

Center for Military Psychiatry and Neuroscience

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Center for Military Psychiatry and
Neuroscience



Purpose

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



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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



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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.



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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
 - Numerous publications in high-impact journals such as *Science*, *Nature*, the *New England Journal of Medicine* and the *Journal of the American Medical Association*.
- A continuum of research from basic science animal models to applied field studies produces innovative solutions to enhance Service Member resilience and recovery.



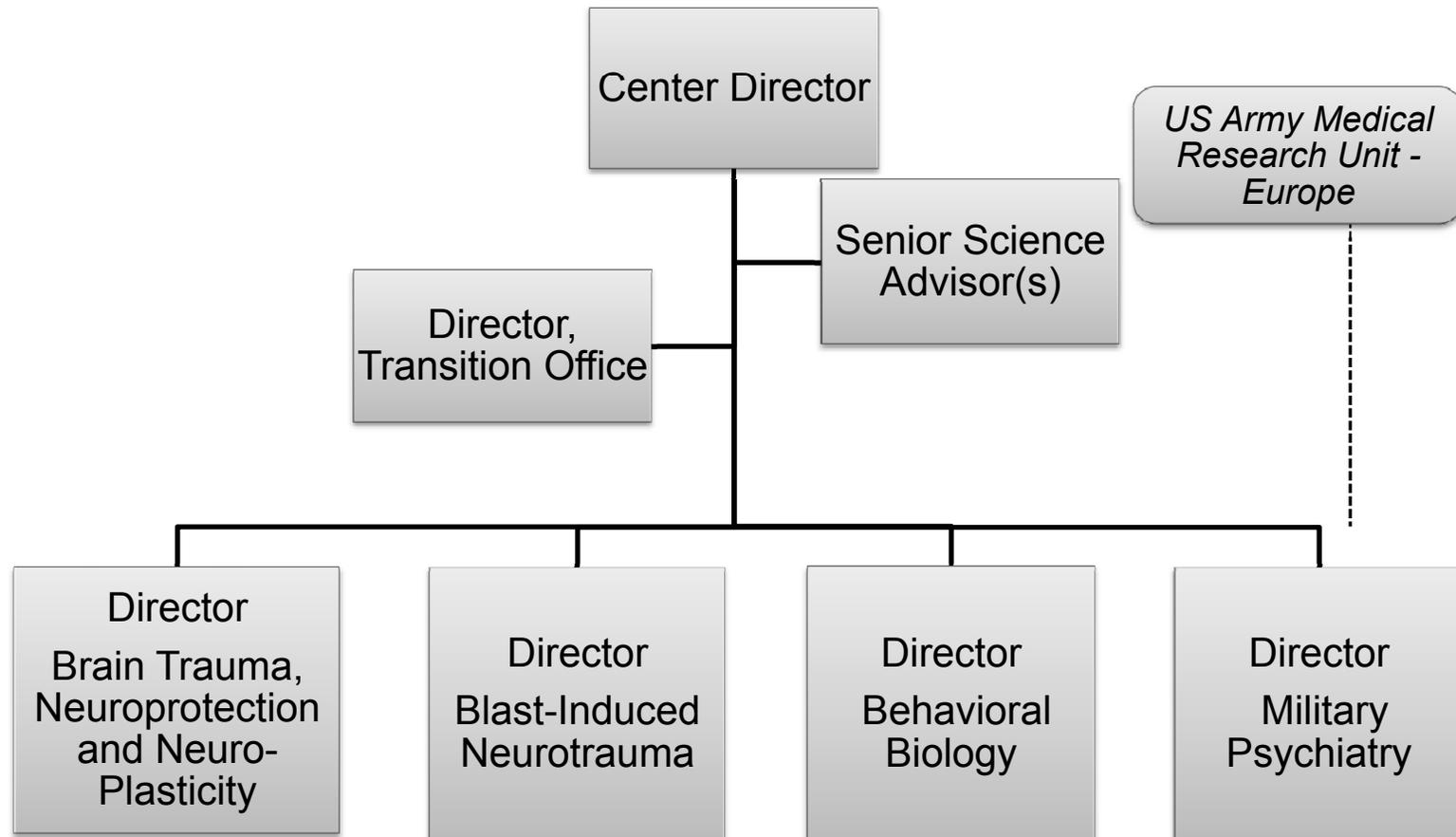
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Structure



