CDMRP
DEPARTMENT OF DEFENSE
CONGRESSIONALLY DIRECTED MEDICAL RESEARCH PROGRAMS

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EPILEPSY RESEARCH PROGRAM

Service Members who experience head injury are at an increased risk for developing post-traumatic epilepsy. PTE currently affects an estimated 2,187 Iraq/Afghanistan Veterans, with a five-times-higher mortality rate than other Veterans receiving care in the Department of Veterans Affairs.[1] Many of the pathological mechanisms linking traumatic brain injury to PTE remain a mystery. Studies to characterize TBI-related brain circuitry changes are necessary to understand the linkages among TBI, PTE, and their prominent comorbidities. This will ultimately result in improved diagnosis, treatment, and prevention choices for those living with PTE, their care partners, and health care providers.

VISION

A time when post-traumatic epilepsy is prevented or optimally managed

MISSION

To understand the mechanisms of post-traumatic epilepsy and associated comorbidities to improve quality of life, especially in Service Members, Veterans, and caregivers

PROGRAM HISTORY

Congress first appropriated funds for the Epilepsy Research Program in FY15 to develop an understanding of the magnitude of PTE within the military and to expand research into the basic mechanisms linking PTE development with TBI. Between FY15-FY24, the ERP received $97.5 million and funded 74 awards.

[1] Pugh MJ, et al. 2016. Epilepsy Among Iraq and Afghanistan War Veterans - United States, 2002-2015. *Morbidity and Mortality Weekly Report* 11; 65(44):1224-1227. doi: 10.15585/mmwr.mm6544a5. PMID: 27832054.

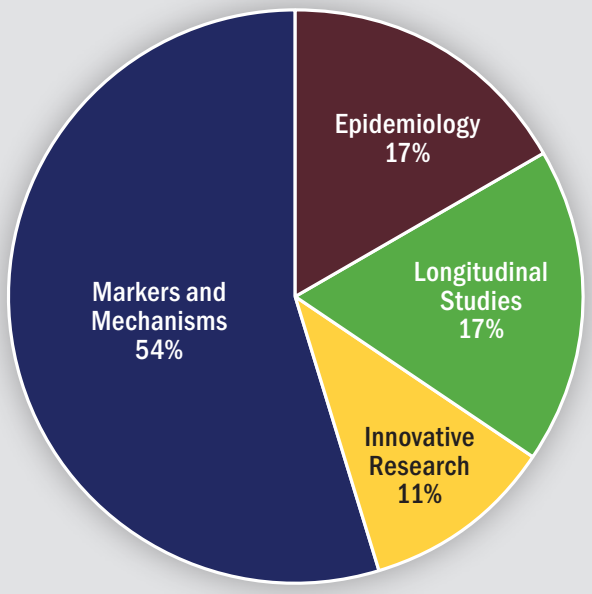
FOCUS AREAS The ERP uses focus areas to drive investment into specific program priority areas. The chart below displays the program's investment in these priority areas.

- **Innovative Research:** Tools intended to better inform or improve upon PTE research and care
- **Markers and Mechanisms:** Identifying biomarkers or mechanisms of PTE
- **Epidemiology:** Epidemiological characterization of PTE following TBI
- **Longitudinal Studies:** Studies of the evolution of PTE

STRATEGIC CHALLENGES The ERP addresses three strategic challenges to advance our understanding of PTE.

Building Research Capacity
Encouraging Collaboration
Building Upon Success Inside and Outside the PTE Research Field

ERP RESEARCH INVESTMENT



FY18-22 ERP FUNDING ACROSS FOCUS AREAS*

** Data do not include two FY22 awards that were not required to address a program focus area*

ERP-FUNDED RESEARCH


Post-Traumatic Epilepsy Center Without Walls

Ramon Diaz-Arrastia, M.D., Ph.D., University of Pennsylvania
Mary Jo Pugh, Ph.D., R.N., University of Utah

In FY22, the ERP initiated the Virtual Post-Traumatic Epilepsy Research Center to develop successful, highly productive PTE researchers in a collaborative research and career development environment to enhance quality and expand quantity of the PTE research field. Diaz-Arrastia and Pugh, two pioneers in the field of PTE research, lead this exciting effort. Through this effort, the ERP aims to expand capacity and foster mentorship and career development for researchers looking to break into the PTE field, as well those early in their careers.

Collaborative Care to Improve Quality of Life for Anxiety and Depression in Post-Traumatic Epilepsy

Heidi Munger Clary, M.D., M.P.H., Wake Forest University Health Sciences
FY21 Quality of Life Research Award

Munger Clary is conducting a clinical trial to assess how a collaborative care approach can impact neurological outcomes and quality of life for people living with PTE. In this study, the research team integrates neurological and psychological care together with a care management coach and a social worker to provide holistic and accessible care to participants. This remote intervention has the potential to increase patient access to care, including overcoming transportation barriers faced by people with PTE, while also improving overall quality of life.

Innovative Tools for Detection of Post-Traumatic Epilepsy

Anand Joshi, Ph.D., University of Southern California
FY17 Idea Development Award and FY22 Idea Development Award

Joshi developed and publicly released BrainSync, an extension of the open-source BrainSuite data analysis toolbox that uses high-resolution functional magnetic resonance imaging to define cortical surfaces, including lesions, to identify and quantify grey and white matter structure. Researchers can use the BrainSync tool to help construct high-resolution maps of an individual's brain, which may be used to identify connectivity differences and predict neural outcome(s) after an injury. The development and implementation of innovative tools such as BrainSync are critical for evidence-based risk assessment of epilepsy development after a TBI.

Acute Pharmacological Augmentation of Kv7 K+ Ion Channel Prevents Post-Traumatic Epilepsy and Chronic Traumatic Encephalopathy

Fabio Borges-Vigil, Ph.D., University of Texas, Health Science Center at San Antonio
FY21 Idea Development Award

Borges-Vigil evaluated how potassium channels, proteins that transport potassium ions across cellular membranes, contribute to the development of PTE after repetitive TBI. The study found that mice experienced shorter post-traumatic seizures and fewer animals developed PTE when treated with a potassium channel opener, retigabine, shortly after injury. Retigabine treatment also minimized other indications of neurodegenerative disease in animals, such as post-injury hypersomnia and nerve fiber damage.