Abstract Submitted for the SHOCK13 Meeting of The American Physical Society

Development of Experimental Tissue Models for Blast Injury¹ BENJAMIN BUTLER, Department of Physics, University of Cambridge, CHIARA BO, Institute of Shock Physics, Department of Physics, Imperial College London, ALUN WILLIAMS, Department of Veterinary Medicine, University of Cambridge, ANDY JARDINE, KATHERINE BROWN, Department of Physics, University of Cambridge — There is a pressing need to better understand the relationship between the intensity of a blast wave and the clinical consequences for victims of an explosion. In order to quantitatively study how these factors correlate with one another, blast injury tissue models are being developed. Sections of larynx, trachea and pulmonary tissue were excised from a recently sacrificed pig and maintained on ice prior to testing. The samples were subjected to strain rates of between 0.001 s^{-1} and 1000 s^{-1} in the laboratory by using a Split Hopkinson Pressure Bar and quasi-static testing apparatus. During high strain rate testing, samples were housed in a polycarbonate chamber which permitted experimentation on tissue held in fluid. Data were analysed using 1, 2 and 3 wave analysis software in Matlab to yield information about the material properties of both undamaged and damaged tissues. In addition, macroscopic changes in tissue organization were also visualized using histopathological techniques. This work is being extended to cellular and animal models to derive more detailed information about the underlying molecular changes relating to blast-induced damage and repair.

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