



B1 Evaluation of Y-STR Multiplexes for Analysis of Casework Samples

Lora Bailey-Van Houten, BS, Office of the Attorney General, Bureau of Forensic Services, Fresno Regional Laboratory, 5311 North Woodrow Avenue, Fresno, CA 93740; and Sulekha R. Coticone, PhD, California State University, Department of Chemistry, 2555 East San Ramon Avenue, Fresno, CA 93740*

After attending this presentation, attendees will learn the relative abilities of various Y-STR multiplexes for forensic use.

This presentation will impact the forensic community and/or humanity by assisting in the ability to determine relative performance of Y-STR multiplexes.

Fluorescence-based DNA detection systems are being widely used in forensic DNA analysis. These methods have greatly assisted the sensitivity and ease of measurement of PCR amplified short tandem repeat (STR) alleles. In multiplexed STR genotyping kits, fluorescent dyes are covalently coupled to one primer for each locus. These STR multiplexes amplify 13 autosomal STRs with a power of discrimination of over one in a billion and have proven invaluable in identification of perpetrators of violent crimes. However, sexual assault cases often contain a mixture of DNA from the male perpetrator and the female victim that are difficult to interpret using autosomal STR kits, due to the presence of excess female DNA in these samples as compared to the male DNA. By using male polymorphisms on the Y chromosome, male DNA can be identified specifically in male-female mixed samples.

The present study was conducted to evaluate two recently introduced commercial Y-STR multiplexes (Promega's PowerPlex® Y and Reliagene's YPlex 12). The robustness of the multiplexes was determined by sensitivity studies. The sensitivity data indicated that both kits were sensitive, although the YPlex 12 displayed consistently higher peak heights. Additional stutterlike peaks were noticed in pristine male samples at DYS392, DYS389II, DYS437 and DYS385 loci, though no artifacts were noticed when amplification was performed with female DNA. Further analysis of these artifacts need to be performed to determine the origin of these additional peaks. Mixture studies indicated that the limit of detection of the minor component in a male:male mixture was 1:5 (for YPlex 12) and 1:2 (for PowerPlex® Y). Researchers also performed CEPH family studies to demonstrate Mendelian inheritance of the Y-STR loci. To assess the ability of the multiplexes to analyze forensic samples, testing on blood, oral swabs and male-female mixtures as well as previously adjudicated sexual assault samples were performed. Based on these studies, the relative ability of the two multiplexes to successfully analyze a variety of forensic was determined.

Y-STRs, Multiplexes, Casework