MA Thesis – Human Skeletal Biology Track, Physical Anthropology - New York University (2010)

AROUND THE HUMAN MID-SHAFT FEMORAL CORTEX AS IT RELATES TO INTRASPECIES VARIATION IN BODY SIZE

Stephanie L. Minor

Abstract

The number or density of osteocyte lacuna in any given bone is a means of measuring osteoblastic growth, poliferation and activity. The research presented here takes this into account, and attempts to utilize the subsequent data to analyze the intracortical, intercortical, and intraspecific similarities and differences between lacuna densities at the specified anatomical regions within and around the human femoral cortex.

Secondary osteonal bone was imaged and analyzed for these purposes, and patterns in osteocyte lacuna density related to the various anatomical regions and growth characteristics and body size variables are observed.

Two modern populations of differing geographic and ethnic lineages are included. The Australian (Melbourne) sample of individuals (n = 10) is of Anglo-Celtic descent, while the Malawian (Bantu) is of South African descent (n = 12).

While patterning between lacuna density and several body size variables is easily observed among the Melbourne sample, and in particular between lacuna density and height ($r = 0.71$; $p = 0.03$), fewer significant relationships between lacuna density and body size for the Bantu were observed. However, a rather strong correlation exists between the difference in the periosteal and endosteal lacuna densities and age ($r = 0.680$; $p = 0.030$), and an even stronger relationship between the high and low differences in periosteal and endosteal densities and age in the Bantu population ($r = 0.823$; $p = 0.003$).

Although the Bantu are considered to be undernourished by the standards of the World Health Organization and relative to their Australian counterparts, they nonetheless have an exceedingly low fracture incidence at the femur. The question remains to be answered: Is there a patterning between osteocyte lacuna density and growth and body size characteristics that would allow for a more in-depth comparison between Bantu bone and that of other individuals of Caucasian descent?