Bloodstained Footwear Impression Enhancement: Comparison of Infrared Photography to Diaminobenzidine (DAB) Treatment[1]

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The purpose of this study is to compare bloodstained footwear impressions recorded with infrared photography to impressions treated with Diaminobenzidine (DAB). The comparison was made to determine which method provides superior enhancements.

In this experiment, 30 footwear impressions were prepared for infrared photography and subsequently treated with a solution of DAB. Components of the blood catalyze the oxidation of DAB with peroxide and change to a blue-black color. A variety of multi-colored fabrics were selected for testing. Fabric samples were cut into pieces approximately 15.24 cm by 35.56 cm (6 in x 14 in) in size. The samples included ten 100% cotton, ten 100% polyester and ten mixed blend fabrics.

To produce bloodstained shoe impressions, two layers of 100% cotton fabric were placed in a glass dish approximately 22.86 cm by 33.02 cm (9 in x 13 in) and saturated with bovine blood. Shoe impression samples were produced by stepping onto a piece of fabric presoaked with bovine blood in the glass dish and then by stepping onto a precut sample of fabric.

Once the sample impressions dried, color photographs were taken to illustrate the condition of the impression prior to treatment. Next, infrared photographs were taken to obtain an enhanced impression of each footprint. Fabric samples were then processed with the DAB treatment. The DAB treatment required mixing 4 solutions. Solution A, the fixer, was prepared by adding 1000 mL of distilled water to 20.0 g of 5-sulfosalicyic acid. Solution B, the buffer, was prepared by mixing 100 mL of 1M phosphate buffer solution (pH 7.4) to 800 mL of distilled water. Solution C, DAB, was prepared by adding 100 mL of distilled water to 1.0 g of 3, 3'-diaminobenzidine tetrahydrochloride. Solution D, the DAB developer solution, is prepared by mixing 180 mL of solution B, 20 mL of solution C to 1 mL of 30% hydrogen peroxide.

The bloodstained samples photographed with infrared photography produced 9 (30%) superior enhanced impressions. No impressions were enhanced on the 100% cotton fabrics, 6 (20%) were enhanced on 100% polyester, and 3 (10%) were enhanced on the fabric blends.

When the DAB treatment was applied to the bloodstained samples, 21 (70.0%) were enhanced. Ten (33.3%) were on 100% cotton, 4 (13.3%) on 100% polyester, and 7 (23.3%) on fabric blends.

In conclusion, DAB was more effective than infrared photography for enhancing bloodstained impressions on the 30 fabrics tested. On the 100% cotton samples, the DAB treatment produced more superior images than infrared photography. Infrared produced more superior images on 100% polyester and fabric blends than DAB produced. It is important, however, to note that investigators should exercise caution when applying the DAB treatment because diaminobenzidine is a hazardous chemical.

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