A40 Evaluation of MCLAB Buffer and NanoPOP-4™ as Alternative Consumables for Applied Biosystems Capillary Electrophoresis

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After attending this presentation, attendees will have a better understanding of how capillary electrophoresis (CE) buffer and polymer affect resolution and precision of CE instruments. Further, attendees will appreciate the differences between MCLAB consumable CE products and Applied Biosystems consumable CE products.

This presentation will impact the forensic science community when evaluating MCLAB consumable CE products, as a cheaper alternative, for use on Applied Biosystems CE instruments.

The enhancements in forensic DNA analysis that have occurred over the past 15 years can be partially attributed to the capabilities of CE. The successes of such systems rely on accuracy, reproducibility, and precision, all of which allow for the ability of associated software to assign discrete allele values to DNA fragments. Resolution and precision are two means of evaluating the overall health of a CE system. Resolution is a measurement that predicts the ability of an instrument to effectively separate two components, such as two DNA fragments of similar size. On the other hand, precision is the degree to which repeated measurements under unchanged conditions show the same result upon replicate testing. Factors such as resolution and precision can be affected by variations to the reagent components used in a CE instrument. Both Applied Biosystems (ABI) and MCLAB manufacture buffer and polymer that are compatible with ABI CE instruments. The evaluation of resolution and precision are necessary measurements for the validation of any component used on a CE instrument. MCLAB's consumable CE products could be a cheaper alternative to ABI products; however, information on the performance and quality of MCLAB products has not been made available to the forensic community. Therefore, this study was designed to evaluate the performance of MCLAB consumable CE products using ABI AmpF*l*STR® Yfiler™ PCR Amplification Kit with analysis on a ABI 3100*Avant* Genetic Analyzer. In this study, Y-STR data quality, resolution, precision, and cost were evaluated to determine if MCLAB consumable CE products perform comparably to ABI consumable CE products. As described by Heller et al., resolution was calculated for the two allele peaks at the DYS385 locus using $RSL=W_h/(\Delta X/\Delta M)$. In this study, W_h and ΔX were measured in CE scan

time units (ms) and ΔM was measured in bases. Precision was calculated

using the 250 bp DNA fragment of GS500 LIZ ILS for both sample groups. Regardless of the consumable CE products used, all expected Y- STR alleles were detected for each sample analyzed in this study. For samples analyzed with ABI consumables, 36.1% of the loci produced artifacts above threshold, whereas 55.5% of the loci had artifacts when MCLAB consumables were used. Consistent artifacts included pull-up and baseline for both products. However, the average number of loci with artifacts above threshold was not significantly different for ABI and MCLAB products. ABI consumables produced significantly higher peak heights, on average, than MCLAB consumables. Peak heights for ABI analyzed products were slightly over 500 RFU higher than MCLAB, on average. However, both manufacturers' products had peak heights well above typical stochastic thresholds. Further, both MCLAB and ABI consumable CE products were comparable in all other measures of STR data quality, resolution, and precision. Both manufacturer products produced size ranges for the 250 bp fragment that varied less than 0.2 bp. Therefore, if laboratories decide to evaluate a different manufacturer consumable to implement, other factors, such as cost, may be considered. While formamide cost differences are negligible, ABI buffer and POP- 4™ are approximately 4.5 and 2 times more expensive than their analogous MCLAB products, respectively. This study suggests that MCLAB products are appropriate for DNA analysis on ABI CE instruments and may provide a cheaper alternative for DNA separation. **Applied Biosystems, MCLAB, Polymer**

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