

Validation of the PowerPlex™ 1.1 Loci for Use in Forensic Casework

S. Greenspoon, Ph.D., P. Lytle, M.S., S. Turek, B.S., J. Rolands, B.S., M. Scarpetta, Ph.D. and C. Carr, B.S.
Forensic Services Division, Detroit Police Department, Detroit, MI, 48201



STR typing is now the favored method of DNA analysis for the purposes of human identification in the forensic community. The Forensic Services Division of the Detroit Police Department has completed its validation of the PowerPlex™ 1.1 loci (CSF1PO, TPOX, TH01, vWA, D16S539, D13S317 and D5S818) for use in forensic casework. We have carried out the experiments for our validation recommended by Quality Assurance Standards for Forensic DNA Testing Laboratories.

We utilized our own metro area database samples supplied by the American Red Cross. 150 samples were typed from each racial/ethnic group and allele and genotype frequencies were calculated. (Exception: Only 58 individual samples were used for the American Indian database.)

A comparison between our own allele frequencies at a particular locus and those generated by Promega show very similar numbers within a particular racial/ethnic group. As expected, allele frequency value differences are much greater when comparing allele frequencies at a particular locus between racial/ethnic groups. Interestingly, we identified two rare off-ladder variants among our database samples – a 22 allele vWA and a 9.1 allele at the D7 locus. We also found two examples of 9.3, 10 heterozygous at the TH01 locus.

Our validation results were repeatable and informative. For the matrix study, DNA extracted from surfaces typed well and accurately, except for the DNA extracted from leather (largest loci missing) and from grass (no PCR product generated.) From the mixture study we were able to easily discern the minor contributor STR type from 250-500 pg of DNA input into the amplification reaction. The Concordance study, the variety of fluids from same individual, and NIST standards studies all produced the expected results. Since the adjudicated casework samples had previously been typed for D1S80 and DQA1/PM, the STR results simply confirmed the earlier results.

Thus, our validation studies demonstrated that we can generate repeatable and reliable results using the Promega PowerPlex™ 1.1 kit.