Y29 FARO® Laser Scanner as a Tool for Bloodstain Pattern Analysts: Documentation of Bloodstains Enhanced by Luminol and BlueStar®

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Learning Overview: The goal of this presentation is to test the FARO® laser scanner's ability to capture chemiluminescence created by the application of luminol and BlueStar® to a dilution series of bloodstains.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by beginning to define the capabilities of a 3D crime scene documentation system and testing if it can be advantageous for analysis as well as documentation.

Hypothesis: Due to the limitations of the FARO® Laser Scanner's equipment, it is predicted that the current methodology used to document luminol and BlueStar® reactions, photography, will be more accurate in documenting the chemiluminescence of the two reagents.

Luminol and BlueStar® have commonly been used at crime scenes to locate potential bloodstains.[1] Luminol is known to have a shorter chemiluminescence than BlueStar®, while BlueStar® is known to enhance potential bloodstains in locations that have more light exposure, such as outdoors scenes. Photography is the documentation for these methods of stain enhancement, with photographs being taken within seconds of luminol and BlueStar® application. There have been new developments in crime scene documentation due to the desire to capture the scene "as-is" for litigation; however, experimentation has not been done to test the capabilities of these new systems in documenting crime scenes that have been enhanced using reagents such as luminol and BlueStar®. This research will use the FARO® laser scanner to document bloodstain patterns enhanced with these reagents.

Experimental Design/Materials and Methods: This experiment is set up as four trials repeated three times. Two sets of bloodstains made from blood diluted at 1:1, 1:10, 1:50, 1:100, 1:500, and 1:1000 and will be created on two different surfaces, carpet and concrete, using 5mL of sheep's blood. The stains will be created and allowed to dry for two hours prior to their washing. The stains will be washed away using dish soap and water. The carpet and concrete will be allowed to dry for 24 hours prior to application of the reagents. One set of diluted bloodstains on the carpet will be enhanced using luminol and the other set using BlueStar®. The same procedure will be followed for the bloodstains on the concrete. Both the FARO® laser scanner and a Nikon® D7200 will be set up to record the reactions of each bloodstain. The documentation will be completed in a mostly dark environment.

The results for each stain will be evaluated to determine the sensitivity of the reagents, as well as the effectiveness of both means of documentation. The FARO® laser scanner is predicted to document the BlueStar® reactions better than the luminol reactions, as BlueStar® is known to have a longer chemiluminescence. The FARO® laser scanner takes longer to document the room because of the amount of data it is collecting. Scans roughly take five minutes to complete. However, because of the time required to scan a room using the FARO® laser scanner, it is predicted the documentation from the Nikon® D7200 will be the most effective in capturing the reactions. As for the sensitivity of each reagent, it is predicted that the BlueStar® will be more sensitive than the luminol to highly diluted bloodstains. This belief is based on known prior experiments in forensic literature of BlueStar® and luminol sensitivity.

Reference(s):

1. James, Stuart H., Paul E. Kish, T. Paulette Sutton. The Detection of Blood Using Luminol. In *Principles of Bloodstain Pattern Analysis: Theory and Practice*, [369-389]. CRC Press, 2005.

Bloodstain, FARO® Laser Scanner, BlueStar®

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