

Abstract Submitted
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High-Frequency Ultrasound for Evaluating Breast Cancer Surgical Margins: Micro-Tumor Detectability Study using Histology Mimicking Phantoms NICOLE COWAN, ZACHARY COFFMAN, ROBYN OMER, BENJAMIN FINCH, TIMOTHY DOYLE, Utah Valley University — The ability to differentiate between malignant and normal tissues in surgical margins during breast cancer surgery would reduce the risk of local recurrence and the need for subsequent surgeries. Clinical studies conducted in collaboration between Utah Valley University and the Huntsman Cancer Institute show that high-frequency (HF) ultrasound (20-80 MHz), and the parameters peak density and attenuation, are sensitive to breast tissue pathology. Pathology results from these clinical studies showed that many margin specimens contained micro-tumors measuring 1 mm in diameter or smaller. The objective of this study was to determine the sensitivity of HF ultrasound to these micro-tumors using histology mimicking phantoms. Phantoms were created from distilled water, agarose powder, 10X TBE stock solution, and microspheres to simulate tumors. Microspheres of 925 μ m diameter were embedded in the phantoms singularly and in clusters ranging from 3-12 microspheres. Pitch-catch measurements were acquired using large (low-resolution, 6.35mm diameter) and small (high-resolution, 1.5mm diameter) 50-MHz transducers, a HF pulser-receiver, a 1-GHz digital oscilloscope. Both large and small transducers were sensitive to single microspheres and microsphere clusters validating the clinical studies.

Nicole Cowan
Utah Valley University

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