

HOW LOW CAN YOU GO? – A COMPARATIVE SENSITIVITY STUDY

J. Thompson, M. Marfori, M. Roche, and T. Kupferschmid
Sorenson Forensics, Salt Lake City, UT

Forensic casework samples come in a variety of shapes and sizes. Along with this variety of evidentiary samples comes a wide range of DNA concentrations. It is important that the chemistry used to amplify these samples is capable of handling such variety, especially when dealing with lower amounts of DNA.

This study examined the performance of six different amplification kits. Four of the kits were autosomal STR kits, one manufactured by Promega, PowerPlex16 (PP16) and three manufactured by Applied Biosystems, Profiler Plus (Pro+), Cofiler (Co), and Identifiler (ID). The remaining two kits were Y-STR kits, one manufactured by Promega, PowerPlexY (PPY) and one produced by Applied Biosystems, Yfiler (Yf). Sensitivity was examined to determine the saturation point of the kits as well as the minimum detection limits.

For the autosomal study, three different genomic samples, female 1 (F1), male 2 (M2), and male 4 (M4) were used. A range of input DNA from each of these samples (4ng, 2ng, 1ng, 0.5ng, 0.25ng, 0.125ng, 0.0625ng, and 0.0312ng) were amplified and analyzed in triplicate with each kit. The heterozygote peak balance, average peak height, and locus to locus balance were calculated for each sample. The total number of alleles was also recorded for each profile.

For the Y-STR study three different genomic samples were used, male 1 (M1), male 2 (M2), and male 4 (M4). A range of input DNA from each of these samples (1ng, 0.5ng, 0.25ng, 0.125ng, 0.0625ng, 0.0312ng) were amplified and analyzed in triplicate. Heterozygote peak balance and locus to locus balance were calculated for each sample. The total number of alleles was also recorded for each profile.

Profiler Plus obtained a full profile for all replicates at 0.25ng for female 1, male 2, and male 4. All replicates of 0.25ng for female 1 and male 4, and 0.125ng for male 2 obtained a full profile with the Cofiler. Identifiler obtained a full profile for all replicates for female 1, male 2, and male 4 at 0.5ng. PowerPlex16 obtained full profiles in all replicates for female 1 at 0.0625ng, and male 2 and 4 at 0.125ng. The average peak height at 1ng (typical targeted amount of DNA) for Profiler Plus was 1080 RFU, Cofiler averaged 1357 RFU, Identifiler averaged 478, while PowerPlex16 was the highest with peak heights reaching 4104 RFU.

Yfiler obtained a full profile in all replicates for male 1, male 2 and male 4 at 0.125ng. PowerPlexY obtained a full profile in all replicates at 0.125ng for male 1, and 0.0625ng for male 2 and male 4. The average peak height at 1ng of input DNA was 2447 RFU for Yfiler, and was 6336 RFU for PowerPlexY.

PowerPlex16 and PowerPlexY showed a lower detection threshold than their ABI counterparts. This poster will demonstrate the strengths and weaknesses of each of the STR and Y-STR kits.