

## **INCREASING EFFICIENCY OF HIGH THROUGHPUT DNA TYPING WITH A SINGLE REACTION STR MEGAPLEX: USE OF POWERPLEX® 16 ON ABI PLATFORMS**

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STR typing represents a significant improvement over previous DNA analysis methods, resulting in its adoption as a standard by various forensic laboratory systems around the world. The FBI has selected thirteen core STR loci as the basis for the CODIS database for both convicted felon and crime scene evidence samples. The advent of fluorescent detection methods allowed these loci to be tested as a pair of multiplexes requiring two sets of analyses to test all thirteen loci

Recently available, the PowerPlex® 16 multiplex amplifies the thirteen CODIS loci, the gender specific locus, amelogenin, and two additional pentanucleotide STR loci (Penta D and Penta E) in a single reaction. Analysis requires a single injection for capillary electrophoresis analysis or a single lane for slab gel analysis. The single-reaction kit offers significant improvements over two-reaction kits: 1) by decreasing the amount of labor involved in the DNA analysis from amplification up through detection, 2) by effectively doubling the throughput of the fluorescent detection platforms being used, and 3) by reducing consumption of tiny evidentiary samples. Increased throughput may be a particularly important consideration for laboratories using the single-capillary ABI™ 310 Genetic Analyzer.

We have validated the PowerPlex® 16 System on the ABI™ 310 Genetic Analyzer and the ABI™ Prism® 377 DNA Sequencer, addressing reproducibility, precision, sensitivity, balance, stutter, DNA mixtures, and comparing performance across detection platforms. Two-reaction analysis necessitates duplication of every step of testing, from amplification set-up (or from punching and extraction in the case of FTA®-card punches) through fluorescent detection. To address this, we have also evaluated the increased efficiency and throughput using single-reaction PowerPlex® 16 analysis on ABI detection platforms. Increased personnel efficiency and machine throughput are of interest to both forensic casework laboratories and to high throughput CODIS testing laboratories.