnancy free. Over 90% chose contraception, 17% of whom opted for a LARC. UHS and Metro Health Teen Clinic provided 217 LARC implants, 39 contraceptive injections, and 3 contraceptive pill sets to a total of 259 teen females. All 45 of the patients that completed the Metro Health satisfaction survey indicated that they would recommend the teen-friendly clinical service to others. In the AMH training post-survey, respondents were asked to choose two practices they would likely implement into their future practice. Almost half chose talking alone with teen patients and over 30% indicated that they would also utilize positive youth development to engage teens.

Conclusions: The four 1115 Medicaid Waiver Project WORTH programs all met their pre-determined metric and achieved their project milestones. These partners collaborated to empower youth to prevent teen pregnancy through evidence-based education, promoting healthy behaviors, and cultivating community relationships.

1 San Antonio Metropolitan Health District 2013 teen birth data is preliminary.
2 The National Campaign to Prevent Teen and Unplanned Pregnancy, 2014.

Acknowledgments: Healthy Futures of Texas, University of Texas at San Antonio, Dr. Erica T. Sosa, Dr. Sara B. Oswalt, The Children's Shelter of San Antonio, University Health System, UT Health Science Center San Antonio School of Medicine

Funding Support: Medicaid 1115c Waiver, Delivery System Reform Incentive Payment pool
INTERPENETRATING COLLAGEN-FIBRIN HYDROGELS FOR SKELETAL MUSCLE REGENERATION

Sarah J. Stagg¹, Beth E. Pollot, Ph.D.¹², Christopher R. Rathbone, Ph.D.², Anson Ong, Ph.D.¹, and Teja Guda, Ph.D.¹

¹Department of Biomedical Engineering, College of Engineering, The University of Texas at San Antonio; ²Extremity Trauma and Regenerative Medicine, US Army Institute of Surgical Research, Ft. Sam Houston, TX

Background: Biomimetic hydrogel scaffolds have been used extensively for in vitro investigation and to create synthetic grafts for wound healing applications such as skeletal muscle. The use of biologically ubiquitous extracellular matrix proteins such as collagen I and fibrin provides the necessary biocompatibility and biodegradability to scaffolds. Previously, we performed an in-vitro screening of natural hydrogels, evaluating collagen I, agarose, alginate, fibrin and collagen-chitosan. This included 14 day cell studies with both L6 rat cells (ATCC, Manassas, VA) and rat satellite cells. The results indicated that collagen and fibrin were best suited as myogenic scaffolds compared to the other groups tested. This was further validated with a pixel analysis histogram of representative images showing that fibrin and collagen had the most MF20 staining. It was hypothesized that a combination of the two substrates might be better suited for myogenesis than either individually.

Materials & Methods: For the current study, we used the following collagen:fibrin ratios: 100:0, 75:25, 50:50, 25:75, and 0:100. Characterization methods included evaluation of material stability over 14 days with and without cells (rat skeletal myoblasts L6), uniaxial tensile testing, rheology and in vitro myogenesis. Statistical differences were determined using a two-way ANOVA with Tukey’s post hoc test (n=6, p<0.05).

Results and Conclusions: The material stability test indicates that the groups have an increasing level of degradation with increasing fibrin content. The addition of cells appear to increase degradation initially but stabilize it later in the study, presumably due to extracellular matrix (ECM) deposition. This allows us to potentially tune the rate of scaffold degradation to match the rate of ECM synthesis by skeletal myoblasts. The rheological data shows that all groups have predominantly elastic behavior rather than viscous. Furthermore, the elastic moduli was similar between all groups and comparable to the native muscle ECM. In vitro testing of the gels using L6 cells over 14 days indicated that that all substrates supported myogenesis based off immunofluorescent staining for myosin heavy chain, a late myogenic differentiation marker. In conclusion, this study demonstrated the ability to tune the composition of interpenetrating hydrogels made of native extracellular matrix proteins and promote the in vitro expansion and tissue specific differentiation of myogenic cells.

Partially funded by the US Army Institute of Surgical Research, the Department of Defense, and the University of Texas at San Antonio.
Photoacoustic ophthalmoscopy (PAOM) is an evolving imaging technology that images the retina in vivo, using optical absorption-based contrast. In PAOM, a laser pulse is focused on retina to generate ultrasonic waves. These ultrasonic waves can then be detected with an ultrasonic transducer to generate an image. This technology can quantitatively measure materials with high absorption such as the eye, which is challenging for more common reflection-based imaging technologies. PAOM is capable of quantifying hemoglobin oxygenation of retinal blood and melanin concentration in retinal pigment epithelium, tissues that are impacted by many eye diseases including diabetic retinopathy and age-related macular degeneration. However, current PAOM detection techniques use piezoelectric ultrasound transducers, which must be in direct contact with the eye, restricting human use.

The purpose of this experiment was to synthesize, develop and test a hydrogel contact lens into which, in future studies, a recently developed microresonator ring ultrasonic transducer can be embedded, thus opening up ultrasound detection in humans. This lens is required to be transparent, have shape memory, moldable, and durable enough to eventually accommodate a sensor. First a mold was developed to create a flattop lens that would fit the eye of a rat. To synthesize the hydrogel, varying concentration of ethylene glycol dimethacrylate were added to a foundation of 2-hydroxyethyl methacrylate (HEMA), to moderate its physical properties. The components were then hydrated and polymerization was initiated with a UV initiator Irgacure 1173. We found that 63% HEMA, 1% EGDMA and 35% deionized water, and 1% Irgacure 1173, was the optimal proportion to produce these characteristics. Testing was then performed on this lens to determine refractive index, transmission spectrum, cylinder compression, hydrophobicity, and biocompatibility, and functionality as a ultrasound sensor.

Preliminary results indicate that the developed lens is a biocompatible hydrogel that is hydrophilic and has a flexible modulus comparable with present day commercial contact lenses. This lens formula will be used in followup experiments to encase our ultrasonic sensor. Thus, these results have brought us one step closer to achieving a patient-friendly PAOM detector that will allow ophthalmologists to get a more detailed view of the retina’s distinctive layers, assisting with early detection and treatment of retinal diseases.
Biomaterial scaffolds have been extensively investigated to function as synthetic graft substitutes and meet a growing need to regenerate bone defect sites caused by traumatic injury, cancerous resection or congenital defects. Bone is a composite tissue with an extracellular matrix comprised of a protein component (primarily Collagen Type I) which contributes to its high toughness, and a mineral component (primarily hydroxyapatite (HA)) which contributes to its high strength. It has been shown that synthetic HA has good regenerative properties as a bone graft substitute due to its strong osteoconductive nature. Carbon nanotubes (CNTs) have also been previously shown to function mechanically as matrix reinforcing fillers and biologically to promote bone growth in composites. The primary objective of this study was to determine whether CNT incorporation into porous interconnected HA scaffolds provided a biomechanical benefit in terms of increased strength, toughness and/or fluid permeability. HA scaffolds were prepared using a previously described template coating process. Briefly, polyurethane sponges with a mean pore size of 340 μm were cut and used as templates, then were coated twice in a distilled waterbased HA powder slurry. Binders used with the slurry to improve sintering and to stabilize the scaffold structure included polyvinyl alcohol, carboxymethylcellulose, Darvan 820A as a dispersant, and N,N dimethylformamide, a drying agent. CNT (Molecular Rebar Design Austin, TX) were added to make three different groups with 0%, 1% or 5% CNT concentration per unit mass of HA. Scaffolds were then sintered under one of four gas treatments: no flow, or a steady flow of air, nitrogen or argon. Characterization methods included evaluation of porosity and architecture by pycnometry and microCT analysis, mechanical characterization by pure compression and permeability by a custom flow apparatus. No significant morphological, architectural or porosity changes were observed in the HA scaffolds when CNT’s were incorporated into the composite blend for scaffold synthesis. While no differences in mechanical properties were observed when 1% CNTs were included, mechanical strength and toughness were significantly reduced when 5% CNTs were incorporated and the scaffolds sintered in an inert atmosphere (Argon or Nitrogen). This is potentially because the CNTs do not oxidize in these environments, and at 5% are probably causing volumetric changes in the load sharing. Permeability testing showed that the 1% and 5% CNT sintered under air flow exhibited significantly higher permeability (~2 fold) compared to the rest of the groups, this further supports that premise that sintering the HACNT composites in an oxidizing atmosphere is potentially leading to the generation of CNTchannels (p<0.05).
Texas Somali Refugees Beliefs in Health, Illness and Help Seeking Behavior

Raege Omar, Institute for Health Disparities Research, The University of Texas at San Antonio

More than a million Somalis fled their homeland and found refuge in other countries after the collapse of the central government of Somalia in 1991. The United States is home to tens of thousands of Somali refugees, and they are the largest ethnic refugee group of African descent. Many of these refugees experienced violence through civil war in the loss of loved ones, homes, exposure to torture and many stayed in refugee camps for longer than a decade. The impact of resettlement and relocation from one country to another demands radical and extensive adaptation to the new context and can potentially come at the cost of disruption in social support and ultimately as altered health.

The main purpose of this thesis is to describe how traditional beliefs of disease causation and treatment preside the conceptualization of optimal health based on Somali cultural beliefs and practices. In addition, I will explore how Somali cultural beliefs determine who is labelled to be sick or suffering from a particular illness and the reciprocal relationships in terms of health seeking behavior patterns. I will utilize a Cultural Cognitive Model to describe the relationship between beliefs in health or illness, and the level of individuals’ awareness of changes in physical or emotional well-being, and whether these changes would be labelled abnormal. While health is generally considered to consist of a physical and an emotional component, the two can only be partially differentiated. Research demonstrated that more traditional cultures tend to differentiate less between physical illness and psychological disturbances.

The thesis will elaborate how Somali beliefs of disease causation and treatment influence the conceptualization of optimal health, and how Somali refugees give specific meaning on death and suffering; and hence how to prevent or treat diseases and illnesses. The thesis inquires about Somali refugees' beliefs which specifically impact health, and healing in a western medical system, and how traditional beliefs interact with acculturation and shape Somali refugees' health seeking behavior. Qualitative data will be captured through in-depth interviews to document refugee definitions of health, sickness, sick role and their differences in gender. I will investigate to answer the following research questions: What are the Somali refugees' beliefs which specifically impact health, illness and healing in a western medical system? How do those beliefs interact with acculturation and shape Somali refugees' help seeking behavior?

The United States health care system faces the challenges of global migration process which alters the patterns of disease and increases physical and psychological illness. In-depth cultural understanding on what is perceived to be a disease, or a health related problem will help health care providers to deliver health care services in a culturally competent manner.
Background: Influenza is a serious disease that spreads easily. Children are more likely to have disease complications and are key vectors in the spread of flu. In 2008, the recommendations for annual influenza vaccination were expanded to include all children 6 months through 18 years of age. Influenza outbreaks in communities all around the United States (U.S.) cause many missed days of school and work for both children and parents each year. Vaccinating children in schools has shown to be effective in reducing transmission of the virus to vulnerable groups. School-located influenza vaccination (SLV) programs can efficiently immunize large numbers of children.

Providing annual influenza vaccine is a difficult challenge for many providers. This challenge includes the logistical problems of ordering, receiving, and storing vaccine while also convincing patients to accept the vaccine.

Materials and Methods: An effort in 2013 to increase the influenza immunization levels of 3 and 4 year old Head Start children led to the development of a partnership between Metro Health and the City of San Antonio Head Start program. All presentations of flu vaccine for these ages were administered at 7 Head Start centers with 764 of the enrolled children being vaccinated. Also in this season, Metro Health partnered with Pre-K for San Antonio campuses and immunized at two campuses.

In 2014, this partnership expanded to 27 Head Start campuses and an additional Pre-K for San Antonio campus. At Head Start Campuses Metro Health Staffs administered 930 doses. At 3 Pre-K for San Antonio campuses 102 students were immunized. Metro Health supplied the vaccines at no cost. A nine page packet of information (English and Spanish) went to parents to review and consent for administration of vaccine. A health questionnaire was included to determine if contraindications were present. Parents were given the opportunity to choose the vaccine presentation that they preferred. Head Start and Pre-K staffs distributed packets and made every attempt to get consents back from parents. Vaccine Information Statements produced by the CDC were included in packets to explain both the benefits and risks of the vaccine.

Results: These children benefitted from easy access to the flu vaccine. This low-cost intervention is sustainable because each year vaccine is made available through the VFC program. In SLV Head Start Campuses, 31% – 40% of enrolled students received the vaccine.

