

Abstract Submitted
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Assessment of Bone Microstructural Changes by NMR QINGWEN

NI, Texas A&M International University, XIAODU WANG, University of Texas at San Antonio — Previous studies have shown that age related increases in bone porosity without significant changes in bone mineral density (BMD) (without bone microstructural information) result in a decrease in bone strength. Bone fracture toughness is also significantly correlated to changes in porosity, microarchitecture, collagen integrity, microdamage, and water distribution, all of which are measures of bone quality. Unfortunately, current technology does not allow the non-destructive and non-invasive detection of bone water distribution or other measures of bone quality including microporosity. On the other hand, Nuclear Magnetic Resonance (NMR) proton spin-spin (T2) relaxation time measurements and computational analytical method have been used to determine microstructural characteristics of various types of fluid filled porous materials. The study in here is to demonstrate that non-destructive and non-invasive NMR proton spin-spin (T2) relaxation techniques has been developed and applied to quantify the porosity, pore size distribution and water distribution in human cortical bone. This new bone microstructural information can then be used as descriptions of bone quality and, along or in combination with existing method (BMD) to more accurately assess bone fracture risk, and the results could help doctors and researchers to detect osteoporosis and other conditions related to weak bones in persons.

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