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STRAIN RATE DEPENDENT RESPONSE OF RABBIT FEMUR BONES

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Abstract

The complex and functionally graded structure of bones results in a challenging scenario for characterizing and modeling its mechanical properties. Recent work showing the strain rate dependence of hard tissues has led to interest in their dynamic properties. The present study attempts to better understand the high strain rate response of rabbit bones. The testing was conducted using the Split-Hopkinson pressure bar (SHPB) set up. A high speed digital camera is used to capture the fracture patterns. The bones were also characterized under quasi-static compression to determine their strain rate sensitivity. The trabecular and the cortical rabbit bones showed a compressive modulus in the range of 2-4 GPa and 8-11 GPa, respectively, under quasi-static compression testing. Under high strain rate loading conditions the modulus is observed to increase with strain rate and attains values as high as 10-12 GPa for trabecular bone and 30-50 GPa for cortical bone.

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