Conclusions: Influenza vaccination during SLV drives results in decreased influenza rates and improved school attendance. Herd immunity for unvaccinated children may also occur in these schools.
Although autologous bone grafts from iliac crest are considered to be the gold standard for bone defect restoration, there is a growing need for synthetic bone grafts to overcome donor site morbidity and supply, especially for large segmental defects(1). INFUSE® (Medtronic) which is a combination of recombinant human bone morphogenetic protein-2 (rhBMP-2) and an acellular collagen sponge (ACS) is currently the clinical standard for treatment of type III tibial fractures and large open bone defects in the extremities such as those in military trauma(2). However, its high cost of therapy and side effects of delivering supra-physiological doses of rhBMP-2 such as osteoclast activation resulting in transient bone resorption, cyst-like bone void formation and heterotropic bone formation are cause for great concern(3). Hydroxyapatite (HA) has good regenerative properties as a synthetic bone graft substitute due to its osteoconductivity(4) and ability to support angiogenesis in vivo(1) with little to no adverse host response. We previously investigated that pairing the HA scaffold with a collagen wrap aids bone regeneration over HA alone creating a protected milieu and a directed periosteal scaffold(5). The goal of this study was to determine whether the rhBMP-2 dose required to heal critical sized defects in vivo could be reduced using a combined osteoconductive scaffolds and osteogenic cell sources. This study used varying rhBMP-2 dosages with hydroxyapatite (HA) scaffolds (15mm length, 3x5mm oval cross section, 80% porosity) coated with collagen and paired with a collagenous periosteal membrane. The scaffolds were implanted in a critical sized (15mm) diaphyseal radial defect in New Zealand white rabbits. The groups examined were ACS+76μg rhBMP2 (clinically used INFUSE® dosage), HA+76μg rhBMP2, HA+15μg rhBMP2, HA/Col+15μ rhBMP2 and HA/Col+15μg rhBMP2+BMSCs. Fluorochrome labeling, micro-CT, histology and torsion testing were completed after the 8 week study. The rate of bone infiltration after 2, 4, and 6 weeks across groups indicated HA+76 μg rhBMP-2 in the first 2 weeks while HA/Col+15μg rhBMP2+BMSCs showed greater bone regeneration in the 2-4 week time frame. Bone volume and bone mineral density measurements showed that INFUSE® regenerated the least bone, while the HA/ Col+15 μg rhBMP-2 regenerated greater mineralized tissue than ACS and HA scaffolds at any dose. Histological analysis of bone area measurements indicated that the Collagen coated HA+15 μg rhBMP-2 regenerated greater mineralized tissue than INFUSE®. Torsion testing compared stiffness, toughness, maximum torque and maximum angle. No significant differences were found between the groups. In conclusion, the HA/Col scaffolds with 1/5th of clinical rhBMP-2 dosages produced significantly greater bone regeneration, bone quality and similar mechanical properties to INFUSE® controls.

This study was supported in part by the Orthopaedic Extremity Trauma Research Program USAMRMC # W81XWH-08-1-0393.

References
**Bombyx Mori** silk fibroin has a tunable secondary protein structure allowing changing of material and mechanical properties. This structure has led researchers to create scaffolds for a range of tissues including bones and ligaments. Silk can be molded and shaped to form gels or solid structures. This wide spectrum of possibilities allows mimicking of native tissue. This study analyzed the processing steps in scaffold synthesis to create suitable platforms for pancreatic islet expansion. Briefly, silk cocoons underwent multiple cleansing steps and were lyophilized. The lyophilized scaffolds were treated with methanol. Porous silk scaffolds were developed using hexafluoro-2-propanol (HFIP) to dissolve silk prior to methanol treatment. The silk/HFIP solution was then poured over NaCl, followed by leaching of the NaCl. The scaffolds were characterized using scanning electron microscopy (SEM), Fourier Transform infrared spectroscopy (FTIR) and atomic force microscopy (AFM). Nonporous scaffolds were used as controls. Also, a human mesenchymal stem cell seeding, attachment and proliferation study was carried out over 14 days in growth media to evaluate suitability for cellular expansion. The silk scaffolds produced significantly greater cell expansion in vitro compared to tissue cultured plastic controls. Varying pore sizes (150 to 400μm) were observed in this study. FTIR and AFM analyses confirmed structural changes with a change in modulus from 953.3MPa to 4.96GPa and the transformation of the secondary protein structure of silk from an amorphous random coil structure (1645cm-1) to a more crystalline β-sheet structure (1622cm-1), depending on the methanol concentration (ranges from 10% to 100%). A 15:1 (w/w) NaCl to silk ratio with 15% (w/v) silk/HFIP solution was also observed to produce the most consistent porosity when compared to 20:1 and 25:1. SEM micrographs confirmed the different pore sizes and consistent porosity throughout the scaffolds. Large (0.5mL versus 50μL of silk solution) porous scaffolds were then created in 3D molds of 15.4mm diameter and 4mm thick to compare structural consistency with scale up. These large scaffolds produced continuous pores throughout the scaffold with average FTIR peaks at the same wavenumber as the 100% methanol treatment (1622cm-1). The pore sizes for the large scaffolds were confirmed with SEM, measuring 192.73±36.05μm and 354.65±35.66μm. It was concluded that silk scaffolds can be tailored into porous and nonporous scaffolds of varying sizes while maintaining structural properties. The protein structure can be adapted through altering the methanol treatment used and porosity can vary with NaCl:silk ratio and NaCl crystal size with continuous pores throughout the scaffold. Additionally, data observed indicates that silk scaffolds can be tuned to the appropriate properties for mimicking tissue specific applications.

*Supported in part by funding from the San Antonio Life Sciences Institute.*

**References**

Background: While it has been previously observed that an injury to the skeleton results in metabolic changes in intact bones distant to the site of the injury, calcium loss at such distant skeletal sites following a local bone injury has never been specifically investigated. In this study we analyzed the calcium loss at different distant skeletal locations including contralateral femurs, radius and ulna, iliac crest, lumbar vertebrae and calvaria following surgical bone restoration. The primary objective of this study was to determine whether an injury resulting in the loss of bone tissue (locally) causes calcium loss from the skeleton at a distant site from the site of injury.

Methods: In order to determine skeletal effects following local injury, a standardized critical sized defect in the rat femur was treated with either fully demineralized, partially demineralized or freeze dried allograft bone and observed after 4, 8 and 16 weeks (n=4/group). We performed micro-computed tomography to assess the variations in bone quality at different skeletal sites. Regions of interest were manually generated to separate the cortical bone from the trabecular volume in each of these bones of interest. We analyzed the variations in bone quality using bone mineral density, bone volume to tissue volume ratio, bone surface density, cortical thickness and trabecular thickness, trabecular pattern factor, and trabecular number across the different groups. The differences between groups were analyzed using two way ANOVA (across treatment and time) followed by Tukey’s post hoc test (p<0.05).

Results: Left femur analysis indicated that demineralized bone matrix group exhibited significantly lower bone volume compared to allograft while allograft treated group showed significant loss of bone volume from 2 week to 4. Lumbar vertebral body analysis showed a strong trend of bone volume within the group treated with allografts from week 2 to week 4 while trabecular separation was observed to be significantly higher within demineralized bone grafts at 2 weeks compared to 4 weeks. Calvarial analysis indicated that bone mineral density observed within demineralized bone graft group was significantly increased from 2 week to 4 weeks while the trabecular thickness within the partially demineralized bone graft treatment group at 2 weeks was significantly higher than at 4 weeks and that of allograft treated group at 2 weeks.

Significance: Significant changes in trabecular architectural parameters of left femurs were observed compared to other skeletal sites suggesting the fact that calcium depletion primarily occurs in the long bones during defect healing process. Although enhanced trabecular separation was seen in lumbar vertebral bodies no significant differences were seen in bone volume indicating their minimal contribution in maintaining calcium homeostasis during distant bone healing process. Microarchitectural evaluation at the calvarial site (most distant) from the site of injury reveal that different treatments has an impact on bone quality at distant skeletal sites.

This study was supported in part by the University of Texas at San Antonio College of Engineering, the Department of Defense and by USAMRAA Grant# W81XWH-15-P-0214.
PSYCHOMETRIC ANALYSIS OF THE RELATIONSHIP BETWEEN TRAUMA AND RESILIENCY

Casey Szajnecki, B.A., Melina Acosta, and Augustine Osman, Ph.D.
Department of Psychology, College of Liberal and Fine Arts, The University of Texas at San Antonio

Abstract: This study examined the relationship between the degree of the impact from trauma, and resiliency level in college-age individuals. Risk and protective factors were used as the measures of comparison between each group that differs in the level of trauma and resiliency. Additionally, differential correlates were observed between individuals with high and low levels of resiliency.

Participants: Total of 226 participants (students) were recruited at the University of Texas San Antonio’s main campus. For the purpose of the study, four groups were formed according to the participants’ trauma level, using DSM-IV PTSD scores (PCL-C), and resiliency level, using the Connor-Davidson Scale scores (CD-RISC). Group 1 (n=35)- high trauma & high resiliency, Group 2 (n=60)- low trauma & high resiliency, Group 3 (n=59)- low trauma & low resiliency, Group 4 (n=72)- high trauma & low resiliency.

Study Procedure: 1) Questionnaire packets are assembled, and participants are recruited via SONA Research Participation system. 2) Data is collected in person during collection session at various dates & times (informed consents are signed, and debriefing is given), and 3) Data analysis (independent t-test, Pearson correlations, and reliability-Cronbach’s Alpha) & results.

Results: Using effect size estimates, clinically meaningful differences between individuals with symptoms of PTSD were found: 1) Individuals with a high level of trauma, when possessing a high level of resiliency showed more self-control, calmness, and collectiveness when compared to those with a low level of resiliency, 2) Individuals with a high level of trauma and low level of resiliency scored higher in suicidal behaviors (i.e., Frequency of thoughts about suicide, threat of suicide, likeliness of suicide in the future) than those who possess higher level of resiliency, 3) Individuals with a high trauma level and a high resiliency level showed more symptoms of depression, such as loneliness, sadness, feeling and blue, when compared to those with a low level of trauma, and 4) Individuals with a low trauma level and a high resiliency level believed to have found the purpose/meaning in life, more so than those with a high level of trauma.
Background: Osteochondral lesions, or injury to articular cartilage and the bone directly underneath it may occur in a variety of ways. The most common ways include traumatic bone injuries, several arthritis diseases, or large loads applied to joints in bariatric patients. The degree of severity may vary from bone cracks to eventually losing fragments of bone in the epiphysis area. Different means of approaching bone defects include total knee joint implantation, autografts and allografts, however they do hold limitations. Implantations can fail over time, autografts require two incision locations which lead to a higher risk of infection, and allografts may have a difficult time integrating into the body properly. Because of such restrictions, considerable interest has been given to various fabrication techniques of scaffolds to seek different means of overcoming bone loss. Studies demonstrate that scaffolds act as temporary matrixes at the site of injury to promote cell proliferation, which in turn promote tissue regeneration. This study focuses on constructing scaffolds that exhibit different gradients of pore architectures and various gradients of collagen coating on their surface in order to mimic physiological structures and compositions and lead to enhanced subchondral bone regeneration.

Materials and Methods: Scaffolds were constructed from porous interconnected templates with a 250 μm, 340 μm or 450 μm pore size formed into spatial gradients in a inferior-superior and external to internal direction of decreasing pore size to mimic subchondral bone. These three compartment templates were then coated with a hydroxyapatite (HA) slurry and sintered. Scanning Electron Microscopy was used to identify trabecular thickness and pore size. Compression testing was performed to compare the strength of various scaffolds before and after collagen coating. Finally, three dimensional reconstructions were obtained from the MicroCT which was able to differentiate the different gradient compartments present in the assembly of the scaffold. Uniform, single compartment scaffolds were coated with various collagen concentrations (0.1%, 0.05%, and 0.25%) to determine the optimal coating concentration. Scaffolds with three compartments were then coated with ideal collagen concentration.

Results: After mechanical testing, it was determined that the single compartment scaffolds coated with 0.05% collagen concentration had an increase in toughness. The trabecular thickness and pore size of each scaffold was not significantly affected after the coating of collagen, indicating that they retained their open porous architecture. Scaffolds coated with 0.05% collagen for 30 minutes showed the strongest trend for an increase in toughness from the uncoated scaffolds (p=0.082).

Conclusion: Lower concentrations of collagen may have resulted in a uniform thin film-like coating on the scaffolds in contrast to higher collagen concentrations which potentially led to local agglomerations with minimal impact on impeding fracture crack growth. Scaffolds with three compartment architectural gradients exhibited improved mechanical properties with an increase in ultimate stress and an increase in toughness when compared to single compartment control groups.
NOVEL SUBNETWORK ALIGNMENTS REVEAL NETWORK COMPONENTS INVOLVED IN PATHOGENESIS IN THE MALARIA PARASITE

Hong Cai, Ph.D.¹, Timothy G Lilburn, Ph.D.², Changjin Hong, Ph.D.³, Jianying Gu, Ph.D.⁴, Rui Kuang, Ph.D.³, and Yufeng Wang, Ph.D.¹,⁵

¹Department of Biology, The University of Texas at San Antonio; ²Novozymes NA; ³Department of Computer Science, University of Minnesota; ⁴Department of Biology, College of Staten Island, City University of New York; ⁵South Texas Center for Emerging Infectious Diseases

Background: Malaria is a major health threat, affecting over 40% of the world’s population. The latest report released by the World Health Organization estimated about 198 million cases of malaria infection, and about 584,000 deaths in 2013 alone. Malaria is considered of military operational significance, as it is endemic to regions of the Middle East, South East Asia and Africa, where large numbers of U.S. military personnel are deployed. During the past decade, new therapeutic targets have been identified and are at various stages of characterization, thanks to the emerging omics-based technologies. However, the mechanism of malaria pathogenesis remains largely unknown.

