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**Relationship Between Mechanical Properties and Acoustic**  
**Parameters Obtained from Fast and Slow Waves for Cancellous**  
**Bone**

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The bone-density measuring equipment using the characteristics of the ultrasound has been applied for the diagnosis of osteoporosis. The propagated ultrasonic wave in the cancellous bone changes dramatically due to its complicated structure, and is separated into fast wave and slow wave. The parameters obtained from two-waves are closely related to the structure properties and the elastic properties of bone, which is considered to provide important information related to bone strength. However, the relationship between the strength obtained by the mechanical tests and the fast and slow wave properties is not clearly investigated. In this study, compression tests of the cancellous bovine bone were conducted to determine the compressive strength in addition to the ultrasonic measurements. Our results showed that amplitude ratio of fast and slow wave significantly correlated ( $r^2=0.88$ ) with the compressive strength, which reasonably indicates that the bone strength increases in proportional to the density of the cancellous bone.