B10 Validation and Incorporation of RapidHIT™ Technology Into Routine Forensic DNA Casework

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After attending this presentation, attendees will understand that the RapidHIT™ instrument can be used for forensic DNA evidence in addition to buccal swabs for routine forensic analysis.

This presentation will impact the forensic science community by educating analysts about the ability of this system to be used for routine forensic DNA casework.

In December of 2013, the Richland County Sheriff's Department (RCSD) acquired a RapidHIT® (IntegenX®) instrument for fully automated sample-to-answer Short Tandem Repeat (STR) -based human identification. This system produces a DNA profile from swabs or cuttings in approximately two hours. The focus of this system in the scientific field has been on its use for DNA profiling of buccal swabs for a myriad of applications. The laboratory validated and implemented this instrument for full integration into routine forensic DNA casework to include buccal swabs from suspects as well as evidence swabs and cuttings. During validation, a study was performed to assess usable sensitivity (ability to produce a profile for exclusion or inclusion) of the system for evidence samples. Of the 28 different samples evaluated (drinking straw, gum, pulled hair, cigarette butt paper, drink can, steering wheel, door handle, foam cup, bitemark, jacket collar, cell phone, etc.), 22 produced full (16 of 16 loci) profiles, four produced partial profiles (11 to 15/16 loci), and two produced no profiles (whole cigarette butts were placed into the sample cartridge which resulted in interference of the extraction). Upon completion of validation, RapidHIT® was approved for casework and has been successfully utilized for several different case types.

A serial burglary (three related burglary cases), a criminal sexual-conduct case, an aggravated armed robbery/attempted murder case, and multiple suspect standards for the local database have been analyzed with RapidHIT®. The burglary cases consisted of two blood swabs and a bloodstained cutting from a leather pouch from the crime scenes as well as a buccal swab from a suspect. These were analyzed on a RapidHIT® utilizing PowerPlex® 16 HS chemistry using the "Other" protocol. Complete (16 of 16 loci) profiles were generated from the evidence and the suspect's buccal swab. Resulting DNA profiles were interpreted after the two-hour run and the results were communicated to the investigator after technical review. The profiles generated from the three different crime scenes matched the suspect. As a result, the suspect was arrested and charged with 2nd-degree burglary and larceny. Evidence from the attempted murder case consisted of swabs from the suspect's pants, shoes, and a victim's buccal swab. These were run on the RapidHIT® utilizing GlobalFiler® Express chemistry with the "Other" protocol. Complete (22 of 22 STR loci) profiles were generated from the evidence and victim's standard. Profiles generated from the suspect's clothing matched the victim. After technical review, findings were communicated to the investigator and the suspect was arrested for attempted murder and armed robbery.

The RCSD successfully renewed its American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) -International accreditation in June of 2014. RapidHIT® technology was in place, reviewed, and memorialized during this assessment. Currently, the results generated from this system are used for investigative information. If the customer requires a laboratory report, samples are re-analyzed utilizing the conventional DNA profiling method. Once the quality standard requiring human quantitation is modified to accommodate this technology, any profile generated from this instrument could be considered eligible for the Combined DNA Indexing System. The RCSD DNA laboratory views this instrument as an evolution in DNA typing technology.

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