B11 Development and Validation of a Y-Chromosome STR Typing System Y-PLEX 12, for Forensic Casework

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This presentation will demonstrate to the forensic community the usefulness of Y-STR analysis in forensic casework.

The forensic community will have a better understanding of the usefulness of Y-STRs. The commercial Y-STR kit, Y-PLEX, can help identify a Y-STR profile. Y-STR's can benefit forensic casework and solve even the most difficult sexual assault cases.

Short tandem repeat loci on the Y-chromosome (Y-STRs) have become beneficial in resolving difficult forensic cases such as a sexual assault case. Using Y-STRs, it is possible to obtain an exclusive profile of male DNA in a sample containing mixtures of male and female DNA. Scientific Working Group on DNA Analysis Methods (SWGDAM) has identified a set of eleven loci namely DYS19, DYS385a/b, DYS389I, DYS389II, DYS390, DYS391, DYS392, DYS393, DYS438 and DYS439
for forensic analysis (1).

Two Y-STR typing systems, Y-PLEX™ 6 and Y-PLEX™ 5, for forensic DNA analysis are available commercially (2,3). The two systems working together enable analysis for all 11 Y-STR loci recommended by the SWGDAM. In order to achieve simultaneous amplification and analysis for the 11 Y-STR loci, we have developed a Y-STR typing system Y-PLEX™12. In addition to 11 Y-STR loci, the sex determinant marker Amelogenin is incorporated in the Y-PLEX™ 12 system. Amelogenin provides results for gender identification and serves as internal control for detection of PCR inhibitors in male/female mixture samples. The validation studies were performed according to the DNA Advisory Board's (DAB) Quality Assurance Standards. The minimal sensitivity of the YPLEX™12 system was 0.125 ng of male DNA. Amplification of DNA from male primates, domestic and farm animals and microorganisms reveal that the primers present in the Y-PLEX™12 system are specific for human male DNA and some higher male primates. Female DNA, as high as 700 ng, did not provide amplification products for Y-STRs. A database for the 11 Y-STR loci for Caucasian, African American and Hispanic population groups, which is currently available at *www.reliagene.com* can be used for obtaining haplotype frequency. The results reveal that YPLEX™12 is a sensitive, valid and robust multiplex system for forensic analysis. Forensic casework examples demonstrating advantages of YSTRs will be presented.

1. *Budowle B, Sinha SK, Lee HS, Chakraborty R. Utility of Y-chromosome STR haplotypes in forensic applications. Forensic Sci Rev 2003; 15: 153-64.*
2. *Sinha SK, Budowle B, Arcot SA, Richey SL, Chakraborty R, Jones MD, et.al. Development and validation of a multiplexed Y-chromosome STR genotyping system, Y-PLEX™6, for forensic casework. J Forensic Sci 2003; 48: 93-103.*
3. *Sinha SK, Nasir H, Gross AM, Budowle B, Shewale JG: Development and validation of the Y-PLEX™5, a multiplexed Y-chromosome STR genotyping system, for forensic casework. J Forensic Sci 2003; 48 (5): In Press.*

Forensic Casework, Y-STR, Y-PLEX

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