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DUAL EXTRACTION OF RNA AND DNA FROM HUMAN BODY FLUIDS FOR USE IN FORENSIC CASEWORK

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Conventional methods of body fluid identification use a variety of labor-intensive, technologically diverse techniques that are performed in a series, not parallel, manner and are costly in terms of time and sample. Recently, a multiplex reverse transcription polymerase chain reaction (RT-PCR) method for definitive identification of body fluids that are most commonly encountered in forensic casework analysis, namely blood, saliva, semen, and vaginal secretions, has been developed (Juusola and Ballantyne, 2005). A messenger RNA (mRNA)-based approach to body fluid identification offers several advantages over conventional methods, including greater specificity, simultaneous analysis through common assay format, the potential for automation, and decreased sample consumption.

In order for a multiplex RT-PCR assay to become routine in casework, the ability to co-extract DNA and RNA from forensic samples needs to be validated. It is critical that the use of RNA for body fluid identification does not deplete the supply of DNA required for further genetic typing of the donor, which is especially pertinent in samples containing low amounts of DNA. Therefore, dual DNA and RNA extraction protocols that limit sample consumption are being developed and evaluated. Both RNA and DNA were obtained from evidentiary-type samples by utilizing a modified version of the FBI's Standard Operating Protocol (SOP) followed by the use of Qiagen's AllPrep DNA/RNA Mini Kit. Extracted RNA was quantified and was found to be in sufficient quantities for downstream analysis. Specifically, RNA was amplified through a multiplex RT-PCR with tissue-specific primers targeted for commonly encountered body fluids in forensic casework samples. Short tandem repeat (STR) analysis was performed on DNA extracted using our modified protocol to demonstrate that the method of DNA extraction did not alter the STR profile of the sample. Samples extracted using the modified protocols provided similar amounts of DNA as compared to the SOP. Initial results suggest that a dual extraction protocol is feasible for isolation of RNA and DNA from forensic samples.