



B126 A Comparison of Differex™ and Organic Differential DNA Extractions for the Acquisition of a Male Profile From Samples That Exhibit Mold Growth

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The goal of this presentation is to provide attendees with knowledge on which, if either, of the two DNA extractions explored is most suitable for mixed male and female DNA samples contaminated with mold growth.

This presentation will impact the forensic science community by potentially aiding forensic scientists in making a decision regarding how to process a DNA sample contaminated with mold growth. Finding an optimal method to process mold-contaminated vaginal swabs in sexual assault cases could allow for the analysis of samples previously deemed untestable.

Backlogged cases in crime laboratories have increased dramatically since 2005 due to lack of funding and personnel. The statute of limitations has also been extended in some states, allowing more sexual assault evidence kits to qualify for testing. These backlogs can range from months to years since collected and stored. Recently, there has been a push to allot funds for the processing of sexual assault evidence kits in an attempt to reduce these backlogs. The most commonly tested piece of evidence in sexual assault evidence kits is a vaginal swab. If not collected and stored properly, vaginal swabs can develop mold over time. This can be a result of varying environmental conditions or exposure to humidity; however, it has become common practice to dispose of samples with excess mold growth because it is believed that no accurate human DNA profile can be obtained. Some agencies choose not to process these samples due to the expense involved and the limited chance of obtaining successful results. While this practice may seem rash, it has been determined that the mold slowly degrades the DNA, causing it to become more fragmented. Additionally, mold acts as an inhibitor for Polymerase Chain Reaction (PCR), a crucial step in current forensic DNA analysis. PCR inhibition can cause loss of signal, peak imbalance, and/or allelic dropout.

This research attempts to compare the effectiveness of the standard organic differential extraction protocol to the Differex™ System on vaginal swab samples that exhibit varying degrees of mold growth. Optimal packaging procedures currently exist for sexual assault evidence to prevent the development of mold. These procedures reduce the incidence of mold growth, but they are not as effective if the sample has not been dried properly prior to packaging or if the sample is exposed to moisture during storage. There is little research and information on what to do with samples previously collected that may contain mold growth. Traditionally, a differential DNA extraction procedure is performed on these samples. This extraction involves wash steps, which theoretically get rid of any contaminants. While the organic differential extraction technique is regarded as the gold standard, the Differex™ System uses the same principle and is less time consuming. The Differex™ System employs the use of DNA IQ™ magnetic resin to bind the DNA, effectively reducing the sperm loss that is common to other differential techniques. This could allow for a partial or complete male profile to be obtained from samples contaminated by mold growth.

Mock sexual assault samples were prepared by obtaining sterile cotton swabs containing female epithelial cells and vaginal fluids. Four swabs were submerged in each of the following seminal dilutions: 1:2; 1:8; 1:32; and 1:128. The swabs were then stored in improper conditions to promote mold growth for 0, 1, 2, 3, 6, and 14 months.



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Photographs were taken of each swab to record mold growth. One-half of each swab was subjected to a standard organic differential extraction, while the other half was processed using Differex™. DNA quantitation values and profile quality were compared between the two extraction methods.

Examining alternative means of dealing with mold-contaminated samples is essential not only to further advance testing of backlogged cases, but also to avoid disposing of essential incriminating evidence that could potentially lead to the incarceration of a rapist. Comparing current DNA extraction methods could result in the discovery of an optimal technique for samples of this nature. An optimal method could limit the severity of inhibition and allow more accurate results in data analysis.

Differex™, Organic Differential, Mold