NIST Mixture Interpretation Interlaboratory Study 2005 (MIX05)

John M. Butler and Margaret C. Kline

The human identity project team within Biotechnology Division of the National Institute of Standards and Technology (NIST) is funded by NIJ to conduct research that benefits the human identity testing community and to create tools that enable state and local DNA laboratories to be more effective in analyzing DNA. We have conducted a number of interlaboratory studies (see http://www.cstl.nist.gov/biotech/strbase/interlab.htm) over the years to assess consistency in results from multiple laboratories with mixture interpretation (1,2) and DNA quantitation methods (3). In early 2005 an interlaboratory challenge exercise was initiated involving only data interpretation. DNA mixtures representing four different mock sexual assault case scenarios were generated at NIST with multiple STR kits and provided to laboratories as electrophoretic data (ABI 3100 .fsa files are available at http://www.cstl.nist.gov/biotech/strbase/interlab/MIX05.htm). In each case, we provided the "evidence" sample result, which was a mixture of at least one perpetrator and a victim, along with the "victim" reference sample. All data were generated on five different STR kits (Profiler Plus, COfiler, SGM Plus, Identifiler, and PowerPlex 16) from the same lot of DNA mixtures. Additionally, for those laboratories using the FMBIO platforms, gel images generated either at the Pennsylvania State Police laboratory or the Arkansas State Crime laboratory from PCR products produced at NIST with PowerPlex 16 BIO were made available. The MIX05 interlaboratory study was designed to evaluate (1) the current "lay of the land" regarding STR mixture interpretation across the forensic DNA typing community and (2) to aid development of training tools to enable mixture interpretation and reporting. A summary of results obtained from the 70 forensic DNA typing laboratories that participated in MIX05 will be described. References: (1) Duewer DL, Kline MC, Redman JW, Newall PJ, Reeder DJ. (2001) NIST Mixed Stain Studies #1 and #2: interlaboratory comparison of DNA quantification practice and short tandem repeat multiplex performance with multiple-source samples. J. Forensic Sci. 46: 1199-1210. (2) Kline, M.C., Duewer, D.L., Redman, J.W., Butler, J.M. (2003) NIST mixed stain study 3: DNA quantitation accuracy and its influence on short tandem repeat multiplex signal intensity. Anal. Chem. 75: 2463-2469. (3) Kline, M.C., Duewer, D.L., Redman, J.W., Butler, J.M. (2005) Results from the NIST 2004 DNA Quantitation Study. J. Forensic Sci., 50(3): 571-578.