B32 Presumptive Test Compatibility With Efficient DNA Collection Swabs

Bruce Budowle, PhD, University of North Texas Health Science Center, Fort Worth, TX 76107*

Learning Overview: After attending this presentation, attendees will be better informed regarding the fact that the collection of stains at crime scenes and preservation of the integrity of the collected biology evidence after collection are critical components impacting the success of downstream chemical and molecular biology assays. While an important part of the evaluation of biological evidence, presumptive tests and whether there are any inhibitory effects associated with the swabs used to collect evidence have rarely been validated. Over the past few years, there have been advances in the collection tools (i.e., swabs; notably the advent of nylon swabs that presumably should be inert regarding downstream assays). However, the glues, process residuals during manufacturing, and any additives (especially those intended to preserve DNA) may impact performance of chemical or enzymatic presumptive tests. Therefore, swabs should be evaluated for presumptive tests compatibility, just as the rest of the tests in the laboratory workflow.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing an understanding that all aspects of forensic biological analyses require validation. In particular, the development of superior performance synthetic swabs requires consideration that the additives or manufacturing components may impact presumptive test results. Therefore, these swabs, if used for sample collection, should be validated for the intended use.

Swabs should be tested to determine if there are any effects from the swabs on downstream presumptive tests. Based on the demonstrated success of DNA collection and DNA yield in the studies by Comte et al. and Sherier et al., the COPAN® Italia 4N6FLOQSwabs™ were selected to develop an effective test system.[1,2] These swabs are similar except that some versions contain an anti-microbial reagent. Thus, a controlled experiment between swab types can be performed for this initial test design. If the process is effective, then it could be used for more comprehensive testing among a variety of swabs, if needed. Blood, semen, and saliva stains on glass slides were prepared. The concentrations were neat and diluted (up to 1:99). The stains were allowed to dry overnight (minimum) before testing. Standard presumptive tests for each stain type (blood: leuco malachite green, saliva: RSID saliva; semen: acid phosphatase) were employed. These three presumptive tests were selected because they span the range of chemical (peroxidase-like catalytic activity of hemoglobin), enzymatic activity (acid phosphatase), and antibody-based (amylase detection) assays. The results were compiled as positive/negative and with an arbitrarily designed 1-4 scale. Preliminary testing supports that 4N6FLOQSwabs™ are inert with regard to these presumptive tests.

Reference(s):

1. Comte, J. et al. (2019) Touch DNA collection—Performance of four different swabs. *FSI Genetics* (in press).
2. Sherier, A. et al. (2019) Copan microFLOQ® Direct Swab collection of bloodstains, saliva, and semen on cotton cloth. *Int J Leg Med* (in press).

Presumptive Tests, 4N6FLOQSwabs™, Validation