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A COMPARISON OF GROSS MORPHOLOGY AND HISTOMORPHOMETRY AGE-AT-DEATH ESTIMATION METHODS ON A KNOWN FORENSIC SAMPLE

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Abstract

Estimating age-at-death is often the most difficult aspect of constructing a biological profile. Traditionally, adult age-at-death estimation is done through macroscopic observation of gross degenerative changes to the skeleton. Other methods for adult age estimation include microscopic analysis of bone. Few studies to date have attempted to compare both macroscopic and microscopic age-at-death estimation methods on a known skeletal population. A better understanding of how macroscopic and microscopic skeletal changes relate to one another can provide anthropologists the ability to create more accurate and precise age-at-death estimation methods.

This research applied gross morphology and histomorphometry age-at-death estimation methods to known individuals from the Forensic Anthropology Unit (FAU) at the Office of Chief Medical Examiner (OCME) in New York, NY. The left and right pubic symphyses, sternal 4^{th} rib ends, and 6^{th} rib midshafts were collected and analyzed for n=40 individuals. The accuracy, inaccuracy, and bias values were compared for each method. In addition, three multifactorial age-at-death estimation methods incorporating both gross morphology and histomorphometry data were tested on the sample.

The results of this study indicate that both the gross morphology methods and histomorphometry methods work well with this modern forensic sample. In addition, this study shows that histomorphometric analysis can provide comparable values of accuracy to gross morphology analysis for age-at-death estimation. Not all histomorphometric methods performed equally; however, when incorporated into multifactorial age-at-death estimation methods the results of this study show that histomorphometric data can improve the final age-at-death estimate when compared to using gross morphology methods alone. Specifically, using the pubic symphysis as an indicator for relative age can improve inaccuracy and bias rates for histomorphometric age-at-death estimates. This exploratory analysis supports future development of multifactorial age-at-death estimation methods on a large and diverse known skeletal sample that incorporates both macroscopic and microscopic examination of bone.