

INTEGRATION AND VALIDATION OF A 24-MARKER MULTIPLEX ASSAY ON THE RapidHIT® SYSTEM

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PowerPlex® 16 HS (PP16HS) a multiplex STR assay which contains the 13 core CODIS loci and the highly discriminating Penta D and E loci has been validated on the RapidHIT® System for single source reference samples. The RapidHIT system using PP16 HS chemistry has also been successfully used for crime scene investigations by three law enforcement agencies in the USA (Arizona DPS, City of Palm Bay, Florida and Richland County Sheriff's Department) as well as in China (Wuhan Police Department). These four law enforcement agencies generated STR profiles from crime scene samples that identified potential suspects in multiple cases, demonstrating how rapid DNA typing provides a transformative solution to help forensic laboratories and law enforcement agencies solve and prevent crimes.

Continued expansion and creation of databases is expected as more states and countries pass legislation that allows for collection of DNA samples from convicted criminals and arrestees—increasing the need for faster time to result and more discriminating assays. Recommendations by the Federal Bureau of Investigation (FBI), European Network of Forensic Science Institute (ENFSI) and European DNA Profiling Group (EDNAP) to expand the number of loci in the standard European Standard Set (ESS) and core CODIS loci led manufacturers to commercialize new STR assays containing the additional markers. These new assays increase the discrimination power of STR genotyping, enable international data sharing, and reduce the risk of adventitious matches in the expanding databases. The GlobalFiler® Express Kit, an NDIS-approved chemistry, contains all the loci required and recommended by ENFSI and the core CODIS Loci Working group. The kit contains 21 autosomal STR loci (D3S1358, vWA, D16S539, CSF1PO, TPOX, D8S1179, D21S11, D18S51, D2S441, D19S433, TH01, FGA, D22S1045, D5S818, D13S317, D7S820, SE33, D10S1248, D1S1656, D12S391, D2S1338) and 3 sex determining markers (Amelogenin, DYS391, Y-indel).

To further support the community worldwide the GlobalFiler® Express PCR Amplification Kit was integrated and validated on the RapidHIT system. Developmental validation studies were performed following the guidelines published by the Scientific Working Group on DNA Analysis (e.g., sensitivity, PCR based studies, accuracy, mock inhibition, cross-contamination, and re-use of swabs). The results confirm the reliability of the RapidHIT system for generating DNA profiles from reference samples or casework knowns. Future applications being developed on the system will also be discussed.