IMPROVED TOOLS FOR EXAMINING LOW COPY NUMBER (LCN) DNA OBTAINED FROM CHALLENGED OR DEGRADED SAMPLES

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There are limits to forensic DNA analysis. One important parameter is the amount of template DNA used in the polymerase chain reaction (PCR). When the amount of DNA is below a certain quantity, the results obtained from current forensic DNA typing methodology generally are not reproducible because low copy number (LCN) typing is not sufficiently robust. In order to improve LCN typing, several approaches were undertaken which include: 1) improvements to the robustness of the amplification through the use of PCR enhancers; 2) increasing DNA recovery using pressure cycling technology (PCT), improved silica columns, or synchronous coefficient of drag alteration technology (SCODA); and 3) more efficiently reducing inhibition. The data illustrate that each of these approaches can contribute to improving the efficacy of analysis either by increasing yield of sample, more effectively purifying a sample, or by increasing amplification efficiency (e.g., decreased stutter). The impact is that some samples that traditionally yield too little DNA for typing may become suitable for routine analysis or a more effective methodology may be developed that will enable analysis of samples that typically have not been typeable. Moreover, more challenged samples may be analyzed by combinations of better purification columns, PCT, SCODA, and PCR enhancement.