DEVELOPMENT AND VALIDATION OF THE Yfiler® PLUS PCR AMPLIFICATION KIT, A NEW HIGHLY DISCRIMINATING Y-STR MULTIPLEX FOR FORENSIC APPLICATIONS

S. Gopinath, Jill Muehling , C. Bormann Chung and J. Mulero, Life Technologies

Y-chromosomal markers have proven useful in solving investigations where low levels of male DNA are present in a high female DNA background. An intrinsic limitation of Y-STRs compared with autosomal STRs is a reduced power of discrimination due to a lack of recombination throughout most of the Y-chromosome. Thus, in an effort to increase the power of discrimination we have developed a new 6-dye, 27-plex Y-STR system that includes the 17 markers from the AmpF□STR Yfiler® and Yfiler Direct kits plus 10 additional highly polymorphic Y-STR markers (DYS576, DYS627, DYS460, DYS518, DYS570, DYS449, DYS481, DYF387S1a/b and DYS533). These ten new loci include 7 rapidly mutating Y-STR loci which allow for improved discrimination of related individuals.

The new multiplex is a dual application assay designed to amplify DNA from extracted casework samples and database samples from storage cards and swab lysates via direct amplification. Compared to the previous Yfiler® and Yfiler® Direct kits, the new multiplex shows improved performance in inhibited samples, faster time to results, admixed male and female samples at ratios >1:1000 and better differentiation in male:male mixture samples in high female DNA background. Additionally under optimized conditions, no reproducible cross-reactive products were obtained on bacteria and commonly encountered animal species. The haplotype diversity and discriminatory capacity calculations for several population groups will be presented, as well as father-son studies and validation studies demonstrating improved performance with challenging samples.