DEVELOPMENT AND CHARACTERIZATION OF 30 NOVEL POLYMORPHIC Y-STR LOCI FOR INCREASING THE POWER OF DISCRIMINATION OF MALE DONOR IDENTIFICATION IN SEXUAL ASSAULT CASES

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We report on identification and characterization of 30 novel highly polymorphic Y-STR loci. These STR loci were identified from a search using 4 complete Y chromosome sequence data in GenBank (NC_000024.10, NC_000024.9, AC_000156.1 and AC_000067.1). Approximately 50 million bases were downloaded to the program pSTR finder and STR loci with repeat units of 4 to 6 bases were saved. After excluding all currently reported Y-STR loci, 83 novel polymorphic STR loci were screened further from which 30 highly polymorphic STR loci were identified. A 6 bp repeat motif was identified in 2 of the loci, 13 loci consisted of 5 bp repeat units and the other 15 loci were 4 bp repeat units. The number of alleles observed, based on 100 individuals, ranged from 6 to 17. A novel 30-YSTRplex was adapted for massively parallel sequencing and used to survey a local population, from which 20 of the 30 loci exhibited a gene diversity higher than 0.7. The novel polymorphic Y-STR loci developed in this study are a new addition for incorporation into currently used Y-STR loci to increase the confidence of identifying a male donor in the evidential samples collected from alleged sexual assault cases.

Keywords: sexual assault, Y-STR locus, massively parallel sequencing, male identification, forensic science.