THE POWERPLEX® 16 SYSTEM: DEVELOPMENT AND VALIDATION

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Short tandem repeat (STR) polymorphisms are becoming the standard genetic markers used throughout the world for development of forensic databases. Many countries have selected STR loci for use with centralized databases. These searchable databases will eventually include the DNA profiles of millions of individuals and will make it possible to link suspects to crime scenes through the comparison of biological samples. STR loci are also being used for paternity and for immigration testing.

In this talk we will describe the development of the PowerPlex® 16 System. The PowerPlex® 16 System allows for amplification of 15 STR loci and the Amelogenin locus simultaneously in a single tube and analyzed in a single injection or gel lane. In the PowerPlex® 16 System, one of the two primers for Penta E, D18S51, D21S11, TH01 and D3S1358 loci is labeled with fluorescein (FL), one primer specific for FGA, TPOX, D8S1179, vWA and Amelogenin loci is labeled with carboxy-tetramethylrhodamine (TMR) and one primer specific for Penta D, CSF1PO, D16S539, D7S820, D13S317 and D5S818 loci is labeled with 6-carboxy-4´, 5´-dichloro-2´, 7´-dimethoxy-fluorescein (JOE). The PowerPlex® 16 System is designed specifically for use with the ABI Prism® 310 Genetic Analyzer and is compatible with the ABI Prism® 377 DNA Sequencer.

We will also discuss the validation efforts for the PowerPlex® 16 system. Several laboratories in the United States are participating in the validation of the PowerPlex® 16 System for use in forensic casework following the TWGDAM Guidelines (1) and for CODIS (Combined DNA Indexing System). Additionally, we will highlight the status of new systems being developed for forensic work and the creation of a multimedia tutorial for the PowerPlex® 16 system.

1) Technical Working Group on DNA Analysis Methods and California Association of Criminalists Ad Hoc Committee on DNA Quality Assurance. Guidelines for a quality assurance program for DNA analysis. Crime Laboratory Digest 1995; 22: 21-50.