HIGHLY RELIABLE REFERENCE SAMPLE GENOTYPING UTILIZING AN AUTOMATED RAPID DNA TYPING PLATFORM

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Automated rapid DNA typing systems provide a unique potential to deploy STR-profiling systems outside of a traditional laboratory setting and into areas such as police stations or mobile laboratories without a dedicated laboratory infrastructure, such as pre and post amplification areas. This type of forward deployment has the capacity to increase the utility of arrestee DNA typing by reducing the time between sample collection and profile generation. The RapidHit 200 (IntegenX; Pleasanton, CA) was independently evaluated using primarily buccal swabs for reliability, reproducibility, sensitivity, concordance, sensitivity to inhibitors, and both intra-run and inter-run contamination. The instrument analyzes swabs that are added directly to a single-use micro fluidic sample cartridge where DNA extraction, normalization and amplification occur. Capillary electrophoresis is performed utilizing an on-board capillary array, and data are compiled in a standard .fsa file for analysis utilizing a separate computer. We also assessed instrument performance against the backdrop of how samples are processed in a databasing laboratory (albeit with a lower throughput). The results of our testing support that the reliability of the instrument mirrors that of traditional methods used for generating profiles to be entered into a database. Additionally, reference swabs processed using the instrument could be recovered for subsequent analyses in either another RapidHit 200 run, or extraction and processing by more traditional STR-typing methods. The instrument consistently generated high quality STR profiles that were concordant with standard methods using the PowerPlex 16 HS (Promega; Madison, WI) chemistry, which is the current STR configuration of the sample cartridges and instrumentation. The initial success rate was >90%. Re-analyses of a failed run increases the overall success rate and mirrors the process in the database laboratory. Using an alternating pattern of blank and buccal swabs, the instrument was tested for both intra-run and inter-run contamination. No evidence of cross-contamination was detected over the course of several consecutive runs completed over multiple days. In summary, the RapidHit 200 can reliably generate STR profiles from reference samples. The automated single platform system performs comparable to that of standard DNA-typing methods, and in the event of a failed result allows for further analysis of the same sample by repeating the same test or by using other methods. The platform can be operated by laypeople with minimal training which could potentially free analysts to focus on the more difficult tasks of data analyses and interpretation.