Materials & Methods: To unveil previously unknown proteins that are potentially involved in pathogenesis in the malaria parasite Plasmodium falciparum, we developed a module-based subnetwork alignment approach. We have framed the prediction of functional orthologs in P. falciparum as a subnetwork querying problem. In order to analyze and score the degree of similarity between the P. falciparum and Escherichia coli neighborhood subnetworks, a shortest-path graph kernel was used to measure the similarity between two labeled networks, and a numerical score for each alignment was assigned. Each shortest path through the central protein can be considered a chain of cellular activities, and the path defines the dynamic function of this protein.

Results: Our module-based subnetwork alignment approach identified 24 functional homologs of pathogenesis-related proteins in P. falciparum. Eighteen out of these 24 proteins are associated with 418 other proteins that are related to DNA replication, transcriptional regulation, translation, signaling, metabolism, cell cycle regulation, as well as cytoadherence and entry to the host.

Conclusions: The subnetwork alignments and subsequent protein-protein association network mining predicted a group of malarial proteins that may be involved in parasite development and parasite-host interaction, opening a new systems-level view of parasite pathogenesis and virulence.

This work is supported by NIH grants GM100806, GM081068 and AI080579 to YW. KR and CH are supported by University of Minnesota Grant-in-Aid of Research, Artistry and Scholarship.
Objective: This research examined the health of Global War on Terrorism (GWOT) veterans and their civilian counterparts to determine if there were differences in health status and whether these effects are moderated by Socioeconomic Status (SES).

Materials and Methods: Data for this study come from the 2013 National Health Interview Survey, administered through face-to-face interviews in a nationally representative sample of households. Restricting the sample size to non-Hispanic black and white men, aged 18-64, with a high school or higher education, the final sample size was 7,883.

Results: GWOT veterans represented 15% of the sample and nearly twice as likely to have reported “poor health” compared to their civilian cohorts. The majority (86%) of the sample were white, age-average 42, unmarried, completed some college or higher, incomes below $35K, and had health coverage. Regression model results show veterans 30% more likely to report “poor health” than their civilian counterparts, SES moderated this relationship, and surprisingly, poor health behaviors such as smoking reduced the odds of veterans reporting poor health by 18%.

Conclusion: This analysis found significant health differentials between GWOT veterans and their civilian counterparts. Explanations for the SES-health gradient, the role of stress and its impact on health behaviors and direct effects on the body are important factors to further to explore, suggesting a more comprehensive approach is needed.

Implication: The long-term effects of military service on GWOT veterans in largely unknown. Answers and explanations are needed to identify interventions to improve the health and livelihood of America’s most recent warriors.
ACUTE ISCHEMIC COLITIS AND PORTAL VEIN THROMBOSIS
IN A YOUNG FEMALE SMOKER ON AN ORAL CONTRACEPTIVE

John Hunninghake, MD1, Brian Murray, DO2, Pedro A. Manibusan Jr., D.O., M.B.A.3, Scott McNear, MD3, Willis Kann, MD2, and John Gancayco, MD3

Departments of 1Internal Medicine, 2Emergency Medicine, and 3Gastroenterology,
San Antonio Military Medical Center

Previous studies have shown an increased risk of arterial and venous thrombosis in the mesenteric vasculature in patients using an oral contraceptive pill (OCPs) that includes estrogen. While a few case series since the 1980s have detailed the severity of intestinal ischemia caused by this phenomenon, this case report highlights the important clinical features of a mesenteric thrombosis.

Patient is a 23-year-old female who presented with a 1-day history of multiple syncopal events followed by acute onset abdominal pain and bloody diarrhea. Her PMH was significant for an H. pylori infection treated three years prior. On admission, her only medication was an estrogen-including OCP. She reported smoking about one pack-per-day of cigarettes for the past year. Her stool studies were negative for an acute infection. CT imaging demonstrated wall thickening along the entire descending colon, nonspecific intrahepatic biliary duct dilation in the right hepatic lobe, and bilateral sacroiliitis. Follow-up MRCP visualized a portal vein thrombus without evidence of collateralization. Diffuse circumferential inflammation from the proximal sigmoid to the distal transverse colon was found on colonoscopy. Random biopsies demonstrated surface degeneration and withering of surface crypts, consistent with brisk acute inflammation. Due to the acute ischemia presumably from a thrombus, the patient was started on coumadin with a weight-based lovenox bridge. Her abdominal pain improved without recurrence of bloody diarrhea. She was eventually discharged in stable condition. A laboratory workup for an inherited thrombophilia was ultimately negative.

The etiology of the patient’s “reversible” acute ischemic colitis was attributed to a transient occlusion in the mesenteric vasculature, as suggested by the portal vein thrombosis and the patient’s clinical recovery. While the CT result was more consistent with an IMA distribution, the colonoscopy’s watershed findings suggested a vascular blockage at the SMA/IMA junction due to the spared sigmoid colon and rectum. The incidence of thromboembolic events in the mesenteric vasculature, which result in reversible ischemic colitis or progression to intestinal infarction, have been documented less as a complication of OCPs due to the decreasing estrogen dose. However, the combination of an estrogen-containing OCP with regular tobacco use caused an acquired hypercoagulable state placing this patient at higher risk for a mesenteric thrombosis.
RISK FACTORS ASSOCIATED WITH DECLINE IN ADULT OBESITY - BEXAR COUNTY, TEXAS 2010 - 2012

Thomas Schlenker, MD., MPH.,1 Anil T. Mangla, MS., PhD., MPH.,1 and Nhiem Luong, MD., MPH.2

1San Antonio Metro Health; 2Delaware Health Department

Background: To assess for change in obesity and obesity-related risk factors, an increased-sample Behavioral Risk Factor Surveillance System (BRFSS) survey of Bexar County was conducted, by the Texas State Health Department per CDC protocol.3 The survey demonstrated that from 2010 to 2012 in Bexar County, Texas, obesity prevalence declined from 35.1% to 28.5%. This report presents and discusses the nutritional, physical activity and demographic risk factors associated with the decline.

Materials and Methods: Obesity by risk factor, pre and post CPPW intervention, was assessed with a modified version of the BRFSS survey that randomly sampled, both years, approximately 1500 Bexar County residents >18 years old in households with land lines. The Bexar County BRFSS used land lines exclusively for both 2010 and 2012 in order to ensure comparability of data, even though the national BRFSS survey switched, in 2012, to include cell phones. Obesity is defined as body mass index (BMI) ≥ 30 kg/m2 calculated from self-reported weight and height. The BRFSS collects and calculates weighted prevalence with confidence intervals for all demographic and risk factor categories and reported to SAMHD all variables with sufficient respondents. Responses to BRFSS questions were examined for changes that might be related to obesity decline. Weighted data were tested for statistical significance using Chi-square analysis for changes in BMI and factors associated with obesity.

Results: Total obesity prevalence in Bexar County declined from 35.1% (95% CI = 30.4-39.9) in 2010 to 28.5% (95% CI = 23.7-33.3), p=0.05, in 2012, a proportional reduction of 18.8% (Table 1). Greatest change was noted in the non-White (“Other race”) population where obesity declined from 40.5% to 29.6%, p=0.02. Obesity among Whites increased slightly from 25.3% to 27.7%.

Table 1. Obesity and Population Characteristics, Bexar County, Texas 2010 - 2012

For obesity related risk factors, little change occurred in total amount of physical activity per week or in the proportion of the population physically active (Table 2). However, the proportion of local residents who met exercise muscle strengthening guidelines increased significantly from 24.4% (95% CI = 19.7-29.0) in 2010 to 32.2% (95% CI = 26.6-37.9) in 2012, p=0.02. For nutrition variables measured, those who consumed no “regular soda or pop” on a daily basis increased significantly from 29.3% (95% CI = 25.4-33.2) to 36.1% (95% CI = 31.0-41.2), p=0.02.
For obesity related risk factors, little change occurred in total amount of physical activity per week or in the proportion of the population physically active (Table 2). However, the proportion of local residents who met exercise muscle strengthening guidelines increased significantly from 24.4% (95% CI = 19.7-29.0) in 2010 to 32.2% (95% CI = 26.6-37.9) in 2012, p=0.02. For nutrition variables measured, those who consumed no “regular soda or pop” on a daily basis increased significantly from 29.3% (95% CI = 25.4-33.2) to 36.1% (95% CI = 31.0-41.2), p=0.02.

**Conclusions:** The San Antonio CPPW experience demonstrates that creative and well financed promotion of muscle strengthening physical activity may contribute to reduction of adult obesity and that many adults, especially Hispanic women, can be induced to break the daily soda habit. Being a majority Hispanic community in which, unfortunately, 64% of adults still drink soda every day, it is encouraging that Hispanic women are beginning to turn toward healthier diets.

Table 2. Obesity Risk Factors, Bexar County, Texas 2010-2012

For obesity related risk factors, little change occurred in total amount of physical activity per week or in the proportion of the population physically active (Table 2). However, the proportion of local residents who met exercise muscle strengthening guidelines increased significantly from 24.4% (95% CI = 19.7-29.0) in 2010 to 32.2% (95% CI = 26.6-37.9) in 2012, p=0.02. For nutrition variables measured, those who consumed no “regular soda or pop” on a daily basis increased significantly from 29.3% (95% CI = 25.4-33.2) to 36.1% (95% CI = 31.0-41.2), p=0.02.

**Conclusions:** The San Antonio CPPW experience demonstrates that creative and well financed promotion of muscle strengthening physical activity may contribute to reduction of adult obesity and that many adults, especially Hispanic women, can be induced to break the daily soda habit. Being a majority Hispanic community in which, unfortunately, 64% of adults still drink soda every day, it is encouraging that Hispanic women are beginning to turn toward healthier diets.

Table 1. Obesity by Population Characteristics–Bexar County, Texas 2010 – 2012

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>2010</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondents Total</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,501</td>
<td>1,075,903</td>
</tr>
<tr>
<td><strong>Male</strong></td>
<td>548</td>
<td>540,360</td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td>952</td>
<td>534,159</td>
</tr>
<tr>
<td><strong>White/Non-Hispanic</strong></td>
<td>671</td>
<td>380,504</td>
</tr>
<tr>
<td><strong>Other Race/Ethnicity</strong></td>
<td>792</td>
<td>677,174</td>
</tr>
<tr>
<td><strong>55-64 years</strong></td>
<td>373</td>
<td>139,238</td>
</tr>
<tr>
<td><strong>65+ years</strong></td>
<td>584</td>
<td>157,531</td>
</tr>
<tr>
<td><strong>Income &gt;$75,000</strong></td>
<td>250</td>
<td>191,804</td>
</tr>
<tr>
<td><strong>High School or G.E.D</strong></td>
<td>418</td>
<td>300,775</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>418</td>
<td>337,888</td>
</tr>
<tr>
<td><strong>College Graduate</strong></td>
<td>445</td>
<td>243,638</td>
</tr>
</tbody>
</table>

Table 2. Obesity by Risk Factor–Bexar County, Texas 2010-2012

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>2010</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondents Total</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,501</td>
<td>1,075,903</td>
</tr>
<tr>
<td><strong>Regular soda, no daily</strong></td>
<td>1,574</td>
<td>1,138,821</td>
</tr>
<tr>
<td><strong>Male</strong></td>
<td>554</td>
<td>545,526</td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td>1,019</td>
<td>591,911</td>
</tr>
<tr>
<td><strong>Other sugar drinks, no daily</strong></td>
<td>1,569</td>
<td>1,133,564</td>
</tr>
<tr>
<td><strong>Physical activity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None in 30 days</td>
<td>1,555</td>
<td>1,111,542</td>
</tr>
<tr>
<td>&gt;150 minutes/week</td>
<td>1,537</td>
<td>1,104,695</td>
</tr>
<tr>
<td>&gt;300 minutes/week</td>
<td>1,499</td>
<td>1,089,708</td>
</tr>
<tr>
<td><strong>Muscle strengthening exercises</strong></td>
<td>1,512</td>
<td>1,102,148</td>
</tr>
<tr>
<td><strong>White/Non-Hispanic</strong></td>
<td>667</td>
<td>373,943</td>
</tr>
<tr>
<td><strong>Other races</strong></td>
<td>805</td>
<td>709,070</td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td>534</td>
<td>524,148</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td>978</td>
<td>578,000</td>
</tr>
</tbody>
</table>
Since 2001, over 50% of service members in the US Armed Forces have been deployed in support of the Global War on Terror (Padden & Agazio, 2013). Of the 2.2 million deployed service members, 44% were married with children, raising the number of impacted individuals to at least 5.3 million. Military deployments, particularly to combat zones, often have profound effects on military service members and their families. Family systems are vulnerable to negative short- and long-term effects due to prolonged uncertainty, fear, and ambiguous loss accompanying separations and reunions (Huebner et al., 2009; Huebner et al., 2007). However, clinicians outside of the military community frequently overlook mental health care for families coping with deployments. Expanded attention to interconnected military war and home fronts exists (Bowling & Sherman, 2008; DeVoe & Ross, 2012) and necessitates renewed attention to the role of mental health counselors in supporting military-connected families.

