H102 Using the Acetabulum to Estimate Age: A Revised Method until each specimen had been examined in order to eliminate observer bias.

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The goal of this presentation is to evaluate the Rissech et al. (2006) method of estimating skeletal age using the acetabulum and to demonstrate the benefits of simplifying the technique for use in a forensic context. This is the first step in a two-stage process involving the recognition of potential problems with the Rissech et al. (2006) method and the development of effective solutions. The second and future stage of the research will include devising and testing specific age ranges to accompany the modifications. At this juncture, emphasis is on the need to alter the criteria utilized by Rissech et al. (2006) and to demonstrate the resulting improvements to precision in scoring traits, while maintaining the potential for accuracy in age estimation. Attendees will gain a better understanding of how morphological features of the acetabulum change with age, as well as some of the difficulties in distinguishing states within each criterion in the original method. Participants will be introduced to a new, more effective approach to acetabulum age estimation.

This presentation will impact the forensic field and larger community by providing a new, reliable age estimation technique to increase the likelihood of identifying human remains in forensic practice.

In this study, Rissech and colleagues' (2006) existing scoring method was analyzed using multiple stepwise regression to identify the traits that contribute most to age estimation. Through this process, the technique was simplified to reduce the number of morphological features and scoring states. Three variables were found to account for most of the variation associated with age. These traits were tested on males and females to determine if the simplified method does in fact increase precision, while maintaining the potential to accurately reflect age changes. Because Rissech and colleague's (2006) method relies on the use of a known comparative collection to generate age ranges for the scores obtained by examining an unknown skeleton, there are no fixed age categories in the original method. The current research was designed to simplify the scoring and to assess the potential of the modified traits to reflect age consistently, regardless of the ancestry of the individual, thereby eliminating the need for a reference population. For this purpose, it was necessary to first determine the ability of the modified method to simply reflect broad age changes.

The revised non-destructive method to estimate broad categories of age was developed on two twentieth century anatomy series, the University of Toronto Grant Skeletal Collection (males) and the William M. Bass Donated Skeletal Collection (females). Based on trait occurrence, broad definitions of age were established: Young Adult (17- 39 years); Middle Adult (40-64 years); and, Old Adult (65+ years). Descriptions distinguishing key features for phase identification are defined in this manner to reflect the greatest variation observed among individuals. The method was tested blind on two contemporary North American skeletal populations – the William M. Bass Donated Skeletal Collection and the University of New Mexico Documented Collection (n=249). Both collections contain complete skeletons from donated persons and positively identified forensic cases with documented demographic information, representing diverse socioeconomic classes and ethnic affinities. This study utilized 85 individuals from the William M. Bass Donated Skeletal Collection and 164 from the University of New Mexico Documented Collection, ranging in age from 19 to 101 years, who died between 1984 and 2006. The left os-coxa of each specimen was examined one at a time, to mimic forensic situations. Individuals with non-inflammatory osteoarthritis or diffuse idiopathic skeletal hyperostosis were not excluded since such manifestations are related to age. Known ages for each individual were not documented

Although males (n=189) and females (n=60) were examined separately, non-significant sex-specific differences were found. The inaccuracy of the modified method is 8 years. The direction of bias indicates this acetabulum technique tends to *under*estimate age. Three statistically significant characteristics are highly correlated with age ($p<0.05$), and together are capable of estimating age-at-death with 82% accuracy, both sexes combined. Results of intraobserver error testing were extremely low (4.4%) indicating that very little error exists when estimating the degree of development of features. Consistency in scoring, reduction in data collection time, and exclusion of a reference population are significant advantages to using this technique and, as a result, is more flexible and useful in forensic situations than the original technique proposed by Rissech et al. (2006). Forensic investigators should be aware that delicate features of the acetabulum are more difficult to distinguish on greasy bone and specimens may appear younger in these cases.

Improving the accuracy and precision of estimating age for adults requires a conservative but reliable approach. Based on successful correlations with age that explain similarities between individuals in the near age classes and differences among groupings of distant age classes, the second (and ongoing) step of this research is to develop narrow age categories from morphological descriptions of 8 phases based on 10-year age classes for individuals from 20-99 years. **Forensic Anthropology, Skeletal Age Estimation, Acetabulum**

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