AUTOMATED EXTRACTION OF FORENSIC SAMPLES USING ESTABLISHED SPIN COLUMN TECHNOLOGY ON THE QIACUBE

Helge Lubenow, Mario Scherer, Dagmar Herold
QIAGEN GmbH, Hilden, Germany

Spin-column based kits have been widely established for the extraction of nucleic acid evidence. These prefabricated formats relieved forensic scientist from preparing reagents themselves, improved quality control of materials and helped to minimized process variation. Laboratory processes could be standardized by spin columns, resulting in improved accuracy and run-to-run consistency.

However, no automated solutions were available that would enable walk-away processing of spin columns.

For the first time, an innovative robotic concept is introduced to the field of molecular forensics that facilitates complete automation of spin columns. The QIAcube platform is a novel system that provides hands-off automation of 2 to 12 samples per run, thus allowing forensic scientist to instantly translate their established spin-column based manual processes into an automated workflow.

Based on the new QIAamp DNA Investigator kit, automated protocols have been developed for various forensic casework and reference sample materials, and for post-PCR purification:

- Small volumes of blood or saliva
- Surface and buccal swabs
- FTA and Guthrie cards
- Miscellaneous casework samples, e.g. cigarette butts, chewing gum, paper, hair
- Post-PCR purification

Data will be presented on the automated extraction of DNA from reference and case work samples using QIAcube. These will include concordance data comparing manual with QIAcube-automated processes, data demonstrating intra- and inter-run cross contamination safety, and performance data on STR profiling.

Standardized processing and elimination of handling errors are key factors for forensic sample preparation to ensure reliable results. Automated nucleic acid extraction offers many advantages compared to manual extraction methods: minimal hands-on time, further reduction of operator-dependent variation, and maximal safety in handling of samples. QIAcube represents a novel approach to instantly automate spin column based forensic processes both. Feasibility is shown for prenalytical extraction of forensic reference samples and casework evidence, and for post-PCR purification.