VALIDATION OF TECAN FREEDOM EVO MODEL 200 ROBOT IN HIGH-THROUGHPUT OFFENDER DNA EXTRACTION

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Background: The BioSprint96 BioRobot, currently used with the Qiagen DNA Blood Kit for DNA extraction, can process samples prepared by the Tecan Freedom EVO Model 200 Robot in a 96-well format. Sample preparation involves the addition of precise volumes of digestion and cell lysis reagents to liquid blood samples. Robotics, such as the Biomek 2000 that were previously used for preparatory steps, were time-consuming, carried the risk of contamination, and were susceptible to mechanical failures. Unlike the Biomek 2000, the Tecan Freedom EVO Model 200 is designed for sample preparation at higher throughput and a lower failure rate. To minimize the risk of contamination, the Tecan Freedom EVO Model 200 also utilizes disposable tips. This study's objective is to validate the DNA Blood kit technology preparatory steps on the Tecan Freedom EVO 200 for human identification DNA testing applications in a high-throughput offender samples testing laboratory.

Methods: Genomic DNA was extracted from 168 whole blood samples of known DNA profiles using the BioSprint96 robot and the Qiagen's DNA Blood Kit. DNA extracts were then quantitated using PicoGreen and amplified using Profiler Plus, Cofiler and Identifiler PCR kits on GeneAmp 9700 thermocyclers. Amplified products were processed on a 3130 16-capillary array and the resulting genotypic data was analyzed with GeneMapper (version 3.2.1), using CODIS version 1.1 panels and bin sets. Data quality parameters examined in this study included contamination checks, concordance, precision, and sensitivity.

Results: DNA analysis results were used to assess contamination and to check the concordance of the DNA profiles with profiles generated from previously validated and implemented DNA extraction methods. No instances of non-concordance were observed. Tip-to-tip dispensing precision and accuracy was evaluated by examining different volumes using a calibrated hand operated disposable tip pipettor. The precision of volume transfers for 100 microliters (using one milliliter conductive tips) was determined to average 95.4 (n=84) with an accuacy (standard deviation) of 2.03.

Conclusion: This study demonstrates that the Tecan EVO 200 yields reliable and consistent results within the context of high-throughput DNA extraction BioSprint96 preparatory steps for human identification testing laboratories.