B178 Toward Implementation of Improved Body Fluid Identification Methods

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After attending this presentation, attendees will better understand the considerations involved in evaluating various novel body fluid identification methods for implementation into the forensic biology workflow. Attendees will be aware of the pitfalls of current serology practice and the benefits of several emerging methods while gaining insight into the challenges associated with operationalizing techniques for which few guidelines exist.

This presentation will impact the forensic science community by highlighting the results of at least three collaborative research efforts that resulted in methods to improve body fluid identification. In addition, this presentation will impact the field by: (1) describing the hurdles that must still be addressed for these methods to be used routinely; (2) proposing potential solutions; and, (3) prompting collaborative progress toward the establishment of guidelines and standard samples for their use.

While DNA technologies have advanced substantially over the past several decades, methods used to determine the presence of a particular body fluid have remained stagnant. Outdated techniques limit testing to three fluids — semen, blood, and saliva — via chemical, immunological, or histological methods. Though generally robust and easy to perform, these methods require a separate test for each fluid, have limited sensitivity, and consume a portion of the biological sample. Often, multiple sequential tests are used in combination to confirm the presence of a fluid, further adding to overall time, cost, and sample consumption. Additionally, known false positives and subjective interpretations hinder the definitiveness of an examiner's conclusions and testimony.

To this end, several emerging methods for body fluid identification are being explored at the Defense Forensic Science Center (DFSC) that could complement or replace these traditional techniques. These new methods simultaneously test for biological markers or signatures that indicate the presence of multiple body fluids, including two for which laboratories cannot routinely test at present: vaginal fluid and menstrual blood. Advanced reporting offers quantifiable results that can be reviewed by other examiners prior to court testimony as part of routine quality assurance measures. Initial results indicate a false positive rate for at least one of these methods of less than 1%.

Despite these benefits, integration into existing laboratory workflows is not straightforward. Additional instrumentation may be required, and an increase in processing time might drive decisions on how best to use the additional information provided by these methods. Though current guidelines exist for the validation of traditional serological and DNA techniques, these methods have not yet been operationalized in United States laboratories, and standard reference samples that allow both meaningful evaluation and subsequent quality control procedures do not exist. Potential strategies to begin addressing these concerns will be described and discussed.

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