VALIDATION OF THE QIAGEN 200ul BLOOD KIT AND THE BIOROBOT® EZ1 FOR THE DNA EXTRACTION AND PURIFICATION OF REFERENCE SAMPLES FOR FORENSIC CASEWORK

Shawn Montpetit, Janine Miller, Ian Fitch, and Patrick O'Donnell
San Diego Police Department Crime Laboratory

➢◇➢◇◅

With the large backlogs currently being experienced in the DNA sections of crime laboratories across the nation, methods to reduce analysis time are being sought. The DNA section of the San Diego Police Department Crime Laboratory has incorporated robotic DNA extraction technology for reference samples in casework to streamline the analysis process and make casework more efficient.

The QIAGEN BioRobot® EZ1 System is an automated extraction system that can rapidly purify high quality DNA from 1-6 samples in as little as 20 minutes through magnetic particle technology. The 200uL Blood kit from QIAGEN is optimized for the extraction of liquid blood samples. The types of reference samples typically encountered in the majority of cases are liquid blood samples, bloodstain cards, and reference mouth swabs. A pre-treatment of all sample types with digest buffer and proteinase K was devised within a single protocol allowing for the simultaneous handling of all three reference sample types.

The 200uL Blood kit from QIAGEN and the BioRobot® EZ1 were evaluated for the following: I) The ability of the kit to provide high quality DNA from all reference sample types routinely encountered in forensic casework. II) Detection of possible sample-to-sample contamination in BioRobot® EZ1 extractions. III) The effect of altering the pre-treatment digestion time on DNA yields. IV) A comparison of the DNA yields from the BioRobot® EZ1 with the 200uL Blood kit and organic extraction. V) The ability of samples extracted with the BioRobot® EZ1and 200uL Blood kit to yield STR profiles without effects of inhibition or artifacts.

The results of the validation experiments demonstrate that by using a pre-treatment of digest buffer and proteinase K, high quality DNA can be obtained from all reference sample types. It was demonstrated that the pre-treatment with digest buffer and proteinase K improved the DNA yield from the robot. The yields obtained for liquid blood samples extracted on the BioRobot® EZ1 with the 200uL Blood kit after pre-treatment were comparable to yields from organic extractions. The DNA recovered from the robotic extraction produced STR profiles free of inhibition and comparable to organic extraction. No sample-to-sample contamination was detected after extraction with the BioRobot® EZ1.

We have found the 200uL Blood kit on the BioRobot® EZ1 offers an immediate savings in analysis time during routine casework. Using the robotics system for the extraction of reference samples is a reliable and simple means of improving the efficiency of how forensic cases are analyzed in the modern crime laboratory.