

Strategies for the Design and Assessment of Y-Short Tandem Repeat Multiplexes for Forensic Use

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ABSTRACT: In order to improve the discriminatory potential, and hence the probative value, of Y-STR-based testing, the set of Y-chromosome STR loci available for forensic use needs to be expanded. We have designed and tested two novel Y-STR multiplexes for potential forensic casework use. In accord with the requirements of Y-chromosome multiplex analytical systems developed specifically for forensic casework use, we have tried to maximize the number of loci able to be co-amplified and minimize confounding female DNA artifacts while ensuring appropriate assay sensitivity (1–2 ng of input genomic DNA) and interlocus signal balance. This review will describe the strategies that we have developed that may provide guidance for the design and assessment of novel Y-STR multiplex systems. Novel Y-STR multiplexes developed for forensic use need to undergo a series of validation exercises that go beyond simply optimizing the PCR reaction conditions. Specifically, stringent performance checks on their efficacy need to be carried out using casework type specimens in order to determine potential confounding effects from female DNA.

KEYWORDS: Y-Chromosome markers, Multiplex I (MPI), Multiplex II (MPII), multiplex STR analysis, postcoital cervicovaginal samples, Y-STR.