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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



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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



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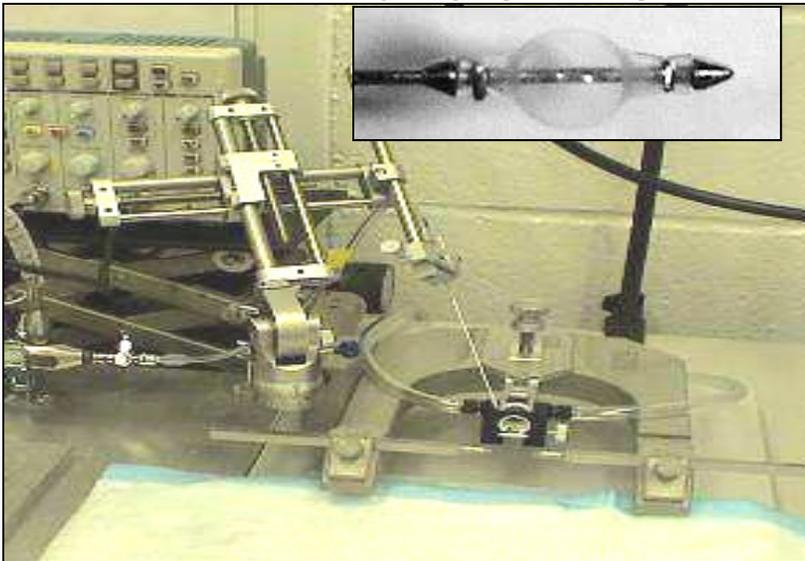
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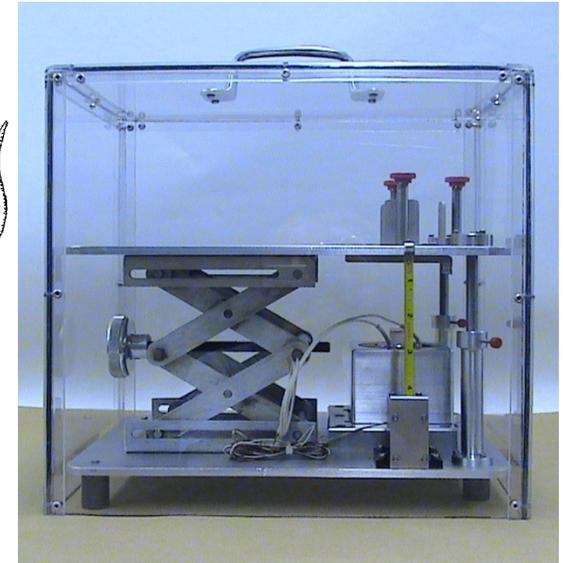
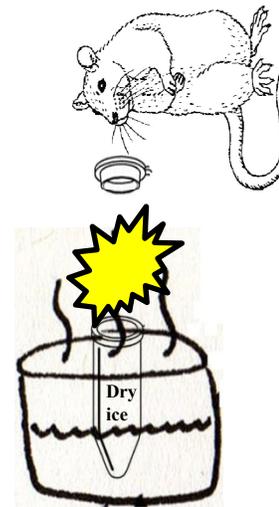


Core “Preclinical” Program

Penetrating Ballistic-like Brain Injury (PBBI)



Closed-Concussive (mild) TBI



- **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)



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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



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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



