Characterization of Additional STR Loci to Benefit Human Identity Testing

Carolyn R. Hill, Amy E. Decker, Peter M. Vallone,
Margaret C. Kline, and John M. Butler

At the present time, the U.S. forensic DNA community has settled on 13 core autosomal short tandem repeat (STR) loci and 11 recommended Y-STR markers for human identity testing. We are evaluating and characterizing additional STR loci in order to benefit missing person investigations and identification of mass disaster victims where limited numbers of biological relatives may be available for kinship analysis and additional genetic markers will be useful.

A total of 26 additional STR markers spanning unused "real-estate" across the 22 autosomes have been characterized so that they may be combined (without conflicting) with the current 13 CODIS core loci that are widely used in DNA databases. These 26 STRs have been developed as reduced size 3plex miniSTRs with product sizes below 140 bp for recovery of information from degraded DNA that can come from missing persons/mass disaster samples. As noted in the figure, work is also underway to construct a single multiplex that combines all of these new loci to enable rapid analysis of reference samples. These new STR loci have been examined in U.S. population samples and sequenced for calibration of allele nomenclature in standard samples.

Autosomal STR 23plex in development

that amplifies 22 of the 26 miniSTR loci plus the sex-typing marker amelogenin in a single megaplex for rapid reference sample typing.

The 82 Y-STR loci examined thus far are ranked according to their observed diversity values in our U.S. population samples. We are developing a 6 highlighted loci that should help further resolve common haplotypes not separated by commercially-available Y-STR kits.

We have examined more than 80 Y-STR loci in a common set of 95 U.S. population samples to see which ones will be helpful beyond those already available in commercial kits to aid separation of common haplotypes and closely related individuals. The widely used Yfiler kit examines 17 Y-STR loci (highlighted in blue) and encompasses the 11 recommended Y-STR loci (shown in red font). The six loci highlighted in purple appear to be most promising in terms of haplotype resolution.

http://www.cstl.nist.gov/biotech/strbase/newSTRs.htm

Funding: Interagency Agreement 2003-IJ-R-029 between the National Institute of Justice and NIST Office of Law Enforcement Standards

Disclaimer: Points of view are those of the authors and do not necessarily represent the official position or policies of the US Department of Justice. Certain commercial equipment, instruments and materials are identified in order to specify experimental procedures as completely as possible. In no case does such identification imply a recommendation or endorsement by the National Institute of Standards and Technology nor does it imply that any of the materials, instruments or equipment identified are necessarily the best available for the purpose.

For more information please contact: becky.hill@nist.gov or amy.decker@nist.gov