B115 Leuco Dye Detection of Latent Blood: New Fluorescein Chemistry and Other Promising Chromophores

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After attending this presentation, attendees will understand how to use this new latent blood stain detection kit, and how this kit is superior to other techniques.

This presentation will describe new chemistry that significantly improves latent blood detection, greatly increases the time window for evidence collection and is easy to use. Additional leuco dye chemistries can be tailored to avoid interferences. This new fluorescein chemistry works even through paint.

Leuco dyes typically exhibit zero or very little fluorescence when applied to surfaces. If latent blood residues are present leuco dyes are oxidized and become fluorescent dyes. Fluorescin has been used frequently for this purpose. The chemistry used in the past has several disadvantages. The most significant of these is the rapidly diminishing contrast after application. Typically the investigator has a very limited time to secure pictures of the site. After a few minutes fluorescin background becomes fluorescent even where there is no blood residue thus effectively preventing photography of the crime scene. In addition to the background difficulties, past chemistries need to be prepared at the site. This new fluorescein chemistry works even through paint.

This paper discusses a new chemistry for fluorescin latent blood detection. This new chemistry results in excellent contrast for several hours and in a significant number of cases the contrast remains for days or weeks. The FBI's Evidence Response Team and DNA I unit worked together with Georgia State University to validate this new fluorescin chemistry for use in the field. This new chemistry requires no preparation at the crime scene. The kit is supplied in a ready-to-go format, i.e., the formulation is packaged as used. This ready-to-use format does not adversely affect shelf life and it can be stored up to a year.

Several examples will be presented to illustrate how time and conditions affect contrast and false positive results. The performance of the new fluorescin chemistry on different substrates will be discussed. While this new chemistry is fully compatible with presently used light sources, new truly portable light sources can be used as well. The use of blue LED light sources will be discussed. These light sources are now commercially available from several sources or can be made easily using off the shelf components.

In addition to the visualization of latent bloodstains, this kit is also suitable to observe latent fingerprints on certain surfaces. This feature does not interfere with latent bloodstain detection due to the time delay. In addition to the practical applications of this new kit, the presentation will discuss the chemistry behind the kit, e.g., what components are present in latent blood or fingerprint that would facilitate fluorescin oxidation. In addition to fluorescein, rhodamines can be prepared in their leuco form and are oxidized by latent blood stains. This new rhodamine chemistry requires no preparation at the crime scene similar to fluorescein. The longer wavelength absorption and fluorescence properties of rhodamine can be very useful on certain substrates of high interference. Finally the paper will discuss typical interferences and how those can be minimized.

Latent Blood, Leuco Dyes, Fluorescein

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