

ILLUMINATING LATENT BLOOD

*Application methods, fixatives, alternatives and
new formulas for luminol*

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Ultra

Table 4.8: Table of p-values from the multiple regression

The p -values show that the water treatment performed significantly better than all of the other treatments. Lumiscene Ultra, Bluestar Magnum, Hemascein and Lumiscene performed significantly better than Grodsky. Hemascein also performed significantly better than Bluestar Magnum, Lumiscene and Lumiscene Ultra. Bluestar Magnum and Lumiscene performed significantly better than Lumiscene Ultra, though they could not be significantly separated and thus performed similarly.

The 1:100 profiles were then analysed. The following graphs show the relationship between peak height and STR size for each of the profiles of the 1:100 diluted bloodstains treated by the various treatments. Each graph shows each data point from all profiles for each given treatment. The line equation was excluded from these graphs as these samples were only run in duplicate (except for the Bluestar Magnum and Lumiscene Ultra treatments where only one sample produced a profile) and therefore there was deemed insufficient data to be described by the line equation.

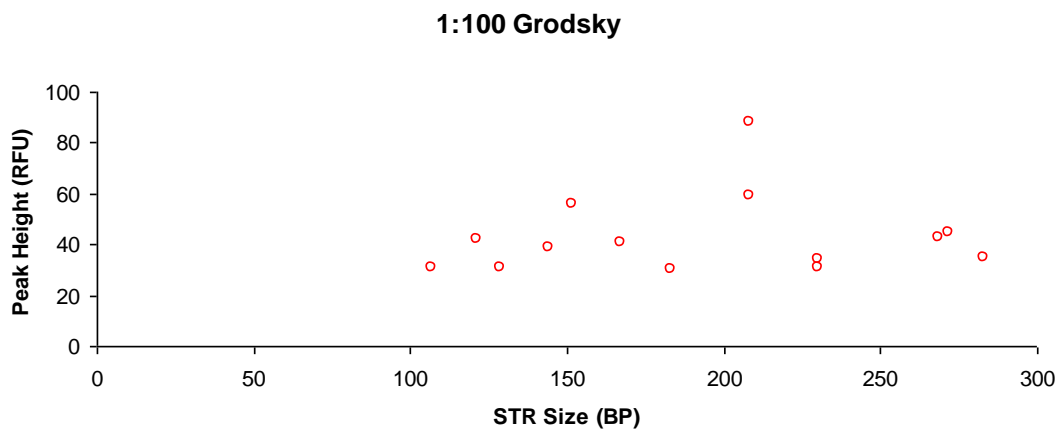


Figure 4.33: Grodsky peak height vs STR size

ABSTRACT

Luminol is an effective chemical reagent for the detection and enhancement of latent blood and is widely utilised for this purpose throughout the forensic community. It is characterised by a pale blue chemiluminescent light which is emitted upon reaction of luminol with blood.

Many improvements to the luminol formula have been attempted over the years. In this thesis I critically evaluated three new luminol based formulas, one commonly used luminol formula and an alternative to luminol, fluorescein. These reagents were compared and contrasted in terms of sensitivity, longevity of reaction and DNA preservation as well as economic and practical considerations.

Blood pattern distortion and destruction is a major disadvantage to using luminol at crime scenes. Five spray types and five fixatives/ shear thinning agents were evaluated on their ability to preserve the spatial morphology of bloodstain patterns on non-porous surfaces.

Lumiscene Ultra showed the highest intensity of emitted light for higher concentrations of blood. However, when blood was diluted to lower concentrations, this intensity was comparable to Bluestar Magnum, Lumiscene and Hemascein blood detecting reagents. All of the aforementioned reagents, however, had a greater sensitivity than the Grodsky formula. Hemascein had the longest reaction time with Lumiscene Ultra and Grodsky having the longest reaction times for the luminol based reagents. All of the reagents showed a certain amount of DNA degradation when compared to a water control sample. Hemascein preserved DNA to a greater extent than the rest of the reagents. Lumiscene significantly decreased the success of DNA profiling success.

The ECO spray and spray gun were found to be the best application methods for luminol for the purpose of preserving the morphology of blood patterns. The hand pump sprayer severely affected the preservation of blood patterns.

The combination of a zinc fixative, a shear thinning agent called ABA fix and the ECO spray was found to be best at fixing and preserving the morphology and spatial position of blood patterns.