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VALIDATION OF THE INVITROGEN IPREP™ PURIFICATION INSTRUMENT FOR THE PROCESSING OF SAMPLES IN A MEDIUM THROUGHPUT FORENSIC DNA LABORATORY

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The Forensic Molecular Biology Department of the Insitute of Legal Medicine, University of Bern has validated the Invitrogen iPrep™ Purification Instrument for the extraction of DNA from evidence and reference samples in forensic casework.

The Invitrogen iPrep™ Purification Instrument is a compact automated DNA purification instrument capable of processing thirteen samples in approximately 20 minutes, utilising the ChargeSwitch® Technology (CST©). The CST© is a novel magnetic bead based technology that provides a switchable surface charge, dependent on the pH of the surrounding buffer to facilitate nucleic acid purification. In low pH conditions the CST© beads binds DNA and it is subsequently eluted by raising the environmental pH to 8.5 in a low salt solution. The purified DNA is immediately ready for downstream applications.

Validation studies were carried out using mock forensic samples and comparison to the standardized organic extraction methods. The samples used were dilutions of blood on cotton swabs, blood stains on various substrates, cigarette butts, stamps, touch samples collected on cotton swabs and various tissue samples. Modified pre-extraction steps were developed to accommodate the various sample types and substrates commonly seen with forensic evidentiary samples and to allow presumptive testing for sample type.

Our results show that the DNA extraction with the iPrep™ technology was at least as efficient as that using organic solvents. Ample DNA to generate full DNA profiles using the AmpflSTR SGMPlus Kit was consistently obtained from as little 0.05µl blood on cotton swabs. The major factor for this increased efficiency was the utilisation of a homogenizer in pre-extraction steps.

We present here our results of the validation, the problems encountered when processing real casework samples and our modifications to overcome these.