

DIRECT AMPLIFICATION OF CASEWORK BLOODSTAINS USING THE PROMEGA POWERPLEX® 21 PCR AMPLIFICATION SYSTEM

Kerryn Gray, Damian Crowle, Pam Scott, Forensic Science Service Tasmania

A significant number of evidence items submitted to Forensic Science Service Tasmania (FSST) are blood swabs or bloodstained items. Samples from these items routinely undergo phenol:chloroform:isoamyl alcohol organic extraction and quantitative Polymerase Chain Reaction (qPCR) testing prior to PowerPlex® 21 amplification. This multi-step process has significant cost and timeframe implications in a fiscal climate of tightening government budgets, pressure towards improved operating efficiencies, and an increasing emphasis on rapid techniques better supporting intelligence-led policing.

Direct amplification of blood and buccal cells on cloth and Whatman FTA™ card with PowerPlex® 21 has already been successfully implemented for reference samples, eliminating the requirement for sample pre-treatment. Scope for expanding this method to include less pristine casework blood swabs and samples from bloodstained items was explored in an endeavor to eliminate lengthy DNA extraction, purification and qPCR steps for a wider subset of samples.

Blood was deposited onto a range of substrates including those historically found to inhibit STR amplification. Samples were collected with micro-punch, micro-swab, or both. The potential for further fiscal savings via reduced volume amplifications was assessed by amplifying all samples at full and reduced volume (25 and 13µL).

Overall success rate data showed 80% of samples yielded a complete profile at reduced volume, compared to 78% at full volume. Particularly high success rates were observed for the blood on fabric/textile category with 100% of micro-punch samples yielding complete profiles at reduced volume and 85% at full volume.

Following the success of this trial, direct amplification of suitable casework blood samples has been implemented at reduced volume. Significant benefits have been experienced, most noticeably where results from crucial items have been provided to police investigators prior to interview of suspects, and a coronial identification has been successfully completed in a short timeframe to avoid delay in the release of human remains to family members.