Frequent geographic relocation is a salient aspect of military culture, which may differentiate military families from civilian families and result in additional family stressors. The deployment cycle is a term used to describe the experiences that occur when a military service member is called to deploy (Peebles-Kleiger & Kleiger, 1994; Pincus, House, Christenson, & Adler, 2001). This process involves a series of three stages in which the service member and their family experience and prepare for departure, separation, and reintegration. Each of the three stages (pre-deployment, deployment, post-deployment) entails unique emotional and logistical transitions military-connected families must navigate. For example, during the pre-deployment stage family members often alternate between feelings of denial and anticipation of the loved one leaving, which can be a very painful time for families. Families are also charged with focusing on the tasks that need to be accomplished before the service member deploys, such as planning for childcare, budgeting, and creating or finalizing wills. Alternately, at the post-deployment stage family members work to reestablish family dynamics, renegotiate day-to-day responsibilities, and reintegrate the returning service member into the family – tasks further exacerbated by potential injuries, traumas, potential future deployments, and even death.

Familiarity with the deployment cycle and interrelated emotional and logistical tasks of each stage is essential for mental health counselors providing targeted and evidence-based support to military-connected families. Given the mounting mental health needs of service-members and their families, as well as the dearth of mental health counselors trained to perform this work, the presently outlined poster will describe the three stages of the deployment cycle, including salient concerns, tasks, and resiliencies for military-connected families at each position in the cycle. The poster will also outline practical suggestions and tools for both military and civilian mental health counselors working in school and community based settings. Finally, implications for future practice and research will be forwarded.
BUILDING A PLATFORM TO SHOWCASE THE HIDDEN TALENTS OF PATIENTS

Anisha Guda, & Sammar Ghannam

Facilitated Acceptance to Medical Education (FAME) Program, College of Sciences, The University of Texas at San Antonio/The University of Texas Health Science Center at San Antonio

Background: Isolation, health-related complications, and fear and uncertainty of the unknown encompass the lives of patients and frequently result in their centering of their lives around disease, despair, and hopelessness. Not only do these patients begin to lose their identity, but psychologically, disease starts to take a toll upon their minds, transforming them into different people. Dehumanization, as a result, comes to the forefront as a detrimental flaw in the healthcare system. In order to solve this problem, hospitals and clinics throughout the nation are incorporating creative arts into the overall treatment of their patients. Creative Arts Programs serve as an outlet for self-expression and identity and group formation for patients. In the San Antonio community itself, no distinct Creative Arts Program exists. Limited to Music for Healing and Art Cart, there is a need for a broad-ranging program serving the larger patient community. Our goal is to take on a cost-effective and beneficial approach toward the incorporation of a Creative Arts Program within hospitals and clinics in San Antonio to enhance patient satisfaction.

Materials and Methods: We plan to provide an array of opportunities for patients to immerse themselves within the arts through the creation of an Open Arts Studio, which provides space for the creation and display of the arts. Within this studio, we will offer creative arts workshops, music therapy, creative writing workshops, an art gallery, and a patient journal. At the end of each patient’s stay, they will be provided with a gift that includes all of the artwork that they created during their hospital/clinic stay. In order to measure the effects of these programs, we will provide patients with a survey before and after their stay to measure observed changes in levels of happiness.

Results: Our expected results include a potential for the creation of wonders in the level of happiness of patients, improved social functioning in patients, elevated mood, a positive healing experience for patients, positive effects on patients’ views of hospital stays, reduced pain, shorter hospital stays, and an overall patient satisfaction.

Conclusions: A Creative Arts Program is an essential change in order for patients to have a greater clinical experience. We do expect to face challenges along the way such as a possible lack of enthusiasm from certain groups of patients, a lack of accessibility to arts professionals, and a potential difficulty in large-scale implementation. However, we expect that the ultimate result will include an increase in the happiness of patients, a positive healing experience, elevated mood, reduced pain, and much more.

Although we are currently searching for potential funding sources, we are planning to apply for the Community Service Learning Grant through the University of Texas Health Science Center at San Antonio. We would like to thank UTSA as well as the FAME Program, the UTHSCSA School of Medicine faculty, the Community Service Learning branch of UTHSCSA, and hospitals and clinics throughout San Antonio for providing us with strong support and an immense amount of feedback.
Despite the fact that millions of people are confined to a wheelchair in America there is not a specific shopping cart that allows this demographic to perform the everyday task of grocery shopping. I researched several problems that those that are physically disabled face and narrowed it down to something that is overlooked, yet can be corrected quite easily. As a society we rely on grocery shopping to meet our needs of survival and accomplish it without a second thought, but for some this everyday activity is extremely difficult. I continued to witness firsthand the difficulties that a person that has a physical disability has when grocery shopping and addressed them individually when designing my cart. The “boundless cart” allows greater mobility and accessibility for those that are unable to leave behind their own personal wheelchair for a motorized scooter and are shopping by themselves. After finishing my research I came to the conclusion that for the most part those that are physically disabled are a demographic that is widely overlooked for the most part. There are several things that we take for granted that cause a great deal of trouble for this demographic, yet with a few simple innovations such as my cart those that are physically disabled can accomplish day to day activities far easier.

Acknowledgments: Dr. Colleen Witt University of Texas San Antonio, Mr. Ruben Trevino, Ms. Shires, Ms. Brietzke SAILS
DERIVATION AND IN VITRO EXPANSION OF RETINA PROGENITORS FROM PLURIPOTENT STEM CELLS

Alberto Muniz, PhD, & Tiziano Barberi, PhD
Southwest National Primate Research Center, Texas Biomedical Research institute

**Background:** Human pluripotent stem cells (hPSCs) constitute a promising resource for use in cell-based therapies and a valuable in vitro model for studying early human development and disease. There is a lot of interest in using these cells to derive retinal elements such as Retinal Pigmented Epithelium (RPE) and neural Retinal Progenitor Cells (RPCs) that may provide a source of specialized retinal cells. While isolation of RPE has been achieved and hPSC-derived RPE cells are currently used in clinical trials, additional work is required to efficiently isolate and expand RPCs able to differentiate toward multiple retinal cells. Thus, there is a need for methods to specifically identify, select and expand viable RPCs.

**Purpose:** Major limitations in the advancement of basic stem cell science towards translational and pre-clinical testing in some retinal disease include the specific selection and expansion of viable RPCs from heterogeneous cell populations. Thus the aim of this study is to develop a method for the derivation, selection and subculture of RPCs from hPSCs.

**Methods:** Induced pluripotent stem cell (iPSC) line IMR90-1 was maintained in feeder-free conditions. Cell differentiation was initiated when iPSC colonies reached appropriate size and cell density. The cultures were then placed in differentiation media optimized for retina development and allowed to differentiate for 4-5 weeks. RPCs were then isolated by FACS following a 3 colors sorting scheme. Purified cells were then subcultured in adherent conditions under different treatment and allowed to expand in vitro. Additionally, RPCs were also cultured in suspension to allow formation of what we called retinospheres. Retina progenitor cells and their derivatives were identified by immunocytochemistry and RT-PCR for specific molecular markers.

**Results:** RPCs spontaneously form under specific hiPSC differentiation conditions and are detectable within 3 weeks. Using a 3 color FACS sorting strategy we are able to isolate a population of Pax6+/Chx10+ RPCs. This RPC population has been maintained and passaged for up to 4 passages. Selected RPCs gave rise to retinospheres and showed differentiation toward multiple retinal cells including Muller, Bipolar, Amacrine, Horizontal and Ganglion precursor lineages.

**Conclusions:** This study demonstrates that RPCs can be isolated from a differentiated heterogeneous cell population of hiPSCs and remain viable. Additionally, our selection method allows for the purified RPCs to be expanded and differentiated toward different retina subtype cells. Carefully selected and expanded RPCs will provide platforms to develop drug discovery and therapeutic strategies for retinal degenerative disease.
Objective: The increased use of central nervous system (CNS) acting medications has been associated with serious adverse outcomes such as overdose and suicide-related behavior (SRB) in military personnel deployed in support of the wars in Iraq and Afghanistan. The extent and impact of prescribing multiple CNS drugs in this cohort has not been studied. The purpose of this study was to identify the burden of CNS polypharmacy in Iraq and Afghanistan Veterans (IAV), identify associated characteristics, and adverse outcomes.

Methods: This cross-sectional observational study used national inpatient and outpatient data of IAV (N=303,316) who received care from the Veterans Healthcare Administration (VA) during fiscal year 2011. CNS polypharmacy was defined as five or more CNS acting medications. Demographic and clinical characteristics associated with CNS medication use, overdose, and suicide-related behavior (SRB) were identified and controlled for using logistic regression models.

Results: RPCs spontaneously form under specific hiPSC differentiation conditions and are detectable within 3 weeks. Using a 3 color FACS sorting strategy we are able to isolate a population of Pax6+/ Chx10+ RPCs. This RPC population has been maintained and passaged for up to 4 passages. Selected RPCs gave rise to retinospheres and showed differentiation toward multiple retinal cells including Muller, Bipolar, Amacrine, Horizontal and Ganglion precursor lineages.

Conclusions: CNS polypharmacy was independently associated with drug overdose and suicide-related behavior. These novel findings suggest that CNS polypharmacy may increase morbidity and mortality among this relatively young patient population of Veterans.

Implications: If CNS polypharmacy is causally related to risk, preventing the concomitant use of five or more CNS acting agents in the IAV population may reduce drug overdose by a factor of roughly 3.85 and SRB by a factor of roughly 3.94. The VA can leverage Clinical Data Warehouse capabilities to develop algorithms identifying individual Veterans at risk for drug overdose and suicide-related behavior. These findings may lead to specific patient-centered interventions improving individual and facility-level outcomes for the Veterans Healthcare System.

Funding: VA Health Services Research and Development Service (DHI 09-237)
Francisella tularensis is a bacterium that causes the potentially fatal disease tularemia in humans. *F. novicida*, a closely related species, is avirulent in humans, but causes disease in small mammals. *F. novicida* can induce protective immunity against *F. tularensis* infection in multiple animal models, and thus *F. novicida* is being developed as a potential live attenuated vaccine against tularemia. Expression of heterologous antigens by *F. novicida* is predicted to expand the utility of this vaccine strain by inducing immunity against additional diseases. Expression of heterologous antigens on the outer membrane surface of this Gram negative bacterium would be optimal to induce maximum humoral responses to these antigens.

We identified two *F. novicida*-specific proteins, FTN_0714 and FTN_0142, that are predicted to be localized to the outer membrane (OM). We are modifying these proteins to contain a FLAG tag in putative surface-exposed regions, and will verify their OM localization by cellular fractionation and Western immunoblot. We will then introduce the protective F1-V antigen from *Y. pestis* into these proteins, to determine if *F. novicida* expressing this heterologous antigen can induce protection against plague. The long-term goal of these studies is to develop a multi-valent vaccine strain that can prevent tularemia and other diseases.

This study was supported by DTRA HDTRA1-14-C-0116.

References
EVALUATION OF THE EFFICACY THE iTCLAMP® FOR HASTY COMPRESSIBLE HEMORRHAGE CONTROL VERSUS A TOURNIQUET DURING “CARE UNDER FIRE”

Background: Hemorrhage is the leading cause of preventable death on the contemporary battlefield. During the last two conflicts the tourniquet has proven a critical device for lifesaving hemorrhage control. However, tourniquet use is associated with severe pain, transient impairment of limb function, and the potential tissue injury. The iTClamp® (created by Innovative Trauma Care, Inc., San Antonio, TX, USA) is an FDA cleared device that is purported to stop hemorrhage by closing the soft tissue over a wound. If the iTClamp® is equivalent to a hasty tourniquet for hemorrhage control, it could become an option for pre-hospital tactical and non-tactical medical care. The goal of this study was to compare hemorrhage control between the iTClamp® and a tourniquet in a cadaveric extremity with arterial hemorrhage.

