



B151 The Benefits and Burdens of Implementing Probabilistic Genotyping (PG) Software

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Learning Overview: The goal of this presentation is to relate challenges and rewards encountered when implementing and using PG software in DNA casework.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing information to assist laboratories planning to implement PG software as a tool for DNA statistical calculations. Laboratories may encounter an unexpected negative impact on productivity after implementation.

PG methods are becoming widely used for DNA statistical analysis and this will continue as these statistical software tools provide more information in a more consistent and unbiased manner than previous methods. The Harris County Institute of Forensic Sciences implemented PG statistical software in February 2019 following validation and training DNA analysts over approximately 12 months. Since then, an increase in the number of informative results obtained per sample tested has been seen. Although the initial dip in productivity was attributed to analyst learning curve, it also became clear that as the sample success rate has increased, a commensurate increase in turnaround times was observed.

Low-level mixtures and mixtures exhibiting degradation become increasingly difficult to interpret manually as the number of contributors increases. This complexity is due to both potential missing information and an exponential increase in possible genotypes with each additional contributor. PG software allows an analyst to provide statistical calculations to samples that previously could not be evaluated through a binary method and were reported as inconclusive, uninterpretable, or having the potential for allele drop-out. While PG allows the laboratory to provide more information and do so more objectively, it does require more time to analyze samples. The additional information increases the detail in the report and the length and complexity of technical review.

To quantitate the increase in informative results, this study reviewed the percentage of samples that could be compared to a reference sample before and after implementing PG. Informative results increased from 18.8% to 34.2% with PG, almost doubling the reportable comparisons ($n=1,451$ and $1,183$ samples, respectively). Prior to PG, the average turnaround time of a sexual assault case (from submission to release of the report) was approximately 77 days and after implementation, it increased to approximately 98 days. This is approximately a 27.3% increase in time to complete analysis. To combat the increase in turnaround time, measures to limit the number of samples reported may be incorporated, such as a Y-screen for sexual assault samples or a stop at quantification procedure.

Using a PG statistical software can increase the number of informative results that a laboratory can report. Without additional changes to speed testing and reporting, the additional comparisons will increase the amount of time required to complete a case.

DNA, Probabilistic Genotyping, Productivity