VALIDATION OF THE BECKMAN BIOMEK® NXP LABORATORY AUTOMATION WORKSTATION FOR AUTOMATED FTA WASH IN PATERNITY TESTING

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The Whatman FTA™ card is a simple yet effective tool for blood sample collection in paternity cases and reference blood profiling. With the traditional STR-PCR amplification kits, it is vital that the FTA™ punch be washed thoroughly to remove cell debris and inhibitors such as heme, prior to solid phase PCR amplification, to ensure good DNA profiles. The current washing of the FTA™ punch is either performed manually or by the use of the Beckman Biomek® 2000 Laboratory Automation Workstation. The manual method of washing is laborious and time consuming while the Biomek® 2000 instrument has a limited wash process of 4, 8, or 12-column of samples in 96-well plates. In this study, we validated a faster automated wash method in the DNA Profiling Laboratory with the recently acquired Beckman Biomek® NXP Laboratory Automation Workstation, allowing the user the flexibility of choosing the number of columns for wash and the option of using either full-skirted or half-skirted 96-well plates. This validated FTA wash method is also used in a separate study using the Promega PowerPlex® ESX 17 kit to study allele frequencies of the Chinese, Malay and Indian population in Singapore.

One hundred and six blood paternity samples on FTA™ cards were processed into 0.75 mm diameter punches using a Harris Uni-Core and subjected to a total of five wash cycles, with three using the FTA™ purification reagent and the last two using autoclaved deionized water. The punches were subsequently amplified using the Applied Biosystems AmpFℓSTR® Identifiler® PCR amplification kit and analysed on a genetic analyzer. To exclude the possibility of contamination, checkerboard, horizontal row, and vertical column contamination-check assays were performed. During the wash process, no punches were lost and most FTA™ punches were observed to have lost the initial red colour, which is indicative of the absence of the heme inhibitor. All the tested samples produced full concordant DNA profiles with sharp allele peaks, indicating efficient PCR amplification with good resolution in the capillary separation of PCR products. The absence of contamination in the automated washing method was demonstrated as no mixture profiles were observed in any of the samples or positive controls and no profiles were detected in any of the blank or negative samples. The results have demonstrated that the automated wash method for the Beckman Biomek® NXP Laboratory Automation Workstation is robust, sensitive and reproducible and confers the additional advantage of allowing washing of user-specified number of columns (from 1 to 12) in a plate. This reduces time and pipette tips wastage. Furthermore, the DNA profiles obtained from FTA wash in the half-skirted 96-well plate demonstrate concordance and reproducibility, conferring the lab an additional option for use during FTA wash. ⌘