B50 Analyzing the Effect of Cleaning Products on Presumptive Blood Testing Kits

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Learning Overview: The goal of this presentation is to provide a better understanding of the ways in which cleaning products may negatively affect presumptive blood tests.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by equipping crime scene professionals with an increased understanding of chemical interactions in the field. An increase in the knowledge of these chemical reactions between cleaning products and presumptive blood tests will reduce the concern of missed blood evidence and DNA at a crime scene. Establishing and maintaining the criteria for truth in evidence is crucial to forensic investigations. This presentation intends to improve the ability of crime scene professionals to perform well in uncertain conditions within a crime scene.

This presentation will increase the understanding of chemical interactions and presumptive blood tests performed in the field. An increase in this knowledge will not only improve performance, but will also reduce the concern of missed blood evidence and DNA at a crime scene. Past research has found that certain cleaning products negatively interfere with presumptive blood testing.[1,2] This research presentation will impact the forensic science community by adding to the current criteria for truth in evidence.

This research focused on the hypothesis that if consumer-grade cleaning products are applied to blood stains, then they will negatively interfere with presumptive blood testing results. Phenolphthalein (PT), Leucocrystal Violet (LC), and Tetramethylbenzidine (TB) presumptive testing kits were used to test blood on tiles cleaned with common products. Approximately 10mL of blood was left to dry for 20 minutes on seven tiles. The blood was cleaned using paper towels and 10mL of one of six common cleaning products: Method® glass cleaner; Dawn Essentials® dish soap; Wet Ones® disinfecting wipes; Citrasolve® cleaner and degreaser; HDX® citrus degreaser; and Mean Green® degreaser and cleaner. The control tile was wiped with a paper towel but not with a cleaning product. The tiles were then left for one week (seven days) to simulate the time between the commission of a violent crime and the crime scene investigation process. Each sample was then tested with the PT, LCV, TB and Hydrogen Peroxide (H_2O_2) presumptive blood tests.

The simple H_2O_2 test did not yield any results. PT was not affected by any of the cleaning products while LC and TB were unable to detect blood on tiles cleaned with degreasing products. It can be concluded that the results obtained in this research study successfully identified false negatives on the LCV and TB presumptive blood testing kits. This research has shown that with the LCV presumptive blood test, Citrasolve® and Mean Green® both yielded false-negative results. The TB presumptive blood test yielded false negative results with Mean Green®. Chemical interactions between the presumptive tests and components of the cleaning products have been identified as the cause behind the false negative results.[1,2] Cationic compounds within the LCV reagent and the chelating agents in the degreasing cleaning products have been identified as the likely sources of interaction.

This research presentation will explain the characteristics of the chemical compounds that affected the presumptive blood testing kits. It will also illustrate the chemical reaction that occurs to interfere with the test in the field.

Reference(s):

1. Menough, W.H. II. (2020). The Reaction Between Leucocrystal Violet and Various Household Cleaning Products. (Master's Thesis). Emporia State University.
2. Signavesky, M. The Effect of Household Cleaning Agents on Blood and the Suitability for Screening Using the Phenolphthalein Test. *Journal of Forensic Identification*, 69 no. 1 (2019).

Presumptive Testing, Latent Blood Detection, Crime Scene