



Young Forensic Scientists Forum— 2019

Y10 Comparison of Periodic Acid-Schiff Staining With Lugol's Iodine for the Detection of Vaginal Fluid in Dried Material

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Learning Overview: The goal of this presentation is to illustrate the stark differences observed between vaginal fluid, saliva, and urine when stained with the Periodic Acid-Schiff (PAS) stain.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing the foundation for a potential confirmatory test for vaginal fluid, and so provide context for sexual assault investigations.

Forensic science literature presents a variety of tests to confirm the presence of various bodily fluids; however, such a test for vaginal fluid is still needed. A confirmatory test for vaginal fluid will provide critical context for forensic casework, especially in sexual assault cases in which no semen is present. In the past, Lugol's iodine was used as the main method for determining the presence of vaginal fluid by staining glycogen.¹ However, this type of staining has been shown in the present study to produce positive results for both saliva and urine, demonstrating its lack of specificity. Although not frequently used as a test for the presence of vaginal fluid, the PAS reagent has been reported to be effective in staining epithelial cells high in glycogen.² This study aims to compare the ability of these two stains to detect the presence of vaginal fluid in dried material.

Following Institutional Review Board (IRB) approval, multiple vaginal swabs, saliva swabs, and urine samples were obtained from female participants who varied in age, menstrual cycle, and birth control methods. The first stage of this study involved extracting the glycogen from these samples, then adding a 3% solution of Lugol's iodine to each extract to sample wells in a microtiter plate. The absorbance of each sample was then measured with subsequent quantitative analysis for glycogen using a standard curve. The results of this method indicated that the concentration of glycogen in urine was very similar to that of vaginal fluid, and so could not be distinguished from each other. Concentration values in saliva were also not appreciably lower. Staining of vaginal smears on microscope slides with Lugol's iodine also did not show observable differences between the three fluids. Conversely, for the second stage, vaginal smears showed significant observable differences in glycogen staining with PAS when compared to smears made from saliva and urine. Differences were so pronounced that absorbance assays would simply be redundant. Results between women of varying age were comparable.

Not only do these results bring to light a more effective stain for vaginal fluid, but also provides the foundation for a potential confirmatory test that could be used in serology laboratories. Development of such a test for vaginal fluid will help provide context for sexual assault investigations.

Reference(s):

1. Rothwell T.J., Harvey K.J. The Limitations of the Lugol's Iodine Staining Technique for the Identification of Vaginal Epithelial Cells. *J Forens Sci Soc* 1978 Jan;18:181-184.
2. Jones E.L. The Identification of Semen and Other Body Fluids. In: Saferstein R, editor. *Forensic Science Handbook: Volume II*. Upper Saddle River, 2005;360-68.

Serology, Vaginal Fluid, Periodic Acid-Schiff