[1055] MRI Based Virtual Bone Biopsy Detects Large One-Year Changes in Trabecular Bone Architecture of Early Postmenopausal Women.

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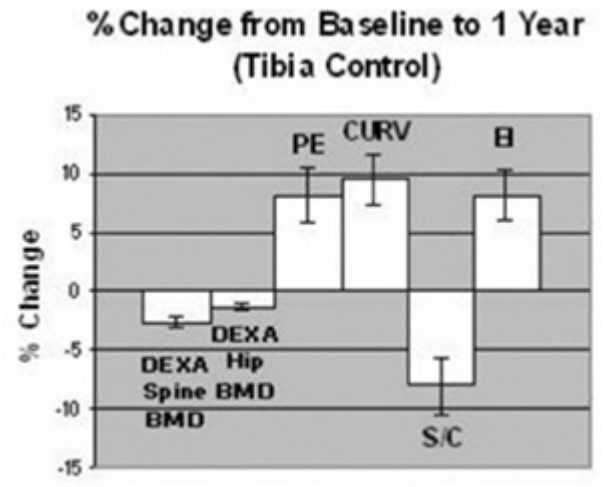
Estrogen depletion following menopause is accompanied by bone loss and architectural deterioration of trabecular bone (TB); hormone replacement therapy (HRT) protects against such bone loss. Here we provide an update on preliminary data from the first *in vivo* detection of such skeletal changes in an ongoing study involving early postmenopausal women, half of whom are getting HRT and half of whom are not (controls). Images of the distal radius and tibia were acquired by means of a MRI-based virtual bone biopsy at 137x137x410 μm^3 voxel size with bone volume fraction maps generated using subvoxel processing to yield a final voxel size of 62x62x103 μm^3. These images were then binarized, skeletonized and subjected to 3D digital topological analysis (DTA). Skeletonization converts rods to curves and plates to surfaces. Parameters quantifying scale included BV/TV and Tb.Th while DTA parameters included the volume densities of curve voxels (CURV), surface voxels (SURF) and profile edges (PE, ends of structures intermediate between surfaces and curves) and composite parameters included the surface/curve ratio (S/C) and erosion index (EI, ratio of parameters expected to increase with osteoclastic resorption divided by those expected to decrease). Images were collected at baseline and 11-13 months with preliminary results presented for 29 control and 17 HRT subjects that afforded images of adequate quality. Scale parameters at the tibia were not significant while DTA parameters PE, CURV, S/C, EI provided highly significant changes (P<0.0001-0.003) ranging from 8.0 to 9.5% in control subjects but little or no significant change was observed in the HRT group. Similarly, DEXA BMD in the spine (hip) decreased 2.7% (1.4%) in controls (P<0.0001-0.001) (though less than DTA parameters) but not in HRT subjects. These findings, not previously observed *in vivo*, are consistent with the known protective effects of HRT ensuring maintenance of a more plate-like TB architecture. This work suggests that MRI-based *in vivo* micromorphometry of trabecular bone shows promise as a tool for monitoring osteoporosis treatment. (Sponsors: NIH R01AR41443, T32DK07006 & Novartis)



Disclosures: **G.A. Ladinsky**, Novartis 2; Micro-MRI 4.

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