

BIOLOGICAL EFFECTS OF BLAST ON SHEEP: COMPARISON OF SHOCK TUBE EXPOSURE TO FREE FIELD EXPOSURE

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Free field blast overpressure (FFBOP) induces generalized injuries confined primarily to the gas-containing structures of the body: respiratory tract, middle ear, and gastrointestinal tract. FFBOP studies are realistic but require the outdoor Detonation of explosives which can be affected by adverse weather conditions. Shock tube blast overpressure (STBOP) focalizes injury to only the exposed organs. Depending on the size of the shock tube and the animal exposed, the STBOP-induced injuries may vary from those seen in FFBOP exposures. The advantage of STBOP studies is the ability to conduct shock tube studies indoors using sophisticated physiological and biochemical measuring equipment. However, we first must understand the differences in resultant FFBOP- versus STBOP-induced injury. The purpose of this study was to compare the level and distribution of injury in sheep exposed to FFBOP versus STBOP. The STBOP study defining " No Injury", "Trace", " Slight", " Moderate" and "Severe" Injury levels for sheep was previously completed by Dodd et al. This study defines these same levels in FFBOP-exposed sheep. Groups of 3-5 animals were exposed to 0, 100, 200, 300, and 400 kPa of BOP with a 2 ms Aduration. Necropsy was performed at time of spontaneous death or at 24 hr. post-exposure. Organs were scored according to the Walter Reed BOP Pathology Scoring Method for gross pathological changes. Additionally, lung and gastrointestinal sections were taken for histological examination. The five levels of injury were identified for FFBOP exposure in sheep. The magnitude of peak pressure required to produce the same level of injury in FFBOP appeared to be higher than that required in STBOP exposure. At "moderate" injury levels slight gastrointestinal and bladder hemorrhages were noted. This study provides for the comparison of levels of injury produced by FFBOP and STBOP exposures. It will serve as a basis for a more comprehensive, invasive cardiopulmonary study which will compare the physiological responses of FFBOP- and STBOP-exposed sheep.