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U.S. Department Of Defense Supports Study Of Brain, Eye Injuries In Military Personnel

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The Virginia Tech-Wake Forest University Center for Injury Biomechanics has been awarded a $2.8 million contract from the U.S. Army Medical Research and Materiel Command for phase 2 of an overall project focusing on brain and eye injuries in military personnel. Specifically, blast induced brain trauma will be investigated using experimental and computational models. Given improvements in helmet design and body armor and the resulting reductions in penetrating injuries, including penetrating head trauma, blast-related closed head injuries have become the signature injury of most military operations.

Stefan Duma from Virginia Tech and Joel Stitzel Jr. from Wake Forest University are principal investigators on the project. Co-principal investigators are Warren Hardy, associate professor of mechanical engineering, and H. Clay Gabler, associate professor of biomedical engineering, both in the College of Engineering at Virginia Tech. "By combining the excellent faculty and capabilities at Virginia Tech and Wake Forest University, we were able to successfully compete for this funding. The Virginia Tech Transportation Institute provided the talent and resources to integrate these programs and succeed in a highly competitive funding arena," said Duma, who is professor and head of the Virginia Tech-Wake Forest University School of Biomedical Engineering and Sciences. The program will also involve new partnerships at the Radford Army Ammunition Plant, Duma said. Design changes to the High Mobility Multipurpose Wheeled Vehicle, such as additional ballistic armor, have lead to a severe increase in rollover accidents. Specifically, rollover accidents account for 42 percent of accidents with these vehicles and over 70 percent of all fatalities suffered in these vehicles in Iraq. Performing research on the vehicle safety aspects in the military is a logical extension of the Virginia Tech Transportation Institute's current research projects.

Institute Director Tom Dingus said, "We are continuing to expand our research in the field of military personnel safety. This phase 2 award will move us even further toward determining the causes of brain and eye injuries in military personnel thereby allowing us to then development safety mechanisms for the soldiers and transport vehicles."

Stitzel, associate professor of biomedical engineering and program leader of the Virginia Tech-Wake Forest University Center for Injury Biomechanics, will lead the activities at the Wake Forest University part of the center. His team has experience developing computer models of the human body for injury prediction and studying injuries that occur in real-world scenarios. They will perform computational modeling of blast, brain, and eye injury. They will also help with development of physical surrogates to measure blast loading on the human face and head for integrating experimental and computer modeling results. "With current prototyping technologies and our experience with development of three dimensional models of human anatomy, we are positioned to do the right kinds of research to really understand this important problem," said Stitzel.

The United States military is faced with a number of significant biomechanical questions for the nearly 3 million active duty and reserve personnel who fight in this nation's conflicts. Head (brain, eye, and facial fracture), neck, and chest injuries are an ever present risk of military duty. Injuries to the head, neck, and chest can be seriously debilitating or fatal and dramatically reduce the combat effectiveness of the American soldier.

Six Virginia Tech institutes support research and creative scholarship in strategically important areas, drawing upon the university's established strengths. The Virginia Tech Carilion School of Medicine and Research Institute, the Virginia Tech Transportation Institute, and the Virginia Bioinformatics Institute. focus on national research priorities, including translational health and medical research, national security, and safe infrastructure. The Institute for Critical Technology and Applied Science, Fralin Life Science Institute, and the Institute for Society, Culture, and Environment provide additional resources to develop opportunities at the intersection of engineering, science, and medicine; target infectious disease; and advance human development and the arts.

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