A89   Processing One Million DNA Samples: Lessons Learned From a Decade of Offender Databasing

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After attending this presentation, attendees will learn: (1) a variety of tools and methods that can improve the efficiency and quality of offender databasing processing; (2) the importance and impact of selecting the most appropriate procedures and technical specifications; and, (3) how to recognize factors that significantly affect turn-around time, cost, efficiency, and overall productivity within their own forensic DNA laboratories.

This presentation will impact the forensic science community by discussing methods that DNA databasing laboratories can use to increase productivity, improve quality, and decrease costs in order to effectively manage and reduce offender DNA sample backlogs.

As a result of expanding offender collection legislation and demands to reduce DNA backlogs across the country, laboratories are continually confronted with meeting the challenges of an increased workload while following strict budgetary constraints. Additionally, with the increase in arrestee legislation, there is a higher demand to process DNA reference samples in much shorter turnaround times, which can often lead to inefficiencies within the laboratory. Through the processing of more than one million DNA database samples for the U.S. national database (CODIS), and more than 10 years of experience in high throughput DNA database sample processing and analysis, this study has identified a variety of methods described in this presentation that other laboratories can use to eliminate time-consuming and costly inefficiencies to increase throughput and reduce DNA backlogs.

This presentation will address ways to optimize the collection and testing process, and improve the first pass success rates of databasing samples. Maximizing the first pass success rate allows the laboratory to minimize re-testing, re-amplifications, re-injections, and ultimately simplifies data review. In order to achieve full optimization, a variety of processing, analytical, and quality factors were identified and evaluated based on overall impact and ease of implementation within the laboratory. Substrate options were carefully examined and evaluated, and a variety of extraction techniques were compared to determine which methods yielded the highest quality DNA while minimizing cost and processing times. Additionally, through experience, testing, and cost analysis reports, it was determined that maintaining a proper balance of automated and manual procedures is more productive and efficient than relying on just one method.

The selection of appropriate technical specifications is also highly critical. Specifications such as imbalance ratios, minimum relative fluorescent unit (RFU) values, and ceiling thresholds should be carefully considered. These factors can be key drivers of first pass success rates and dramatically influence reprocessing rates and cost. In addition, the importance of implementing a Laboratory Information Management System (LIMS) program that has been specifically designed for high-throughput processing of databasing samples is explained. The use of an LIMS program allows a laboratory to effectively track samples starting from accessioning through analysis and reporting, and should include extensive quality control checks specific to high-throughput testing. Additionally, the number of samples processed together within a batch has a large impact on cost and productivity. Factors such as collection rates, turnaround times, and staffing should be carefully considered when determining the appropriate batch size both for in-house processing and for outsourcing.

Knowing the limits of each step can also aid in the development of an effective database analyst training program. It has been documented that new analysts can be effectively trained within six weeks and be fully independent once the FBI QAS six-month training requirement is fulfilled. Finally, analyst productivity tracking has shown that analysts will be approximately 40% more efficient in their second or third year than analysts in their first year. This determination facilitates project planning, personal development goals, and the ability to meet expectations in even shorter turnaround times.

Database, Efficiency, Backlog