

A CAPILLARY ELECTROPHORESIS BASED METHOD FOR IDENTIFYING FORENSICALLY RELEVANT BODY FLUIDS USING miRNAs

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In many cases, probative information may be gained from evidence through the identification of the source body fluid in addition to identification of a person. While serological tests are commonly used by crime laboratories, they are generally presumptive in nature due to differing levels of specificity and sensitivity. However, nucleic-acid based methods have been proposed as a means to provide a more confirmatory method of body fluid identification (BFID). These methods allow for the identification of a greater number of body fluids as well as the ability to co-analyze with DNA and consume less evidentiary sample. Recently, miRNAs have been suggested as a biomarker for BFID due to their small size (19-22 nucleotides), making them ideal for analyzing highly degraded samples.

In this study, we generated both DNA and miRNA profiles from single co-extracted samples using capillary electrophoresis-based methods. For the miRNA analysis, we expanded on a previously reported linear primer system in order to include additional markers. In this panel, an 8-marker system was designed to differentiate venous blood (miR-451 and miR-142-3), menstrual blood (miR-141-3 and miR-412), semen (miR-891 and miR-10), and saliva (miR-205). In addition, an endogenous reference gene (let-7g) was included to confirm successful reverse transcription and amplification.

Each primer set was evaluated in singleplex to assess cross-reactivity between body fluids and genomic DNA as well as to determine optimal amplification conditions. All samples tested yielded full STR profiles from the DNA fraction and let-7g amplification from the RNA fraction. Although some cross-reactivity was observed, a presence/absence scheme was developed to distinguish between venous blood, menstrual blood, semen, and saliva.