

# VISION RESEARCH PROGRAM

## WHAT IS THE PROGRAM'S CONGRESSIONAL INTENT?

In order to implement therapeutic strategies to prevent or treat visual problems common to combat Soldiers, the Army needs to develop and validate compounds and strategies. Congress directs the Vision Research Program (VRP) to target the various causes, effects, and treatment of visual injury resulting from exposures to elements during combat operations and damage from explosive devices. This type of research will ultimately be used to ensure and sustain combat readiness.



### FY22 Congressional Appropriations

**\$20M**

### FY22 Research Investment

Clinical Trial Award.....	\$2,013,112
Focused Translational Team Science Award.....	\$5,553,561
Investigator-Initiated Research Award.....	\$7,493,070
Translational Research Award ....	\$1,435,449
Translational Research Award - Pilot Clinical Trial.....	\$1,646,466

**Total: \$18,141,658**

### FY22 Withholds and Management Costs

USAMRDC .....	\$384,048
SBIR/STTR .....	\$667,000
Mgt Costs (4.26%).....	\$807,295

**Total: \$1,858,342**



“Military combat medics are charged with saving life, limb, and eyesight. Thanks to the emerging

research from the VRP portfolio, their available tools are continually expanding, and increasingly impactful rehabilitative opportunities realized.”

**Donald Overton, Blinded Veterans Association, Programmatic Panel Member, FY23**

## WHY IS THERE A NEED FOR VISION RESEARCH?

Over a 10-year period,<sup>1</sup> at least

**141,500**  
Service Members reported ocular system injuries

During the same period, other DOD beneficiaries reported

**634,775**  
incidences of ocular system injuries

Of the reported incidences by Service Members and beneficiaries,

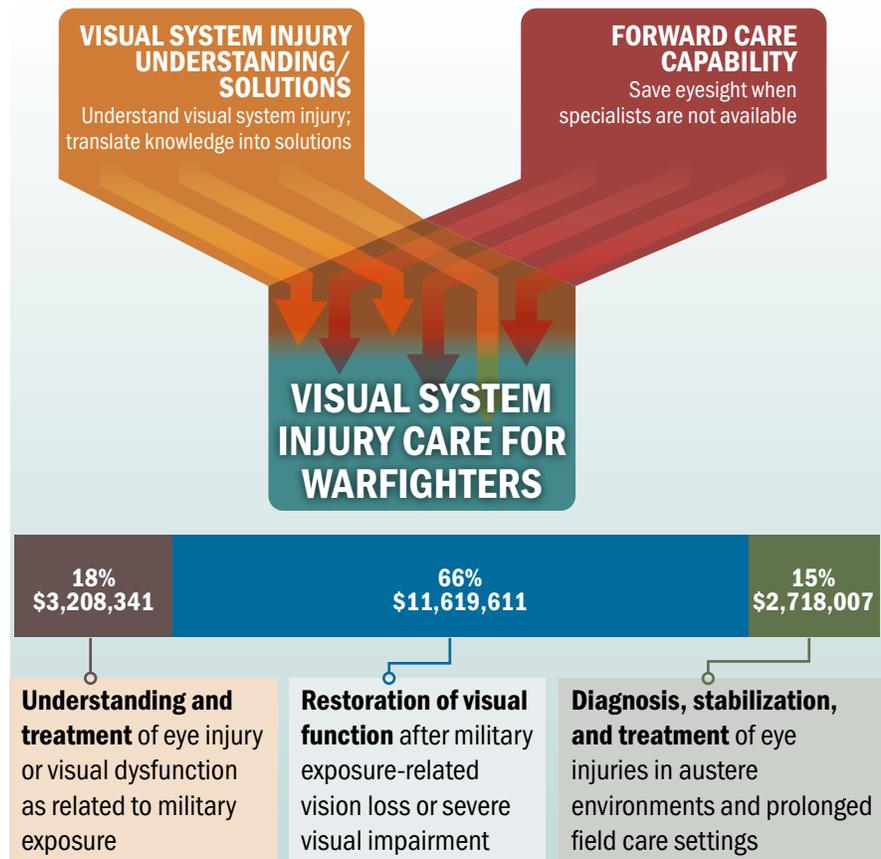
**~1,488**  
were considered at high risk for blindness



Over a 22-year period, **463,392** U.S. Service Members worldwide sustained TBIs, which can impair vision without direct injury to the ocular system<sup>2</sup>

## HOW IS THE PROGRAM ADVANCING VISION RESEARCH?

The VRP used the program’s strategic plan (top) to direct FY22 investments into three program priorities (bottom).