Materials and Methods: This was a randomized, balanced, two-period, two-sequence, two-treatment, crossover study. A comparably viscous, though biochemically-inert, human blood analog was perfused (proximal infusion pressure of 92 mmHg) into fresh, human cadaver legs. Simulated arterial hemorrhages in two separate locations on the same lower extremity were studied separately. Perfusion controls were performed prior to surgical wounds being created in the femoral artery first, then the posterior tibial artery. After a 2 mm incision was placed in the subject artery, a tourniquet was applied above the wound, and the clamp was applied to the wound, per manufacturer recommendations, during separate randomized iterations. A two minute bleeding interval was used. Hemorrhage was classified as fluid lost from the intravascular space. Perfusion was defined as amount of blood collected distal to the wound. All statistical testing was two sided with a significance level of 5%.

Results: We found that 25,546 (8.4%) of IAV had CNS polypharmacy; 515 (0.17%) had overdose, and 4229 (1.4%) had SRB. Those with only posttraumatic stress disorder (PTSD) (AOR 6.50, 99% CI 5.96-7.10), only depression (AOR 6.42, 99% CI 5.86-7.04), comorbid PTSD and depression (AOR 12.98, 99% CI 11.97-14.07), and comorbid traumatic brain injury, PTSD and depression (AOR 15.30, 99% CI 14.00-16.73) had the highest odds of CNS polypharmacy. After controlling for these comorbid conditions, CNS polypharmacy was significantly associated with drug overdose (AOR 3.85, 99% CI 2.95-5.04) and suicide-related behavior (AOR 3.94, 95% CI 3.58-4.33).

Results: 16 pairs of fresh, human cadaver legs were included. The mean intravascular fluid loss was greater with the clamp relative to the tourniquet at the posterior tibial artery [Clamp 120±47, Tourniquet 16±14, difference 104±51, p<0.001] and femoral artery [Clamp 103±68, Tourniquet 5±4, difference 98±70, p<0.001].

Conclusions: In our limited, coagulopathic cadaver model, the iTClamp® allowed more intravascular fluid loss, but more distal perfusion (not shown), than a hasty tourniquet.

This material is based upon work Supported by a grant from the Telemedicine and Technology Research Center, U.S. Army Medical Research and Materiel Command.

Acknowledgements: Alison Burkett, Bulverde Spring Branch Centre for Emergency Health Sciences, and Iona Williams
Background: Local antimicrobial delivery through antibiotic-loaded bone cements, including poly (methyl methacrylate) (PMMA) and calcium sulfate (CaSO4), are used for the prevention and treatment of orthopaedic infections, most often attributed to Staphylococcal species. Importantly, the emergence of antimicrobial resistance and/or the development of bacterial biofilms have been shown to limit the effectiveness of this intervention. The non-reducible iron analog gallium (III), the active component of Ganite (gallium (III) nitrate; Ga(NO3)3) an FDA approved drug for treatment of malignant hypercalcemia, has shown broad antimicrobial activity in vitro. While in vivo studies have reported that intravenously administration Ga(NO3)3 is efficacious in treating infection, studies evaluating the compatibility and potential use gallium loaded bone cements for treatment of orthopaedic infections are lacking. Herein, we evaluated whether Ga(NO3)3 could be incorporated into PMMA and CaSO4; moreover compared PMMA and CaSO4 as carriers for local delivery of Ga(NO3)3, by assessing the release kinetics and antimicrobial activity against planktonic and biofilm derived Staphylococci.

Methods: Evaluation of PMMA (PALACOS®R; Zimmer) and CaSO4 (Osteoset; Wright Medical Technology) as carriers for Ga(NO3)3 was determined by assessing the curing time subsequent to loading of beads, 2.4, 4.7, 9.09, and 13% w/w, as well as characterization of the release kinetics at daily intervals for up to 7 days using inductively coupled plasma mass spectrometry (ICP-MS) for the detection of gallium. Antimicrobial activity of Ga(NO3)3 loaded beads was evaluated by determining the inhibitory activity against planktonic cultures, the ability to prevent bacterial colonization of beads, as well as the activity on established biofilms of Staphylococcus aureus (ATCC 29213) and Staphylococcus epidermidis (ATCC 12228) in vitro for up 7 days.

Results: Ga(NO3)3 was compatible for incorporation into both PMMA and CaSO4, although concentrations >9.09% (w/w) were observed to increase curing time of PMMA. Release profiles of Ga(NO3)3 from PMMA and CaSO4 were bimodal, with initial rapid release of high concentrations followed by sustained release for up to the study duration. Gallium loaded beads were able to effectively reduce planktonic cultures, prevent bacterial colonization of beads, and reduce viable bacteria with established biofilms. Comparison of elution and antimicrobial activities indicated that PMMA was a more optimal carrier for the local delivery of Ga(NO3)3.

Conclusions: Our findings demonstrate that Ga(NO3)3 is suitable for incorporation into and release from PMMA and CaSO4 for the management of orthopaedic infections due to Staphylococci and other Gram negative organisms. Future studies are warranted to evaluate the clinical relevance of this intervention in vivo.

We would like to thank Dr. Keith MacRenaris for the metal analysis performed at the Northwestern University Quantitative Bio-element Imaging Center generously supported by NASA Ames Research Center Grant NNA04CC36G.

The opinions or assertions contained herein are the private views of the author and are not to be construed as official or as reflecting the views of the Department of the Army or the Department of Defense

This work was supported by intramural funding from the Combat Casualty Research Program, Medical Research and Material Command to JCW.
THE EFFECTS OF A PHOTO ISOMERIZING COMPOUND TREATMENT ON DRUG-RESISTANT CELL LINES

Justin Avila, B.S., The University of Texas at San Antonio

Supervising Professor: Matthew Gdovin, Ph.D.

The American Cancer Society estimates that 1.6 million people will be diagnosed with cancer in 2015. Chemotherapeutics are one of the most employed methods for treating cancer, however their use inadvertently selects for cells resistant to the proscribed chemotherapeutic. The appearance of drug resistant cancer cells in patients often leads to terminal prognoses. Finding new treatments to combat drug resistant strains of cancer is of considerable importance for improving long term outcomes in cancer patients. Recent studies have shown that the activation of a photo isomerizing compound (PIC) induces cell death in aggressive triple negative breast cancer (TNBC). The PIC reduces intracellular pH (pHi) of the cells, leading to an induction of an intrinsic pathway to apoptosis. Experiments have been designed to test if programmed cell death is achievable through the activation of the PIC in the cytosol of prostate drug-resistant cancer lines, 22-RV-1 and LNCaP, in vitro. Cells will be loaded with the PIC and exposed to the activating wavelength of light to induce acidification that will be monitored with the pH-sensitive fluorescent dye DCFDA. Either Annexin V or Ethidium Homodimer III will be loaded into the cell with DCFDA to monitor for apoptosis or necrosis, respectively. The PIC has been effective in killing cancer of varying degrees of metastatic ability in vitro. The ability to effectively treat drug-resistant cancer would provide alternative opportunities for patients who are limited in treatment options due to the development of drug resistance.
NITRILE GLOVES PREVENT THE COMPRESSOR FROM DETECTING A 360 JOULE DEFIBRILLATION IN A SHAM CONTROLLED CADAVER HANDS ON DEFIBRILLATION STUDY

David Wampler, PhD, LP, Col.1, Chetan Kharod, MD, MPH2, Scotty Bolleter, BS, EMT-P3, Alison Burkett BS3, Caitlin Gabehart1, and Craig Manifold, DO1,3

1Department of Emergency Health Sciences, The University of Texas Health Science Center at San Antonio; 2United States Air Force, Military EMS & Disaster Medicine Fellowship, Joint Base San Antonio, TX; 3Centre for Emergency Health Sciences, Bulverde Spring Branch Emergency Services, Spring Branch TX

Introduction: Chest compressions and defibrillation are the only therapies proven to increase survival in cardiac arrest. Historically, rescuers must remove hands to shock, thereby interrupting chest compressions. This hands-off time (pre-shock pause) results in a zero blood flow state. Pre-shock pause has been associated with poorer neurological recovery from cardiac arrest.

Methods: This was a blinded randomized control cadaver study evaluating a rescuer’s ability to detect defibrillation during manual chest compressions. We used two defibrillators, with identical auditory signals during charging, and shock delivery. The active defibrillator was connected to the cadaver in the sternum-apex configuration with self-adhesive defibrillation pads. The sham defibrillator was connected to a device designed to safely and silently receive current. After informed consent, paramedic subjects performed chest compressions on the cadaver using 6 types of hand barriers: no-barrier, single and double layer nitrile gloves, firefighter gloves, neoprene pad, and a manual chest compression/decompression device. Randomized defibrillations (10 per barrier type) were delivered at 30 joules (J) for bare hand and 360J for all other barriers. After each shock, the subject indicated degree of sensation on a Likert scale.

Results: Ten subjects participated and utilized six barrier methods. Half of the shocks were randomized to sham. All subjects detected 30j shocks during barehand compressions, with only 1 undetected real shock, and no reports of feeling a bare-handed sham shock. All barriers combined totaled 500 shocks delivered. Five (1%) active shocks were detected with any barrier, 1 (0.2%) with single layer of Nitrile gloves, 3 (0.6%) with double layer nitrile-gloves and 1 (0.2%) with the neoprene barrier. One sham shock was reported detected with the single layer nitrile glove. No shocks were detected with fire gloves or compression decompression device. Subjects reported all shocks detected as barely perceptible (0.25 (±.05) cm on 10 cm Likert scale).

Conclusions: Nitrile gloves or a neoprene pad essentially prevent (99%) responder’s detection of a 360J defibrillation on a cadaver. Fire gloves and compression decompression device prevented detection.
Diabetes is the seventh leading cause of death in the United States and continues to rise. When compared to individuals in the non-minority population, a greater percentage of minority individuals experience clinical-level diabetes complications in the ocular, renal, and vascular systems, highlighting a health disparity element in diabetic retinopathy, nephropathy, and vascular disorders. Molecules of the extracellular matrix are crucial for healthy tissue homeostasis. Perturbing extracellular matrix-specified pro-survival signals induce cell death and tissue damage, which further progresses diabetic complications. In diabetic tissues, an increase in ECM synthesis and diminished ECM turnover largely account for accumulated ECM molecules, including the pro-apoptotic protein called BIGH3. Recently we uncovered evidence of a novel apoptosis pathway called BIGH3-mediated apoptosis (BMA). Our study here indicates that macrophages and macrophage-derived TGF-β1 promote BMA, thus advancing nephrology and diabetic retinopathy diseases. In addition, we show that in diabetic conditions BMA targets two different cell types. In the retina BMA targets retinal pericytes and in the kidney BMA targets renal proximal tubule epithelial cells. The BMA mechanistic pathway that kills retinal pericytes and renal proximal tubule epithelial cells involves macrophage-derived TGF-β1, BIGH3 protein, BIGH3 C-terminal cleavage, C-terminal-derived integrin ligand peptides, and specific integrins expressed on renal and pericyte cell surfaces. After BIGH3 is secreted into the cells’ milieu, a crucial step in the BMA mechanism is cleavage of BIGH3’s C-terminus which can be accomplished by the peptidases plasmin, matrix metalloproteinase 9, and serine protease high-temperature requirement A1. BIGH3 C-terminal cleavage generates integrin-ligand peptides that manipulate targeted integrin signaling pathways to evoke BMA. We also found that cells in a prediabetic environment synthesize BIGH3 protein, indicating that BIGH3 is a biomarker signifying a prediabetic state that left untreated will likely progress to complications including diabetic retinopathy and nephrology. Identification of the macrophage source of BIGH3 in diabetic conditions and the sequence of the integrin-ligand peptides derived from BIGH3, as well as the integrins involved in BMA, is expected to offer novel therapeutic targets for interventions to block development and progression of diabetic complications.
Health Literacy: A Health Disparity of the 21st Century

Rhonda Andrew¹, Carmen Cardenas¹, Stephanie George¹, Swetha Gogu¹, Kimberly Farias¹, Nicole Michael¹, Mercedes Rodriguez¹, Bianca Stimson¹, and Seshidar Tekmal²

¹Public Health & Epidemiology, University College, and ²Department of Biology, College of Sciences, The University of Texas at San Antonio

Background: Health literacy is defined as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions,” (U.S. Department of Health and Human Services [HHS], 2008). This concept directly corresponds with a person's ability to navigate their local healthcare system such as filling out forms and finding appropriate care for specific needs. The purpose of the research was to combat health disparities through examining health literacy as it relates to the three main populations of healthcare - health administrators, providers, and patients. The ultimate goal was to discover solutions that will remove health disparities pertaining to health literacy.

Materials & Methods: The research entailed searching online databases and official, credible organization web pages. Additionally, online research and interviews were conducted with the Director of the Health Equity and Resource Opportunities Division at the Oklahoma State Department of Health and Dr. Jayaraj Salimath. The presentation includes a PowerPoint, along with a trifold summarizing data. The PowerPoint includes embedded interview videos, phone calls, summaries, excerpts, and Skype calls. Charts and diagrams are incorporated in the presentation. The Socioecological Model was used to address how changes can be made on different levels.

