

## **The Effects of Ultraviolet Light Exposure on DNA Analysis of Fingerprints**

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The Sirchie® KRIMESITE Imager™ is a tool that can be used to detect and document latent fingerprints on various surfaces without the use of chemical enhancement. The Imager takes advantage of the different UV light reflectance properties of the fingerprint and the surface on which it is located. Large surfaces can be searched quickly and then any fingerprints detected can be digitally photographed for comparison purposes. Due to the use of specific optic filters, the search for fingerprints can be conducted in daylight or darkness. A growing trend in forensic DNA analysis is the analysis of the epithelial cells contained within a fingerprint or fingerprint smudge that is not suitable for fingerprint comparison purposes. One concern from a DNA analysis perspective is the exposure of the limited biological material to the UV light used by the KRIMESITE Imager™ which can be harmful to the DNA.

The objective of this study was to determine the effects of ultraviolet light on DNA analysis and to determine the ideal circumstances for biological fluid examination when using a shortwave ultraviolet light source.

Human buccal cells on paper were used to simulate a biological stain. The cells were exposed to a 12 Watt, shortwave (254nm) ultraviolet light for one minute, two minutes or three minutes at distances of one foot, two feet, or three feet. After exposure to the ultraviolet light, DNA was extracted from the stains for subsequent quantification and STR (Short Tandem Repeat) analysis using PowerPlex® 16 (Promega Corporation).

Results indicate that short-term (one minute) exposure of these biological samples to ultraviolet light does not greatly affect downstream DNA analysis. A longer exposure (two minutes) at a short distance (one foot) causes allelic dropout, which may be due to degradation of the biological sample. However, increasing the exposure distance to two feet or three feet improves the recovery of DNA from the paper. DNA analysis was most affected by longer exposure (three minutes) to ultraviolet light, resulting in poor recovery and increased allelic drop out.

This technique was subsequently used on probative evidence successfully. Ultimately, this information will be applied to the examination of fingerprints and a method will be developed to scan evidence for biological stains using ultraviolet light causing minimal damage to the DNA.

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