B50 Effectiveness of Zar-Pro™ Fluorescent Blood Lifting Strips

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After attending this presentation, attendees will be better informed about Zar-Pro™ fluorescent blood lifting strips and which surfaces obtained an effective and detailed lift of a bloody fingerprint impression. Attendees will also learn if the amount of dilution affects the degree of fluorescence produced by the lifting strip when visualized with an Alternate Light Source (ALS).

This presentation will impact the forensic science community by introducing a simple, cost-effective tool to lift bloody fingerprints, especially from immovable objects at a scene. Also, the fluorescence enhances ridge details of the lifted print to provide a permanent identification comparison.

Many times at a crime scene, objects with bloody impressions on them have to be removed and brought back to the laboratory and processed using chemical techniques. This can sometimes be onerous and difficult if the object is large and immovable. Jessica Zarate's invention of the fluorescent blood-lifting strips allow for bloody impressions to be lifted and preserved from virtually any surface. Zarate developed a chemical formula which has a high binding power with proteins, added a photo fixative, and bound it to a nylon transfer membrane. The photo fixative allows the prints to be preserved without being altered or smudged. Titanium dioxide has only been tested for the last ten years but has been found to be a non-toxic alternative that can be used on fingerprint impressions. These lifting strips provide a non-toxic fluorogenic method for lifting bloody impression evidence. The fluorogenic properties are a product of metal-enhanced fluorescence and don't require additional chemicals. The fluorescence is produced by blood proteins and other proteinaceous secretions, which contain intrinsic fluorophores when excited with an ALS. These strips were developed to create an easy-to-use, portable, non-toxic method for lifting, enhancing, and preserving bloody impressions, with the intent of being universally accepted. They are both durable and affordable for law enforcement agencies with minimal training needed. The entire process only takes minutes, cutting out numerous chemicals and time-consuming multi-step procedures. The major advantage is that they are preserved in a non-perishable form until ready to be used.[1]

In this study, the materials being tested were hardwood floors, 2x4s (unfinished wood), brick, granite counter top, and unpainted drywall. This study used human blood and pig blood to test if there is a difference in the results of ridge detail or fluorescence with the lifting strips. In addition, this study tested dilutions of the blood to determine if there are limitations of visualization on the lifting strips (undiluted, 1/10, 1/100, and 1/1,000). For deposition, the subject's finger was held in a horizontal position with approximately ten microliters of blood placed on the thumb. The dry time on the subject's finger before deposition on a test surface ranged from 20 to 50 seconds, timed using a digital stopwatch. After deposition on the substrate, the bloody impression was left to dry for one hour before use of a lifting strip. The strips were then activated according to manufacturer's instructions. After the lifting strip was used, it was viewed with the CrimeScope® ALS using the 455nm filter with an orange barrier filter. Photographs were taken using a Canon® EOS® Rebel T5i EF-S after deposition, after lifting, and after fluorescence to ensure proper documentation of the process.

Data shows that the lifting strips produced a full print with significant identifying ridge details. The experiment also showed that fluorescence occurs with undiluted blood, although the blood did quench the fluorescence in some cases. The dilution series was used to test the limit of detection of the strips. For treated hardwood samples, fluorescence occurred down to the 1:10 dilution for both human and pig blood, whereas for untreated pine, fluorescence occurred down to the 1:10 dilution for both blood sources, but it did not fluoresce for undiluted human blood. In comparison, for lifting strips used on polished granite, fluorescence was seen down to the 1:10 dilution for both blood sources. Lifting strips used on masonry bricks showed fluorescence at the 1:10 dilution but not for undiluted blood. For lifting strips used on unpainted drywall, undiluted human blood did not fluoresce but fluorescence was noted for all other blood sources down to the 1:10 dilution. Overall, there was no difference or change in fluorescence by source of blood tested.

Reference:

1. Zarate, J. (2011). A Method for Lifting Bloody Impressions Using a Lifting Strip Containing Titanium Dioxide. *IAI* Manuscript, 1-60.

Blood, Fingerprints, Fluorescence