IDENTIFY PROBLEMS AUTOMATICALL USING GeneMarker®HID SOFTWARE QUALITY CONTROL TOOLS: CONTAMINATION CHECK, REPLICATE AND PROJECT COMPARISONS, ANALYTICAL THRESHOLD, CONTROL AND GENDER CONCORDANCES

Kayla Hendricks, B.S., Teresa Snyder-Leiby, Ph.D., Tyler Zhang, B.S., CS Jonathan Liu, Ph. D, SoftGenetics LLC

"Because the sensitive PCR technique replicates any and all of the DNA contained in an evidence sample, greater attention to contamination issues is necessary" [1]. A joint statement from European Network of Forensic Science Institutes (ENFSI), the FBI Laboratory's Scientific Working Group on DNA Analysis Methods (SWGDAM), and the Australian Biology Specialist Advisory Group (BSAG) advocates that forensic DNA laboratories maintain an elimination database for screening DNA results. Results of a 2015 Forensic Science International: Genetics publication [2], illustrate the importance of including genotypes of all crime scene workers (police, laboratory and field employees) in an elimination database. Typically, labs will compare profiles in spread sheets with macros to detect profile-to-profile and profile-to-staff member contamination, which is time consuming and error prone. GeneMarker®HID software enables the analyst to easily and automatically perform profile comparisons to check for contamination, eliminating data transfer to a separate database or spreadsheet/macro.

After genotyping data from 4, 5, 6 or 8 dye human identity STR kits, select the Contamination Check tool. The Contamination Check interface allows the user to select their analysis parameters and the desired comparison database. The contamination check detects profile-to-profile contamination within a project and staff member genotype inclusion in profile(s). The results can then be reviewed, saved, and exported as a comparison table.

Results are shown in the summary table, and can be sorted by clicking the column headers. Information displayed for each sample includes the Sample name, the name of the sample against which it was compared (the reference sample), the number of matching alleles compared to the number of reference alleles, and the similarity ratio.

Improvements to the sensitivity of the polymerase chain reaction (PCR) have necessitated increased diligence in detecting possible contaminates. Contamination may jeopardize data analysis and can originate from many common sources, particularly from the skin or hair of a staff member. The Contamination Check tool rapidly and effectively calculates the potential risk of contamination for each profile, thereby reducing analysis time and improving confidence in the resulting findings. Additional quality control tools in GeneMarkerHID software: replicate comparison, project comparison, analytical threshold, control and gender concordances will be presented.

References

[1] DNA Evidence: Basics of Analyzing, National Institute of Justice, August 9, 2012, http://nij.gov/topics/forensics/evidence/dna/basics/pages/analyzing.aspx.

[2] Leading-edge forensic DNA analyses and the necessity of including crime scene investigators, police officers and technicians in a DNA elimination database, Lapointe, Martine et al., Forensic Science International: Genetics , Volume 19 , 50 – 55