Results: The results from the research demonstrate multiple issues regarding health literacy do exist. Health administration and policies affect everyone, with providers and patients at the core of the consequences. These three components were broken down and discovered multiple problems but more importantly, ways to address administrative, provider, and patient barriers to health literacy. Administrative issues presented were funding, collaboration, and the need to make policy changes. Three main issues providers have are language barriers, various levels of literacy, and cultural competency. Three barriers seen in patients are low levels of health competency, the ability to access comprehensible health information, and a need for empowerment. Some solutions that were found for administration include awareness and involvement. Provider's solutions include the demonstration and use of visuals, as well as clearly written education materials and usage of translators or caseworkers. Patient's solutions would include access to health literacy workshops and establishing a role in their health care.

Conclusions: Health literacy was proven to be an undiscriminating issue - varying from adults over sixty-five with a college education or twenty-one year old with only an elementary school education. A person's health can be remarkably impacted by simply having the knowledge and accessibility of additional health opportunities. It was determined with a combination of public programs similar to one established by the Oklahoma State Health Department and other private operations; a mitigating effect on the health literacy disparity is possible. There must be engagement in skill building with health care professionals and adult educators in reaching people with limited literacy skills.
PUBLIC HEALTH SURVEILLANCE FOR PERTUSSIS IN BEXAR COUNTY, 2011-2014

Rita Espinoza, MPH, Donnie Diaz, MPA, and Anil T. Mangla, MS, PhD, MPH, FRIPH
San Antonio Metropolitan Health District

Background: Pertussis is a highly contagious respiratory tract infection that is easily preventable by vaccine. Everyone is at risk for pertussis, but it is most severe for babies, especially in the first months of life before pertussis immunizations begin. Pertussis is a disease that is monitored through the surveillance system. Data are analyzed locally to determine who is being affected in the community in order to develop targeted prevention messages.

Materials & Methods: The National Electronic Disease Surveillance System based system (NBS) is a web-based surveillance system used by the state of Texas as their disease reporting system. All suspected cases of pertussis are to be reported to the health department and are investigating by epidemiologist. Data are collected and are reported in this system. This system has been utilized since September 2004. Data were abstracted for Bexar County for the years 2011-2014 and analyzed using Excel.

Results: During the time frame of 2011-2014, there were a total of 289 cases of pertussis reported: 23, 69, 114, and 83 respectively. The age range of cases is 1 month to 82 years and 42% of the cases are less than or equal to 1 year of age. Fifty-eight percent of the cases are Hispanic. There were no deaths associated with cases during this time period.

Conclusions: Pertussis cases in Bexar County seem to follow the 3-5 year cyclical spikes that are mentioned in the literature. Vaccination efforts have led to a decrease in severe cases among infants. The data can be used to target increasing awareness of importance vaccination among the populations most affected by the disease in Bexar County.
Testing the Gate Hypothesis for Seizure Development:
Muscarinic Receptor Modulation of Input/Output Through the Dentate Gyrus

Kael McInnis¹*, Jessica Perkins¹*, Robert Brenner², Mark Shapiro², and David Jaffe¹

¹Department of Biology, UTSA Neuroscience Institute, The University of Texas at San Antonio;
²Department of Physiology, The University of Texas Health Science Center at San Antonio

Traumatic brain injury (TBI) is a leading cause of temporal lobe epilepsy (TLE) in humans and is usually accompanied before or after by behavioral stressors, most notably during combat. Both stress and novelty modulate transmission of signals through the hippocampal formation, a temporal lobe structure highly prone to epileptic activity. The dentate gyrus (DG) serves as a filter or gate for information flowing into the hippocampus. Cholinergic signaling, in particular, is elevated with extreme stress, and we hypothesize that muscarinic cholinergic receptor activation promotes seizure development by altering the gating function of the DG. Using the mouse hippocampal slice preparation, we studied the effects of muscarinic receptor activation on DG filtering. As expected, bath application of the muscarinic agonist carbachol (CCh, 20 μM, n=4) boosted the initial slope of single field EPSPs (fEPSPs), evoked by perforant path stimulation and recorded in the DG granule cell layer, by +163 ± 150%. Likewise, frequency-dependent synaptic depression fEPSPs was enhanced by CCh. Under control conditions, depression of the sixth fEPSP in a 50 Hz train was -21 ± 20%, compared with -42 ± 12% in the presence of CCh. In stark contrast, CCh induced frequency-dependent facilitation of the population spike (PS). Under control conditions the difference in PS amplitude was -51 ± 57%, while with CCh the change was +38 ± 45%. Postsynaptic excitability, and therefore the net input/output function, was directly assessed by normalizing PS amplitude to fEPSP slope. Utilizing this ratio, we found that the optimum input/output frequency shifted from 15.0 ± 23.4 Hz, a value just above the theta frequency range (5-10 Hz) to 52.5 ± 36.9 Hz, a value within the gamma frequency range (40-80 Hz). These initial findings suggest that muscarinic receptor activation within the DG network induces a strong increase in both excitatory synaptic transmission and postsynaptic hyperexcitability for low frequency input (less than 1 Hz), while at the same time shifting the bandpass filtering properties of the network from theta to gamma frequency. These results are consistent with our hypothesis that stress-associated neuromodulation alters DG filtering. Combined with other collaborative studies including tissue-specific chemogenetic neuronal excitation, optogenetic silencing, and an animal model of TBI, this work will advance our understanding of how DG activation contributes to epileptogenesis and its role in the development and expression of post-traumatic stress disorders (PTSDs).

This work was supported from an award from the Mind Science Foundation (K.M.) and a multi-investigator pilot grant from the UTHSCSA School of Medicine/Institute for Integration of Medicine and Science Project award (M.S., R.B., & D.J.).

*Both K.M. and J.P. contributed equally to this work.
Lyme disease is the most common arthropod-borne disease in the United States with more than 30,000 new cases reported annually to the CDC. *Borrelia burgdorferi*, the causative agent of Lyme disease, is transmitted to humans through infected *Ixodes scapularis* ticks. To better understand the role of proteins in the physiology and infectivity of the causative agent, *B. burgdorferi*, mutations are made in the bacteria. The mutated strains are propagated by using various resistance cassettes such as resistance to streptomycin, gentamicin and kanamycin. By creating polyclonal antibodies to the proteins which confer the resistance to these antibiotics, we will be able to screen for mutated strains with western blots. This will lead to an ease in generating and confirming mutations in *B. burgdorferi*. The recombinant antibiotic resistance proteins are induced using the pET23a system with a C-terminal 6x histidine tag for purification. After purification via nickel column and elute trap, the protein were prepared to generate polyclonal antibodies in mice. Once generated, these antibodies were used to analyze the streptomycin-, gentamicin-, and kanamycin-resistance protein levels of previously generated *Borrelia burgdorferi* mutants. Mutants generated via homologous recombination and plasmid complementation were studied for a difference in the previously mentioned protein levels. Mutants generated by homologous recombination have a restricted number of copies of the antibiotic resistance genes inserted into them. However, plasmids are not always held by this restriction, allowing more copies of the plasmid per bacterium and in turn allowing more copies of antibiotic resistance genes. This could lead to high levels of the proteins associated with antibiotic resistance in mutants with plasmid complementation when compared to mutations via homologous recombination. Additionally this can explain variation in antibiotic resistant microorganisms and thus these polyclonal antibodies can be used to understand how they may evade many of the antibiotic treatments used clinically.

*This work is supported by Public Health Service Grant SC1-AI-078559 from the National Institutes of Allergy and Infectious Diseases, the Army Research Office of the Department of Defense under Contract No. W911NF-11-1-0136, and the South Texas Center for Emerging Infectious Diseases.*
Human schistosomiasis is a disease caused by species of the genus *Schistosoma*, which globally affects over 200 million people. The major species effecting humans are *S. mansoni*, *S. haematobium*, and *S. japonicum*. There is currently only one method of treatment (monotherapy), the drug Praziquantel. Constant selection pressure through mass chemotherapy - this year alone will see the administration of over 250 million doses - has yielded evidence of resistance to PZQ. This has been observed in both the laboratory and field. The purpose of this research is to develop a second drug for use in conjunction with PZQ. Previous treatment of *S. mansoni* included, among others, the use of oxamnique (OXA), a prodrug that is enzymatically activated in *S. mansoni* but is ineffective against *S. haematobium* and *S. japonicum*. The OXA activating enzyme was identified, described, and crystallized, as a collaboration with our laboratory, as being a sulfotransferase (SmSULT). Structural data has allowed for directed drug development. The focus of this research is to reengineer OXA to be effective against *S. haematobium* and *S. japonicum*. Twelve OXA derivatives were synthesized, of which three showed schistosomicidal activity as good as or better than OXA against *S. mansoni*. A further 5 drugs were designed based on the most schistosomicidal derivative and yielded 2 more drugs with even higher schistosomicidal activity *in vitro*. These drugs yielded 9 more derivative drug designs. Of these derivatives, a further 3 showed schistosomicidal effects; yielding another 3 with anthelmintic activity making a total of 11 derivatives discovered that may potentially be used to treat schistosomiasis. *In vitro* test of these 11 derivatives against *S. haematobium* and *S. japonicum* have also yielded positive results. Testing of generation 5 against the three major schistosome species is ongoing. The information gleaned from these early studies will be used to optimize OXA derivative design for testing in the *in vivo* animal model. This iterative process of using structural data to inform chemical synthesis of derivatives, which are then tested *in vitro*, continues to provide us with novel compounds with improved antischistosomal activity.
**Poster Seventy Three**

**IN VITRO ANTIMICROBIAL ACTIVITIES OF GALLIUM (III) COMPOUNDS AGAINST MULTIDRUG-RESISTANT ISOLATES OF ACINETOBACTER BAUMANNII**

David Chang MD¹, Rebecca A. Garcia BA², Kevin S. Akers MD¹, Clinton K. Murray MD¹, Joseph C. Wenke PhD², and Carlos J. Sanchez Jr PhD²

¹Infectious Disease Service, Department of Medicine, San Antonio Military Medical Center, Fort Sam Houston, TX; ²United States Army Institute of Surgical Research, Extremity Trauma and Regenerative Medicine, Fort Sam Houston, TX

**Background:** *Acinetobacter baumannii* is a clinically challenging pathogen due to the emergence of multidrug resistance and ability to form biofilms. Iron (III) is critical to both physiology and virulence which has promoted interests in the development and use of agents to target iron metabolism. Gallium (III) is an iron (III) mimic with antimicrobial activity against multiple bacterial pathogens including *A. baumannii*. To date, studies evaluating the activity of gallium against *A. baumannii* have focused on planktonic but not the biofilm phenotype. To address this gap, we evaluated *in vitro* the activity of gallium compounds, gallium nitrate (GaNO3) and gallium meso-/protoporphyrin (GaMP/GaPP), against biofilms of clinical isolates of *A. baumannii*.

**Materials and Methods:** Bacterial isolates used in this study included a collection from the Trauma Infectious Disease Outcome Study (n=12) and a reference strain of *A. baumannii* (ATCC 17978). Antimicrobial activity of gallium compounds against planktonic and biofilm bacteria was evaluated by performing broth microdilution assays in iron-limited medias, RPMI 1640 and 10% MHB-II. Microdilution assays consisted of exposing bacteria or formed 24 hour biofilms overnight to increasing concentrations (0.25-512 μM) of the gallium compounds in 96-well plates or individual wells of the Calgary Device. Concentrations reducing viability of planktonic and biofilm bacteria to 50% and 90% of the untreated control were reported as the effective concentration or biofilm eradication concentration 50 and 90 (EC/MBEC50 and EC/MBEC90) respectively.

**Results:** Median EC50 and EC90 for GaNO3 were 64μM/128μM in MHBII and 128μM/256μM in RPMI, whereas EC50 and EC90 for GaMP and GaPP were 1μM/2μM and 2μM/8μM respectively with no observable difference seen with different media. The MBEC50 and MBEC90 for GaNO3, GaMP, and GaPP were 256μM/512μM, 16μM/32μM, and 128μM/256μM respectively.

**Conclusions:** Gallium (III) compounds have differential activity against MDR *A. baumannii* in planktonic and biofilm forms. The heme-conjugated gallium compounds (GaMP/GaPP) had the most potent *in vitro* activity. Further investigations should explore their potential role as novel anti-biofilm agents.

