



Y14 Determining the Ideal Swab Type for Collection of the Microbiome for Forensic Identification Purposes

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Learning Overview: The goal of this presentation is to educate attendees on the human microbiome, a newly emerging forensic tool, and the swab type that is most ideal for its efficient collection and elution for further analysis.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing a recommendation regarding the best swab type for collection of the human microbiome, as well as the potential for recovery of the microbiome off of various surfaces. The information could be valuable for future researchers who continue to investigate the potential forensic applications of the human microbiome, including studies investigating recovery from additional surfaces and from human subjects.

In recent years, forensic scientists have begun looking at the human microbiome as a new tool in forensic science. The microbiome is made up of all the microorganisms living on or in the human body.¹ Past studies have shown that it may be possible to use the microbiome as a unique identifier, to link cohabiting individuals, or even to connect a person with a location.²⁻⁵ The relative abundance of the microbiome shows potential for it to be used in cases where a usable human DNA sample is not left at the scene.⁶ In order to study the microbiome, one must first be able to successfully collect it, then release it from that collection tool for further examination. This may sound simple, but this area of research is so new that even the best method of collection has not yet been determined.

Therefore, this research focuses on finding the optimal swab type for collection and analysis of the human microbiome. To do this, a predetermined amount of a bacterium, *Proteus mirabilis*, will be deposited directly onto four swab types (traditional cotton, nylon flocked, superfine dental applicators, and Luna dissolvable swabs). Then, extraction of the bacterial DNA will be performed for all swabs using the MagMAX™ Total Nucleic Acid Isolation Kit, followed by quantitation using real-time Polymerase Chain Reaction (PCR). This will allow for determination of absolute microbial DNA recovery and comparison of yields across the four swab types. An additional set of samples will be taken through the same extraction and quantification as the swab samples but with no swab used. These positive controls with manipulation will allow for determination of how much microbial DNA is lost during the extraction process rather than being left behind in the swab. Following the initial evaluation of the four swab types directly impregnated with the bacteria, the two top performing swabs will be evaluated further by adding the additional step of picking up the bacteria from various surfaces representative of common household materials (wood, glass, metal) before extraction and quantification.

Reference(s):

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Microbiome, Quantitative PCR, Swab