VALIDATION OF THE CPA200™ (CARD PROCESSING AUTOMATION 200) A SEMI-AUTOMATIC PUNCH SYSTEM FOR PROCESSING SAMPLE CARD FOR HUMAN DNA PROFILING

Davide Dabellani[2], Gabriele Savoldi[2], Valter Molinari[2], Alessandro Agostino[3], Cesare Rapone[1], Andrea Berti[1]

[1]Carabinieri, Reparto Investigazioni Scientifiche
[2]NewLab
[3]Thermo Fisher Scientific

Introduction: The number of samples to process for DNA profiling, for both criminal or normal population for data banking registry has increased exponentially in recent years. The forensic laboratories have to handle data banking samples as well as casework samples from crime scenes. Copan developed first the NUCLEIC-CARD™ for buccal or blood sample storage for DNA profiling, and NewLab recently developed the CPA200™, a Card Processing Automation, a semi-automatic punch system for processing buccal and blood sample card for human DNA profiling. The CPA200™ punches a disk of the NUCLEIC-CARD™ containing the samples and places it into the well, assigned by the worksheet, of an Optical 96-Well Reaction plate. A computer, integrated with the CPA200™, allows the operator to create customized working protocols, assigning the specific sample ID to the well of the plate, selecting the punching position on the card, implementing the cleaning procedure and more additional features. The CPA200™ workflow and protocols and all features have been previously validated in Copan.

Objectives: The objectives of this study were to validate the CPA200™:

1) Workflow and punching parameters
2) Sample carry over during sequential punches and cleaning punches.
3) If all forensic laboratory requirements are satisfied by CPA200™design.

Methods: The CPA200™ initial validation, like workflow, punching parameters, testing for sample carry over during sequential punches and cleaning punches were done in house while the forensic laboratory requirements satisfaction was performed in the Forensic laboratory of the Carabinieri, Reparto Investigazioni Scientifiche, in Rome Italy. Buccal swabs and blood samples were deposited on NUCLEIC-CARD™ (Copan, Brescia, Italy) and these cards were used for the validation processes. The CPA200™ workflow protocols and all the features were extensively tested. The punches generated from the sample cards and cleaning cards were tested and human DNA profiles were generated. Samples and cycle parameters included in the protocol files were all performed in order to evaluate sample variability and working conditions. Cross contamination was tested by testing the 2 cleaning punches after punching cards containing a high and low concentration of blood sample.

Results and conclusions: The CPA200™ system correctly punched all the samples on the NUCLEIC-CARD™, deposited all the punches in the appropriate wells on the microplate. The punching of the sample card was performed accurately and rapidly. Complete profiles were generated when testing all samples punched, only a partial profile was generated by the first cleaning punch and not a single allele was generated by the second cleaning punch.

These findings demonstrated that the CPA200™ system can be used in a forensic laboratory to process large number of samples for data banking registry and forensic case works samples.