

Blast Brain Injury – An ongoing story

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I. ABSTRACT

Recognition of primary blast pulmonary injury is old. Ambrose Paré, the 16th century court and battlefield surgeon for French kings, may have described blast lung associated with exposure to large mortars. Later, the First World War saw countless cases of blast pulmonary injury associated with copious use of high explosive artillery. In 1924, Hooker established the experimental basis for blast lung, notably well before analytical tools were available to describe the physical mechanism of injury in the lung. Subsequent decades saw the development of primary blast-lung injury-risk assessments using animal models (notably, the Bowen curves, published in 1968 [2]) and more recently reanalysis of blast-lung assessments using only large animal models with expanded datasets (e.g. Bass et al. 2008 and Panzer et al. 2012 [3-4]). Blast-brain injury, however, is 'new' in the sense that it was thought for approximately 80 years that the air-containing lungs were far more vulnerable to primary blast than the solid brain; and yet, military conflicts in the early 2000s seemed to produce brain injuries in personnel that were associated with high explosive blast events. This presentation explores the mysteries of this conundrum, elaborates on where I was wrong, and outlines the current status and potential future of blast-brain injury-risk assessment.

II. REFERENCES

- [1] Hooker, D. R. (1924) Physiological effects of air concussion. *American Journal of Physiology*, 67(2): pp.219–274.
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- [3] Bass, C. R., Rafaels, K. A., Salzar, R. S. (2008) Pulmonary injury risk assessment for short-duration blasts. *The Journal of Trauma*, 65(3): pp.604–615.
- [4] Panzer, M. B., Bass, C. R., Rafaels, K. A., Shridharani, J., Capehart, B. P. (2012) Primary blast survival and injury risk assessment for repeated blast exposures. *Journal of Trauma and Acute Care Surgery*, 72(2): pp.454–466.