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Characterization of Acoustic Droplet Vaporization Using MRI DAVID LI, STEVEN ALLEN, LUIS HERNANDEZ-GARCIA, JOSEPH BULL, University of Michigan — Acoustic droplet vaporization (ADV) is the selective vaporization of liquid droplets to form larger gas bubbles. The ADV process is currently being researched for biomedical applications such as gas embolotherapy, drug delivery, and phase-change contrast agents. In this study an albumin encapsulated dodecafluoropentane (DDFP, CAS: 678–26–2) microdroplet suspension was vaporized using a single element focused (f/2, D=19 mm) 3.5 MHz transducer (Panametrics A321S, Olympus, Waltham, MA). The resulting DDFP bubble clouds were imaged using both bright field microscopy and MRI (Varian 7T, Agilent Technologies Inc., Santa Clara, CA). Field distortions due to DDFP bubble generation were characterized against the bright field images as a function of acoustic power and bubble cloud size. Experimentally a direct correlation between bubble cloud dimensions generated and field distortions seen in the MRI was observed. Additionally, MR velocimetry was used to measure the flow field resulting from ADV. The field distortions due to the bubbles were further characterized by modeling Maxwell's equations using COMSOL (COMSOL Inc., Burlington, MA). The ability to characterize ADV with alternative imaging modalities may prove useful in further development of ADV based biomedical therapies.

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