D46 DNA Extraction of Desiccated Contact Lens Using the Medium Chelex® 100

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After attending this presentation, attendees will understand that Chelex® is a viable means for extraction of amplifiable DNA from desiccated contact lenses. This protocol is preferred over an organic extraction method such as phenol/chloroform as it is a faster, less hazardous extraction protocol, using a single tube thereby greatly reducing the potential for introducing laboratory contaminants.

This presentation will impact the forensic community and/or humanity by demonstrating that dehydrated contact lens may be collected and used as a source of evidence in order to link a suspect or victim to a crime scene. Because only one person, which is not always the case with a toothbrush or hairbrush, uses contact lenses for example, no mixtures would be encountered giving way to a positive identification that does not require further testing to resolve a potential mixture of genotypes.

The study performed during the Ronald E. McNair summer research program, (supported by USDE grant # P217A030070) will be presented on this poster. It will be demonstrated that exposure time of a soft contact lens to the ambient environment, for up to 72 hours, will not significantly affect the ability to extract, amplify, and type DNA as tested at the D1S80 locus. This poster will also demonstrate that Chelex® is a viable means for extraction of amplifiable template. This protocol is preferred over an organic extraction method such as phenol/chloroform as it is a faster, less hazardous extraction protocol, using a single tube thereby greatly reducing the potential for introducing laboratory contaminants.

Because crime scenes, areas of mass disasters, and unmarked graves sites are unpredictable, evidence recovered at such locations can also be unpredictable, creating a need for the forensic science community to look at unusual matrices as potential sources of DNA used for identification. The DNA found on such substrates may be limited in both quality and quantity making it necessary to subject extracts from the matrices to PCR prior to analysis. A recent report demonstrated that amplifiable DNA was successfully isolated from contact lens fragments using the phenol/chloroform method (Wickenheiser & Jobin, 1999). To study the comparative effectiveness of other, less hazardous DNA extraction methods on DNA left on desiccated contact lens, this pilot study was conducted.

A total of three brands of contact lenses (Acuvue®, Bausch & Lomb and Focus Dailies®) were donated by five volunteers and subjected to a dry environment for either 24, 48, or 72 hours. Buccal scrapings were performed on each individual in order to establish a reference genotype for D1S80. The DNA from both the reference samples and the lenses were extracted using Chelex®, the D1S80 alleles were then amplified and typed using a vertical polyacrylamide gel on an ABI Prism 377XL DNA sequencer.

The preliminary results indicate that an inverse relationship exists between exposure time and quality of DNA recovered: as the “dry” exposure time increases, the DNA quality decreases. Genotypes identified from three out of the five desiccated lens (exposure times of 24 and 48 hours) matched the alleles for their corresponding buccal sample. DNA was recovered from the remaining two lenses (dry for 48 and 72 hours) but appeared to be severely degraded and could not be typed. The successful typing of the three lenses indicates that the Chelex® protocol is an adequate method for extracting DNA.

In order to resolve the difficulty in the recovery of DNA from some of the samples, the preservation and storage of the lenses needs to be enhanced in order to eliminate any continual degradation of the DNA. Although the procedure used was relatively successful, it may be helpful to incorporate an additional step to purify the DNA prior to PCR such as filtration purification (i.e., Microcon YM100).

The results obtained demonstrate that dehydrated contact lens may be collected and used as a source of evidence in order to link a suspect or victim to a crime scene. Because only one person, which is not always the case with a toothbrush or hairbrush, uses contact lenses for example, no mixtures would be encountered giving way to a positive identification that does not require further testing to resolve a potential mixture of genotypes.

This is the initial study undertaken by the researcher, with further, in-depth study being planned using the 13 loci used by the forensic community.

Contact Lens, DNA Extraction, Chelex

 ** Presenting Author*