

Abstract Submitted
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The dynamic response of a viscoelastic biological tissue simulant
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DEREK ALLSOP, Cranfield University — The development and optimisation of new
projectiles requires comparative techniques to assess ballistic performance. Porcine
gelatin has found a substantial niche in the ballistics community as a tissue mimic.
Primarily due to its elasticity, gelatin has been shown to deform in a similar manner
to biological tissues. Bullet impacts typically occur in the 350-850 m/s range and
consequently, knowledge of the high strain rate dynamic properties of both the
projectile constituents and target materials is desirable if simulations are to allow
the optimisation of projectile design. A large body of knowledge exists on the
dynamic properties of projectiles, however relatively little data exists in the literature
on the dynamic response of flesh simulants. The Hugoniot for a 20 wt% porcine
gelatin, which exhibits a ballistic response similar to that of human tissues at room
temperature, is determined in this paper using the plate impact technique. Up-U_s
and Up-P relationships are determined for impact velocities in the range of 200-900
m/s. Good agreement with the limited available data from the literature for similar
concentrations is found and the dynamic response established at impact stresses
up to 3 times higher than that observed elsewhere. Additionally, high frequency
elastic properties are investigated using ultrasound and compared to those observed
elsewhere.

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