A140 DNA Extraction and Amplification From Soft Contact Lenses

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The goal of this presentation is to demonstrate to the forensic community the feasibility of obtaining high quality and quantity DNA yields for subsequent analysis from soft contact lenses.

This presentation will impact the forensic science community by presenting pilot data on the successful extraction and PCR amplification of transferred epithelial cells from soft contact lenses. Since the items left at crime scenes are often not the best reservoirs for DNA or in ideal environmental circumstances, it is important to systematically test potential pieces of crime scene evidence in a controlled environment.

Forensic investigators are often confronted with less than ideal crime scene evidence available for the positive identification of an individual or for linking an individual to a particular location. DNA analysis is a popular technique that produces individualizing biological information. However, there is often limited evidence containing DNA of high enough quantity and quality for subsequent analysis. There have been published case reports in which victims have lost contact lenses during an attack or confinement at a particular location. Soft contact lenses are used by a large proportion of the American society and it is very likely that they may be recovered at a crime scene location and become a valuable piece of information in a forensic investigation. There have not been any systematic studies undertaken to examine the utility of contact lenses as a source of viable DNA for PCR amplification based analyses. The goal of this research is to conduct a pilot study to assess the potential of successful DNA extraction and amplification from soft contact lenses.

Soft contact lenses can potentially provide a source of DNA in sufficient quantity to produce a DNA profile due to their close association with human skin. A contact lens fits tightly against the anterior aspect of the eye and contains two types of epithelial cells: corneal and bulbar. The corneal epithelial cells are located along the eye's surface and the bulbar epithelial cells are located on the inner eyelid and corners of the eye. These epithelial cells are shed each time an individual blinks their eye. Since these cells are nucleated and regenerate every six to twenty four hours, they become a potential source for template DNA. This study exploits the possibility that the epithelial cells are transferred to the inner and outer contact surfaces once they are shed from the body.

This pilot study employed both dry and wet contact lenses that had been worn for various time periods beginning at fifteen minutes. The dry lenses were allowed to air dry for one to three weeks, and the wet lenses were swabbed for DNA immediately after removal from the eyes. The type of DNA employed in this study is nuclear DNA because of its individualizing properties and its use in forensic investigations. PCR amplifications used the HUMTHO1 primer set, and appropriate controls were used to check for contamination throughout the process. The quantity and quality of the amplified DNA was compared between the wet and dry lenses. DNA quantity was assessed by amplicon intensity on an agarose gel and DNA quality was assessed by PCR amplification success. PCR amplifiable DNA was obtained from both the wet and dry soft contact lenses in various quantities, suggesting that contact lenses are a potential source for analyzable DNA at crime scenes.

DNA, PCR Amplification, Contact Lenses

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