



B64 Highly Discriminating Y-STR Multiplexes Suitable for Forensic Use to Permit the Determination of 42-Loci Male Haplotypes

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The goal of this presentation is to inform the forensic community about novel Y-STR systems to dramatically increase the discriminating potential of Y-STRs currently available to the forensic community.

Most of the Y-STR multiplex systems in current forensic use incorporate the so-called European Y chromosome community's minimal haplotype loci together with a limited number of additional markers. In an attempt to dramatically increase the discriminatory potential of Y-STRs available to the forensic community, an additional 2 novel Y-STR systems have been developed. In order to develop Y chromosome multiplex analytical systems specifically for use in the forensic community, efforts were made to maximize the number of loci able to be co-amplified within the systems (including the introduction of a 5-dye system rather than the 4-dye system frequently used), to ensure appropriate assay sensitivity (1-2ng of input genomic DNA), and to minimize interference from female DNA.

Multiplex III (MP3) and Multiplex IV (MP4), have been developed in addition to the previous 2 Y-STR systems in the laboratory (Multiplex I and Multiplex II). Multiplex I and Multiplex II include DYS 19, DYS 385(a) and (b), DYS 388, DYS 389I and II, DYS 390, DYS 391, DYS 392, DYS 393, DYS 425, DYS 434, DYS 437, DYS 438, DYS 439, Y-GATA-C4, Y-GATA-A7.1, and Y-GATA-H4. Multiplex III and Multiplex IV contain an additional 23 loci to extend the 19 loci included in Multiplex I and Multiplex II to allow the amplification of 42 total Y-STRs. Multiplex III includes DYS 426, DYS 436, G09411 (DYS 462), DYS 441, YAP (Alu insertion), Y-GATA-A10, DYS 288, DYS 435, and DYS 442. Multiplex IV utilizes the new 5-dye capability of the ABI 310 Genetic Analyzer (6-FAM, VIC, NED, PET, and LIZ) that allowed for incorporation of 14 loci in a single multiplex system. Multiplex IV incorporates DYS 443, DYS 444, DYS 445, DYS 447, DYS 448, DYS 449, DYS 452, DYS 453, DYS 454, DYS 455, DYS 456, DYS 458, DYS 463, and DYS 464.

The 2 multiplex systems provide consistent and robust amplification over a broad range of primer, magnesium, and DNA polymerase concentrations. Full male haplotypes can be obtained from picogram amounts of input DNA, making these systems suitable for use in forensic casework. The systems were designed to target only male DNA and to avoid interference from large amounts of female DNA. As such, the Y-STR systems may eliminate the need for differential extractions since only male DNA is targeted and thus eliminate the possible loss of DNA associated with the differential extraction. Also, since these systems provide a male haplotype, the number of male donors within a given sample is easier to discern.

Y-STR, Multiplex, Haplotype