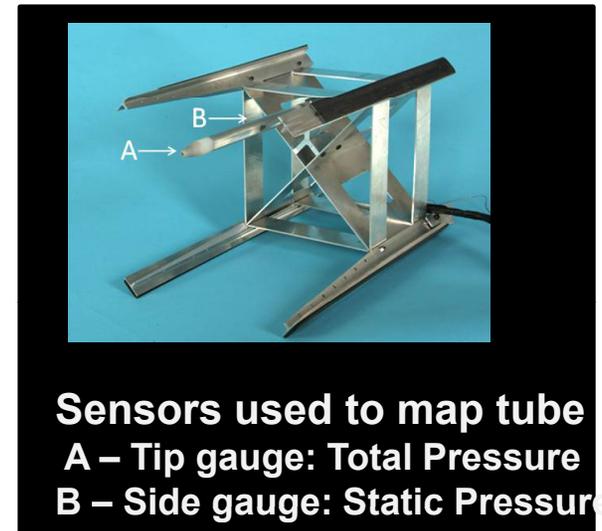
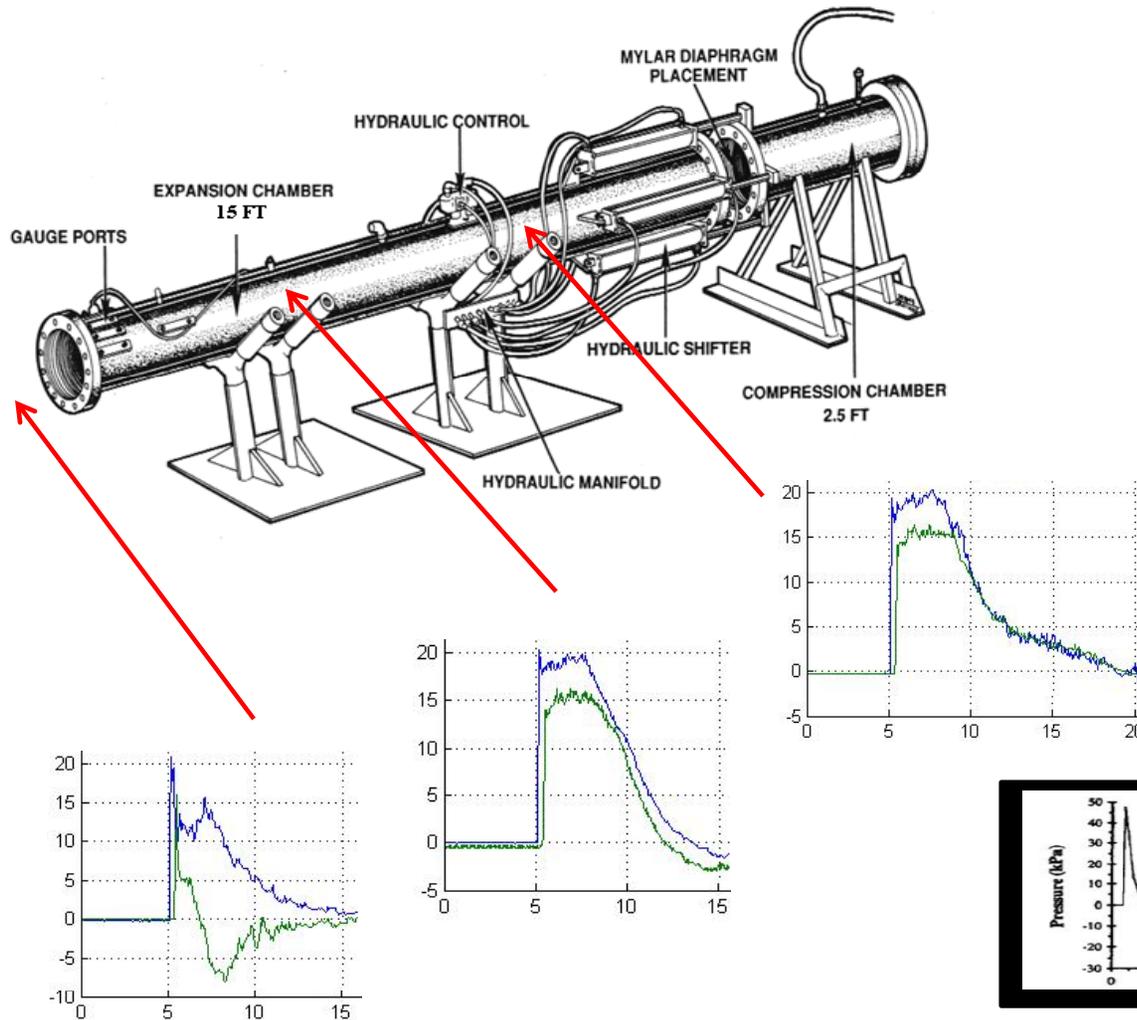
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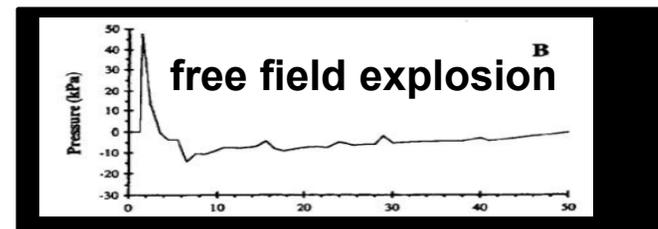
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Blast Tube Properties



