



A58 Comparison of Surfactants for the Transfer of Touch DNA

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After attending this presentation, attendees will have learned about the effectiveness of different surfactants employed for the collection of touch evidence from held objects for downstream extraction of DNA.

This presentation will impact the forensic community by indicating which surfactant yields the highest concentration of DNA thereby resulting in a higher probability of obtaining a complete genetic profile.

Attendees of this presentation will learn about the effectiveness of different surfactants employed for the collection of touch evidence from held objects for downstream extraction of DNA. Three objects commonly processed by forensic crime labs: firearm grips, hats and spent bullet casings have been swabbed with two experimental surfactants along with a water control using the double swabbing technique.

A surfactant is a solution that can greatly reduce the surface tension of water. Touch DNA is the transfer of DNA molecules to a solid surface of an item via the deposit of cells through the handling of that item. Using the traditional double swabbing technique, low copy number (LCN) DNA may be lost because of the high water content of fingerprints and subsequently touch DNA. Using a surfactant allows a protective coating to be formed around the transferred material and the hydrophilic ends associate with the water from the touch DNA. The traditional double swab technique uses water as the surfactant which could further dilute the LCN DNA. It is believed that the use of ethanol and sodium dodecyl sulfate (SDS) as a surfactant retains a greater amount of DNA. Studies have shown that ethanol, an alcohol used at even a concentration of 20% reduces the surface tension of water. SDS is a detergent which contains hydrophilic properties allowing greater transfer of the compromised DNA left by touching an object.

Both male and female volunteers were recruited for this study, for a total sample size (N) of 20. Prior to swabbing, the nonporous objects were wiped with a 100% ethanol solution, air dried, and exposed to ultraviolet light to reduce contamination from previous handling of the object. Each subject was asked to handle the item in a way that would replicate everyday use. The objects were swabbed using the double swab technique. The initial swab was moistened with either a 1:1 absolute ethanol and Nanopure Water solution or 100% SDS solution, followed by a dry swab to collect any extraneous solution left behind. The process was repeated for each surfactant and the control with a one week interval between each experimental condition. An interval of one week allowed for the regeneration of surface epithelial cells. On average it takes thirty days for a skin cell to go from the most inner part of the epidermis to the outer layer. For the purpose of this study complete regeneration is not necessary therefore a one week interval between experimental conditions is more than sufficient. The top of the swabs were cut and stored in a 1% PBS solution before the extraction process. Both the dry and wet swabs were combined in the extraction process using the commercially available Qiagen QIAamp DNA Blood Mini Kit. Extracted DNA was quantified via real-time PCR. A multiplex of mini-STR primers was used in the PCR reaction. Genotyping was performed on an ABI 3100-Avant Genetic Analyzer. Preliminary results support the 100% SDS as being the most effective surfactant.

Surfactant, Touch DNA, Double Swabbing Technique