

ACOUSTICS2008/1776
**Distribution and anisotropy of fast wave speed in the cancellous
bone of bovine femur**

Katsunori Mizuno^a, Hiroki Soumiya^a, Mami Matsukawa^a, Takahiko Otani^a, Masahiko Takada^b, Isao Mano^c
and Toshiyuki Tsujimoto^d

^aDoshisha University, 1-3, Tatara Miyakodani, 610-0321 Kyotanabe, Japan

^bOmiyachiman Community Medical Center, 1379 Tsuchida-cho, 523*0082 Omiyachiman, Japan

^cOyo Electric Co., Ltd., 63-1, Nakamichiomote Hirakawa, 610-0101 Joyo, Japan

^dHoriba, Ltd., 2, Miyano Higashi-cho, Kisshoin, Minami-ku, 601-8510 Kyoto, Japan

The ultrasonic longitudinal wave in the cancellous bone is separated into two waves, fast and slow waves [1]. In this study, the relationship between the fast wave speed and the cancellous bone structure is experimentally investigated. A conventional ultrasonic pulse measurement was performed using a PVDF focus transmitter (Custom made, Toray) and a self-made PVDF receiver. Cylindrical specimens of cancellous bone were taken from the head of bovine femur in the distal part, along the three orthogonal directions. The distribution of fast wave speed was obtained by changing the measurement position along the cylindrical axis. The anisotropy of speed was also investigated by rotating the specimens. The structural parameters of each specimen were also measured by X-ray micro CT (MCT-12505MF, Hitachi), which gave us the trabecular length and alignment from MIL (mean intercept length) parameters through TRI/3D-Bon software (Ratoc). We found that the fast wave showed large distribution and strong anisotropy depending on the measurement positions and wave propagation directions in the specimens. The fast wave showed the maximum speed in case of wave propagation along the load direction. Reference [1]A. Hosokawa and T. Otani: *J. Acoust. Soc. Am.*, 101(1997)558.