Long et al, *IFMBE Proceedings* 30; 2010



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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



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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



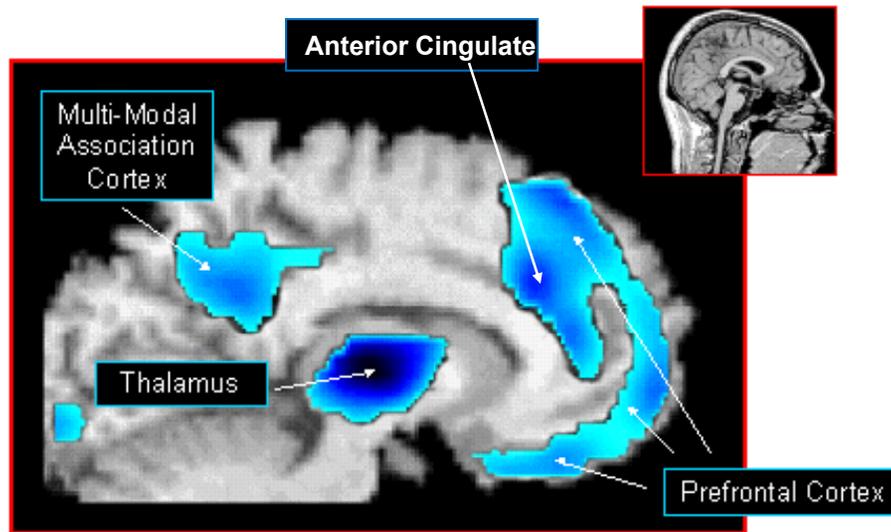
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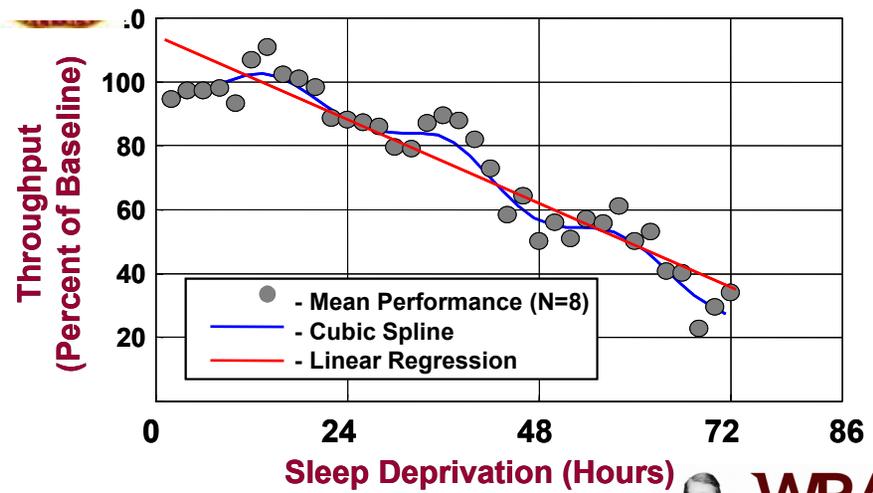
Physiological and Behavioral Effects of Sleep Loss



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

72 Hours of Total Sleep Deprivation: Effect on Performance

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



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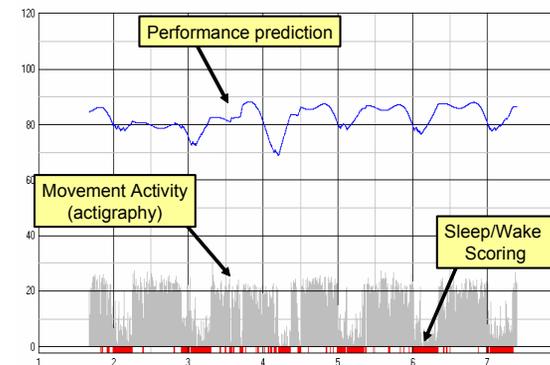
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WRAIR
Walter Reed Army
Institute of Research
Soldier Health • World Health

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



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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



