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### **Estimation of in vivo cancellous bone elasticity**

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Effect of decreasing bone density (a symptom of osteoporosis) is greater for cancellous bone than for dense cortical bone, because cancellous bone is metabolically more active. Therefore, bone density or bone mineral density at cancellous bone is generally used to estimate the onset of osteoporosis. Elasticity or elastic constant is one of fundamental mechanical parameters and directly related to the mechanical strength of bone. Accordingly, elasticity is a preferable parameter to assess the fracture risk. A novel ultrasonic bone densitometer LD-100 has been developed to obtain mass density and elasticity of cancellous bone with a spatial resolution comparable to that of the peripheral quantitative computed tomography system. Bone mass density and bone elasticity are evaluated using ultrasonic parameters based on fast and slow waves in cancellous bone using a modeling of ultrasonic wave propagation path. Elasticity is deduced from measured bone mass density and propagation speed of fast wave. Thus, elasticity of cancellous bone is approximately expressed by a cubic equation of bone mass density.