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O18 RESPONSE TO TERIPARATIDE TREATMENT DIFFERS BY ANATOMICAL SITE AND BONE COMPARTMENT Margaret A Paggiosi¹, Lang Yang¹, Daniel Blackwell¹, Jennifer S Walsh¹, Eugene McCloskey¹, Nicola Peel², Richard Eastell¹ 1 The University of Sheffield, Sheffield, UK, 2 Sheffield Teaching Hospitals NHS Foundation Trust, Sheffield, UK

Background: Teriparatide, a licensed anabolic treatment for severe osteoporosis, stimulates bone formation and resorption. It has the potential to exert distinct effects on different bone compartments. Large increases in spine bone mineral density (BMD) occur during teriparatide treatment, but concomitant effects on the peripheral skeleton are not well described.

Objective: To characterise the central and peripheral skeleton using imaging techniques to better understand the mechanism of action of teriparatide.

Methods: Osteoporotic postmenopausal women ($n = 20$, 65.4 ± 5.5 years, BMD T-score ≤ -2.5 at the total hip or lumbar spine by dual energy x-ray absorptiometry (DXA)) were recruited to an open label study of subcutaneous teriparatide (Forsteo 20 mcg daily) for 104 weeks. Total and sub-total bone mineral content (BMC) were measured by DXA (Discovery A). Radius and tibia volumetric BMD (vBMD) and microstructural properties were assessed by high resolution peripheral quantitative computed tomography (XtremeCT) using standard and extended cortical bone analyses. Trabecular bone structure of vertebra T12 was studied using high-resolution quantitative computed tomography (GE Lightspeed).

Results: By week 104, no significant change in total or subtotalbody BMC was detected. Lumbar spine ($p = 0.0001$) and pelvis ($p = 0.0005$) BMC had increased but there was a decrease in skull ($p = 0.008$) and arm ($p < 0.01$) BMC. Peripheral changes included a significant decrease in cortical vBMD (radius mean change $= -3.6\%$, $p = 0.02$; tibia mean change $= -3.4\%$, $p = 0.002$) and cortical tissue mineral density (TMD) (radius mean change $= -3.7\%$, $p = 0.006$, tibia mean change $= -3.9\%$, $p = 0.0006$). Cortical porosity increased at the radius (mean change $= +18.8\%$, $p = 0.007$) and tibia (mean change $= +10.3\%$, $p = 0.05$) but cortical pore diameter remained unchanged. There were no statistically significant changes in radius and tibia trabecular bone parameters. Within T12 there was an increase in trabecular number and thickness (mean change $= +32.0\%$ and $+24.0\%$ respectively, $p < 0.05$).

Conclusion: The mechanism of action of teriparatide to increase BMC within the central skeleton is through an increase in trabecular number and thickness. In contrast, within the peripheral skeleton, treatment decreases BMD through a reduction in cortical TMD and an increase in cortical porosity.