HALF-VOLUME DIRECT AMPLIFICATION OF DATABASE SAMPLES USING THE PowerPlex® HALF-VOLUME DIRECT AMPLIFICATION SYSTEM: A VALIDATION STUDY

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The Wisconsin DNA Databank Unit Familial Search Program is in the process of implementing several techniques for the Y-STR processing of reference DNA samples that will allow a significant reduction in cost and an increase to efficiency while maintaining a high success rate. The purpose of this study was to validate the direct amplification of DNA from both FTA storage cards and swabs using the PowerPlex® Y23 amplification system. The procedure for swabs was modified from the SwabSolution™ Technical Manual to reduce the amount of substrate needed to ¼ of a swab head. For FTA storage cards, one 1.2mm punch was used. Setup for amplification was performed using half of the standard reaction volume; 5X AmpSolution™ reagent was added for FTA storage cards only.

An optimization study demonstrated that 3.0µL of swab extract and 27 cycles on a GeneAmp 9700 thermal cycler generated quality DNA profiles on an ABI 3500xL Genetic Analyzer for both FTA storage cards and swabs. All samples were analyzed using Gene-MapperIDX v1.4. The analytical threshold and stochastic threshold were determined through a sensitivity study that utilized target amounts of organically extracted DNA. In conclusion, direct amplification using the PowerPlex® Y23 amplification system will allow the Wisconsin State Crime Laboratory to streamline sample processing for the Familial Search Program while maintaining a high level of integrity.