



A101 Significance and Reliability of Presumptive Testing for Semen

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After attending this presentation, attendees will understand the experimental differences between the AP spot test, the PAN test, and the diSTMP test and their effectiveness, based on Bayesian statistical theory. Attendees will also be informed as to the effectiveness of the presumptive semen test diSTMP over a period of six years and the apparent differences between the analysis of a specific type of sample and the amount of DNA ultimately recovered.

This presentation will impact the forensic community by serving as an example of a long - term study in the types of samples and the DNA that is recovered. This could impact how fellow laboratories analyze samples and which presumptive semen test they use. The experimental portion of the study also gives the community an opportunity to objectively assess three presumptive semen tests. The use of Bayesian statistics allows for a completely objective methodology to analyze the effectiveness of tests and this study gives an example of how this statistical analysis can be used.

By using a combination of a statistical analysis and an experimental study, this project strived to give a more objective answer as to which presumptive test for semen would be most effective for the Kansas City Police Crime Laboratory (KCPCL).

The statistical portion of the project took six years worth of casework and correlated the results of diSTMP AP testing and whether a foreign DNA profile was present. The results of this portion of the study directly impacted how KCPCL analyzes evidence and has made the laboratory aware of the inherent differences in the types of samples commonly encountered. This portion of the project showed that, generally, stains elicit a foreign profile more often than swabs. Non- cavity swabs are responsible for the highest amount of false negatives, while cavity swabs have the highest rate of false positives. Overall, the diSTMP test correctly identified the presence or lack of semen 70% of the time, with 26% of false positives and 4% of false negatives. The laboratory continues to gather the same type of statistical information to use in future evaluations of the new presumptive semen test.

In the experimental portion of the study, three common presumptive semen tests were compared with known samples to objectively assess their specificity and sensitivity in analyzing these samples, specifically using Bayesian statistical theory. The three tests were the diSTMP test, the AP Spot test and the PAN test. Based on the results, the AP spot test was found to be more effective than the diSTMP test, although the PAN test proved to be the better test. The difficulty in interpreting the PAN test made it an unrealistic choice for KCPCL. Currently, the laboratory has validated and is using the AP spot test in casework.

Additionally, KCPCL has also implemented a semen analysis scheme based on the results of this study. At the conclusion of this study, the marked difference between stains and swabs was obvious and a new semen analysis scheme was realized. Stains are treated first to the AP spot test, while swabs are screened with the p30 test (PSA Semiquant card). This updated analysis scheme allows for the weaknesses of both types of test to be strengthened based on the sample being examined and also gives examiners an improved sense of confidence in the presumptive testing for semen. **Semen, DNA, Acid Phosphatase**