A173 Evaluating the Validity of Angle of Impact/Incidence Determinations Made From Very Small Bloodstains

Kristin L. Allard, BS, Cedar Crest College, 100 College Drive, Allentown, PA 18104; Paul E. Kish, MS, Forensic Consultant & Associates, PO Box 814, Corning, NY 14830; and Brian J. Gestring, MS, Cedar Crest College, Department of Chemistry & Physical Science, 100 College Avenue, Allentown, PA 18104*

After attending this presentation, attendees will know if the size of a bloodstain affects the analyst's ability to determine the angle of impact or incidence of that bloodstain.

This presentation will impact the forensic science community by guiding bloodstain pattern analysts in how to select bloodstains that will provide accurate calculated angles of impact after being measured using the technique outlined in this study.

The error associated with calculating the angle of impact or incidence of bloodstains has never been fully elucidated. The calculation was originally created by Balthazard in 1939 and has been involved in many studies since then. Laturnus demonstrated the fluctuations in how bloodstains are measured, particularly in determining the length. DeForest attributed at least a plus or minus 5° range of error for well- formed stains. Analysts; however, are often faced with interpreting bloodstain patterns comprised of stains that are not always well-formed. Sometimes the individual stains are more circular in shape or very small, which may result in measuring difficulties as well as the potential for increased error in calculating the angle of impact or incidence. The stain may be a result of a deviation from the light model of how the angle of impact or incidence calculation is made. These deviations can include expansion of the droplet upon contact with the impact surface or a continuation of oscillations in flight up until the point of impact. Little research has been conducted to determine if the size of a stain will affect its impact with the target surface, and therefore alter the determination of the angle of impact or incidence.

This study is working to determine a more specific rate of error associated with calculating the angle of impact. Bloodstains at different angle ranges were compared to determine if the rate of error differed based on the angle at which the blood impacted the surface. The bloodstains analyzed were also of varying sizes to establish any connections between the accuracy of the calculated impact angle and the size of the bloodstain.

To accomplish this goal, a device was made to create very small bloodstains. The device involved the use of a modified spring hinge, which would spatter blood onto pieces of Foam Board™ that were held in a fixed position on either side of the device. The extremely fine impact patterns created on the Foam Board™ was at known angles due to the fixed position of the target surface as well as the stationary impact source. The individual stains, some smaller than 0.3 mm, were excised using a scalpel and placed on a microscope slide. Mounted stains were then placed under a transmitted light microscope at low magnification (40 x overall) and captured via a digital photomicrograph. The images were then opened in Adobe® Photoshop®, enlarged, and measured.

The results of this study illustrate which stains are suitable for use and which are more prone to error. This study will also correlate data from very small stains which are not often used with larger stains which are often used in bloodstain pattern reconstructions.

Bloodstain Pattern Analysis, Angle of Impact, Validity

 ** Presenting Author*