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Title: Implementing the M-Vac to Collect Larger Quantities of DNA from Large Surface Areas

Abstract:

In forensic science, the collection of cellular material is extremely important. Today, forensic labs use the traditional swabbing, cutting, and taping techniques to recover cellular material. However, these "traditional" techniques have limitations. Large surface area requirements and PCR inhibitors hinder forensic analysts. With a new wet vacuum technique, the analyst can sample large areas and eliminate inhibitors. The Microbial Vacuum System (M-Vac®) is a liquid based biological evidence collection system. Simply, the wet vacuum sprays a sterile buffer while simultaneously vacuuming the liquid with any cellular material that was present on the surface. In our research, we determined whether the M-Vac is more efficient at collecting DNA from large surface areas than traditional methods by determining the amount of DNA collected.

First, we determined how much touch DNA the M-Vac could recover from cotton fabric. Compared to the cutting method (1 cm² fabric), the M-Vac can collect one sample from 500 cm². In some situations, the cuttings result in little to no DNA; however, the M-Vac is capable of collecting touch DNA. Second, we tested the M-Vac's efficiency at collecting male saliva from female skin. Traditionally, sexual assault examiners would swab a victim for biological evidence. Compared to swabbing, the M-Vac collects more salivary DNA. Additionally, the M-Vac collects very little of the female's epithelial cells, making downstream STR profiles easier to interpret. Finally, we determined if the M-Vac was capable of collecting male saliva from a female's skin after showering. The M-Vac can collect salivary DNA present after showering, while the swabbing method is much more limited. The M-Vac makes the collection of biological evidence from skin and fabric plausible without being hindered by surface area limitations.