Fragment Analysis for the Joint Trauma Analysis and Prevention of Injury in Combat (JTAPIC)

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The Joint Trauma Analysis and Prevention of Injury in Combat (JTAPIC) Program was established at the U.S. Army Medical Research and Material Command (USAMRMC). JTAPIC is a partnership whose purpose is to collect, integrate, and analyze operational and injury data. Its goal is to improve our understanding of vulnerabilities to threats and enable the development of improved tactics, techniques, and procedures (TTPs) and materiel solutions to prevent or mitigate traumatic injuries. Fragment analysis is one project that was established as a part of the JTAPIC Program. During an event in-theater, fragments from the ballistic threat and/or surrounding environment are often embedded in Soldiers and in vehicles. Fragments embedded in service members killed in action (KIA) are received by the U.S. Army Research Laboratory (ARL) via the Armed Forces Medical Examiner Systems (AFMES). Fragments from battle damaged vehicles are received by ARL via the National Ground Intelligence Center (NGIC) and associated battle damage survey team.

Fragments are analyzed to determine their elemental composition. Qualitative analysis is performed using Scanning Electron Microscopy- Energy Dispersive X-Ray Spectroscopy (SEM-EDS). Quantitative analysis is performed on select fragments using Inductively Coupled Plasma- Atomic Emission Spectroscopy (ICP-AES). The results from these analyses are examined in combination with the operational and injury data in order to determine the identity and origin of the fragments. Understanding the identity of the fragments assists with event recreation, modeling, and simulation. Fragments resulting from the threat itself can sometimes be linked back to a country of origin, which assists in the tracking and targeting of countries providing weapons to terrorist cells.

Fragment analysis also assists in the medical treatment of service members wounded in action (WIA). Events that result in both a KIA and WIA with embedded fragments are identified. The elemental compositions of fragments from these KIAs are provided to Health Affairs personnel. Knowing the compositions of fragments from the same event assists Health Affairs in identifying toxic hazards that might remain in wounded service members.

This presentation will briefly describe the procedure used by ARL to process and analyze JTAPIC fragments.