

A COMPARISON OF CONCENTRATION METHODS FOR LOW COPY NUMBER FORENSIC DNA ANALYSIS

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A commonly encountered hurdle in the processing of forensic DNA samples is the amount of DNA available for STR genotyping. This can be a function of either the sample itself, the collection of DNA from the sample, or the DNA extraction process. Standard low copy number (LCN) DNA typing techniques are typically performed as part of, or following, the amplification process. These include but are not limited to: increased amplification cycles, reduced amplification reaction volumes, increased injection voltage and/or time, and post-amplification purification. Due to the relatively small amount of input DNA utilized in amplification of LCN samples these methods are highly controversial as a result of stochastic effects which complicate the data analysis interpretation process. However, LCN typing techniques may be avoided or reduced by improved processes prior to amplification of purified DNA such as improved sample storage, DNA collection, DNA extraction, or concentration of extracted DNA.

In the study presented, several commonly used methods of DNA concentration were tested including Millipore™ Amicon-Ultra centrifugal filters, sample dry-down to specific volumes, sample dry-down and re-suspension, ethanol precipitation, and polyethylene glycol precipitation. Furthermore, the use of different carrier molecules were evaluated (*i.e.* carrier RNA, non-human carrier DNA) to determine their utility in each method and to what degree they influenced recovery of LCN DNA. Finally, the ability of each technique to effectively concentrate degraded DNA was tested. A comparison of percentage recovery and increase in final DNA yield and concentration was performed in order to determine the best approach for processing low-level DNA samples prior to amplification, thereby minimizing or eliminating stochastic effects *a priori*.