

Abstract Submitted
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CTH Simulation of a Shockwave Interaction with the Human Thorax DOUGLAS COLDWELL, University of Louisville — With the rise of non-state actors in terrorist actions, the use of high explosives in improvised devices (IED) has significantly increased over the past ten years. Contrary to public perception, the major cause of death is due to the interaction with the thorax, not traumatic brain injury. The thorax has a much lower limit of overpressure it can tolerate before damage occurs. The primary causes of death due to shock are: pulmonary damage (“blast lung”), stroke, heart attack, burns. These were successfully simulated using the Sandia National Laboratory’s CTH Shock Simulation Program. A 2cm thick bar of highly pressured air was placed immediately in front of the chest and allowed to proceed through the thorax. Each organic component of the chest was individually represented with their characteristic mechanical properties. The model predicted and was consistent with both animal experiments and autopsy results demonstrating the injury to the lungs and burn damage suffered. The stroke and heart attack were also demonstrated by the appearance of cavitation in the cardiac chambers and the aorta leading to the formation of bubbles that act as emboli to both the carotid arteries and the coronary arteries resulting in death.

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