ABSTRACT

Author:	Justin Glennon
Title:	A Comparative Study of Dietary Adaptations and Encephalization in Extinct and Modern Hominins
Thesis Advisor:	Michael Rogers
Department:	Department of Anthropology
Year:	2021

The Expensive Tissue Hypothesis (ETH) and the Cooking Hypothesis (CH) are foundational theories that explicitly link the evolution of the expanding hominin brain with a changing diet. These hypotheses are more than 20 years old and are in need of reevaluation. Using the ETH as a metabolic foundation for brain growth, this study examined the most likely dietary environments for encephalization. Paleoenvironmental change affecting the abundance of food resources over the last five million years was analyzed with respect to primate diet quality (DQ) to provide a theoretical framework for likely dietary habits among extinct hominins. This information was applied to the fossil record to illustrate trends in encephalization quotients (EQs) and attribute them to major cognitive pulses in evolution, most notably the advent of cooking. Using weight and EQ metrics from previous studies, estimates of resting metabolic rates (RMRs) were tabulated for nine extinct hominin species. The equation $RMR = 54.7(Mass)^{0.81}$ renders an accurate RMR for all mammals. Furthermore, the percentage of calories allotted to the brain was calculated for the species by interpolating between modern ape (8-10%) and modern human (20-25%) allotments based on each species' EQ of each species. These calculations are the first estimates of RMR or brain allotment in extinct hominins, providing a detailed correlation of diet and encephalization in extinct hominins. A trend of consistent growth in brain metabolism can be seen from ~4 million years ago (mya) with a significantly larger increase at the advent of *Homo habilis* at ~2 mya which can be attributed to the impact of cooking and its cognitive impacts. These results establish further support for the ETH and CH by illustrating the changes in brain metabolism in extinct hominins.