Investigating intra-skeletal variation in cortical bone strength parameters of the radius and tibia in non-osteoporotic males

RANDEE L. HUNTER1, KAREN C. BRILEY, ALLISON J. YARD1, MICHELLE M. MURACH1 and AMANDA M. AGNEW1

1Skeletal Biology Research Laboratory, The Ohio State University; 2Department of Anthropology, The Ohio State University; 3Department of Radiology, The Ohio State University

The goal of this study is to investigate intra-skeletal variation in measures of cortical bone strength in the radius and tibia in non-osteoporotic males. The range of variation in bone quality for individuals deemed “skeletally healthy” through traditional methods needs to be explored. Left and right radii and tibiae were excised from 30 male cadavers ranging in age from 33 to 79 years (64.13 ± 11.31) and with DXA lumbar spine T-scores qualifying them as non-osteoporotic (p > 0.05). Quantitative CT was performed on both radii and tibiae sites. Total area (Tl.Ar), cortical area (Cl.Ar), section modulus for both the anterior (Zant) and posterior (Zpost) cortices and robusticity (Tl.Ar/bone length) were quantified. Paired samples t-tests indicate significant differences in Tl.Ar (p < 0.01), Cl.Ar (p < 0.005), robusticity (p < 0.01), SSIant (p < 0.05) and SSIpost (p < 0.01) between left and right elements; as well as significantly higher SSIant in the tibia and SSIpost in the radius. However, there were no significant differences in vBMD between right and left sides for the radius (p > 0.05) or tibia (p > 0.05). Side differences in variables related to bone strength could be the result of functional adaptation due to laterality or side preference. Intraskelatal comparisons indicate significant correlations for SSIant (r = 0.484; p < 0.0001) and SSIpost (r = 0.568; p < 0.0001). This is a non-destructive method of capturing intra-individual variation in cortical bone strength parameters and suggests differential response to mechanical loading. Considering these differences within individuals has implications for assessing skeletal health within past and present populations.

Homo naledi’s frontal lobe: Modern in form, ancestral in size

SHAWN D. HURST1, RALPH L. HOLLOWAY2, HEATHER M. GARVIN3, TOM SCHÖNEMANN3, WILLIAM B. VANT1, JOH-HN HAWKS2 and LEE R. BERGER

1Department of Anthropology, Indiana University, 2The Stone Age Institute, 3Department of Anthropology, Columbia University, 4Department of Anthropology/Archaeology and Applied Forensic Sciences, Mercyhurst University, 5Science and Engineering Library, Columbia University, 6Department of Anthropology, University of Wisconsin-Madison, 7Evolutionary Studies Institute and Centre of Excellence in PalaeoSciences, University of the Witwatersrand

There is no greater difference in frontal lobe morphology between apes and Homo sapiens than in the inferior frontal gyrus. The degree to which this evolutionary change is due to increase in brain size versus brain reorganization has long been in dispute. Here we show the Homo naledi DH3 fossil skull fragment, recently discovered in the Dinaledi chamber of the Rising Star cave system, South Africa, provides an endocast with an unusual degree of detailed cortical morphology that is essential to answering this question. In the ancestral morphology seen in apes and Australopithecus, the fronto-orbital sulcus forms the anterior boundary of the orbital cap, whereas the homologous sulcus in modern Homo has moved posteriorly and been draped over by the formation of the frontal opercula associated with Broca’s language area in humans. Despite an overall brain size similar to those of apes and Australopithecines, H. naledi exhibits the modern condition of the orbital cap, bound anteriorly by an extended inferior frontal sulcus. In addition, a clear vertical ramus of the lateral fissure and its horizontal branch permits easy identification of a modern configuration of the frontal opercula. DH3 thus shows a modern Homo-like frontal brain organization despite its small size, which separates it from endocasts of A. africanaus, A. afarensis, A. sediba, and H. floresiensis.

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The “other” drug: Implementing bird grasshoppers as a treatment for anemia

KAYLA J. HURD

Department of Anthropology, Wayne State University

In a recent publication, the Food and Agriculture Organization of the United Nations (FAO) states that “entomophagy can be promoted for three reasons: health benefits, environmental benefits, and the improvement of our livelihoods involving economic and social factors.” Their main argument is that insects are a vast resource for human diets, especially when the population is projected to increase. While the potential of insects as a food source is important, one area that is perilously overlooked is their medicinal potential. This poster examines the efficiency of bird grasshoppers as a substitute for anemia treatments, as practiced by many rural communities in Mexico. Here the genus Schistocerca was examined for Vitamin B6, or more specifically pyridoxine, and iron content, two common supplements used to treat anemia. The recommended dietary allowance (RDA) for iron is from 7.27 mg/day varying with age and sex, and the iron content of Schistocerca falls well into that range at 8.38 mg/100g dry weight. While other sources of iron and pyridoxine such as beef, poultry, and even over-the-counter supplements provide sufficient content, these resources are costly. Utilizing bird grasshoppers for medicinal purposes is a low cost aide for developing countries with no access to such supplements. Identifying this, along with other benefits, helps to relinquish the stigma associated with edible insects as well as facilitate more widespread use of this underutilized resource.