



### **B79 Validation of an Automated Liquid Handling System and Application Software for Streamlined Processing of Forensic DNA Samples Using the Tecan EVO 150 and Applied Biosystems 7500 Real Time PCR System and 3130xl Genetic Analyzer**

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After attending this presentation, attendees will be briefed on the use of automated liquid handling system for generation of STR profiles from forensic DNA samples.

This presentation will impact the forensic community and/or humanity by demonstrating a way for forensic labs to automate some of their procedures to help with the DNA sample backlog and the increase in DNA sample submission

Over the last two years, forensic casework and databasing laboratories have observed increases in the numbers of samples submitted to their labs for DNA testing. This increase is due, in part, to two factors: 1) the extensive backlog of evidence samples, and the lack of funding and/or personnel currently available to process these samples, and 2) implementation of legislation which fuels development and expansion of DNA databases resulting in increased submissions of convicted offender samples. These factors require an increase in throughput, and consistent, error-free sample processing and data handling. TECAN and Applied Biosystems established a relationship to develop an automated liquid handling system with application specific software to process forensic DNA samples. The goals of this project were to 1) reduce the hands on time required to set up and process samples, 2) eliminate pipetting errors (transposition), 3) streamline transfer of sample data between instruments, 4) provide extensive validation of the system, and 5) establish a flexible system foundation that is expandable to accommodate additional applications in forensic laboratories, and that will allow further improvements in processing speed and efficiency.

This presentation summarizes the work performed to develop and validate an automated liquid handling system for DNA quantification and STR profiling using the Applied Biosystems Quantifiler® DNA Quantification Kits and AmpF/STR® PCR Amplification Kits. The hardware for the automated system consists of a Tecan Freedom EVO® 150 for liquid handling, the Applied Biosystems 7500 Real Time PCR System for DNA quantification, an Applied Biosystems GeneAmp® PCR System 9700 for STR amplification, and an Applied Biosystems 3130xl Genetic Analyzer for detection of the amplified STR markers.

Pipetting methods and liquid classes were developed by Tecan automation specialists based on the specific components and requirements of each Applied Biosystems kit. All methods and classes were individually tested and validated on the Freedom EVO® 150 prior to testing in the completed system. Extensive cross contamination studies were performed to confirm the ability of the Freedom EVO® 150 to consistently assemble reactions without contamination. Testing of individual software components was performed throughout software development, and a comprehensive software system test was performed prior to validation of the entire system.

Validation of the entire automated system consisted of processing mock forensic sample DNA extracts through DNA quantitation, DNA normalization, PCR amplification, and generation of the STR profile. Results from the automated system were compared to results generated manually for genotype concordance and peak heights.

**Automated Liquid Handling, AmpF?STR, DNA Quantitation**