



### **B63 Validation and Forensic Casework Applications of the Y-STR Genotyping Systems Y-PLEX™ 6 and Y-PLEX™ 5**

*Sudhir K. Sinha, PhD\*, Amrita Lal, MSFS, Chris Larson, BS, Alison Fleming, BA, Huma Nasir, BS, Elaine Schneida, BS, and Jaiprakash Shewale, PhD, ReliaGene Technologies, Inc., 5525 Mounes Street, Suite 101, New Orleans, LA*

The goals of this presentation are to present to the forensic community the utility of Y-STR analysis in forensic casework.

The analysis of Y-chromosome short tandem repeats (Y-STRs) is very useful in resolving sexual assault cases. This is due to the ability to type the male DNA specifically in a sample containing mixtures of male and female DNA. The Y-STR user group has identified 8 loci namely DYS393, DYS19, DYS390, DYS391, DYS389I, DYS389II, DYS392, and DYS385 as minimal haplotype. Y-PLEX™ 6 and Y-PLEX™ 5 genotyping systems were used in the present study. These 2 amplification systems together provide results for the minimal haplotype and 2 additional loci namely DYS438 and DYS439. DYS385 locus provides results for two alleles which is a result of gene duplication and mutations. Thus, Y-PLEX™ 6 and Y-PLEX™ 5 provides results for 11 alleles.

The validation studies were performed according to the SWGDAM guidelines and included the following experiments: annealing temperature, primer ratio, primer concentration, salts, DNA polymerases, dNTPs, thermal cyclers, denaturation time, annealing time, cycle extension time, final extension time, PCR cycles, reaction volume, female DNA, sensitivity, non-human studies, reproducibility, precision, additives, inter-laboratory studies, female-male mixtures, male-male mixtures, stutter, DNase degradation, environmental insult, and non-probative casework. A database for 11 alleles is generated for Caucasian, African American, and Hispanic population groups. The haplotype frequency and genetic diversity using these 11 alleles will be presented. The database with a haplotype frequency calculator is freely available for use by forensic community.

The results for 6 forensic cases analyzed using the Y-PLEX™ 6 kit will be discussed. The first case was a criminal paternity case involving a mother, alleged father, and product of conception. Studied was a mixture of DNA in which the mother's DNA was the major component and the male fetus' profile was dropping out using AmpFISTR® Profiler Plus and AmpFISTR® COfiler systems. The Y-PLEX™ 6 kit was used to determine if the tested man could be the father of the product of conception. The second case involved a victim who was found strangled to death. The suspect, when arrested, had scratches on his face. Nuclear STR results on the fingernail scrapings showed several alleles consistent with suspect but many alleles were below 75 RFU, producing inconclusive results. The fingernail scrapings were amplified using the Y-PLEX™ 6 kit to obtain single male profile. The evidence in another case was a semen stain found on a bathrobe. AmpFISTR® Profiler Plus results were consistent with the female victim and there was no indication of a male. A Y-STR profile was obtained, even in the absence of a Y peak with AmpFISTR® Profiler Plus. Y-STR results were consistent with the male suspect. In this case, the victim was beaten to death. The suspect was the victim's live-in boyfriend. AmpFISTR® Profiler Plus resulted in an un-interpretable mixture. With Y-STR, the number of male contributors was determined and the boyfriend excluded. The last case that will be discussed was a non-suspect case. The AmpFISTR® Profiler Plus results for a non-suspect case indicated a mixture of at least 3 people. Y-STR results showed 2 males, present in a 1:1 ratio, in the sperm cell fraction.

**Y-STR, SWGDAM Validation , Y-PLEX™ 6 and Y-PLEX™ 5**