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THE TRABECULAR MORPHOLOGY OF THE *HOMO NALEDI* TALUS AND ITS INFERRED FUNCTIONALIMPLICATIONS

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Abstract

Differences in talar trabecular morphology between extant apes, modern humans, and fossil hominins are thought to reflect loading regimes during locomotion. This thesis will focus on internal trabecular structure of the *Homo naledi* foot, which has previously been described as relatively modern in external morphology, with an adducted hallux, rigid midfoot, elongated tarsus, and a talus falling just within the range of modern human shape variation. However, the proximal pedal phalanges are markedly curved, and there is a reduced or possibly absent medial longitudinal arch. Given the mosaic nature of the foot, a better understanding of its precise functional affinities is important.

This study assesses the trabecular morphology of three *H. naledi* tali: UW-101-148/149, UW101-520, and UW101-1417. The *Homo naledi* tali were compared to scans of extant apes *H. sapiens* (n=3), *Pan* (n=3), *Gorilla* (n=4), and *Pongo* 9 (n=5). Specimens were microCT scanned (<40 microns), separated into nine spherical volumes of interest directly plantar to the trochlear surface, and processed to analyze standard trabecular parameters, including thickness (Tb.Th) and number (Tb.N), bone volume/trabecular volume (BV/TV), and degree of anisotropy (DA).

Results show that Tb.Th and BV/TV of *H. naledi* are similar to values for extant apes and other fossil hominins, and higher than in modern humans. The degree of anisotropy follows a similar pattern of anatomical distribution to modern humans, with highly anisotropic trabeculae on the lateral side of the trochlea. I conclude that the *Homo naledi* upper ankle joint was subjected to predominantly modern human-like loading regimes, though the more ape-like Tb.Th and BV/TV values indicate that these were not exclusively modern human-like.