B158 A Comparison of Automated DNA Extraction Methods

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This presentation will describe and compare three different automated DNA extraction approaches.

Three automated extraction procedures were evaluated and compared to chelex extraction. The current chelex extraction procedure used at the OCME takes approximately 2 hours to complete 20 samples. If this step could be automated, it would free up the analyst to work on additional tests.

The comparison experiments were designed to address the success rate for small stain sizes and the efficiency of the removal of inhibitors. Bloodstains of 1 µl and 4 µl in size were made on white and dyed cotton cloth, filter paper, suede, blue jeans, and rug. The stains were then extracted using 5% chelex (OCME STR manual, 2003), QIAamp™ by Qiagen, DNA IQ™ by Promega Corporation, and MagAttrct™ by Qiagen.

QIAamp kits automate the isolation of nucleic acids from a wide variety of samples with a 96-well plate procedure. Nucleic acids bind specifically to the QIAamp silica-gel membrane while contaminants pass through. While the extraction yields a large amount of purified DNA, the batch size is not flexible. The QIAamp technology is currently running on a Biorobot 9604.

MagAttract DNA Systems are designed for fully automated DNA purification on a M48 or a M96 robot. The M48 has many anti-contamination features such as an enclosed workstation, a drip tray, and built in UV capability. MagAttract uses paramagnetic particle technology for the capture and release of DNA. The batch sizes of the M48 and M96 robots are flexible.

The DNA IQ™ system is a DNA isolation system and quantitation system designed to yield a preset constant amount of DNA. This constant amount of DNA allows quantitation to become optional on database samples. This system also employs aparamagnetic particle technology that binds and releases the DNA. Excess DNA is removed during the wash steps because of the paramagnetic particles becoming over saturated. The isolation of genomic DNA using the DNA IQ™ System has been automated on the Biomek™ 2000 Laboratory Automation Workstation.

All extracted samples were quantitated using the Quantiblot™ system by Perkin Elmer Applied Biosystems. Selected samples were then amplified using Profiler plus with the product then ran on a ABI 3100 DNA Sequencer.

Data were evaluated based on the amount of DNA recovered, presence or absence of inhibitors, and amplification success rates.

Automation, STR Testing, Extraction

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