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### **Ultrasound stimulated vibrometry for measuring tissue properties**

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Background: Harmonic or pulsed radiation pressure and subsequent measurement of the tissue response can be used to accurately quantitatively measure fundamental material properties of tissue. The measurement of shear wave dispersion can be used to estimate elastic shear moduli of tissue using an appropriate model. Fundamental model free properties such as complex modulus can also be measured. Methods: Ultrasound radiation pressure is used to induce free propagating shear waves. The measurable properties of the shear waves such as speed are sensitive to only the local material properties of the tissue under certain circumstances. A model relating the shear wave speed as a function of frequency is related to the elastic and viscous moduli within small regions of tissue according to, for instance, the Voigt model. Results: Shear and elastic moduli in tissue are measured with high accuracy and precision given appropriate models of wave propagation within the geometry of the tissue. Complex modulus in liver of live pig and other tissues have been made. Conclusion: Careful use of shear wave propagation and subsequent measurements can provide fundamental quantitative measurements of tissue mechanical properties if models are accurate. An application of this method is the noninvasive measurement of liver stiffness as a surrogate for fibrosis.