University of Wisconsin-Madison Medical Physics Seminar
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Quantitative Ultrasound of the Breast

Breast cancer is the second leading cause of cancer death of women in the United States, so early detection is an important clinical challenge. Ultrasound imaging is used routinely to assess suspicious breast masses. Although conventional ultrasound imaging is widely accepted for differentiating simple cysts from solid breast masses, the specificity for differentiating benign from malignant masses is relatively low. Quantitative ultrasound (QUS) techniques, including parameters based on the echo signal power spectrum, objectively describe underlying tissue microstructure. This research focuses on whether a combination of QUS parameters, such as the specific attenuation coefficient, the backscatter coefficient, and the effective scatterer size, can provide information that enhances breast mass diagnosis. Results show that no single QUS parameter provides reliable differentiation between benign and malignant disease. However, a Bayesian classifier combining three QUS parameters in a biased pool of high-quality data successfully differentiated all fibroadenomas from all carcinomas. Extensions to 3D will likely improve screening with ultrasound.