



## U.S. ARMY MEDICAL RESEARCH AND MATERIEL COMMAND

USAMRMC

# Joint Trauma Analysis and Prevention of Injury in Combat Program

## Mission

The mission of the Joint Trauma Analysis and Prevention of Injury in Combat (JTAPIC) Program is to facilitate the collection and integration of data and information to improve understanding of our vulnerabilities to threats and enable the development of improved tactics, techniques, and procedures, as well as requirements, materiel solutions, and models to prevent or mitigate traumatic injuries.

## Background and Environment

The JTAPIC Program originated from the Department of Defense (DoD) Directive 6025.21E and falls under the DoD's Blast Injury Research Program. The JTAPIC Program is a multilateral and multicommunity partnership among the intelligence, operational, materiel, and medical communities that enables them to share and analyze data to provide actionable information to improve Warfighter survivability. JTAPIC partners include the representatives of the U.S. Army, Navy, Air Force, and Marines.

The goal of the JTAPIC Program is to integrate data and information into a collaborative work environment and to establish a framework for integrated multicommunity analysis to provide actionable information to Service Materiel Developers, Surgeons General, the Training and Doctrine Command, and other DoD entities to inform decisions.

The JTAPIC Program already has made a difference in the way we protect our Warfighters from combat injuries, as illustrated in the following key accomplishments:

- Provided actionable information to combat vehicle Program Managers (PMs), which has led to modifications and/or upgrades to vehicle equipment and protection systems, such as seat design, blast-mitigating armor, and fire-suppression systems.
- Analyzed combat data related to the performance of modifications to combat vehicles and determined the effectiveness of those modifications.
- Established a near-real-time process for collecting and analyzing combat incident data that confirmed the presence of threat weapons of interest.
- Analyzed combat incident data to identify vulnerabilities in operational procedures and rapidly conveyed those vulnerabilities to commanders in theater.
- Established a process for collecting and analyzing damaged personal protective equipment (PPE), such as body armor and combat helmets, to provide PPE developers with the information they need to develop enhanced protection systems.

## Key Themes and Messages

The JTAPIC Program aims to improve the understanding of our vulnerabilities and to enable the development of solutions that will prevent or mitigate blast-related injuries.

The JTAPIC Program has assembled partners from a wide range of disciplines and includes representatives of the U.S. Army, Navy, Air Force, and Marines.

Though still in its infancy, the JTAPIC Program already has collected and analyzed data to warn commanders of vulnerabilities and to help modify vehicle equipment to better protect soldiers.

## Questions and Answers

### ***Q1. How do you define “blast injury”?***

A1. “Blast injury” includes the entire spectrum of injuries that can result from exposure to an explosive device. Most of these injuries, such as penetrating and blunt impact injuries, are not unique to blast. Others, such as blast lung injury are unique to blast exposure. The DoD Blast Injury Research Program uses taxonomy to characterize such injuries.

- *Primary* blast injury is the result of blast overpressure, which can lead to direct tissue damage from the shock wave coupling into the body.
- *Secondary* blast injury is produced by primary fragments originating from an exploding device and by secondary fragments, which are projectiles from the environment (debris, vehicular metal, etc.).
- *Tertiary* blast injury is the displacement of the body or part of the body by the blast overpressure causing acceleration or deceleration to the body or its parts, which may subsequently strike hard objects causing typical blunt injury (translational injury), avulsion (separation) of limbs, stripping of soft tissues, skin speckling with explosive product residue, building structural collapse with crush and blunt injuries, and crush syndrome development.
- *Quaternary* blast injury is the result of other “explosive product” effects—heat (radiant and convective) and toxic toxidromes from fuel and metals—causing burn and inhalation injury.
- *Quinary* blast injury refers to the clinical consequences of “post-detonation environmental contaminants,” including bacteria, radiation (dirty bombs), and tissue reactions to fuel and metals.

### ***Q2. What are some common examples of “blast injury”?***

A2. Blast injuries encompass a spectrum of injury types. For example, blast overpressure can cause primary blast injuries to internal organs, such as the lungs and gastrointestinal tract. The strong winds behind a blast can propel fragments that can cause penetrating and blunt impact injuries (secondary blast injuries). The strong winds behind the blast front can accelerate the body and cause blunt impact injuries similar to those seen in car crashes and falls (tertiary blast injuries). Blast exposure also can cause a host of other types of injuries, such as burns and toxic gas inhalation injuries.

### ***Q3. What are some of the key accomplishments of the JTAPIC Program to date?***

A3. Although still in its infancy, the JTAPIC Program already has made a difference in the way we protect our Warfighters from blast-related injuries. For example, the Program has:

- Established an effective, near-real-time process for collecting and analyzing data from blast-related combat incidents. Using this process and sophisticated fragment analysis procedures, the program was able to confirm the presence of prominent threat weapons of interest.
- Identified potential vulnerabilities in operational procedures and rapidly conveyed those vulnerabilities to commanders in theater, using incident, injury, and virtual autopsy data.
- Provided actionable information to combat vehicle PMs that have led to the modification of vehicle equipment, such as seats, which are designed to prevent or mitigate blast-related injuries.
- Begun to analyze performance data related to specific modifications to the up-armored High Mobility Multipurpose Wheeled Vehicles to determine the effectiveness of those modifications.
- Begun to collect damaged PPE, such as body armor and combat helmets, for analyses that will provide PPE developers with the information they need to develop improved protection systems.

***Q4. What partners are involved with the JTAPIC Program?***

A4. JTAPIC partners include the U.S. Army National Ground Intelligence Center, Anti-Armor Task Force, Office of the Armed Forces Medical Examiner, U.S. Army Project Manager Soldier Equipment, U.S. Army Research Laboratory, U.S. Army Aeromedical Research Laboratory, U.S. Army Institute of Surgical Research, Naval Health Research Center, Marine Corps Systems Command, and the Air Force Surgeon General's Office.

**POC/SME Resource**

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