F9 Investigating the Potential for Transfer DNA on Laboratory Gloves

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Learning Overview: After attending this presentation, attendees will understand the potential for transferring DNA to laboratory gloves and boxes during routine laboratory use. The goal is to identify technician-mediated contamination and prevent it through the development of appropriate quality control procedures.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by demonstrating that while the transfer of DNA from technicians to routinely used laboratory items, such as gloves and glove boxes, is possible, current contamination prevention protocols in laboratories with restricted access may be sufficient in reducing this potential source of error.

DNA evidence is often a key factor in criminal cases and can have a profound impact on the outcome in the courtroom and the lives of the accused. Therefore, minimizing contamination from field evidence collection through the forensic DNA laboratory analysis is imperative for DNA profile interpretation. Enforcing strict use of personal protective equipment, such as wearing laboratory gloves, can decrease rates of technician-mediated contamination of evidentiary objects and cross-contamination between evidentiary items. This study investigated the possibility of contaminating laboratory gloves after prolonged box use in a variety of laboratory settings.

The study was conducted in two phases: (1) to assess whether the removal of gloves from both new and previously opened boxes of gloves by gloved and ungloved researchers transferred DNA to the gloves or glove box (n=15), and (2) to assess the presence of transfer DNA on used and open glove boxes found in active academic and research laboratories (n=30). Samples from both stages of the study were extracted and amplified using standard forensic DNA laboratory procedures at two analytical thresholds to assess the presence of DNA at increasingly sensitive levels.

In the first phase, only one sample taken from an open box of gloves yielded results at three loci. In the second phase, three samples collected from boxes in academic laboratories yielded quantifiable DNA. Two of these samples generated partial profiles at both analytical thresholds, and the third only produced results at the Amelogenin locus. However, none were from boxes in laboratories with strict contamination precaution procedures in place.

This study found no evidence of manufacturer contamination in the samples taken from unopened boxes of gloves marketed as sterile products. Therefore, the DNA detected on the gloves and boxes in this study was likely introduced by individuals in and around the laboratory.

The introduction of trace DNA from gloves could potentially complicate the interpretation of DNA typing results in cases of low-level profile mixtures, as is usually the case with forensic samples. However, by identifying potential routes of DNA transfer during the handling of evidentiary material, laboratory procedures can be implemented to reduce the risk of technician-mediated contamination.

The results of this study indicate that although contamination of laboratory gloves is possible through regular use, forensic laboratories with restricted access and strict cleanroom protocols may already have the appropriate measures to reduce this potential source of error.

Forensic DNA, DNA Transfer, DNA Contamination