RAPID RESULTS FROM DIRECT AMPLIFICATION OF BLOOD AND TOUCH DNA WITH MICROFLOQ™ SWABS

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Standard forensic DNA profiling is a multistep process that can be time-consuming. The process typically consists of DNA extraction, quantification, PCR amplification of STRs, and resolution of STR amplicons by capillary electrophoresis. It is of great interest for forensic laboratories to reduce processing time as speedier DNA results can facilitate earlier database searches and consequent faster identification of the perpetrator. Direct PCR amplification is a technique that offers a possible solution. In this method, samples are added directly into the PCR amplification reaction. Removing extraction and quantification allows shortening the overall processing time by about three hours. The loss of DNA that is reportedly associated with DNA extraction is also negated with the removal of these steps. However, the removal of extraction and quantification can lead to un-purified and sub-optimal amounts of DNA template being used for PCR amplification, thereby leading to poorer quality DNA profiles.

We evaluated the use of the MicroFLOQ™ direct swabs which are nylon-flocked swabs designed specifically for the collection of samples for direct PCR amplification. Sample collection and processing is made easy as swab heads can be snapped off directly into a PCR tube. A lysing agent has also been incorporated to facilitate the release of DNA from cells for direct PCR amplification. Less sample is consumed as compared to traditional swabbing, allowing for re-testing if and when necessary.

The present study optimised direct PCR using MicroFLOQ™ swabs with the GlobalFiler™ system. As the manufacturer-recommended method of pipetting 1ul of water to moisten the swab head was not readily applicable for crime scene use, we evaluated an alternative method of contacting the swab head onto the water surface which did not result in a loss of efficacy. Additionally, supplementing the PCR reaction mix with a PCR enhancer was shown to lessen the impact of inhibitors in directly amplified blood samples. This study also investigated the impact of collecting different amount of bloodstain. The robustness of the method was evaluated on various substrate types commonly encountered in DNA casework. It was observed that the average peak heights of the DNA profiles generated using this direct amplification method were generally similar, if not higher than that obtained from the standard DNA profiling workflow.