59th Medical Wing

59MDW Science and Technology Overview and Upcoming Toxicology Projects

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Military Medicine: A Shifting Landscape

Military Health System
- OASD(HA) - Responsible for effective execution of the DoD medical mission, providing and maintaining readiness for medical services and support to members of the Military Services; their families... and others entitled to or eligible for DoD medical care and benefits, including those under TRICARE.

Defense Health Agency
- Vision: A Combat Support Agency, leads the Military Health System integrated system of readiness and health to deliver the Quadruple Aim—increased readiness, better health, better care, and lower cost.
- Mission: Unified and Ready.

AF/SG
- Mission: Ensure medically fit forces, provide expeditionary medics and deliver Trusted Care to all we serve.

AETC Commander
- “Help us invent the future ...one idea at a time!”

59 MDW Commander
- Vision: Exemplary Care, Global Response.
Critical National and Local Resource

- **Strategic Asset**
  - “Home of Military Medicine”—SA Chamber of Commerce assessed $4B direct, $1B indirect economic impact
  - 12 MTFs/$1.2B Budget /12,000 staff/250,000 beneficiaries
  - 37 GME programs--600 residents, 22 GHSE programs--78 residents
  - Contingency/Humanitarian response -- Teams on call 24/7 and ~150 Service Members deployed
  - **Significant Medical Innovation, Research, Education, Training**
  - Brook Army Medical Center
    - DoD’s most productive inpatient facility
    - DoD’s only CONUS Level 1 Trauma Center
    - DoD’s only Bone Marrow Transplant Unit
    - DoD’s only Burn Center
    - Center for the Intrepid
  - Wilford Hall Ambulatory Surgical Center and Clinics
    - DoD’s largest outpatient facility
    - DoD’s largest Blood Donor Center
    - DoD’s largest centralized appointment/referral management system

Patients First, Partners Always

**Vision:** Grow Medical Leaders, Drive Innovations in Patient Care and Readiness

**Mission:** Conduct clinical studies and translational research and apply knowledge gained to enhance performance, protect the force, and advance medical care and capabilities across the global health system

Chief Scientist Science and Technology
Providing operational capability through…

Lead & Support Research
Advance Modernization Efforts
Foster and Build Collaborations
Address End User Needs
Ensure Scientific Excellence and Programmatic Relevance
Wing, SAUSHEC, AFMS, LAF, ASD/OSD, Joint Cmts / S&T, Adv Dev liaisons

JBSA Main Office: (210) 292-2097

[https://www.59mdw.af.mil/Units/Chief-Scientist-ST/](https://www.59mdw.af.mil/Units/Chief-Scientist-ST/)
Major Programs/Capabilities

- **Clinical Investigations and Research Support (CIRS)**
  - Clinical Investigations Program, Readiness and Certification Training
- **Nursing Research / Center of Clinical Inquiry**
  - Chief Nurses consultation/24 MTFs; Research & Evidence Based Practice
- **Dental Education, Research and Consultation**
  - USAF Post Graduate Dental School and Clinics, JBSA-Lackland
  - Dental Research and Consultation Service, JBSA-Fort Sam Houston
- **Integrated Clinical Medicine and Center for Molecular Detection**
  - Rapid Pathogen Detection/Analysis, Trainee Healthcare, Precision Medicine Research
- **En Route Care Research Center**
  - Co-located at USA Institute of Surgical Research (USAISR); AE-ERC research in Collaboration with other Organizations
- **Clinical Resuscitation, Emergency Science & Toxicology Program**
  - Clinical research and simulations
  - Emergency Medicine Residents participate to fulfill graduation requirements
- **Trauma and Regenerative Medicine Research**
  - Clinical Investigations, JBSA-Lackland; USAISR/BHT & Tri-Service Research Laboratory (TSRL), JBSA Fort Sam Houston
Theater of Operations ↔ Garrison Care

Role 1
Point of Injury

Role 2
Mobile Field Surgical Team/EMEDS

Role 3
EMEDS +25 AF Theater Hospital

Role 4
OCONUS Definitive Care

Role 5
US-based MTF Full Range/Definitive Care

Post-Acute Care
Dept of Veteran Affairs

Joint Austere Medicine Research Portfolio

Joint Integrative Clinical Medicine Research Portfolio

Performing Research and Providing Deliverables to Address Joint Medical Priorities across the Continuum of Care
Joint Austere Medicine (JAM)

Mission:
Investigate innovative mechanisms to increase clinician skills and practices to utilize early detection methods, latest treatment regimens, and recovery from communicable illness and non-battlefield injuries to improve return to duty turnaround times.

Objectives:
• Provide access to and understanding of recent surgical devices, and techniques to improve patient care and enhance cost-savings and return to fight
• Conduct research to identify the most efficacious learning architecture to improve clinical readiness and ensure skills proficiency and sustainment
• Investigate resuscitation, stabilization, triage, and treatment modalities and their applicability in austere environments
• Support better health initiatives and improve return to duty rates for non-battlefield related injuries occurring in austere training and deployed environments
• Test, evaluate, and realize progressive and autonomous approaches to assist clinicians with patient care in austere environments
PROGRAMES

1. **En Route Care Research Center (ECRC)**

2. **Clinical Resuscitation, Emergency Science, Triage & Toxicology (CREST²)**

3. **Frontline Illness, Exposure, & Recovery Care Efforts (FIERCE)**

4. **Surgical & Technological Advancements for Traumatic Injuries in Combat (STATIC)**

5. **Improvements in Neurological, Sensory, & Perceptible Research (INSPR)**

PEOPLE

- Lt Col Joseph Maddry, MD
- MAJ Steven Schauer, DO
- Col Erik Weitzel, MD
- Lt Col Valerie Sams, MD
59MDW/ST Summary

- Lead AF Clinical Research Platform; Largest DoD GME Platform
- Joint DHP Integrated – Programs and Partners (i.e., Across JPCs; USAISR, NAMRU-SA, Others)
- GME/GHSE-RDT&E Synergized, USU-affiliated Programs; largest AF CIF & Lead Translational Research Platform
- Military Readiness, Joint Force and Medical Care Requirements-aligned
- Lead AF eIRB site / implementation, Preparing for “eIACUC”
- First and Only DoD HRPP Accredited Program (AAHRPP)
- Long-standing AAALAC Accreditation with Merit
- Broad & Deep System Capabilities, Clinical Competencies/Collaborations
Proposed AMD Tox Approach

• High throughput screening using commonly accepted in vitro assays
  • Extracellular lactate dehydrogenase activity as measurement of cell viability
  • Tetrazolium reduction (WST-1/MTT)- measurement of mitochondrial activity
  • GFP cell line signal quantification

1. Assay development
   96-well or 384 well plates
   Robotic addition of reagents (384 well plates)

2. Assay optimization
   Adjust volumes, CO2, serial dilutions and timepoints- look for “edge effect”

3. Assay validation
   Test multiple cell lines with known toxic test material and inert material

4. Screen small molecules
   Run assays- samples in triplicate, 3 independent times

5. Analyze data
   Generate dose response curves at timepoints

6. Communicate Results
   Discuss and interpret data; troubleshoot potential issues (solubility); downselect for additional evaluation
Proposed AMD Tox Approach

• High throughput screening using commonly accepted in vitro assays
  • Adaptation to 384 well plate
  • Autonomous reagent addition
  • Real time data collection

• Initial screening with kidney, liver, skin, and lung cell lines
• Down select for additional assays with primary cells