



D21 Validation of Semen Detection Kits for Field Application in Sexual Assault Cases

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After attending this presentation, attendees will have a general understanding of the sensitivity and specificity of four semen detection tests, two crime-scene-ready-kits and two used primarily in a laboratory setting. This study utilized four substrates, three US Air Force uniform fabrics and a cotton fabric, which allowed determination of semen behavior and biofluid ability when applied to these substrates.

This presentation will impact the forensic science community by indicating whether crime-scene-ready semen detection kits are comparable to laboratory kits in sensitivity and specificity, and whether or not a crime-scene-ready kit should be implemented for field application, in particular by Department of Defense (DoD) criminal investigators. Conducting such tests on certain items of evidence may possibly decrease the amount of backlog in the servicing forensic laboratory, as investigators may be able to better identify items of evidentiary value for laboratory submission.

Synopsis: Currently, DoD, specifically United States Air Force, criminal investigators conduct presumptive tests for certain biofluids; however, field-testing for the detection of semen is not conducted at crime scenes. There are a number of concerns associated with conducting these tests at crime scenes, which include sample consumption, as well as potential erroneous test results. However, semen detection tests could also be extremely beneficial for a number of reasons. In military sexual assault cases, conducting a semen detection test could not only help corroborate a victim's statement, but also provide probable cause for a search warrant, which could garnish additional probative evidence.

In order to determine which crime scene-scene-ready kit, if any, should be used at these crime scenes, the following tests were validated: ABACard p30 for Crime Scene, ABACard p30 for Laboratory, Rapid Stain Identification (RSID™) – Semen, and the Serological Research Institute Acid Phosphatase (AP) Spot Test. Again, four different fabrics, used to manufacture uniforms and/or often associated with sexual assault cases, were utilized in the study. To test the sensitivity of each test, a neat sample and four dilutions (1:10, 1:100, 1:500, and 1:1000) were prepared; fifty microlitres of neat or diluted sample were applied to each substrate, and tested. Furthermore, the fabrics that provided positive results were washed, either once or twice, to determine if semen was still detectable. A volume sensitivity test was also conducted to further determine the sensitivity of each test. To test the specificity, three chemically similar biological fluids were also applied to each substrate and tested. Nine lubricants/pseudo lubricants often seen in sexual assault cases were also tested (mixed with/without semen) to determine if these interfered with the semen detection or provide a false positive result when no semen was present in the sample.

Results/Conclusion: All tests were positive when the samples were neat; however, results differed when the samples were diluted. In the washing stage of the study, the RSID™ – Semen performed the best, detecting semen on two of the four fabrics after these were swabbed a total of three times, and washed twice. The AP Spot Test performed the best in the volume sensitivity test; however, when mixed with one of the nine lubricants, the AP Spot Test failed to detect the presence of semen. These same results were obtained with the ABACard p30 for Crime Scene kit, also with the same lubricant. All tests provided negative results when urine and saliva samples were used; however, the RSID™ – Semen provided a false positive for fecal matter.

Based on the tests conducted and observations made in this study, between the two crime-scene-ready kits, the RSID™ – Semen produced, overall, better results. A recommendation to implement the RSID™ – Semen kit for field application by DoD criminal investigators has been made.

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Semen Detection, RSID, Crime Scene