

CASE REPORT

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The Effects of the Argon Ion Laser on Subsequent Blood Examinations

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ABSTRACT: Dried bloodstains on cotton sheeting ranging in age from three days to three months were exposed to the argon ion laser for durations from 30 s to 3 min. The bloodstains showed greatly reduced reactions or none at all with presumptive reagents applied by fine mist spraying. Filter paper rubs of the same stains followed by presumptive testing yielded the appropriate oxidation reactions of the indicator reagents.

KEYWORDS: criminalistics, blood, lasers

The argon ion laser has been used in recent years for the detection of latent fingerprints by inherent fingerprint luminescence [1] and with the use of fluorescent dusting powders [2,3]. More recently the argon ion laser has been employed to eliminate interference from cloth weave patterns present in visible prints left in blood on cotton sheets and pillowcases.²

Bloodstains subjected to argon ion laser exposure may show some differences in reactivity. This report explores the effects of exposure of a bloodstain to an argon ion laser and reports a case involving the examination of bloodstains after laser exposure.

Case Summary

In a recent homicide case, a sheet and pillowcase from the crime scene were submitted for both latent print examination and serological examinations. Fingerprint impressions in blood were present on both articles. The identification of those prints was made difficult by the limited detail and the weave pattern of the cloth. The prints were examined with the argon ion laser before serological examinations.

Experimental Procedure

Dried bloodstains on cotton sheeting ranging in age from three days to three months were exposed to the argon ion laser. The laser exposure was 18 W all-lines scanning for durations from 30 s to 3 min.

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Presumptive testing for peroxidase-like activity was performed using reduced phenolphthalein, 3,3',5,5'-tetramethyl benzidine, and *o*-tolidine [4-7]. Aerosol misting and filter paper rubs were used. Takayama crystal tests and anti-human precipitin tests were performed by the standard methods [7,8]. Antigen typing techniques used were adapted from Howard and Martin [9]. Electrophoretic techniques used in this study have been adapted from Wrxall [10] for the determination of adenosine deaminase, adenylate kinase, erythrocyte acid phosphatase, esterase D, glyoxalase I, and phosphoglucosmutase.

Results

The examination of the bloody fingerprint impressions by argon ion laser did not develop any additional detail, but the elimination of the fabric weave pattern interference led to an identification of the prints. Later attempts to enhance the bloody impressions by fine mist spraying with *o*-tolidine reagent resulted in no oxidation of the *o*-tolidine, as was evidenced by the absence of blue-green coloration.

Experimental bloodstains exposed to the laser for durations from 30 s to 3 min showed greatly reduced reactions or no reactions at all with presumptive reagents applied by fine mist spraying. Filter paper rubs of these same stains followed by presumptive testing yielded the appropriate oxidation reactions of the indicator reagents.

Takayama crystal tests and anti-human precipitin reactions were conducted with stain extracts. Hemochromogen crystals and anti-human precipitin bands were observed. The results of the electrophoretic enzyme separations were identical to those recorded before laser exposure. No appreciable changes in reactivity or mobility were noted for the polymorphic enzymes adenosine deaminase, adenylate kinase, erythrocyte acid phosphatase, esterase D, glyoxalase I, and phosphoglucosmutase.

Discussion

The experimental results have shown that laser exposure of limited duration has little detrimental effect on the routine examinations of blood stains, including presumptive testing by filter paper rubs, confirmatory testing, antigen typing, and enzyme typing. However, latent fingerprint examiners should be aware that attempts to enhance impressions in blood by using presumptive reagents for blood following laser examination may result in little or no reaction.

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