H54 The Curse of the Curvaceous Femur, the Litigious Line, and the Intrepid Investigator

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After attending this presentation, attendees will become familiar with the results of a two-pronged reliability test of an existing method for determining the ancestry of an unknown individual from the distal femur.

This presentation will impact the forensic community and/or humanity by offering an empirical assessment of the reliability of an often- used method for determining race.

It is well known that ancestry determinations using the postcranial skeleton are a difficult undertaking; very few methods are at the disposal of the forensic anthropologist. A method based on differences between the intercondylar shelf angle of the distal femur of American Blacks and Whites (Craig 1995) is one of the few available options. Since the Daubert decision, the forensic community has been increasingly concerned with the reliability of methods and observational data from which scientific conclusions are drawn. Within the biological sciences, this has led in some instances to the re-evaluation of previously published methods. In light of the rising awareness about the importance of method reliability, this study was designed to examine the inter- and intra-observer error associated with distal femoral measurements to determine race.

Four observers participated in the study using dry human bone housed at the Joint POW/MIA Accounting Command, Central Identification Laboratory. Each observer independently radiographed 33 whole or partial femora using a HOLOGIC RADEX Digital X-ray System. The radiographic protocols followed the Craig (1995) method and also utilized exemplars of "true lateral" positioning from a radiographic textbook. Each femur radiograph was then measured following the method's prescribed instructions. Repeated measurements were carried out with a minimum of 24-hours between measuring sessions in order to minimize short term memory bias. Each observer measured their own data set three times, and measured each other observer's set once. In toto, nearly 800 observations were conducted on the four independent sets of radiographs. Throughout the radiographic and measuring procedures, consultation between observers was prohibited.

The collected data was subjected to rigorous statistical evaluation through Students T-tests, ANOVA analysis, and summary statistics. Since this study focused on reliability of data/observations, all alpha levels were set conservatively at 0.90. The average difference in trials per observer, regardless of direction, was 3.1 degrees. The range of variation was -15 to +11 degrees. In all cases, these differences are highly significant. Inter- observer error tests showed similar results. When inter-observer tests were conducted against a target response (the average of all twelve observations on each femur), significant differences were found for nearly every comparison.

Two clearly defined problems were identified in this study. First, delineating a radiographic true lateral position in dry bone was difficult for the investigators. Small positional differences of each femur increased or decreased the subsequent angle measurement. Second, aligning a ruler with the "distal one third of the femur parallel to the posterior cortex of the bone," as prescribed in the method's instructions was problematic. In most instances, femoral curvature was such that a parallel line was difficult to clearly and consistently define without landmarks. Also, the distal one third of the femur is a relatively arbitrary location, causing further discrepancies between investigators' measurements.

Based on this study, the authors suggest that while the Craig (1995) method for assessing race has utility, specific radiographic positioning of dry bone and refined landmarks for the intercondylar shelf angle should be developed in order to minimize inter- and intra-observer error. For example, utilizing advanced digital imaging or clearly defining two points on the femoral shaft that would provide a means for drawing a consistent line parallel to the posterior cortex could be potentially useful refinements. It is anticipated that further experimentation will result in methods that decrease observer error and improve the method's overall reliability.

Reliability, Racial Determination, Distal Femur

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