The Effect of Cleaning Agents on Presumptive Blood Tests and DNA Analysis of Bloodstains

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Introduction

- Presumptive blood tests are used at crime scenes to examine suspicious stains or to detect the presence of blood.
- Presence is indicated with fluorescence or a color change.
- Luminol, Bluestar, and Kastle-Meyer are the most commonly used.
- Attempts to remove bloodstains with household cleaners to destroy evidence are often made.
- Sodium percarbonate and sodium hypochlorite, common in household cleaners, affect the accuracy of presumptive blood tests.
- Cleaning agents can also degrade DNA and affect DNA analysis.
- This review studies how household cleaners can affect presumptive tests and DNA analysis.

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Methods

- The study was divided into two concepts: The effects washed bloodstains have on presumptive blood tests and DNA analysis.
- Focus on cleaners that utilize sodium hypochlorite or sodium percarbonate.
- Focus on luminol, Bluestar, and Kastle-Meyer presumptive blood tests.

Results

- Sodium hypochlorite alone can produce false positives.
- Sodium hypochlorite and sodium percarbonate on washed bloodstains diminishes the color of presumptive blood tests.
- Luminol, Bluestar, and Kastle-Meyer do not always detect bloodstains that are washed with sodium percarbonate.
- Kastle-Meyer was the most sensitive.
- Sodium hypochlorite and sodium percarbonate had some DNA degradation on porous and nonporous surfaces.
- DNA profiles could be obtained more often from porous surfaces than nonporous surfaces.
- Porous surfaces provided the highest DNA quantity and quality.
- Porous surfaces were able to retain more blood for better stain visualization and DNA extraction than nonporous surfaces.
- More DNA profiles were obtained from sodium hypochlorite treated bloodstains than sodium percarbonate bloodstains.
- Sodium hypochlorite provided the highest DNA quantity and quality.

Discussion/Conclusion

- Sodium hypochlorite reacts with hydrogen peroxide from presumptive blood tests and creates false positives.
- Catalase enzyme in blood converts sodium percarbonate into hydrogen peroxide to break down blood.
- Visual examination is used to examine chemiluminescence.
- Misinterpretations can lead to false positives or false negatives.
- DNA quantity and quality is negatively affected by high concentrations of household cleaners and nonporous surfaces.
- Crime scene investigators should take into consideration that bloodstains could be washed with cleaners.
- Additional studies could explore using different cleaners, presumptive blood test kits, washing techniques, and/or substrates.

References


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