

A COMPARATIVE STUDY ON THE ANALYSIS OF STR LOCI INVOLVING THE PROMEGA POWERPLEX™ 1.1 KIT AND THE APPLIED BIOSYSTEMS AMPF/STR PROFILER PLUS™ AND COFILER™ KITS

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The use of STR (short tandem repeat) analysis in DNA profiling has become the method of choice for most forensic DNA laboratories. The tetranucleotide repeat sequences and small size (100-400 base pair) of these STR loci make them highly amenable to PCR analysis and less prone to environmental degradation. When enough of these loci are analyzed (typically 8-13) the probability of discrimination rivals that obtained through RFLP analysis. Combined with multicolor automatic fluorescent detection methods, accurate high throughput results can be obtained for both forensic casework and database samples.

Currently there are two related but different automatic detection methods used in forensic STR testing. One of these involves the PowerPlex 1.1 Kit™ by Promega Corp. This kit is used in conjunction with PAGE gel analysis and detection with an automatic gel reader such as the Hitachi FMBIO™ of the Beckman Genomyx™ Gene Scanner. The Applied Biosystems Ampf/STR Profiler Plus™ and COfiler™ kits can be used with either the Applied Biosystems 377 DNA Sequencer™ which utilizes PAGE gel technology or the Applied Biosystems 310 Genetic Analyzer™ that employs a capillary electrophoresis detection method.

The Promega Corporation and Applied Biosystems kits have 8 loci that are common to both of them. This allows for comparative validation studies to be performed between both kits. The purpose of this poster is to present the results of internal validation studies when parallel experiments were performed on the PowerPlex 1.1™ Kit and the Ampf/STR Profiler Plus™ and COfiler™ kits. One interesting aspect of this study was that the detection technology for the Ampf/STR Profiler Plus™ and COfiler™ kits involved the use of the Applied Biosystems 310 Genetic Analyzer™ while the detection method for PowerPlex 1.1™ was PAGE gel electrophoresis analyzed on a Beckman Genomyx™ Gene Scanner. Thus, not only can the two kits be compared side by side, but so can the two detection technologies.

Three different studies were performed on each of the kits. The first was a sensitivity study to examine the optimal amount of template DNA needed to obtain interpretable results. Next, a mixture study was done to ascertain the ability of each kit to resolve mixtures. Finally, an intra-laboratory comparison study of non-probative casework, whole liquid blood samples and mock casework was carried out. The results of these experiments where compared within and between each of the two methods and kits. Both of the systems tested gave very close parameters for the sensitivity and mixture studies. The intra-laboratory comparison study failed to reveal any discrepancies between the two kits and methods. The conclusions reached are that both kits and methods provide compatible and reliable results.