EMBEDDED FRAGMENTS - A UNIQUE EXPOSURE SITUATION AND CONCERNS OF POSSIBLE HEALTH EFFECTS

Jose A. Centeno

1Department of Environmental and Infectious Disease Sciences, Division of Biophysical Toxicology, Armed Forces Institute of Pathology, Washington, DC 20306-6000, USA

Abstract: Background: The majority of modern war wounds are characterized by high-energy blast injuries containing a wide range of retained foreign materials of a metallic or composite nature. Health risks of retained fragments such as local or systemic toxicities, and delayed negative health effects, such as foreign body reactions or malignancies, are dependent on the chemical composition of the fragments and need to be further understood. Information obtained by chemical analysis of fragments excised from war wounds can be used to guide clinical decisions regarding the need for fragment removal, to develop therapeutic interventions, and to better manage risk of potential future medical problems arising from retained fragment-related injuries. The objective of this study is to define the chemical composition of retained embedded fragments removed from injured military personnel, and to relate results to histological findings in tissue adjacent to fragment material. Most fragments (~over 650) were obtained from penetrating extremity bone and soft tissue wounds in 285 patients. The majority (~80%) of the fragments were composed of single metals such as iron, copper, and aluminum with traces of antimony, titanium, uranium, and lead. The present study provides a systematic approach for obtaining a full chemical characterization of retained embedded fragments in war wounds. Given the vast number of combat casualties with retained fragments, it is expected that fragment analysis will have significant implications for the optimal short and long-term care of wounded service members.