



Y-STR genetic screening by high-resolution melting analysis

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Genet. Mol. Res. 15 (1): gmr.15017266

Received July 21, 2015

Accepted October 7, 2015

Published February 5, 2016

DOI <http://dx.doi.org/10.4238/gmr.15017266>

ABSTRACT. Currently, the widely used automated capillary electrophoresis-based short tandem repeat (STR) genotyping method for genetic screening in forensic practice is laborious, time-consuming, expensive, and technically challenging in some cases. Thus, new molecular-based strategies for conclusively identifying forensically relevant biological evidence are required. Here, we used high-resolution melting analysis (HRM) for Y-chromosome STR genotyping for forensic genetic screening. The reproducibility of the melting profile over dilution, sensitivity, discrimination power, and other factors was preliminarily studied in 10 Y-STR loci. The results showed that HRM-based approaches revealed

more genotypes (compared to capillary electrophoresis), showed higher uniformity in replicate tests and diluted samples, and enabled successful detection of DNA at concentrations as low as 0.25 ng. For mixed samples, the melting curve profiles discriminated between mixed samples based on reference samples with high efficiency. The triplex Y-chromosome STR HRM assay was performed and provided a foundation for further studies such as a multiplex HRM assay. The HRM approach is a one-step application and the entire procedure can be completed within 2 h at a low cost. In conclusion, our findings demonstrate that the HRM-based Y-STR assay is a useful screening tool that can be used in forensic practice.

Key words: Genetic screening; Y chromosome; Short tandem repeats; High-resolution melting; Forensic practice