*The view(s) expressed herein are those of the author(s) and do not reflect the official policy or position of Brooke Army Medical Center, the U.S. Army Medical Department, the U.S. Army Office of the Surgeon General, the Department of the Army, the Department of Defense or the U.S. Government.*

*This work was supported by intramural funding from the Combat Casualty Research Program, Medical Research and Material Command to JCW*
Lyme disease is caused by *Borrelia burgdorferi* and is the most prevalent arthropod-borne infectious disease in the US with more than 300,000 cases reported each year. *B. burgdorferi* is transmitted by infected *Ixodes scapularis* ticks and the ability of this spirochetal pathogen to interact and survive in arthropod and vertebrate hosts is critical for its potential to cause disease. Much of the host-pathogen interactions are mediated by lipoproteins on the surface of the spirochetes anchored via an N-terminal triacyl-modified cysteine to the outer membrane and those that are induced to facilitate survival of the bacteria in different hosts. Two membrane proteins were chosen for further analysis, Blp1 and CvpA. *Borrelia* lipoprotein 1, or Blp1, is a hypothetical lipoprotein and CvpA is an uncharacterized membrane protein required for colicin V production. To further characterize these two proteins, we have generated recombinant Blp1 and CvpA proteins tagged to maltose binding protein at the N-terminus. This was done using the over-expression plasmid pMAL-c, which allows for purification of recombinant proteins through amylose affinity chromatography. Monospecific polyclonal antibodies against these two proteins will be generated in mice, and plasmid constructs that will facilitate deletion of these two genes will help in analyzing the contributions of these proteins for the pathogenic processes of *B. burgdorferi*. The current canine vaccine is a subunit vaccine consisting of a *Borrelia* lipoprotein called Outer surface protein A, or OspA. Targeting various lipoproteins in *Borrelia* can lead to other discoveries that impact the host-specific interactions. Interfering with such interactions mediated by these proteins will help in the prevention of Lyme disease.

*This work is supported by Public Health Service Grant SC1-AI-078559 from the National Institutes of Allergy and Infectious Diseases, the Army Research Office of the Department of Defense under Contract No. W911NF-11-1-0136, and the South Texas Center for Emerging Infectious Diseases.*
IMPLEMENTATION OF USING A PARAMETER PAL BADGE ON A MEDICAL TELEMETRY WARD

LT LeeAnna Daniel, BSN, SrA Chelsey Gillespie, A1C Zachary Ferguson, Mrs. Jennifer Van Nostrand, LVN, Mrs. Courtney Taylor, LVN, Lt Athena Ra Gonzalo, BSN, and Mrs. Ann Marie Lazarus, CNS

San Antonio Military Medical Center (SAMMC)

**Background:** On a busy medical telemetry ward staff sometimes do not remember when vital signs are out of parameter. They identified a need for earlier communication of possible deterioration of patients and developed a simple tool to assist our front line personnel with recognizing vital signs that are out of parameters. The Parameter Pal badge was designed and given to technicians and CNA’s to help remind them of abnormal vital signs. Serious adverse events have been recognized and reporting of abnormal vital signs has increased with Parameter Pal badges.

**Materials and Methods:** Using the Iowa model a focused question was developed and a literature review was completed. Parameter Pal badges were designed and made and staff was in-serviced on their use. All new technicians and CNA’s will receive a badge during ward orientation. Serious adverse events can be prevented by recognizing and responding to early signs of clinical deterioration. Parameter Pal badges are a tool that has triggered technicians and CNA’s to recognize and report abnormal vital signs to the RN versus simply charting the results.

**Results:** Parameter Pal badges help increase awareness of vital sign parameters and when to notify nurses of abnormalities. Parameter Pal badges increased appropriate RRT activation by 55.2%. Between July 2014 to December 2014, RRT activation was over 13 minutes. Parameter Pal badges were distributed in January 2015 and between that time to May 2015 RRT activation was 7.4 minutes. Serious adverse events have been recognized and reporting of abnormal vital signs has increased with Parameter Pal badges.

**Conclusions:** Due to the successful results, the Parameter Pal badges are being considered by other units in the facility. All new technicians and CNA’s will receive a badge during ward orientation. RRT activation times will continue to be tracked. Parameter Pal badges provided earlier communication of a patient’s deterioration and could be used by other military health care systems.

The view(s) expressed herein are those of the author(s) and do not reflect the official policy or position of Brooke Army Medical Center, the U.S. Army Medical Department, the U.S. Army Office of the Surgeon General, the Department of the Army and Department of Defense or the U.S. Government.
Background: Syphilis rates in Bexar County (58.8/100,000), Texas, are 2.2 times higher than the statewide rate (26.5/100,000 population) and 3.3 times higher than the national rate (17.9/100,000). Syphilis infection can be difficult to diagnose; laboratory tests might not provide a positive result, especially during the incubation period and early primary syphilis. Additionally, exposure to syphilis might not be known by the individual or disclosed to the clinician. Targeted prophylactic treatment is an additional clinical tool for addressing the high rates of syphilis in Bexar County and has been used in some city sexually transmitted disease (STD) clinics to treat clients on the basis of epidemiological risk factors.

Methods: Both early syphilis surveillance and city STD clinic visit information were extracted from the database, STD*MIS. Early syphilis (primary, secondary, and early latent stages) represents recent infection. Data were extracted from the past 14 months: January 1, 2014 to February 28, 2015. Using Microsoft Excel, data were analyzed by zip code, gender, race and ethnicity, and the risk factor men who have sex with men (MSM). An interview was conducted with the Texas Syphilis Elimination Coordinator to better understand the prevalence of syphilis in the state.

Results: There were 603 early syphilis cases in Bexar County from January 2014 to through February 2015. Of these, 77.0% (465) were male and 68.7% (414) were Hispanic. Males remained the majority in all racial-ethnic groups. Six zip codes each contained more than 20 cases of early syphilis, altogether comprising 27.2% (164) of cases. Zip code 78207 had the most cases, 7.6% (46). This zip code had the most cases consistently for males, females, and Hispanics (total and for both sexes). There were 12,149 STD clinic visits during this timeframe; 25.4% (3,087) were from the top six zip codes by case count. Zip code 78207 had the most clinic visits, 6% (735). Additionally, in Bexar County in 2013, 49% of early syphilis cases had an MSM risk factor, more than double than in 2005 (21%). An interview with the Texas Syphilis Elimination Coordinator revealed higher risk of infection for MSMs with any of three behaviors.

Conclusions: Syphilis prophylactic treatment was implemented as of April 2015 in the city STD clinic amongst targeted at-risk populations, using the data compiled from this report. Treatment is offered to any MSM who has >1 sex partner within previous 6 months, or uses Grindr, or similar application, or has anonymous sex, with emphasis placed on those who live in the 78207 zip code.

Acknowledgments: Dr. Junda Woo, Medical Director, San Antonio Metropolitan Health District; Sexually Transmitted Disease Clinic Staff, San Antonio Metropolitan Health District
VALIDATION OF A NOVEL MEASURE OF SLEEP DISTURBANCE IN IRAQ/AFGHANISTAN WAR VETERANS

Catheryn A. Orihuela M.S.¹,³, & Mary Jo Pugh Ph.D.²,³

Departments of ¹Psychiatry and ²Epidemiology and Biostatistics, School of Medicine, The University of Texas Health Science Center at San Antonio; ³Research, South Texas Veterans Health Care System

Sleep disturbance is common in military and Veteran populations. While sleep disturbances in the general population occur in approximately 30% of individuals (McCay, Klam, & Volkert, 2010; Ohayon, 2002), approximately 41% of active duty service members deployed to Iraq/Afghanistan experience sleep-related problems post-deployment. In military and Veteran populations, cognitive and behavioral adaptations necessary during deployment are vital to the safety of the unit. Upon return to the U.S., these adaptations may become maladaptive, resulting in persistent sleep disturbances (Plumb, Peachy, & Zelman, 2013). Moreover, high prevalence of psychopathology, which is often comorbid with insomnia in military and Veteran populations complicates the impact of sleep problems (Ramsawh et al., 2014). Current sleep measures create undue time burden to respondents or are impractical for clinical use.

A survey invitation was mailed to 550 Iraq/Afghanistan veterans (IAV) who first received VA care between 2007 and 2009 and received care at least once during three or more years between 2007 and 2011. One hundred and forty-seven (N = 147 [27%]) individuals responded via mail or online. The Index of Sleep Disturbance (ISD) was derived from seven items that examined the extent to which participants experienced common sleep disturbance symptoms such as insomnia, anxiety before bed, medication and alcohol use to induce sleep, and amount of interference that sleep disturbance causes in daily functioning. Other items included demographic information and several validated published measures that assess depression, PTSD, somatic symptoms, and current pain. Factor analysis, internal consistency, and correlational analyses provided support for associations between variables.

Factor analysis indicated a single factor of sleep disturbance. Evaluation of item total correlations indicated that a parsimonious scale comprised of three items that best represented individuals with sleep disturbance producing high factor loadings and very good reliability (Cronbach’s Alpha = .85). Significant correlations between the Index of Sleep Disturbance (ISD) and other mental health measures within the survey support convergent validity ($p < .01$). Post hoc analysis revealed 92% of the sample that reported high frequency of sleep disturbance also reported high symptomology on at least one other measure of psychopathology (somatization, depression, PTSD, and/or pain).

Results show promise that initial validation of the ISD may be a useful tool in the identification of clinical sleep disturbance. Further studies should evaluate criterion validity (using sleep diary and polysomnography) and confirm diagnosis of sleep disturbance using expert clinical interview. Because of the incidence of comorbidity associated with high sleep disturbance, longitudinal studies could help determine the timeline associated with the development of sleep disturbance as well as the development or progress of comorbid health problems.

Acknowledgements and funding support: VA HSR&D project DHI 09-237
The pre-operative care of patients with congenital heart disease (CHD) requires accurate and precise diagnostic imaging. We present a series of patients referred from the San Antonio Military Health System (SAMHS) for pre-hospitalization evaluation of their CHD. In all three cases, transesophageal echocardiography (TEE) allowed for appropriate guidance of further invasive testing and surgical procedures.

- A 20 month old female with a history of complex congenital heart disease including Pulmonary Atresia (PA) was evaluated with TEE prior to proceeding with cardiac catheterization. A Blalock-Taussig (BT) shunt and Rastelli procedure had been performed. In addition, the patient required an intraatrial baffle secondary to atrioventricular discordance. The systemic venous baffle was intervened upon surgically and by catheterization on three previous occasions. Prior to the scheduled cardiac catheterization there were concerns for systemic venous baffle obstruction that were unable to be accurately evaluated by standard transthoracic echocardiography (TTE). TEE evaluation clearly diagnosed a severe systemic venous baffle obstruction and targeted further investigation in the pediatric cardiac catheterization laboratory.

- A 15 year old male with a large, newly diagnosed Atrial Septal Defect (ASD) was referred for cardiac catheterization and device closure of his ASD. Detailed TEE evaluation of his defect in the cardiac catheterization lab revealed that he was not a candidate for device closure and the patient was sent for surgical closure of his defect. The patient was evaluated by Cardiothoracic (CT) Surgery and his ASD was closed surgically without any complications.

- A 15 year old female with shortness of breath was evaluated and diagnosed with Rheumatic Heart Disease. Her cardiac complications included Mitral Stenosis (MS), and Aortic Insufficiency (AI). Initially the patient was referred for catheter intervention and balloon mitral valvuloplasty. TEE evaluation prior to cardiac catheterization provided detailed definition of her mitral and aortic valve. Given the findings of the TEE, the decision was made to pursue surgical intervention for both the MS and AI. She had both valves replaced and was discharged home uneventfully.

Collaboration in the care of patients with CHD has proven to be of paramount importance in our experience. The level of expertise required to obtain advanced diagnostic imaging is a crucial component in obtaining an accurate diagnostic study. As we have noted, advanced imaging plays a critical role in deciding further intervention. Higher level diagnostic imaging guides appropriate management and avoids unnecessary intervention. Because of the shared vision that collaboration leads to better patient care, our colleagues in the SAMHS are an integral part of the Congenital Heart Program at the University of Texas Health Sciences Center San Antonio (UTHSCSA). We look forward to continued collaboration in the name of excellent patient care.
Local public health is charged with critical functions to include monitoring the health status of the community, identifying and investigating community health issues and empowering people about health issues. Historically, these activities have been funded through traditional forms of financing to include a mix of local tax dollars supplemented through a variety of state and federal grant dollars for core functions such as communicable disease monitoring, immunizations and emergency preparedness. In San Antonio, as in most cities and counties across the nation, local health departments compete for their fair share of ever shrinking budgets with other core social services to include public safety and street maintenance. For these reasons, it is important for public health partners and advocates to recognize investments made through a piece of legislation passed in 2011 which authorized the implementation of a Medicaid Waiver called the Transformation and Quality Improvement Program, otherwise known as, the Texas Medicaid 1115 Waiver.

Authorized under Section 1115 of the Social Security Act, the law provides the Secretary of Health and Human Services authority to “approve experimental, pilot, or demonstration projects that promote the objectives of the Medicaid and CHIP programs.” These demonstrations allow States the flexibility to design and evaluate unique programs and policy approaches that:

- Expand eligibility to individuals who are not otherwise Medicaid or CHIP eligible
- Provide services not typically covered by Medicaid; or
- Use innovative service delivery systems that improve care, increase efficiency, and reduce costs.

