W24 Adult Skeletal Age Estimation: Transition Analysis Using the Entire Skeleton

Stephen D. Ousley, PhD, Mercyhurst University, Erie, PA 16546; George R. Milner, PhD*, Pennsylvania State University, University Park, PA 16802; Jesper L. Boldsen, PhD*, ADBOU, Institute of Forensic Medicine, 5260 Odense S, DENMARK; Svenja Weise, PhD*, Institute of Forensic Medicine, Odense, DENMARK; Sara M. Getz, PhD*, Idaho State University, Pocatello, ID 83209-8005*

Learning Overview: After attending this presentation, participants will: (1) learn why attention must shift to many traits distributed throughout the skeleton to improve age estimation; (2) understand the analytical approach needed to use these age-informative traits effectively; and (3) acquire a basic comprehension of how to apply the procedure for generating age estimates.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by introducing an accurate and precise method of age estimation from the skeleton. Standard and frequently used procedures have long been known to yield inaccurate, biased (especially beyond 50 years), and imprecise age estimates. The new procedure, based on a wide range of skeletal features and refined analytical methods, yields far more accurate age estimates throughout all of adulthood. Attendees will learn how to apply the newly developed procedure, from scoring traits to generating age estimates.

The new version of the Transition Analysis procedure introduced here, based on ca. 1,700 individuals from four continents, yields estimates of age throughout the adult lifespan that are suitable for forensic use. The integrated approach features age-informative traits located throughout the skeleton, incorporates improvements in the analytical approach to make full use of those traits, and features a computer program to implement computationally intensive procedures.

This workshop begins with the logic and challenges of age estimation procedures, followed by a description of age-informative skeletal traits, the definitions of which were refined through examinations of multiple collections, often over a period of years. Most of the skeletal structures will be unfamiliar to forensic anthropologists who use standard methods focusing on pelvic joints, cranial sutures, and sternal rib ends. The skeletal traits are largely scored as either absent or present, which simplifies and speeds up scoring skeletons while reducing inter-observer error. Also discussed is the lengthy process of selecting traits that yield sufficient age-related information for inclusion in the procedure. Analytical procedures are then covered, including the importance of age-at-transition curves that yield age-specific probabilities of moving from one stage to the next (typically absent to present). Then, the use of the computer program for data entry and analysis are covered, including trait selection tailored to each skeleton. Results from the new program are covered, including the use of regionally specific and global (all population) reference samples.

This session ends with hands-on exercises in which participants score traits and estimate age from skeletons. This part of the workshop will provide opportunities to review and amplify points raised in previous lectures, and it will provide participants with a taste of what it is like to deal with real cases.

Although the analytical procedure is computationally complex, the overall goal has been to make it simple to use. Entering data in the program is straightforward, and the choice of which traits yield the most information in specific forensic cases are made automatically by the program. Thus, the program facilitates the best use of available data for human remains that are incomplete.

Biological Profile, Skeletal Age Estimation, Transition Analysis