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Asymmetrical variation in the trabecular bone within the human lumbar vertebrae of the Libben hunting population

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Abstract

Trabecular bone, a porous network of struts found within mammalian bone, has been understood to show regional variations in response to weight bearing activities. In this study, the L4 vertebrae were examined from a population of prehistoric hunters and gatherers, with the hypothesis that the trabecular bone would show left-right asymmetry that may be an indicator of asymmetry in trunk and upper limb use such as during spear throwing. The L4 vertebra of 10 male individuals aged 18-35 were digitally imaged using micro-computed tomography (micro-CT). Trabecular bone properties were quantified in the left and right sides of each vertebral body, then asymmetry determined as the difference. Trabecular bone volume, thickness, and number showed about 10% or less asymmetry. However, anisotropy and elongation, properties that are indicative of the shape and orientation of trabecular struts, showed 35% or greater asymmetry. These results are consistent with other studies that suggest trabecular shape and orientation may be indicators of habitual postural or activity loads. Future studies will explore whether there is a relationship between this asymmetry in the L4 vertebrae and asymmetry in other skeletal indicators of upper limb use (handedness), which may be useful in understanding the evolution of human tool use.