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Military Psychiatry

- 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



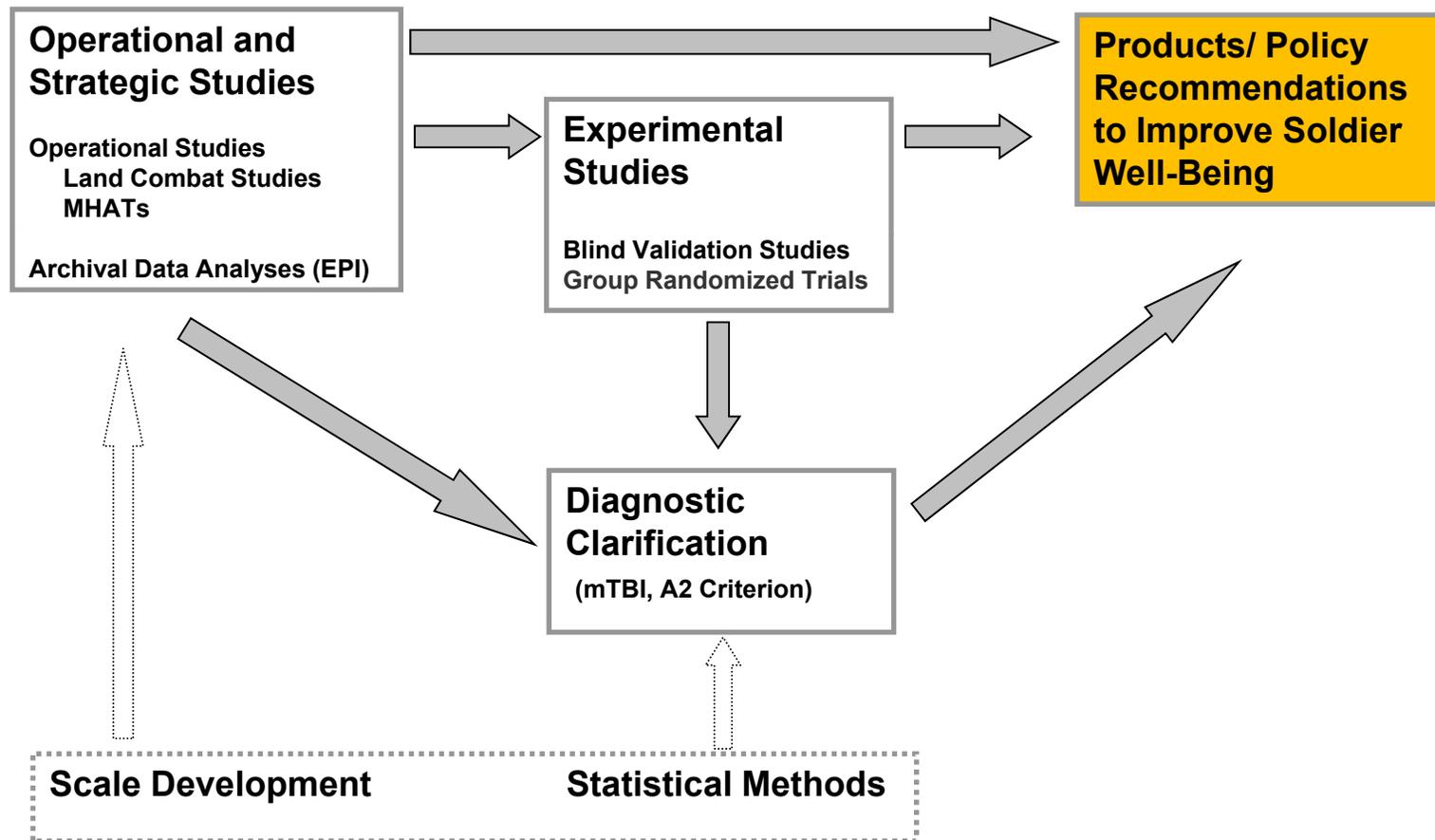
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Research Model



