Development of a New FFFL Plus MultiPlex System for Use in Human Identification Cases Requiring Additional Discriminatory and Statistical Power.

Xavier G. Aranda and Arthur J. Eisenberg

University of North Texas Health Science Center, Forth Worth, TX 76107

The Federal Bureau of Investigation was instrumental in the selection of a group of 13 STR loci, often referred to as the CODIS Core Loci, as the standard for human identification within the United States. These 13 STR loci are used in both forensic and parentage cases, and provide more than adequate discriminatory power for routine casework. Promega with the release of PowerPlex® 16, was the first to provide a kit, which in a single amplification reaction would produce a genetic profile for the 13 core loci and amelogenin. PowerPlex® 16 provided the additional bonus of 2 more STR loci (Penta D and Penta E). Many parentage testing laboratories have found these two additional loci very useful in single parent cases, cases with a single non-matching system (putative cases with a mutation), reconstruction cases, and other cases involving questions of kinship or relatedness. With the increase in the number of these non standard paternity cases, the need for even more genetic systems using the same amplification and instrumentation platforms has also increased. The availability of new STR multiplex systems that provide significant discriminatory power would be highly advantageous for non routine casework. One of the quality control/quality assurance features that laboratories have found to be extremely beneficial when performing multiple amplification reactions has been the availability of systems with overlapping loci to identify potential sample switches. The availability of the individual Monoplex STR loci comprising the Promega PowerPlex® 16 system, has allowed us to customize new multiplex systems that provide significant discriminatory power, and overlapping core loci. The FFFL Plus MultiPlex System provides 4 additional loci (F13A01, FESFPS, F13B, and LPL) in conjunction with several overlapping core STR loci (vWA, D5S818, D13S317, CSF1PO, TPOX, and FGA). In addition, the Penta D, Penta E, Amelogenin, and the European SE33 loci can be easily incorporated and/or substituted. Several paternity laboratories in the U.S. are using the Applied Biosystems AmpF*l*STR® SGM Plus™ kit. The addition of the FFFL Plus MultiPlex System containing the Penta D and Penta E loci would provide 21 STR loci in two amplification reactions, and include 2 overlapping STR loci (vWA and FGA) plus amelogenin. The FFFL Plus MultiPlex System utilizes the same thermal cycling parameters, providing an additional advantage for those laboratories currently utilizing PowerPlex® 16 for DNA typing. The parameters to customize a cost effective multiplex system for use in non standard cases will be presented.