

COMPARISON OF THREE 6-DYE STR DNA TYPING KITS

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Effective January 2017, all forensic DNA laboratories submitting samples to the Combined DNA Index System (CODIS) must use STR DNA typing kits that encompass the new 20 core CODIS loci.

Currently there are three commercially available 6-dye STR DNA typing kits that will produce DNA profiles containing the required 20 core CODIS loci. In an effort to identify the optimal kit for use at the San Francisco Police Department Criminalistics Laboratory, a comparison of all three kits was performed to select a single kit for validation.

Kits and required reagents (spectral standard, size standard, etc.) were donated by three companies for use in the comparison tests. Lab donor saliva swab samples were extracted using a Qiagen EZ1 XL advanced robot with the DNA Investigator Kit and quantified in triplicate using Quantifiler Duo on an ABI 7500.

The initial comparison was a sensitivity study using two samples each of a single source sample, two person 1:1 mixture and three person 1:1:1 mixture. The input of DNA ranged from 3 ng to 0.008 ng and cycling parameters were per manufacturer's recommendations on an ABI 9700, separation using an ABI 3130xl and analysis using Genemapper IDX v 1.4. Based on this study, the optimal input was determined for each kit and used for subsequent comparisons

The next comparison was to evaluate performance in mixtures using two and three person mixtures in triplicate in the following ratios:

1:20, 1:10, 1:5, 1:2, 1:1, 2:1, 5:1, 10:1, 20:1 and 1:1:10, 1:2:10, 1:5:10, 1:1:1, 1:10:2, 1:10:5, 1:2:5

Kit performance in the presence of inhibitors was assessed by maintaining DNA input at 1/4 optimal amount for single source samples with inhibitor amount increased until failure.

Finally, impact of DNA degradation was investigated for each kit by subjecting 1 ng/ul of single source DNA samples to 30 minutes of maximum vortex speed, UV exposure for 30 minutes and 20 minutes of autoclaving.

Results for each study will be presented and the final decision of the laboratory detailing what kit was chosen for final validation for use in casework will be discussed.