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**Effects of bone marrow on the ultrasonic propagation in the  
cancellous bone - Comparative study on experiment and simulation**

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Longitudinal ultrasonic wave in cancellous bone separates into fast and slow waves depending on the bone structure. This phenomenon seems useful for the diagnosis of osteoporosis. In this study, we have investigated the influences of soft tissue (bone marrow) in the cancellous bone on the propagation of waves, in order to investigate the mechanism of this phenomenon. First, we have experimentally investigated the temperature dependence of longitudinal wave velocity and attenuation in bovine bone marrow, using a conventional ultrasonic pulse method. We used the ultrasonic wave at 1MHz. Then, we simulated the wave propagation in cancellous bone. For simulation, we used the 3 dimensional elastic FDTD (Finite Difference Time Domain) method. Here, we used the X-ray CT pictures of actual cancellous bone obtained from the head of left bovine femur as the bone model. By changing the velocity and the attenuation values in the soft tissue among trabeculae from those of marrow to the water, we have found the changes in the waveforms of both fast and slow waves. This indicates the changes in both wave properties, due to the properties of soft tissue.