VALIDATION OF THE HAMILTON AutoLys STARplus FOR FORENSIC DNA CASEWORK

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Automated DNA purification systems and liquid handling workstations have automated most of the forensic DNA workflow including purification, dilution, and PCR assay set-up. However, before a sample can be placed on a liquid handler for processing, it must first be cleared of the substrate. This is largely being performed manually using spin baskets. The Texas Department of Public Safety crime laboratory in Houston, TX recently procured a Hamilton AutoLys STARplus for the purposes of automating the entire DNA workflow, including lysis and substrate removal, on a single platform. The instrument was integrated with the DPS laboratory information system to enable self-generating worklists with built-in data verifications, and complete sample traceability through the use of 2D barcodes.

The validation of this instrument consisted of three phases:

1) Liquid handling capabilities,
2) AutoLys and PrepFiler as methods of lysis and purification,
3) Custom programming, LIMS integration, worksheet generation, and workflow.

All samples were evaluated for contamination.

The validation studies demonstrated that the Hamilton AutoLys STARplus can accurately, precisely (%CV < 10), and reproducibly pipette necessary volumes, and can accurately transfer samples to the correct destination positions.

The AutoLys tubes were successful in clearing a variety of substrates from lysate including fleece, cotton, cotton swabs, denim, diaper, FTA paper, bone, cigarette butt, etc. The volume of liquid recovered from cotton swabs using the AutoLys tubes was significantly greater ($p < 0.05$) than the volume recovered using traditional spin baskets.

AutoLys/PrepFiler extractions of mock evidence and challenging samples (low template, degraded, and inhibited) performed as well as current DPS extraction methods (organic, QIAamp, EZ1) with the exception of samples with extreme heme or humic acid inhibition. AutoLys/PrepFiler extractions of mixtures were not compared to other extraction methods, but performed as expected.

More than 3,000 samples were processed during the validation of the Hamilton AutoLys STARplus. Of those samples, 680 were reagent blanks or negative controls. There were two confirmed cases of contamination; neither was caused by the STARplus.

Overall, the Hamilton AutoLys STARplus has met expectations and has proven to be a reliable platform for the lysis, purification, and PCR assay set-up of forensic DNA casework samples.