Often referred to as the Triple Aim, these program and policy approaches must strive to improve patient experience, improve population health and reduce costs. However, the unique part of Texas’ Waiver was the innovative thinking that led decision makers to carve out a portion of the total $11.4 billion dollars set aside for the Delivery System Reform Incentive Payment Program (DSRIP) funding pool for investments in mental health as well as public health prevention. With 5% of the total allocation set aside for local health departments, this equates to an unprecedented $43 million investment in public health programming over 5 years (2011 – 2016) in Bexar County alone.

With this funding, the San Antonio Metropolitan Health District has made significant investments in the areas of preventing teen pregnancy and reducing repeat teen births, expanded school based oral health services for children, increased testing and treatment for HIV and Syphilis in high risk populations, implemented neighborhood based approaches to improving health outcomes in high risk areas, expanded programming to improve breastfeeding initiation and duration rates and is implementing innovative programs focused on preventing and managing diabetes disease in San Antonio.

---

Francisella tularensis causes the disease tularemia. Human pulmonary exposure to the most virulent form, F. tularensis subsp. tularensis (Ftt), leads to high morbidity and mortality, resulting in this bacterium being classified as a potential biothreat agent. However, a closely-related species, F. novicida, is avirulent in healthy humans. No tularemia vaccine is currently approved for human use. We demonstrate that a single dose vaccine of a live attenuated F. novicida strain (Fn iglD) protects against subsequent pulmonary challenge with Ftt using two different animal models, Fischer 344 rats and cynomolgus macaques (NHP). The Fn iglD vaccine showed protective efficacy in rats, as did a Ftt iglD vaccine, suggesting no disadvantage to utilizing the low human virulent Francisella species to induce protective immunity. Comparison of specific antibody profiles in vaccinated rat and NHP sera by proteome array identified a core set of immunodominant antigens in vaccinated animals. This is the first report of a defined live attenuated vaccine that demonstrates efficacy against pulmonary tularemia in a NHP, and indicates that the low human virulence F. novicida functions as an effective tularemia vaccine platform.

This study was supported by NIH PO1 AI57986 to KEK and BPA, Army Research Office of the Department of Defense Contract No. W911NF-11-1-0136 to KEK and BPA, and contract NIH-NIAID-DMID-05-22 to KEK, BPA, CRL, and RLS. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.
NOVEL DRUG TARGET FOR TREATING ALZHEIMER’S DISEASE: MITOCHONDRIAL PYRUVATE CARRIER

Clyde F. Phelix, Ph.D.¹, Stanton F. McHardy, Ph.D.², and George Perry, Ph.D.¹

Departments of ¹Biology and ²Chemistry, College of Sciences, The University of Texas at San Antonio; ³AL Phahelix Biometrics, Inc.

Background: Inhibition of the mitochondrial pyruvate carrier (MPC) is a novel therapeutic target being tested currently at Phase 3 and Phase 2 clinical trials to delay onset of and progression from mild cognitive impairment to dementia of Alzheimer’s disease. Two thiazolidinediones (TZDs), pioglitazone and MSDC-0160, are the drugs being tested, respectively. Other than hypothetical data from biochemical analyses during the 1970s-1990s, no evidence has yet appeared in the literature for studies of the pyruvate and inhibitor interactions with MPC1&2.

Materials & Methods: Autodock/Vina and PyMOL were used for docking and binding site analysis. First a predicted 3D structure of MPC1&2 was performed using the Bax Group (NIH) PDB Utility Server to create a file extended structure from amino acid residue sequences listed on UniProt. Additionally, Protter was used to generate a 2D visualization of MPC1&2 embedded within the inner mitochondrial membrane. Pyruvate and inhibitor 3D data were downloaded from PubChem as SDF files and Babel was used to convert them to PDB format required by Autodock. The TZDs, pioglitazone and MSDC-0160 were tested as novel MPC inhibitors and compared with well-established inhibitors, UK-5099 and α-cyano-4-hydroxycinnamate. Autodock/Vina was used to screen the entire MPC1&2 molecules for potential binding sites; PyMOL was used to visualize and analyze these binding sites in 3D.

Results: MPC1 and MPC2 each were predicted to have two transmembrane spanning alpha helical segments containing cysteine residues (C60&61 in MPC1 and C54 in MPC2). Both N- and C-terminals projected to the same side of the membrane, intermembrane space for MPC2 and matrix for MPC1. (Fig.1). Pyruvate had 8 binding sites on the entire MPC1/2 complex and both TZDs and known inhibitors bound only to 7 or less, including the critical ones at the cysteine residues of MPC1/2 within the inner mitochondrial membrane. (Fig. 2). The TZDs had higher affinities comparable to the known inhibitors. (Fig.3).

Conclusions: A convergence of pyruvate, characterized inhibitor, and TZD binding sites were localized at cysteine residues of the MPC1/2 transmembrane regions, consistent with biochemical predictions made in the 1970s and 90s by A.P. Halestrap and K.A. Nalecz laboratories, respectively. Supported by Alzheimer’s Association and NIHG12-MD007591.
Figure 1: Pyruvate binds to eight sites on MPC-1/2 complex (A-H).

Note cysteine residues near E & F within the inner mitochondrial membrane (IMM) where MPC2 is facing the intermembrane space (miMS) and MPC1 is facing the matrix.

Legend: residues
A = MPC2_16-18
B = MPC2_108-114
C = MPC2_96-103
D = MPC1_42-50
E = MPC1_60-61
F = MPC2_48-51
G = MPC2_66-72
H = MPC1_83-95

Figure 2. A) MPC1 (green) has pyruvate bound near CYS60-61 and MPC2 (orange) near LYS 49. This is at the intramembranous domains. B) Pioglitazone binds MPC1 at CYS60-61 near pyruvate (left of image) and at other sites closer to the N-terminal (middle and right of image).

Figure 3: Graph of affinities for pyruvate and inhibitors at binding sites shown by amino acid residue numbers.
PSYCHIATRIC AEROMEDICAL EVACUATIONS: CLINICAL CHARACTERISTICS OF DEPLOYED U.S. MILITARY PERSONNEL DURING OPERATION IRAQI FREEDOM

The factors surrounding psychiatric aeromedical evacuation during a military deployment are complex. This research represents an initial effort to promote further understanding of such factors and ultimately strengthen military behavioral health knowledge and practice. Data from a subset of psychiatric aeromedical evacuation cases while in combat theater (Operation Iraqi Freedom and Operation Enduring Freedom), was collected. Demographic characteristics, the prevalence of PTSD, and the presence of any prior mental health history were examined. It was hypothesized that the number of previous deployments would be predictive of PTSD symptom severity, and that individuals with a positive mental health history were more likely to screen positive for PTSD. Standard of care measures, as part of clinical mental health assessments, included the Posttraumatic Stress Disorder Checklist–Military and a mental health questionnaire. This sample was predominantly of male gender between the ages of 21–30, enlisted, and active duty service members in the U.S. Army. The most prevalent mental health disorders noted were anxiety and mood disorders, representing 43% of the total diagnoses. Of the 298 participants who completed the PCL–M, 32% met criteria for probable PTSD; however, only 9% were formally diagnosed with PTSD. The regression model predicting PCL–M scores by number of deployments was significant. Participants scoring near the mean on the PCL–M were approximately three times more likely to report a positive mental health history. The dataset was limited by the exigencies of clinical evaluation and care in a combat zone, but nevertheless provides a rare snapshot of actively deployed military personnel in the process of mental health evaluation and potentially emergent evacuation.

This research is funded by an intramural research grant from the Air Force Medical Support Agency (AFMSA). All correspondence should be addressed to LtCol Monty Baker, SAF 423rd MDS/SGOW, RAF Alconbury, England. Email: monty.baker@us.af.mil. The views expressed are those of the authors’ and do not reflect the official views of the Department of Defense, or its Components.
LIPOPROTEINS HYPER-EXPRESSED FROM MUTANT STRAINS OF BORRELIA BURGDORFERI CONFER PROTECTION IN THE MOUSE MODEL OF LYME DISEASE FOLLOWING TICK CHALLENGE

Trever C Smith II*, Ying-Han Lin, Sean Vargas, and J. Seshu

The University of Texas at San Antonio

**Background:** Lyme disease (LD) is the most-prevalent arthropod disease in the US with 300,000 new infections estimated to occur each year by CDC. LD is caused by *Borrelia burgdorferi* (Bb), a spirochetal pathogen that is transmitted to many vertebrate hosts including humans following the bite of infected *Ixodes* spp. ticks. The disease begins as a localized inflammatory response at the site of tick bite and if left untreated, can lead to arthritis, carditis and other neurological manifestations. Currently, there are no vaccines for prevention of LD. While Doxycycline is effective against *Bb*, about 25% of infected individuals exhibit persistent arthritis after antibiotic treatment. Hence, there is a dire need to develop strategies to reduce the burden of *Bb* infection and transmission. To address this need, we generated mutant strains of *Bb* to reduce the burden of *Bb* in reservoir hosts and thus lead to reduced transmission/incidence of LD. One mutant lacking Borrelia host adaptation Regulator (*badR* mutant) resulted in derepression of RpoS while the second mutant strain had 8 site-specific changes in Carbon Storage Regulator A (*csrABb-8S* mutant). Both mutants resulted in hyper-expression of lipoproteins that are targets of the immune system in many reservoir and dead-end hosts and were shown to be unable to colonize the mouse model of Lyme disease.

**Materials and methods:** To test the hypothesis that total lipoprotein extracts from these mutants will confer protection in the mouse model of LD following tick-challenge, we purified the lipoproteins from the mutant strains and vaccinated C3H/HeN mice (*n*=3) at day 0 and 14 via intradermal inoculation. Following seroconversion, vaccinated and control mice were challenged with 10 *Bb* infected nymphs/mouse. Vaccination protection was determined by culturing *Bb* from select tissues of each challenged mouse performed determination of infectivity.

**Results and Conclusions:** Vaccination with total lipoproteins from both *csrABb-8S* and *badR* showed complete protection 21 days post-tick challenge. These studies indicate that lipoproteins from these mutant strains can be used as a potential vaccine for reducing the burden of *Bb* in reservoir hosts.
It is well known that environmental signals act as a switch for bacteria—various molecules in the extracellular milieu behave as effectors, causing a bacterium to shift from planktonic growth to biofilm growth. Biofilm growth is linked both with virulence and resistance to antibiotics. *Acinetobacter baumannii* and *Klebsiella pneumoniae* are biofilm-forming bacterial species often associated not only with nosocomial infection, but also with multidrug resistance. Notably, the former has emerged as a major source of wound infection for soldiers returning from Iraq and Afghanistan. Of four sequenced clinical isolates of *Acinetobacter* taken from wound infections (CI 77, CI 78, CI 79, CI 86), three showed *in vitro* resistance to beta lactams, aminoglycosides, vancomycin, and a carbapenem. Five clinical isolates of *Klebsiella pneumoniae* were resistant to beta lactams, aminoglycosides, and carbapenems. Crystal violet assays revealed all isolates as biofilm formers; *Acinetobacter* isolates were particularly robust. Strains were grown in M9 minimal media supplemented by casamino acids (M9CA) alone, or in M9CA supplemented with either glucose or methyl-\(\alpha\)-D-glucopyranoside (m\(\alpha\)g) to induce a phosphosugar stress response; after overnight incubation in a rotating incubator, the liquid cultures were aspirated away and biofilms were stained with crystal violet. The CV was solubilized in acetic acid and the OD measured to quantify biofilm formation. Glucose addition enhanced biofilm formation; m\(\alpha\)g inhibited biofilm formation. Since biofilm formation is intimately tied with both virulence and antibiotic resistance, it lends itself as an obvious target for novel therapies to either restore sensitivity to antibiotics, or promote clearance by the immune system. Understanding the particular mechanisms of biofilm inhibition by non-metabolizable sugars could be illuminative.
THE ASSOCIATION BETWEEN MATERNAL EDUCATION & LOW BIRTH WEIGHT

Ashley I. Pollock¹, & Cedric A. Taylor, Ph.D.²

¹Ronald E. McNair Program, University College, The University of Texas at San Antonio; ²Department of Sociology, Anthropology, & Social Work, Central Michigan University

This study investigates the relationship between socioeconomic position and health in the state of Michigan. More specifically, this study uses Michigan’s Pregnancy Risk Assessment Survey (PRAMS) study to explore how education affects health as measured by low birth-weight (LBW) among Black and White women. Findings suggest that more education a mother has, lowers her chances of having a low-birth infant. Similarly, Black mothers – even if they have more education – are still more likely to have an infant who is low birth-weight. By understanding how social factors such as education and race can affect LBW, policymakers may be better able to take the necessary steps to address racial health disparities, improve overall population health and decrease the ever-increasing healthcare system expenditures.

The authors would like to thank the Ronald E. McNair Program and the Department of Sociology, Anthropology, & Social Work at Central Michigan University for their support in this research.