

DEPARTMENT OF DEFENSE -  
CONGRESSIONALLY DIRECTED  
MEDICAL RESEARCH  
PROGRAMS

**Contact Us (/contact) | Site Map (/sitemap)**

 (https://www.facebook.com/CDMRP)  
 (http://twitter.com/CDMRP)  
 (https://www.youtube.com/user/CDMRP)  
 (/rss/funding\_opportunities.xml)



(/default)

Transforming Healthcare through  
Innovative and Impactful Research

Home (/default) / Search Awards

# Search Awards

[Back to Search Results](#) | [Modify Search](#) | [New Search](#)

## Novel Combinatorial Approaches to Repair Visual System After Optic Nerve Damage

**Principal Investigator:** PARK, KEVIN

**Institution Receiving Award:** MIAMI, UNIVERSITY OF, CORAL GABLES

**Program:** VRP

**Proposal Number:** VR180110

**Award Number:** W81XWH-19-1-0736

**Funding Mechanism:** Expansion Award

**Partnering Awards:**

**Award Amount:** \$767,500.00

[View Technical Abstract](#)

PUBLIC ABSTRACT

Vision, the ability to see, is perhaps one of the most important senses in our lives, as it is critical for navigation and survival. Military Service members are more likely than non-military civilians to encounter traumatic events that can result in brain injury. Traumatic brain injury (TBI) is a debilitating, multifaceted trauma that frequently occurs in the military patient population. One of the facets of TBI is damage to the optic nerve, which can result in significant visual impairment. About 75% of active military personnel subjected to trauma suffer from progressive glaucoma or optic nerve injury (also known as optic neuropathy). The optic nerve works like a "highway," connecting the eye to the brain. When it is damaged, such as what often occurs in TBI, the eye no longer can send visual information to the brain, resulting in irreversible blindness. Currently, there is no treatment available to patients that can regenerate the damaged optic nerve needed to reverse blindness.

There has been some progress in animal research aimed at finding a cure for repairing the damaged optic nerve. One promising and relatively safe method is hypothermia exposure (cooling of the body) with beneficial effects observed in preclinical animal models to reduce the rate of nerve damage. Another therapeutic approach is the use of gene therapy to provide nerve protection and permit regeneration. However, these approaches, when given individually, have limited therapeutic effects. An optimized approach would be to combine the individual treatments together, ultimately leading to additive and synergistic effects. Such combinatorial approaches have never been tested in animal models of TBI-induced optic nerve injury. Our proposed study will explore this exciting possibility. The main objective of this study is to determine whether our unique combinatorial strategies rescue cells and promote optic nerve regeneration with a greater efficacy in clinically relevant models of optic nerve injury. To this end, we will use cutting-edge tissue imaging techniques, genetically modified mice, and innovative gene therapy approaches.

#### Specific Aims:

Aim 1. To determine where and when the optic nerve is damaged after head trauma in preclinical animal models of TBI. There is a pressing need to better characterize damage to the optic nerve in animal models of injury due to a limited number of animal studies available. Mice are readily available as gene knockout mice and provide an excellent model to study genes and diseases and to develop potential therapeutics.

Aim 2. To examine whether a combinatorial treatment paradigm, consisting of hypothermia and gene therapy, can work synergistically to protect the eyes and optic nerve more efficiently than individual treatments alone.

Aim 3. To examine the effects of combinatorial gene therapy in promoting optic nerve regeneration and restoration of lost vision after optic nerve injury in animals.

Impact: There is currently no treatment available to restore vision after optic nerve injury. Hypothermia and gene therapy are viable therapeutic options. Combined effects of these strategies have not been examined before in treating this complex vision problem. The potentially robust cell protection and regeneration conferred by these therapeutic strategies will exert a significant impact in the field of neuroscience and on treatment of patients with nerve injury.

Military Relevance: Military personnel are at greater risk of incurring optic nerve injury. This proposal will investigate combinatorial therapeutic interventions to rescue dying neurons, promote regeneration, and restore vision, with the added potential to be administered in the clinic and on the battlefield.

Overall Impact: Our study could prove to be significant to the field of neuroscience, vision research, and in the clinical setting for a number of reasons. First, hypothermia is considered relatively safe in humans.

Second, while the safety of gene therapy in humans still needs to be fully examined, there is increasingly convincing evidence that suggests gene therapy in the eye is safe and effective. To this point, the first FDA-approved gene therapy for the treatment of Leber congenital amaurosis, an inherited eye disease, is currently underway. Positive results from our study demonstrating the effectiveness of combinatorial approaches in a preclinical mouse model will pave the way for future steps. These include testing these combinatorial treatments in larger animal models (i.e., rabbits and porcine) possibly in the next 3 to 5 years before progressing to human clinical trials. Overall, our proposed research may significantly benefit military Service members and Veterans, as well as civilians suffering from trauma-induced progressive blindness.

[Back to Search Results](#)

Note: Documents in Portable Document Format (PDF) require Adobe Acrobat Reader to view, [download Adobe Acrobat Reader](#) (<http://get.adobe.com/reader/>).

## CDMRP

[Privacy Notice \(/privacynotice\)](/privacynotice) · [External Links/Product Disclaimers \(/disclaimer\)](/disclaimer) ·

[Research Programs \(/researchprograms\)](/researchprograms) · [Funding Opportunities \(/funding/default\)](/funding/default) ·

[Consumer Involvement \(/cwg/default\)](/cwg/default) · [Search Awards \(/search.aspx\)](/search.aspx) · [About Us \(/aboutus\)](/aboutus)

CDMRP © 2015



1077 Patchel Street  
Fort Detrick, MD 21702-5024



(301) 619-7071



[cdmrpwebmaster@webcdmrp.org](mailto:cdmrpwebmaster@webcdmrp.org) (<mailto:cdmrpwebmaster@webcdmrp.org>)

### About Us

The CDMRP originated in 1992 via a Congressional appropriation to foster novel approaches to biomedical research in response to the expressed needs of its stakeholders-the American public, the military, and Congress.



(<https://www.facebook.com/TheCDMRP>)



(<http://twitter.com/CDMRP>)



(<https://www.youtube.com/user/CDMRP>)  ([/rss/funding\\_opportunities.xml](/rss/funding_opportunities.xml))