OBTAINING DNA PROFILES FROM PRESERVED TISSUE SAMPLES USING POWERPLEX® SYSTEMS

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In some forensic cases, the victim's body might be missing. Obtaining DNA profiles from evidence samples at the crime scene and comparing them with clinically preserved tissues can help to determine if the body fluids obtained at the crime scene originated from the victim or the suspect. Additionally, in paternity cases in which an aborted fetus has been preserved in fixatives, it is useful to obtain DNA profile from the tissue to find possible linkage to the genetic parents.

The objective of this research was to investigate the quality of the DNA profiles obtained from human tissue samples that had been preserved in various chemicals such as formalin and alcohol. Another aspect of this research was to evaluate the DNA extracted from these preserved tissues to see if they yielded complete STR profiles of the same quality as tissues which were not subjected to preservatives.

DNA was extracted from different tissue samples from two deceased females and one deceased male. Pieces of samples such as liver, kidney, colon, intestine, and muscles were extracted using Qiagen EZ1 BioRobot instrument and DNA Investigator Kit. DNA profiles were obtained using primers from PowerPlex® Fusion System from Promega Corporation.

Reference blood samples were obtained from the donors of these tissues. These blood samples were deposited on FTA cards and amplified directly with primers contained in the PowerPlex® Fusion kit. Results of the STR profiles obtained from the tissues were compared to the known profiles generated from the blood to establish concordance. Profiles from different tissue types were evaluated and no differences were noted in the quality of the profiles from different samples. Once that was established, they were subjected to various chemical preservatives.

A small amount of each sample was preserved in formalin and alcohol. The time the samples were left in the chemicals ranged from a few hours to several days. DNA was extracted from each of the item after they have been left in the chemical for a defined period of time. The recommended EZ1 DNA investigator kit protocol was used for extracting the samples.

An optimum amount of extracted DNA was used for amplification with primers and reagents contained in the PowerPlex® Fusion kit. The volume of the reaction was reduced to half of the recommended amount. Samples from the male individual was amplified using the PowerPlex®Y23 kit following the manufacturer's recommended protocol except that the volume was reduced to half of the recommended volume.

Analysis of the amplified products was performed by capillary electrophoresis injection on the Applied Biosystems 3130xl Genetic Analyzer. The generated data was analyzed using GeneMarker® HID Software from SoftGenetics®. Concordance study was conducted to determine if all of the preservatives and the amount of time the samples have been left in them have similar effect on the quality of DNA profiles.

It was determined that DNA profiles from tissues preserved in alcohol were of better quality compared to the profiles obtained from tissues preserved in formalin. Partial profiles were obtained from tissues fixed with 10% Neutral Buffered Formalin when preserved for 13 days.

Complete and concordant profiles were generated from tissues fixed in alcohol for at least eight weeks using the PowerPlex® Fusion System.