

**Purpose:** Percutaneous radiofrequency ablation is a minimally-invasive treatment option for many hepatic tumors, and ultrasound strain imaging has been used to monitor these procedures. However, strain is not an inherent mechanical property of tissue; the Young's Modulus provides quantitative information. In this study, we generate shear waves in phantoms and liver ablations using transient perturbation of the ablation needle and estimate shear wave velocity, which is proportional to Young's Modulus. We then assess boundary delineation of these ablations.

**Methods:** Two tissue mimicking phantoms were used in this study: phantom 1 contained a solid inclusion in a soft background, and phantom 2 contained an inclusion simulating a partially ablated region. A rod bonded to the inclusion was vibrated, and radiofrequency data of the inclusion and surrounding background were acquired to track propagation of the shear wave. Shear wave velocity was estimated using the time-to-peak algorithm. This procedure was repeated on radiofrequency ablations formed in bovine liver tissue *ex vivo*.

**Results:** Good boundary demarcation was observed between the inclusion and the background in both phantoms. In phantom 2, the partially ablated region was also visible. Shear wave velocity estimates were 1.57 and 3.15 m/s in the background and inclusion, respectively in phantom 1, and 1.56, 3.27, and 2.06 m/s in the background, ablated region, and partially ablated region, respectively in phantom 2. Good boundary delineation was also observed in an *ex vivo* bovine ablation. Shear wave velocity estimates were 0.79 and 18.64 m/s in the background and ablation, respectively.

**Conclusions:** Shear wave imaging provides good boundary delineation, as well as quantitative information not provided with strain imaging. This technique can be used in conjunction with B-mode imaging used for real-time guidance of the electrode, allowing multiple imaging tasks to be performed using a single imaging modality.

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