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Acoustic droplet vaporization of vascular droplets in gas embolotherapy

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This work is primarily motivated by a developmental gas embolotherapy technique for cancer treatment. In this methodology, infarction of tumors is induced by selectively formed vascular gas bubbles that arise from the acoustic vaporization of vascular droplets. Additionally, micro- or nano-droplets may be used as vehicles for localized drug delivery, with or without flow occlusion. In this talk, we examine the dynamics of acoustic droplet vaporization through experiments and theoretical/computational fluid mechanics models, and investigate the bioeffects of acoustic droplet vaporization on endothelial cells and in vivo. Functionalized droplets that are targeted to tumor vasculature are examined. The influence of fluid mechanical and acoustic parameters, as well as droplet functionalization, is explored. This work was supported by NIH grant R01EB006476.