COMBINING FSS-i^3 SOFTWARE WITH NEW ANALYTICAL CAPABILITIES

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For forensic analysis, the period from 1993 to 2002 was characterized by enormous accomplishment in selection of standard loci for DNA typing and for development of sensitive, robust, and convenient STR multiplex systems. The success of this approach has created an enormous work load in forensic sample handling, analysis, and reporting. The number of samples currently requiring analysis, the diversity of sample sources, and analytical methods available to create and report profiles has increased significantly.

Computer software systems have provided new tools for forensic data review. Our laboratory alone will evaluate approximately 200,000 samples this year for over 20 institutions that provide diverse sample types, and require different extraction, quantification, and STR multiplex systems. This large diverse work load requires new and efficient approaches to analysis and data reporting.

The FSS i^3 software offers great advantage in correctly calling DNA profiles without human intervention. However, significant human time and effort results from the necessity to review GeneMapper profiles for samples that the FSS i^3 software puts into an unresolved "to be reviewed" category without definitive calls. We found that we were using the same criteria repeatedly to call most of these unresolved samples.

To minimize the data analysis required to accomplish our analytical goals, we have combined the most valuable data and processing strengths of FSS i^3 software with our internally developed add-on analytical programming. This combined artificial intelligence provides additional characterization of FSS i^3 output more in line with the requirements of our diverse analytical requirements and adapts output to the terminology used by our analysts. To summarize, the BodeCHECKS software solution accomplishes the following tasks with almost no human effort.

- Greater than 99.8% correct allele calls.
- Correct allele calls in circumstances that FSS i^3 provides uncertainty.
- Increased concordance (compared with GeneMapper ID or FSS i^3) between analyst and software conclusions.
- More refined description of reasons for failed samples.
- Unification of BodeCHECKS rejection code language with that of the Analysts.
- Automated determination of reprocessing pathways for failed samples.
- Significantly decreased analysis time.

No review of GeneMapper ID electropherograms or FSS i^3 "spikograms" is required. We will describe how this is accomplished, show how it increases quality checks in our work, and compare allele determination performance versus GeneMapper ID and FSS i^3 software.