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Microcavitation as a Neuronal Damage Mechanism in Blast Traumatic Brain Injury[1] CHRISTIAN FRANCK, JONATHAN ESTRADA, Brown University — Blast traumatic brain injury (bTBI) is a leading cause of injury in the armed forces. Diffuse axonal injury, the hallmark feature of blunt TBI, has been investigated in direct mechanical loading conditions. However, recent evidence suggests inertial cavitation as a possible bTBI mechanism, particularly in the case of exposure to blasts. Cavitation damage to free surfaces has been well-studied, but bubble interactions within confined 3D environments, in particular their stress and strain signatures are not well understood. The structural damage due to cavitation in living tissues particularly at the cellular level are incompletely understood, in part due to the rapid bubble formation and deformation strain rates of up to $\sim$ 105-106 s^{-1}. This project aims to characterize material damage in 2D and 3D cell culture environments by utilizing a novel high-speed red-blue diffraction assisted image correlation method at speeds of up to 10^6 frames per second.

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