DNA FROM URINE AS A POTENTIAL SOURCE OF IDENTIFICATION

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The use of biological samples and bodily fluids as sources of DNA for identification has been thoroughly investigated and documented. Urine, however, has not been heavily studied as a potential source of DNA for forensic identification purposes. This study attempts to evaluate the usefulness of extracting nuclear and mitochondrial DNA from both female and male contributors.

Urine is not considered an ideal source of DNA due to the low concentration of nucleated cells present in human urine. The nucleated cells found in urine are typically white blood cells and epithelial cells. There are large differences between the amount of epithelial cells present in male and female urine. Females are more likely to have a higher number of epithelial cells present in their urine, vaginal cells being the chief contributors.

The need for the use of urine as an identification tool may arise from a crime scene, or in a toxicology laboratory. At a crime scene, urine may be used to identify the perpetrator of a crime, or to place a victim at a particular site. In a laboratory, DNA analysis may be needed to positively identify an individual as the submitter of a particular urine sample, especially in the case of contested positive sample.

Due to the different situations for use, we investigated different extraction protocols, storage methods, and DNA typed. Urine samples were collected from four male and three female volunteers. Whole urine was extracted using a modified Chelex® procedure. Urine was also spotted onto FTA® GeneCards, and extracted according to the Life Technologies protocol. Amplification was performed using the Perkin Elmer AmpF*l*STR™ Profiler Plus™ and Cofiler™ PCR kits, and run on the ABI™ 310 Genetic Analyzer. Results were obtained for Profiler Plus™ and Cofiler™ loci on the female samples, but we had no success with the male samples. Both the female FTA® and Chelex® extracted DNA yielded good results.

Because of the lack of results with the male urine samples, we proceeded with a mitochondrial DNA (mtDNA) amplification on both the male and female samples. Some of the mtDNA amplifications were performed using the Fastype mtDNA System. Amplification was carried out on the HV1A, HV1B, HV2A, and HV2B regions of the mitochondrial genome. We were able to successfully amplify the male and female urine samples for both regions in the forward and reverse directions, using both the FTA® and Chelex® extracted DNA.

Both the Chelex® and FTA® GeneCard extraction methods yielded sufficient amounts of clean template DNA. Female urine seemed to pose no problem in extractions and amplification. Because of the lower amount of DNA present in male urine, mtDNA from urine on FTA® cards would not only be a means for collecting urine at a crime scene, but also a good storage method for laboratories to store urine needed for identity purposes.