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Purpose

• Provide an overview of the Branches and research mission within the Center for Military Psychiatry and Neuroscience
Outline

• Mission statement
• Scientific Background
• Organizational Structure
• Branch Overview
  • Brain Trauma Neuroprotection & Neuroplasticity
  • Blast-Induced Neurologic Injury
  • Behavioral Biology
  • Military Psychiatry
  • Research Transition Office
• Points of Contact
Mission

• Conduct basic and applied research that promotes psychological resilience, neurological functioning, and operational readiness in Service Members. Develop evidence-based strategies to diagnose, prevent, and mitigate the effects of psychological demands, continuous operations, and brain trauma on the health and well-being of Service Members.
Scientific Background

• Integral component of the WRAIR for over 60 years.
  • Early research in the 1950s provided the groundwork for Dr. David Hubel’s 1981 Nobel Prize in Medicine.
  • Over 30 patents for novel scientific contributions

• A continuum of research from basic science animal models to applied field studies produces innovative solutions to enhance Service Member resilience and recovery.
Brain Trauma, Neuroprotection & Neuroplasticity

• Mission
  • Conduct basic, and applied research to reduce death and residual disability caused by brain injury in combat. Focus on improved diagnostics and the discovery, development and implementation of novel therapeutic strategies including pharmaceuticals, hypothermia, and neural stem cell transplantation.

• Expertise
  • Identifying protein biomarkers of brain injury
  • Developing and evaluating novel neuroprotective and neurorestorative treatment therapies
Brain Trauma, Neuroprotection & Neuroplasticity

• Current Research Priorities
  • Deliver an FDA approved therapeutic for the treatment of traumatic brain injury
  • Finalize delivery of a medical device to deployed units that accurately detects when a service member has suffered a mild to moderate brain injury
Core “Preclinical” Program

**Penetrating Ballistic-like Brain Injury (PBBI)**

- Basic Research: molecular and physiological events
  - Secondary insults (ICP, seizures, fever)
  - Brain injury biomarkers (genomics & proteomics)
  - Polytrauma
- Applied Research: Neuroprotection Strategies including
  - Single, Targeted Drug Therapy
  - Combination Therapy
  - Non-traditional Therapies (Stem Cells; Selective Brain Cooling)

**Closed-Concussive (mild) TBI**

Center for Military Psychiatry and Neuroscience
Blast-Induced Neurotrauma

• Mission
  • Conduct basic and applied research on militarily relevant closed-head injury resulting from exposure to blast(s), including studies of blast(s) accompanied by polytrauma and hemorrhage. Discover, evaluate and advance therapies or doctrinal changes that would improve survival and functional outcomes following these injuries

• Expertise
  • Modeling of blast-induced closed head injury, including large animal explosive blast
  • Polytrauma and hemorrhage and the interplay of systemic insults with traumatic brain injury
Blast-Induced Neurotrauma

- Current Research Priorities
  - Develop a nationally and internationally recognized animal model of blast concussive injuries
  - Determine if explosions produce a unique form of brain injury
Blast Tube Properties

Sensors used to map tube
A – Tip gauge: Total Pressure
B – Side gauge: Static Pressure

Long et al, IFMBE Proceedings 30; 2010

free field explosion
Behavioral Biology

• Mission
  • Investigate and develop the means to optimize war-fighter readiness, efficacy, and resilience during continuous military operations when there is little or no opportunity to sleep. Identify the role of sleep in facilitating resilience to, and recovery from, exposure to a variety of combat-related stressors.

• Expertise
  • Alertness and performance management, including (a) predictive models of cognitive readiness, (b) pharmacological interventions to sustain readiness, and (c) neurocognitive assessment testing
  • Animal models of PTSD
  • Human neuroimaging studies
Behavioral Biology

• Current Research Priorities
  • Interventions to enhance the recuperative efficiency of sleep, and enhance Service Member resilience to the deleterious physical and psychological effects of sleep loss.
  • Sleep-related strategies to enhance resilience to, and recovery from, mTBI and PTSD evoking events
  • Development of a mathematical performance prediction model as a fatigue management tool for use in operational environments
  • Refinement and validation of animal model of PTSD
Physiological and Behavioral Effects of Sleep Loss

Sleep loss preferentially deactivates areas of the brain involved in operationally relevant mental processes.

Because sleep loss profoundly degrades mental operations, it constitutes a threat to mission success and Soldier safety.
Comprehensive Fatigue Management

• Fatigue Countermeasures
  • Stimulants and strategies to restore/maintain mental operations
  • Sleep inducers to enhance recuperative sleep when needed

• Cognitive Readiness Prediction Model
  • Predict and manage operational performance degradation
  • FlyAwake used proactively in military flight operations
Military Psychiatry

• Mission
  • Provide knowledge and interventions to improve psychological functioning, reduce the impact of mental disorders, and enhance the resilience of Soldiers, Leaders, and Families

• Expertise
  • Comprehensive survey-based mental health assessments for Army and DoD. Responsible for staffing and implementing in-theater Mental Health Advisory Teams (MHATs)
  • Validating psychological resiliency programs
• Current Research Priorities
  • Lead Joint Mental Health Advisory Teams (MHAT)
  • Develop and validate a training model focused on small unit leaders designed to help leaders build resilience in their subordinates
Research Products

- Mental Health Advisory Teams (MHAT)
  - Policy Implications
- Resilience Training Validation
  - Group Randomized Trials

Sample-Adjusted Values for NCOs (Maneuver Unit Sample)

![Graph showing probability of sleep problems at Time 2 vs. combat exposure.]

Center for Military Psychiatry and Neuroscience
• **Mission**
  - Transition research findings into information and training products disseminated through training during Initial Military Training (IMT) and the Professional Military Education (PME) system as well as unit-level and deployment-cycle training

• **Expertise**
  - Serving as a bridge between research-based recommendations and operational requirements through the development of information and training products
  - Conducting program evaluation of training products in the military context
• Priorities
  • Complete the development of Army-mandated resilience training across the PME system
  • Complete program evaluation of resilience training conducted under the auspices of the Army’s Comprehensive Soldier Fitness (CSF) initiative
Deployment-Cycle Resilience Training

In-Theatre Psychological Debriefing

Pre-Deployment Resilience Training for Soldiers

Pre-Deployment Resilience Training for Leaders

Pre-Deployment Resilience Training for Spouses/Couples (ACS)

During Deployment Integrated Resilience Training (in development)

Reintegration Resilience Training (PDHA)

Post-Deployment Resilience Training (PDHRA)

Post-Deployment Psychological Debriefing

Soldier MRTs receive Resilience First-Aid training & train to deliver pre and post-deployment training for Soldiers [in white boxes]. ACS MRTs receive Resilience First-Aid training & train to deliver pre and post-deployment training for Spouses/Couples [in green boxes].
Institutional (Life-Cycle) Resilience Training

Resilience Training for Basic Combat Training (Red Phase)
Resilience Training for Warrior Leader Course
Resilience Training for Mid-Grade Leaders
Resilience Training for Senior Leaders
Resilience Training for Pre-Command

Resilience Training for Mid-Grade Leaders
Resilience Training for Senior Leaders
Resilience Training for Strategic Leaders

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Points of Contact

• COL Paul Bliese, Center Director
• Dr. Frank Tortella, Center Senior Scientist and Director of Brain Trauma, Neuroprotection & Neuroplasticity
• Dr. James Atkins, Director of Blast-Induced Neurotrauma
• Dr. Thomas Balkin, Director of Behavioral Biology
• MAJ Jeffrey Thomas, Director of Military Psychiatry
• LTC Dennis McGurk, Director of Research Transition Office