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Shear-Wave Dispersion Imaging of the Breast

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Shear-wave elastography is a non-invasive technique for evaluating tumor stiffness and has been widely used for breast lesion evaluation. It is highly reproducible and quantifies tumor hardness. Although most ultrasound elastography models soft tissue as a homogeneous elastic medium and usually quantifies the tissue's shear modulus, all soft tissues in the human body are not only elastic, but exhibit a viscoelastic response. Shear-wave dispersion imaging is a newly developed ultrasound technique that uses a frequency modulated shear-wave elastography to measure the dispersion slope of shear wave velocity versus shear wave frequency, and this slope is directly related to tissue viscosity. The purpose of this lecture is to demonstrate the principles of shear-wave dispersion imaging and early experience in benign or malignant breast lesions, and to discuss the additional role of shear-wave dispersion compared to shear-wave elastography.