



## Pathology/Biology Section - 2016

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### H134 Blast Injuries: Radiology-Pathology Correlation

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After attending this presentation, attendees will better understand how different radiology modalities and techniques can be used to augment the forensic pathology investigations of individuals who die in an explosive event.

This presentation will impact the forensic science community by providing information on how the results from different radiology modalities and techniques correlate to the pathologic findings at autopsy and augment the forensic pathology investigation of blast events.

Blast injuries occur when the body is subjected to an explosive event. The medicolegal death investigation of this type of event is usually complex and the injuries sustained generally vary widely from event to event and individual to individual within a specific event. The type of injuries that an individual sustains depends on many factors such as the nature of the explosive event, distance from the explosive event, and proximity of structures and moveable objects. Blast injuries are often subdivided into primary, secondary, tertiary, and quaternary blast injuries. Primary blast injuries are produced by the impact of the blast wave on the body. These injuries include rupture of the tympanic membrane, lung injury, internal organ injury, and body fragmentation. Secondary blast injuries are produced when fragments of the device or surrounding debris is accelerated by the blast wave and strikes the body. This can result in blunt force injuries, sharp forces injuries, and/or penetrating injuries. Tertiary blast injuries are produced when the body strikes an object after being accelerated by the blast wave. These injuries include lacerations, abrasions, skeletal fractures, and internal organ injury. Quaternary injuries include all of the injuries or diseases not due to the other three mechanisms, such as thermal injuries and inhalation injuries.

At the Office of the Armed Forces Medical Examiner located on Dover Air Force Base, DE, all individuals undergo full-body digital X-ray and full-body Computed Tomography (CT). In addition, fluoroscopy is available for real-time visualization of radiopaque material. Except for total body fragmentation, primary blast injuries are not readily visualized with fluoroscopy and digital X-ray. In contrast, multiplanar 2D and 3D images generated using CT can depict injury to the lungs and internal organs. Radiopaque fragments within the body due to secondary blast injuries can be depicted with fluoroscopy and digital X-ray; however, it is necessary to obtain orthogonal images in order to determine the precise location. CT readily depicts the precise location of the fragment and can give an indication of the type of material. Tertiary blast injuries such as skeletal trauma can be depicted with all three modalities. With the use of directed angiography, CT can depict vascular and some soft tissue injury. The findings of these radiographic studies help guide the forensic pathologist during the examination and allow for the complete documentation of the injuries sustained and recovery of any foreign material.

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#### **Blast Injury, Computed Tomography, Radiology**