H27 A Preliminary Assessment of the Persistence of Prostate Specific Antigen (PSA) Transfers Under Various Conditions

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Learning Overview: The goal of this presentation is to provide attendees with a better understanding of the persistence of PSA detection in semen stains under various conditions.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing a better understanding of the persistence of PSA resulting from different manipulated environmental and transfer conditions.

PSA, also known as p30, is a protein used as an effective marker for the identification of seminal fluid lacking spermatozoa cells. The ABAcard® p30 test is extremely sensitive and can be used to detect the presence of the PSA protein at levels as low as 4ng/mL.[1] Most current research surrounding the stability of PSA over time looks at it within the female reproductive tract; however, very little research examines the detection of PSA outside of the human body where other environmental factors can influence its detection.[2]

The conditions examined in this study were dry versus wet transfer-receiving substrates, pH, drying time, and differing semen dilution concentrations. For all variables manipulated, the ABAcard® p30 test was used for detection. The reaction environment for PSA was manipulated with differing pH levels, starting from a pH of 7, with detection of the protein still possible, up to a pH of 12. The length of time each sample was allowed to dry prior to testing for PSA did not appear to affect detection; however, the rate of appearance of the test band on the ABAcard® was found to be directly dependent on the sample's dilution concentration. Fifteen microliters of semen were allowed to dry on a nitrile glove for varying time periods before being transferred to a cotton swatch with the use of constant pressure upon application. It was found that the transfer stains were typically non-detectable by the ABAcard® p30 test, under the dry receiving substrate conditions. When the cotton receiving swatch was treated with a personal jelly lubricant, chosen for its water-based formula, the test was positive regardless of the length of time waited prior to transfer. For the wet and dry receiving substrate conditions, as well as the dilution series, Adobe® Photoshop® was utilized to examine test band intensity on the ABAcard® p30 cards from photographs taken under controlled conditions. Wet conditions utilized personal jelly lubricant in an attempt to replicate possible moist environments the protein could be transferred to. It was found that the wet conditions yielded more color intense test bands than the dry conditions. Additionally, the wet conditions seemed to stabilize the detection of PSA at differing dilution concentrations, causing the test to behave more consistently. The differences observed between the wet and dry conditions of test band intensity were found to be statistically significant through *t*-testing ($p<0.0054$). For the dilution series, it was found that lower concentrations yielded fainter test bands on the ABAcard® p30 tests. Based on results obtained, PSA is detectable as well as durable under these different environmental conditions. Further research examining longer time periods under certain conditions, as well as increasing the overall number of replicates, would help to more accurately assess any possible statistically significant differences in the findings.

Reference(s):

1. Boward, Emily S., and Stacey L. Wilson. A Comparison of ABAcard® P30 and RSID™-Semen Test Kits for Forensic Semen Identification. *Journal of Forensic and Legal Medicine* 20, no. 8 (2013): 1126-130. doi:10.1016/j.jflm.2013.09.007.
2. Srettabunjong, Supawon, Parimol Betset, Suvit Limawongpranee, and Pattama Ekpo. The Stability of Prostate-Specific Antigen in Semen Under Various Temperatures. *Journal of Forensic Sciences* 60, no. 6 (2015): 1577-581. doi:10.1111/1556-4029.12791.

PSA, Persistence, Transfer

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