Abstract Submitted
for the SHOCK17 Meeting of
The American Physical Society

Tensile characterisation of the aorta across quasi-static to blast loading strain rates DANYAL MAGNUS, WILLIAM PROUD, ANTOINE HALLER, APOLLINE JOUFFROY, Imperial College London — The dynamic tensile failure mechanisms of the aorta during Traumatic Aortic Injury (TAI) are poorly understood. In automotive incidents, where the aorta may be under strains of the order of 100/s, TAI is the second largest cause of mortality. In these studies, the proximal descending aorta is the most common site where rupture is observed. In particular, the transverse direction is most commonly affected due to the circumferential orientation of elastin, and hence the literature generally concentrates upon axial samples. This project extends these dynamic studies to the blast loading regime where strain-rates are of the order of 1000/s. A campaign of uniaxial tensile experiments are conducted at quasi-static, intermediate (drop-weight) and high (tensile Split-Hopkinson Pressure Bar) strain rates. In each case, murine and porcine aorta models are considered and the extent of damage assessed post-loading using histology. Experimental data will be compared against current viscoelastic models of the aorta under axial stress. Their applicability across strain rates will be discussed. Using a multi-disciplinary approach, the conditions applied to the samples replicate *in vivo* conditions, employing a blood simulant-filled tubular specimen surrounded by a physiological solution.

Danyal Magnus
Imperial College London

Date submitted: 16 May 2017 Electronic form version 1.4