H148 Forensic Pathologist Concurrence in the Interpretation of Images of Patterned Injuries

Xianming Fang, PhD, East Carolina University, Dept of Biostatistics, 2435F Health Sciences, Greenville, NC 27834; William R. Oliver, MD, East Carolina University, Brody School of Medicine, Brody Medical Sciences Bldg, Greenville, NC 27834; Karen L. Kelly, MD, Brody School of Med at ECU, Forensic Pathology Division, Dept of Lab Med/Pathology, Greenville, NC 27834; and Colleen Tetterton, Division of Forensic Pathology, Dept of Pathology & Laboratory Medicine, 7S-10 Brody Medical Sciences Bldg, Greenville, NC 27858*

After attending this presentation, attendees will have a better, and quantitative, idea of the degree in which forensic pathologists agree on the interpretation of images of patterned injuries of the skin.

This presentation will impact the forensic science community by providing an estimate of precision and verification of forensic pathology diagnoses from images.

A common problem in forensic pathology practice is the evaluation of patterned injuries of the skin. These injuries can provide important information about the nature of an object that was used to inflict trauma on a victim. In some cases, such as gunshot wounds, there is a rich literature on the proper characterization of the injuries and the inferences that can be made; however, in most cases, the interpretation of these patterns is primarily a matter of personal experience and training.

Traditionally, the ability of a forensic pathologist to interpret patterned injury of the skin has been relatively unquestioned at trial; however, over the past few years, there has been an increasing emphasis on more stringent application of *Daubert* criteria. This presentation represents the results of the first of a series of studies to address the basic issue of the ability of pathologists to interpret patterned injuries. This is a preliminary study in which participants were asked to identify "classic" injury patterns. Images were selected from known cases and teaching sets and were vetted by an expert panel. Since the provenance of each image was not investigated independently, this should be considered a verification study rather than a validation study.

A survey was constructed using 68 "classic" patterned injuries. The participants were presented with the images and asked for a diagnosis. The questions were asked in three tiers, with the first question asking for a diagnosis of the general class of injury (sharp versus blunt versus thermal, etc.), the second asking for a class diagnosis within the general class (e.g., laceration versus abrasion versus contusion for blunt trauma), and the third asking for a specific diagnosis (e.g., hammer blow versus baton mark versus tire mark, etc.). In addition, each participant was asked to rate his or her level of certainty.

Participants were recruited through the National Association of Medical Examiners. Emails were sent to all members of the organization. Approximately one-third of those emailed started the survey (363 people) and 210 people completed the entire survey.

This survey was constructed as a starting point for cases in which there would be a uniformly high consensus. Following surveys were expected to present modified images to see how that affected the degree of agreement; however, there was a surprising lack of uniformity of consensus, ranging from 100% as a high to 27% as a low. In addition, for at least one question, the most common tier 3 answer was that the respondent did not know what object caused the injury, but could match it to an exemplar.

A number of statistically significant findings are noted in the preliminary statistical evaluation. For example, physicians, those who had anatomic pathology training, those who performed autopsies as their primary work product (as opposed to administration, investigation, etc.), and board-certified forensic pathologists were more likely to choose consensus answers. When comparing the percent of consensus answers with mean confidence level for each question, there was a high correlation (r between 0.8 and 0.9) for each tier. There was a moderate correlation between providing a consensus answer and confidence at the individual respondent level.

The degree of consensus was significantly higher for tier 1 (most general) than tiers 2 or 3; however, there was a higher level of consensus for tier 3 "most specific" than for tier 3 "class within a particular injury type." Comments by participants suggest that a possible reason for the higher consensus at the more specific diagnosis was due to the presence of multiple injuries. For instance, in one case, the same blunt object caused both lacerations and abrasions. The tier 2 question asked what injury was more prominent; about half noted lacerations and half noted abrasions, resulting in a low level of consensus. In contrast, the consensus on the specific object was high.

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Patterned Injuries, Forensic Image Analysis, Forensic Pathology