THE USE OF SYNCHRONOUS COEFFICIENT OF DRAG ALTERATION (SCODA) TECHNOLOGY TO EXTRACT, PURIFY AND CONCENTRATE DNA FROM CHALLENDING OR DEGRADED FORENSIC SAMPLES

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Some forensic samples tend to present many challenges for successful short tandem repeat (STR) profiling due to degraded and low amounts of template DNA as well as the presence of inhibitors that can interfere with DNA amplification by polymerase chain reaction (PCR). Commonly used extraction methods, such as silica-membrane columns and phenol/chloroform, have been successful in recovering low copy number (LCN) DNA and removing inhibitors. However, even after the use of such methods some challenged forensic samples still fail to provide an STR profile. In addition, during sample manipulation with these methods there can be substantial loss of DNA. Synchronous coefficient of drag alteration (SCODA) is a new technology, utilized in the Aurora system (Boreal Genomics, Vancouver, BC), that effectively removes all inhibitors while simultaneously concentrating DNA. SCODA was used to extract, purify, and concentrate the DNA from challenged forensic samples. Human skeletal remains (i.e. large bone fragments) from several individuals, which previously failed to generate an STR profile or only produced a partial profile from a silica-membrane column DNA extraction method, were selected to be subjected to SCODA. Following bone decalcification and protein digestion, the large-volume bone lysates were filtered to remove salts and added directly to the Aurora system. Purified DNA was removed from the cartridge and amplified using the AmpFℓSTR® Identifiler® Plus PCR Amplification Kit (Applied Biosystems, Foster City, CA). STR profiles were generated using the 3500*xl* Genetic Analyzer (Applied Biosystems) and analyzed using GeneMapper® ID-X software (Applied Biosystems). SCODA successfully removed inhibitors and concentrated the low quantity DNA from the bone samples to allow for the successful amplification of partial to full STR profiles. The Aurora system provides an automated, minimal-step approach to successfully remove inhibitors and concentrate DNA from challenged forensic samples.