
COMPLEMENTING HIGH THROUGHPUT FORENSIC DNA AUTOMATION WITH MAXWELL® 16 SYSTEM

Karin A. Crenshaw and *Cecelia A. Crouse, Palm Beach County Sheriff's Office
Forensic Biology unit, 3228 Gun Club Road, West Palm Beach, FL 33406

The rate of casework evidence submissions for DNA analysis has significantly increased in all forensic laboratories over the past few years. Although the number of samples processed from violent crimes such as homicides and sexual assaults is a part of this increase, throughout the country there are hundreds and thousands of high-volume crimes including autotheft, burglary to residences, cars, businesses and destruction of property in which evidence is routinely submitted for DNA analysis. There is strong agreement among victim, law enforcement, the crime laboratory, judicial system and the correction system that evidence from these high-volume crimes must be processed not only because the crime may be solved but also because many more crimes may be prevented. As a result, many forensic laboratories are shifting from manual DNA processing techniques to automation. Robotics has been instrumental in dramatically increasing the number of samples processed in the Palm Beach County Sheriff's Office (PBSO) laboratory. This is largely due to the implementation of the Beckman Coulter Biomek2000 robot and ABI QuantiFiler-Human and Quantifiler-Y quantitative PCR methods. Further improvements have been made in the efficiency of the laboratory through the validation of Promega SlicPrep 96-well extraction plates which are used on the BioMek2000. PBSO is near completion of validation studies for the Beckman – Coulter BioMek NX which will extract the DNA samples, prepare for Plexor quantification allowing for quantification of human and Y-DNA at the same time, normalize any high concentration samples and finally conduct pre-amplification preparation with minimal human intervention. There is, however, times in which an emergency case with a few samples or a standard from a CODIS hit needs to be verified in the laboratory and waiting is not an option. The alternatives to using a 96-well plate on a robot for a few samples was limited in the past to conducting manual extraction procedures. There are now several "mini-robots" which will accommodate the same reagents used on a large scale liquid handler on a much smaller platform. The Maxwell® 16 System is a walk-away mini-robot utilizing the DNA IQ Resin and pre-filled cartridges which will process up to 16 samples simultaneously. There are two types of programs, the SEV (Standard Elution Volume) kit for high concentrations of DNA which elutes into a final volume of 300ul, and the LEV (Low Elution Volume) kit which elutes the DNA into a final volume of 25-50ul. The results of the validation of the Maxwell® 16 System will be presented including checkerboard contamination studies, sensitivity and reproducibility as well as low template samples. Results from the LEV kit were compared to the same samples run on the Beckman Coulter BioMekNX. It is anticipated that using the Maxwell® 16 System will save on reagent costs and analyst time.