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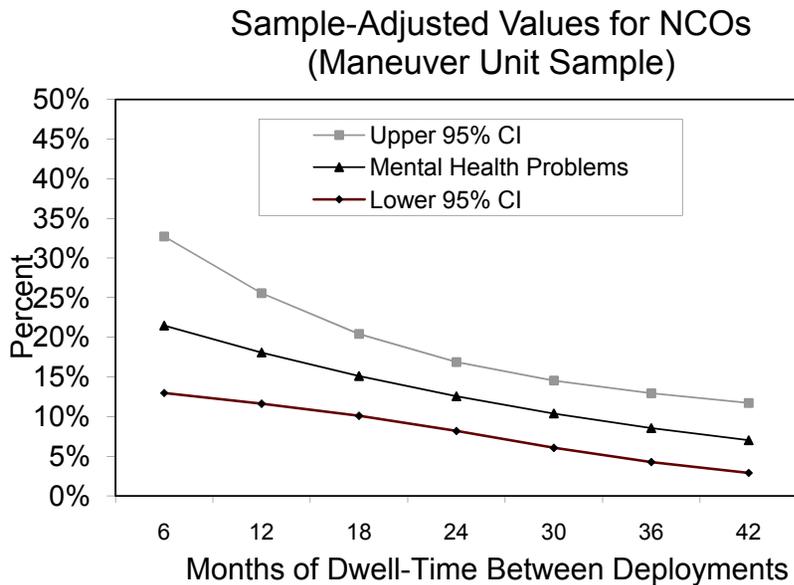
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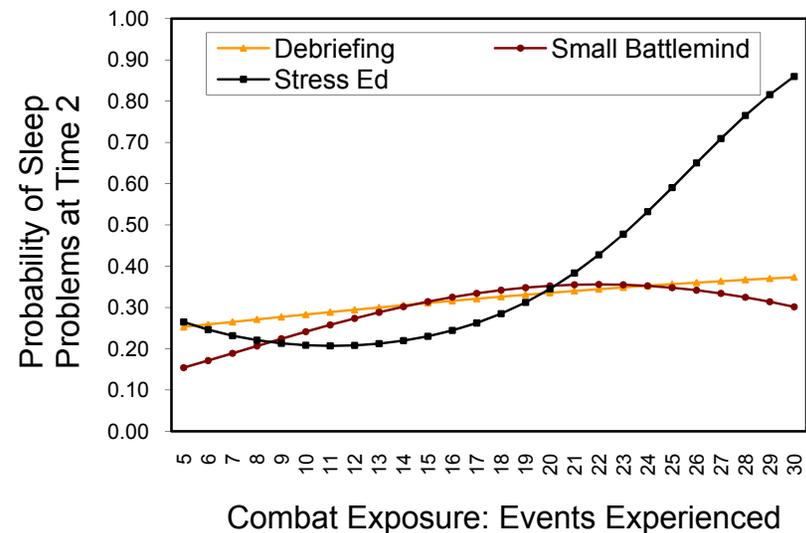


