

A PERFORMANCE EVALUATION AND COMPARISON STUDY OF THE POWERPLEX® FUSION 6C SYSTEM

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The rapid growth and demand for DNA profiling in crime investigation calls for the inclusion of more loci to the CODIS core loci, which would help in reducing adventitious matches, increase the discriminatory capacity for familial searching or missing-persons identification, and facilitate international data sharing.

The PowerPlex® Fusion 6C system (PPF 6C) is a 6-dye multiplex system that targets 27 STR loci, including both CODIS and ESS loci, other loci such as Penta D, Penta E, Amelogenin and 2 rapidly mutating Y-STR loci (DYS570 and DYS576). The increased number of loci can improve the discriminatory power in STR typing and potentially facilitate female-male mixture interpretation.

In this study, the performance and robustness of the PPF 6C in amplifying extracted DNA was evaluated. In-house studies were performed to assess the performance of the kit using the following parameters: baseline noise, sensitivity, mixtures, concordance, inhibitor tolerance and information recovery from degraded DNA. Liquid DNA was extracted using the Wizard® Genomic DNA Purification Kit and quantified using the Quantifiler® Duo DNA Quantification Kit. Amplicons were then injected at 1.2 kV, 15s using the Applied Biosystems® 3500xL Genetic Analyser. Sensitivity studies were then carried out by performing 2-fold serial dilutions of DNA from 500 pg to 31 pg. In addition, Inhibitor tolerance studies were performed by titrating concentrations of Haem and EDTA into the amplification reactions. Lastly, degradation studies were also performed using DNase I-fragmented DNA.

Parallel experiments were also performed using two other commercially available kits: Qiagen's Investigator® 24plex QS Kit and Life Technologies' GlobalFiler™ Kit. The results of our comparison study are also presented in this poster.