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Parametric Imaging of Speed of Sound of Fixed Sheep Brain
CLAUDIA CHAMBLISS, University of Mississippi, WILL NEWMAN, Rhodes College, CECILLE LABUDA, University of Mississippi, BRENT HOFFMEISTER, Rhodes College — Ultrasound provides a useful way to nondestructively investigate the physical properties of materials including biologic tissues. The goal of this study was to measure the speed of sound of ultrasonic pulses propagated through brain tissue. Twelve, 1-cm thick samples of tissue were prepared from the coronal, sagittal and transverse anatomic planes of chemically preserved sheep brains. Ultrasonic measurements were performed using 3.5, 5.0, 7.5 and 10 MHz transducers that were mechanically scanned over the tissue specimens to acquire data from multiple sites. The measurements were imported into image processing software (IMAGE J, NIH) to construct parametric images of the tissue based on the measured values of the speed of sound. A region of interest was determined for each image by selecting all measurements within 1.5 diameters of the ultrasonic beam from the edge of the specimen. The measurements inside the ROI were averaged to determine the mean and standard deviation. The mean speed of sound ranged from 1533 m/s to 1543 m/s and the standard deviation from 8.42 m/s to 13.0 m/s. The parametric images showed features that were consistent with the known anatomic features of the specimens. Statistical analysis of the data showed no evidence of dependence of the speed of sound on anatomic plane, which is consistent with currently published literature.

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