



B68 An Improved Process for Buccal Cell Collection and Analysis

James W. Schumm, PhD, John C. Fox, BS, and Jangbir Sangha, BS, MA, The Bode Technology Group, Springfield, VA*

The goal of this presentation is to expose the community to a reliable efficient new option in sample collection for DNA analysis.

There is a vital need in DNA testing for a reliable, non-invasive, and efficient method of DNA sample collection that feeds directly into automated downstream processes. Currently blood collection and deposition onto membranes provides a reliable collection method. Generally, less than 10% of these samples processed for typing require re-extraction and analysis. However, buccal cell collection methods involving secondary transfer to membranes can increase re-run requirements to 15% or even 30% of samples.

This shortcoming has been overcome by development of a device specifically designed for direct collection of buccal samples for DNA storage and analysis. All components of the device including a support, handle, and a flat membrane are compatible with oral sample collection. The materials are designed for self-collection under the supervision of an observer. Thus, the procedure is compatible with collection of convicted offender samples as well as samples collected at point of arrest. Several swipes of the back-supported membrane against the inside of the cheek allow collection of sufficient buccal cells for at least 20 DNA analyses. A cap with air holes is provided to protect the sample during drying, transport, and storage.

Once received in the laboratory, the design facilitates simple separation of the membrane and handle from the cap and the plastic support. The membrane thickness was selected to allow insertion into an automated membrane-punching device. A barcode placed on the handle either at the time of collection or the time of manufacture is read by the puncher. The instrument places punches into a well of a 96-well tray and creates an electronic file of the location of the sample. (Note: This step may be performed by hand if preferred.) The steps of DNA extraction and preparation for PCR amplification are rapidly completed with multi-channel pipettors. The puncher output file is used to populate electronic and paper support materials for downstream analytical processes.

Prototype devices were given to 56 individuals along with written instructions. Generally, no individualized or verbal training was provided. In all cases, all 13 CODIS STR loci were obtained from amplification with Profiler Plus and COfiler. Similar results were achieved with the PowerPlex 16 multiplex and aspects of validation will be discussed.

In summary, this DNA collection device is a new effective tool to improve reliability of DNA sample collection and typing, facilitate automated rapid sample processing, and integrate with electronic data management.

Buccal, DNA, Device