A36   Internal Validation of GeneMapper®ID-X for Use in Forensic Casework

Emily M. Fete, BS, Marshall University Forensic Science Program, 1401 Forensic Science Drive, Huntington, WV 25701; Angela D. Spessard, MFS, and Karin A. Crenshaw, MS, Palm Beach County Sheriff's Office, 3228 Gun Club Road, West Palm Beach, FL 33406; and Amy McGuckian, MSFS, and Cecelia A. Crouse, PhD, Palm Beach County Sherrif's Office, Crime Laboratory, 3228 Gun Club Road, West Palm Beach, FL 33406-3001*

After attending this presentation, attendees will understand the need for an efficient software system to help streamline data analysis in laboratories experiencing a bottleneck of forensic DNA interpretation.

This presentation will impact the forensic community by demonstrating the effectiveness of GeneMapper®ID-X for analysis of both casework samples as well as an expert system for casework standards. Moreover, mixture analysis tools from GeneMapper®ID-X and ArmedXpert™ will be presented and compared.

Due to the implementation of robotic equipment to extract, quantitate, amplify, and detect forensic DNA samples, the bottleneck of forensic DNA analysis has shifted to data interpretation. There is now a need for computer software that maximizes efficiency and encompasses the resources needed for DNA analysis. Applied Biosystems' GeneMapper®ID-X is one of the software systems capable of reducing this bottleneck and providing a suite of tools to assist in single source and DNA mixture interpretation.

The Palm Beach County Sheriff's Office Forensic Biology Unit (FBU) DNA validation data was originally created, collected, and analyzed using Promega's PowerPlex®16 amplification kit, two AB®3130*xl* platforms, and GeneMapper®ID v3.2.1 (GMID). The FBU recently purchased GeneMapper®ID-X v1.2 (GMID-X) for use with questioned casework samples and plans to utilize the expert system capabilities for streamlining the interpretation and review of known casework samples. The validation of GMID-X for use with casework included the following studies: known samples and stutter, NIST, non-probative, reproducibility, precision, contamination and analytical threshold, sensitivity and stochastic thresholds, and mixtures. The studies were completed according to the Scientific Working Group for DNA Analysis (SWGDAM) guidelines. Original GMID data was analyzed with GMID-X and the results were compared.

The GMID-X software was able to produce accurate, reliable, reproducible, and concordant results between data obtained with GMID. Concordant allele calls, basepair, and RFUs were obtained between GMID-X and the originally analyzed data using GMID. The validation data demonstrates that GMID-X is suitable for use with forensic casework using PowerPlex®16 and the FBU's two AB®3130*xl* platforms.

Upon completion of the validation of GMID-X for typical forensic samples, the validation of GMID-X as an expert system was initiated. GMID-X can automatically review allelic ladders, controls, and samples using user defined thresholds, and with color-coded process quality value flags (PQVs), it can assist in the manual review of single source samples. For the validation of GMID-X as an expert system, known single source samples were run through the software to determine the applicable peak quality values for the FBU laboratory. A workflow with different analysis methods and table settings distinct from those used by the FBU to analyze and interpret unknown casework samples was created.

GMID-X also contains a new Mixture Analysis Tool that is meant to assist analysts in deconvoluting two-person mixtures by performing mixture calculations and helping provide analysts with a common platform from which to interpret DNA mixtures. Another mixture analysis tool that can be used in conjunction with GMID-X is ArmedXpert™. A mixture study was conducted with two mixture sets on both software systems in order to determine ease of use and establish a workflow for each mixture analysis tool. ArmedXpert™ requires GMID or GMID-X to correctly size and generate DNA profiles prior to importing them into ArmedXpert™ for analysis. Once a profile is imported, it can be compared to staff profiles, compared to other samples run in the same batch, compared to known standards, or sent to the mixture interpretation section of the software for up to three-person DNA mixture deconvolution. ArmedXpert™ and GMID-X can also perform random match probability, combined probability of inclusion/exclusion, and likelihood ratio statistics.

Overall, GMID-X is one of several software systems available to reduce the forensic data review bottleneck. The implementation of an expert system into a laboratory's workflow will reduce the need for manual review of known samples by streamlining the analysis of typical forensic casework samples. GMID-X has been validated for use with casework samples and the foundation for its validation for use as an expert system for known single source samples has been established. GMID-X and ArmedXpert™ are important tools available for DNA analysts to assist with the often time-consuming and complicated data interpretation of single source and mixture profiles. The generation of statistically appropriate calculations is another important advantage of these programs.

GeneMapper®ID-X, ArmedXpert™, Validation