G7 The Detection of Saliva: Factors Affecting the Phadebas® Press and Tube Tests

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The goal of this paper is to present to the forensic community, the findings from a study conducted to assess a test employed to detect saliva in forensic casework samples.

Forensic biologists will learn of the relative merits of the Phadebas test for the detection of amylase applied quantitatively as a Tube Test and semi-quantitatively as a Press Test.

It is often necessary for a forensic biologist to locate and identify saliva stains in casework. Not only is saliva important as a source of DNA, its presence in various circumstances can corroborate aspects of an account of a crime. Unlike blood, which is usually evident by visible, red-brown staining, often saliva does not contain any visible components, making the "stains" difficult to observe. Therefore, chemical methods are used to locate saliva stains.

At the Centre of Forensic Sciences, the localization and identification of saliva is determined using the Phadebas® Amylase Test (Pharmacia and Upjohn Diagnostics AB, Uppsala, Sweden). This assay is used to detect the digestive enzyme α-amylase, which is found in high quantities in saliva. The test can be performed in two ways: the press test (Willott and Griffiths, 1980) and the tube test (Willott, 1974). In this study, three variables were assessed to determine their effects on both the press and tube tests: 1) the quantity of amylase in a person's saliva, 2) the type of substrate on which saliva is deposited, and 3) the mixing of saliva with a second body fluid, either blood or semen. A second aim of the study was to evaluate the effectiveness of both tests to determine if the tube test is always necessary to perform in addition to the press test, and to determine the required duration of the press test.

Neat and diluted saliva from thirty individuals was used to stain cotton. Ninety percent of the neat saliva stains were detected in less than 10 minutes using the press test, and all neat saliva stains had amylase activities greater than 0.03 International Units (IU) (Willott, 1974) using the tube test. Overall, the tube test showed higher sensitivity. Press and tube tests were then performed on stains made from saliva from individuals covering a range of amylase levels on the following substrates: cotton, polyester, a blend of 95% acrylic 5% spandex, silk, satin, corduroy, denim, and white S & S #903 filter paper (Schleicher & Schuell Bioscience). The press test could detect saliva more readily on thinner, less absorbent fabrics, while higher amylase activities were obtained with thicker fabrics using the tube test. Experimentation was also done to determine how the deposition of saliva in the presence of semen and blood affects the press and tube tests. Stains were made of saliva and either blood or semen in three different ways: 1) mixing prior to deposition, 2) depositing saliva, letting it dry then depositing the other body fluid on top, and 3) depositing the other body fluid first, letting it dry then depositing saliva on top. Semen did not interfere with the detection of saliva using the press or tube tests, regardless of the method of deposition. Blood did not interfere with the detection of saliva using the tube test, but when the press test was performed there were some instances where the result took longer to appear or did not appear within the 20minute test period.

Overall, the press test is sufficient for detecting saliva stains in most cases if administered for 40 minutes. The limitations discussed must be considered when blood is present on the sample to be tested, or if the substrate fabric is heavy / thick (e.g., denim).

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