H111 Positive Identification Using Radiographs of the Lumbar Spine: A Validation Study

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After attending this presentation, attendees will learn the results of a validation study/survey that was carried out to establish accuracy and error rates among practicing forensic anthropologists with regard to positive identifications made by comparing "antemortem" and "postmortem" radiographs of the lumbar spine.

This presentation will impact the forensic community by adding to the existing literature on validation, accuracy rates and the potential risk of arriving at false positives when using radiograph comparison as a means for arriving at positive identifications of unknown decedents.

Following court rulings, such as *Frye v. United States* (1923), *Daubert v. Merrell Dow Pharmaceuticals* (1993) and *Kumho Tire Co. Ltd. v. Carmichael* (1999), in addition to the recent recommendations included in the 2009 report from the National Academy of Sciences, the forensic community is increasingly mindful of the importance of evaluating, improving, and standardizing the methods employed by scientists practicing in all disciplines of forensic science. Specifically with regard to the *Daubert* ruling, guidelines were established for admissibility of expert witness testimony: a method must have been or have the potential to be empirically tested, there must be established error rates, it must have been subjected to peer review, and it must be generally accepted in the relevant scientific community. As a result, several studies have been published to validate identification methods used by anthropologists. Existing publications on methodology and validations studies involving comparative radiography include, among others: Christensen 2004; Hogge *et al*. 1994; Hulewicz and Wilcher 2003; Kahana *et al*. 2002; Koot *et al*. 2005; Kuehn *et al*. 1997; Mundorff *et al*. 2006; Quatrehomme 1993; Telmon *et al*. 2001; Weiler *et al*. 2000. Though several published case reports and studies involve the use of lumbar spine radiographs, none have sought to validate the comparisons of antemortem and postmortem x-rays of the lumbar region with the specific goal of establishing the method as admissible evidence in a court of law.

This project was designed to evaluate the validity of rendering positive identifications by comparing antemortem and postmortem radiographs of the lumbar spine, and to evaluate the specific features anthropologists most often employ when carrying out such identifications. With permission from the Willed Body Program and the Department of Radiology at Michigan State University, the research being presented made use of cadavers from the MSU Gross Anatomy Laboratory. To mimic the antemortem condition, A-P abdominal x-rays were taken of 29 cadavers, using standard clinical procedures. Five of those individuals were then randomly selected to have their lumbar spines extracted, defleshed, rearticulated and x-rayed a second time to mimic the postmortem condition. Careful attention was paid to orient these "postmortem" images as closely as possible to the "antemortem" images.

After duplicating the radiographs and selecting suitable images, packets of materials containing sets of 20 "antemortem" and 5 "postmortem" radiographs, along with a letter to participants, the project's abstract, consent forms, and data sheets were sent to the study subjects (practicing anthropologists and forensic anthropology graduate students) who participated voluntarily. The first portion of the data sheets contained questions asking personal information such as highest degree, whether the participant was a graduate student or a professional, years of experience each participant has practicing forensic anthropology, whether they had experience using radiographs to make positive identifications, whether any of those identifications were made based on radiographs of the spine, and approximately how many of their cases have involved such identifications. The second portion of the data sheet asked the study participants to identify which "antemortem" radiographs corresponded to the "postmortem" radiographs, how many similarities they found between the radiographs, and which specific features they took into consideration.

Analysis was carried out using contingency tables to evaluate the relationships between the independent variables (i.e. level of education, years of experience practicing forensic anthropology, number of cases involving radiographs, and number of cases involving radiographs of the spine) and the dependent variable (% correct of the five simulated identifications). Results suggest that level of education and years of professional experience may be unrelated to the accuracy rates associated with this type of identification. However, there appears to be a significant relationship between the amount of experience observers have with making identifications using radiographs and the number of identifications they made correctly.

Identification, Validation, Radiographs

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