Research Products

- Mental Health Advisory Teams (MHAT)
 - Policy Implications



- Resilience Training Validation
 - Group Randomized Trials



Research Transition Office

- **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



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Research Transition Office

- **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



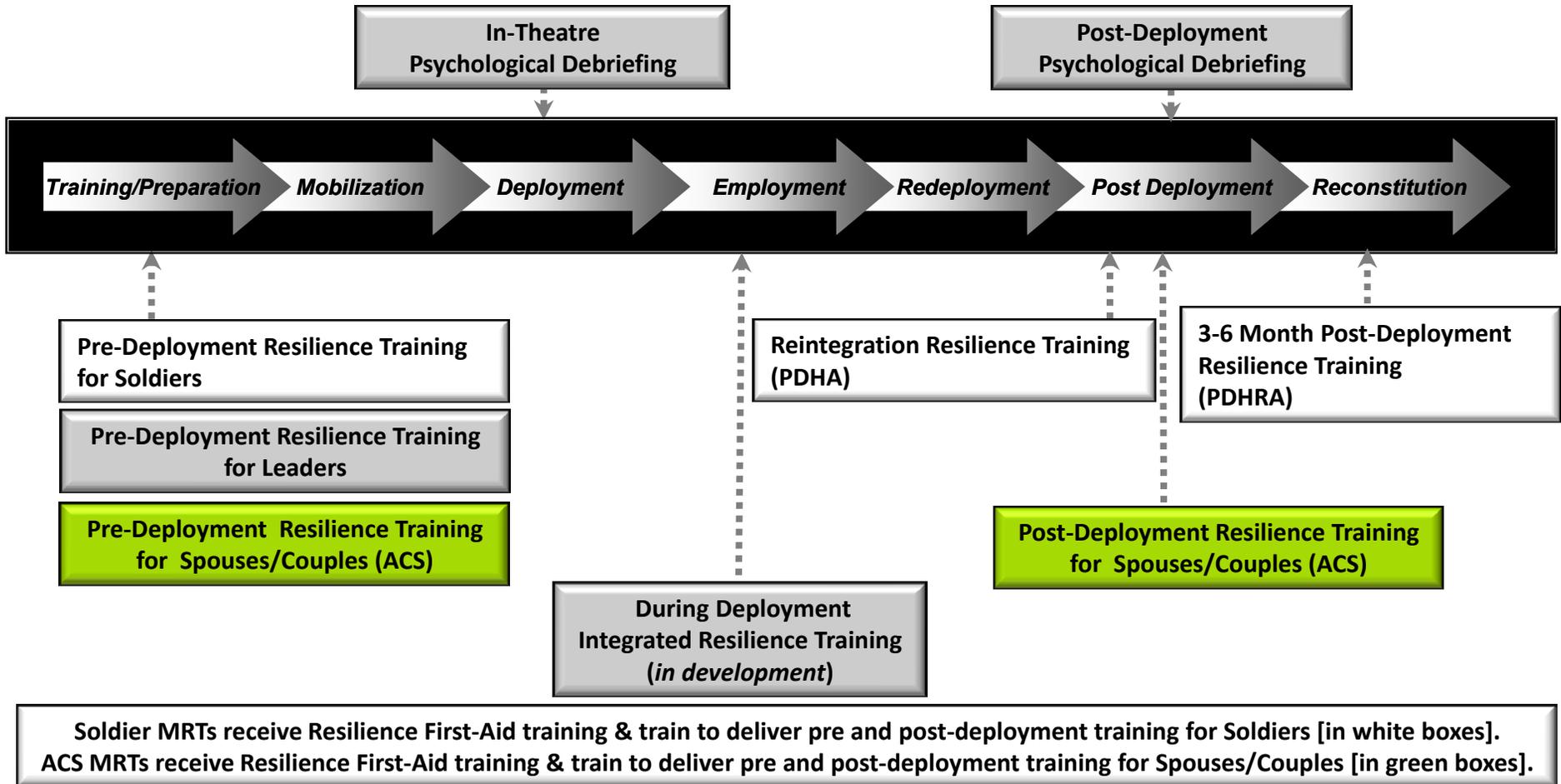
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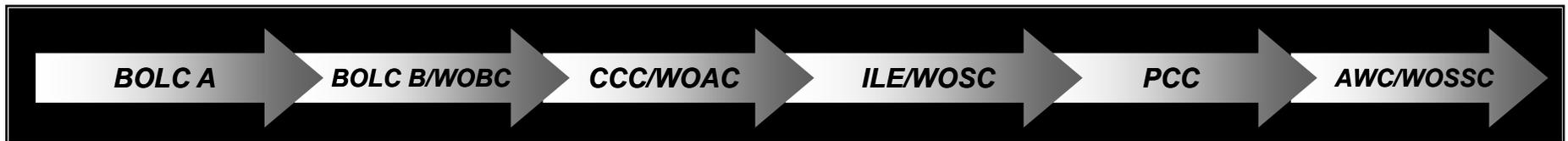
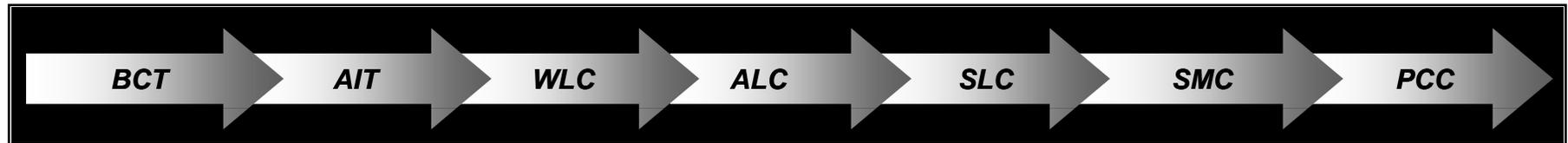
Deployment-Cycle Resilience Training



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Institutional (Life-Cycle) Resilience Training



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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



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