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Mechanisms of thrombolysis acceleration by cavitation HOPE WEISS[1], PRASHANTH SELVARAJ, UC Berkeley, GOLNAZ AHADI, ARNE VOIE, THILO HOELSCHER, UCSD, KOHEI OKITA, Nihon University, YOICHIRO MATSUMOTO, University of Tokyo, ANDREW SZERI, UC Berkeley — Recent studies, in vitro and in vivo, have shown that High Intensity Focused Ultrasound (HIFU) accelerates thrombolysis, the dissolution of blood clots, for ischemic stroke. Although the mechanisms are not fully understood, cavitation is thought to play an important role in sonothrombolysis. The damage to a blood clot's fibrin fiber network from cavitation in a HIFU field is studied using two independent approaches for an embedded bubble. One method is extended to the more important scenario of a bubble outside a blood clot that collapses asymmetrically creating a jet towards the clot. There is significantly more damage potential from a bubble undergoing cavitation collapse outside the clot compared to a rapidly expanding bubble embedded within the clot structure. Also, the effects of the physical properties of skull bone when a HIFU wave propagates through it are examined by use of computer simulation. The dynamics of a test bubble placed at the focus is used in understanding of the pressure field. All other things being equal, the analysis suggests that skull thickness can alter the wave at the focus, which in turn can change the nature of cavitation bubble dynamics and the amount of energy available for clot damage.

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