

IMPLEMENTATION OF A 21-LOCUS PANEL FOR HUMAN RELATIONSHIP TESTING

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In the United States, most relationship testing laboratories utilize markers standardized for forensic use due to the commercial availability of large multiplexes. These systems generally include 13 core STR loci (D18S51, D21S11, TH01, D3S1358, FGA, TPOX, D8S1179, VWA, CSF1PO, D16S539, D7S820, D13S317 and D5S818) along with the gender determination locus, Amelogenin. In order to increase the power of relationship testing, we evaluated the addition of seven STR loci: F13A01, FESFPS, F13B, LPL, Penta C, Penta D and Penta E. Amplification was performed with two fluorescently-labeled multiplexes configured with two overlapping STR loci. The overlapping loci provide a powerful quality control check of the testing process when used in conjunction with two independent DNA extractions. Population studies were performed to further document allele frequencies and to determine the recombination rates for the linked loci Penta E and FESFPS. The recombination rate between Penta E and FESFPS was characterized with >900 cases containing a mother, multiple children, and an alleged father. Penta E-FES haplotype frequency tables have been developed for Caucasians, African Americans, and Hispanics. Results of this 21-locus panel show a significant increase in the typical paternity index over the 13 core STR loci. Utilization of these 21 markers represents a significant increase in genotype information over the 13 core loci. This is made feasible by using two overlapping, multiplexed assays.