SENSITIVITY OF DNA EXTRACTION METHODS FROM DIFFERENT BODILY FLUID FOR HUMAN IDENTIFICATION

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Biological evidence found at a crime scene can provide critical genetic information for crime scene reconstruction by determining if there is a link between sample donors and actual criminal acts. Extracted DNA coupled with detection using different short tandem repeat (STR) systems have become an integrated part of crime scene investigation. Many biological samples are present in the form of biological fluids including blood, saliva, urine, semen and vaginal fluid. The applicability of each of these fluids to human identification could vary greatly. While fluids such as blood contains relatively large amount of cells and hence nucleic acid for genetic identification, some fluids such as urine has very diluted amount of genetic materials for analysis. Moreover, the quality of nucleic acid depends on the degree of degradation of the sample upon sample collection and whether the sample collected is properly preserved, prior to nucleic acid extraction. Finally, different DNA extraction methods may result in different quantity and quality of DNA for analysis. In this study, we attempted to address a number of questions regarding sample collection/preservation as well sample extraction for use of DNA-based human identification including (1) What is the minimal quantity of each bodily fluid sufficient for DNA-based analysis? (2) Which extraction method could provide the most sensitive recovery of DNA from different bodily fluids? (3) Is there a benefit with sample preservation for the bodily fluids collected? DNA was extracted from different volumes of blood, saliva and urine (both preserved and not preserved) using different procedures including both a column-based protocol and an alcohol precipitation protocol. The extracted DNA was subjected to standard STR analysis (including Promega's PowerPlex systems). While the amount of DNA recovered per volume input was much lower from urine compared to blood and saliva, using a column procedure, successful STR analysis could be achieved with as little as 50 □L of urine input. Both column-based and alcohol precipitation extraction worked well for samples with high DNA content such as blood and saliva. However, the use of a resin/column-based protocol provided much better sensitivity for urine. Finally, the requirement of sample preservation is generally preferred, in particular for input rich in nucleases like saliva.