



A127 Automated Extraction of High Quality Genomic DNA From Forensic Evidence Samples Using a Cartridge-Based System

Jason Liu, PhD, Maxim Brevnov, PhD, Allison Holt, PhD, and James Stray, PhD, Life Technologies, 850 Lincoln Centre Drive, Foster City, CA 94404; Declan Donovan, PhD, Life Technologies, 5791 Van Allen Way, Carlsbad, CA 92008; Alan B. Dixon, MSFS, Applied Biosystems, 850 Lincoln Centre Drive, Foster City, CA 94404; Jim Nurse, BS, and Manohar R. Furtado, PhD, Life Technologies, 850 Lincoln Centre Drive, Mail Stop # 402, Foster City, CA 94404; and Jaiprakash G. Shewale, PhD, Life Technologies, Applied Biosystems, 850 Lincoln Centre Drive, Mail Stop 402, Foster City, CA 94404*

After attending this presentation, attendees will have learned about a new and unique method for automated extraction of genomic DNA from forensic evidence samples. The extraction method enables recovery of genomic DNA from forensic samples.

This presentation will impact the forensic science community by demonstrating a novel automated method developed specifically for extraction of genomic DNA from forensic evidence samples.

DNA analysis plays an important role in human identification (HID).

The past two decades have witnessed advancements in the development of new technologies for short tandem repeat (STR) analysis. However, isolation of DNA from forensic evidence samples is still a challenging process that creates bottlenecks in the sample processing workflow. This is due to the large variation in sample types and substrates, possible exposure of the samples to environmental insults, presence of PCR inhibitors and limited starting material. Therefore, it is important that the procedure used to isolate genomic DNA is efficient and delivers DNA in a highly purified form. It is also desirable to have an extraction methodology that enables quantitative recovery of DNA from small quantities of starting material.

In this presentation, we describe an automated DNA purification system that enables the isolation of genomic DNA from forensic samples. This DNA is ready for downstream applications including real-time qPCR and genotyping. We have also designed and implemented a novel apparatus for lysis and the separation of the lysate from the substrate. This novel apparatus minimizes sample handling and maximizes lysate recovery. This automated extraction method employs multi-component surface chemistry to isolate genomic DNA from forensic evidence samples. All reagents required for purification of DNA from the lysate of one forensic sample are packaged into a single cartridge, resulting in consistent recovery and minimizing cross contamination risks. A total of thirteen sample lysates can be processed for isolation of DNA simultaneously. Walk-away operation increases both the efficiency of trained forensic analysts and the throughput of forensic labs. The automated protocols are optimized for extraction of DNA from a variety of sample types including blood stains on denim, cotton cloth, and FTA® paper, samples spiked with PCR inhibitors, saliva on swabs, semen on cotton fabric, bones, teeth, chewing gum, cigarette butts, tape lifts, and touch evidence samples. DNA yields for all samples tested were equal to or greater than other automated DNA extraction methodologies. DNA obtained from these samples was free of detectable PCR inhibitors.

High quality of isolated genomic DNA is demonstrated by the successful amplification of STR profiles obtained. Performance and ease of use of the automated benchtop DNA extraction system is better than or comparable to similar benchtop extraction systems for extraction of DNA from forensic samples.

DNA Extraction, Automation, DNA Analysis