**PROGRAM MISSION:** *To address clinical needs through innovative research targeting the mechanism, effects, and treatment of service-connected eye injuries and vision dysfunction*

## HOW IS THE PROGRAM MAKING AN IMPACT?

### VISION INJURY RESEARCH FORUM TELECONFERENCE



In April, the VRP hosted the inaugural meeting of the Vision Injury Research Forum, or VIRF, to provide a platform for investigators in the vision injury research field and military health medical professionals to engage in scientific exchange and foster communication and collaboration to improve the lives of those affected by vision loss. Investigators from around the world participated in the virtual meeting, including more than 40 DOD and VA medical providers. By bringing DOD and VA medical providers together with academic vision injury investigators and facilitating discussions of capabilities, gaps, state-of-science, and opportunities, the VIRF helps investigators gain better understandings of the needs of vision injury care for the military and Veterans to design the research to best address those needs.



#### ***Supersaturated Oxygen Emulsion as a Novel Topical Treatment for Ocular Chemical Injury***

*Jia Yin, M.D., Ph.D., M.P.H.,  
Schepens Eye Research Institute*

In an effort to broaden the available options for treating chemically induced injuries to the eye, the research team developed a topically applied supersaturated oxygen emulsion, a topical spray treatment that contains suspended oxygen particles, and demonstrated the product to be compatible with human corneal cells. In a recently published article,<sup>3</sup> the team reported a single application **effectively mitigated acute chemical injury** in a mouse model, promoting corneal wound healing, reducing inflammation, and preserving ocular integrity and optical transparency. The novel treatment is a **promising therapeutic for expeditious vision injury care in the military operational environment.**



#### ***Retinal Ganglion Cell Transplantation as a Treatment for TBI-Related Optic Nerve Injury***

*Donald Zack, M.D.,  
Ph.D., Johns Hopkins University*

In order to innovate the understanding and treatment of military-related eye injuries, the VRP is investing in projects that leverage highly collaborative and multidisciplinary teams. This award, led by Dr. Zack, aims to develop cell replacement therapy for **optic nerve regeneration**. This award combines four projects to synergistically advance four critical elements needed for successful optic nerve regeneration: (1) improving differentiation and survival of stem cell-derived tissues, (2) improving retinal integration and synaptic function of transplanted human retinal ganglion cells, (3) optimizing the microenvironment to boost cell survival, and (4) translating these findings into two clinically relevant models of traumatic optic neuropathy. If successful, these complimentary efforts will establish a strong foundation to advance this **viable vision restorative therapy towards clinical implementation.**



#### ***Topical Application of Losartan: An Effective Treatment for Injury-Related Scarring***

*Steven Wilson, M.D.,  
Cleveland Clinic  
Foundation*

Myofibroblasts, cells that aide in wound healing, cause corneal scarring when continually stimulated by the signaling protein TGF- $\beta$ . Dr. Wilson assessed the effect of topical application of Losartan, an FDA-approved inhibitor of TGF- $\beta$ , on corneal scarring in an animal model. **Results indicated Losartan prevents scarring and reduces corneal haze post-injury.** Based on foundational funding from the CDMRP, this work led to a provisional patent and provided scientific rationale for follow-on clinical evaluation of Losartan in patient populations for treating corneal injuries.

<sup>1</sup> Frick KD, Singman EL. 2019. 2019. Cost of Military Eye Injury and Vision Impairment Related to Traumatic Brain Injury: 2001–2017. *Military Medicine* 184(5-6):e338–e343. | <sup>2</sup> 2023. Data collected from 2000–2022 from Traumatic Brain Injury Center of Excellence <https://www.health.mil/About-MHS/OASDHA/Defense-Health-Agency-Research-and-Development/Traumatic-Brain-Injury-Center-of-Excellence/DoD-TBI-Worldwide-Numbers>. | <sup>3</sup> Li S, Pang K, et al. 2022. Perfluorodecalin-Based Oxygenated Emulsion as a Topical Treatment for Chemical Burn to the Eye. *Nature Communications* 13:7371. <https://doi.org/10.1038/s41467-022-35241-1>.