



### A120 Biomatrix DNA SampleMatrix® – A New Prospect for Forensic DNA Sample Storage

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The goal of this presentation is to address the feasibility of using Biomatrix DNA SampleMatrix® as an effective means of stabilizing extracted DNA for room temperature storage, as well as to discuss the advantages and disadvantages of the product for forensic DNA samples.

This presentation will impact the forensic community by illustrating that there may be a space conserving method for long-term DNA sample storage without refrigeration.

Forensic labs across the country currently store DNA extracts in -20°C freezers for sample preservation in an attempt to maintain their integrity over long term storage. These freezers take up vast amounts of valuable laboratory space and need to be continuously monitored for potential malfunctions. Freezing samples may also shear and damage the DNA, especially with repeated freeze-thaw cycles. As an alternative method of storage, the Palm Beach County Sheriff's Office (PBSO) began researching Biomatrix's DNA SampleMatrix® (SM), which is presently marketed through Qiagen as QIA-safe DNA 96-well plates and individual tubes. In this study, the SM 96-well plates were evaluated against current storage methods at six time points ranging from 1 day to 3 months. Matrix samples were assessed for overall sample recovery and quality versus the in-house controls (IHC). Similarly, SM individual tubes were tested, at three time points ranging from 2 weeks to 4 weeks, and compared to IHC samples. The SM 96-well plate and the SM individual tubes were further evaluated at each time point with respect to two different environmental storage conditions. Samples were stored in identical storage cabinets, one with a humidity controlled environment and the other without humidity control.

Sensitivity and mixture series were utilized for the evaluation of the SM. The sensitivity study consisted of DNA concentrations from 4ng to 0.0625ng in a total of 20µL, with a serial dilution factor of 2.0 for both a male and female donor. The mixture study consisted of 1ng total in 20µL of several different male to female ratios. The Beckman Coulter BioMek® NX<sup>P</sup> was used to aliquot 20µL of each sample from a stock tube into SM 96-well plates and SM individual tubes for each time point and condition. The NX<sup>P</sup> simultaneously created IHC samples of 20µL aliquots of each sample from the same stock into dolphin tubes. IHC samples were stored in a -20°C freezer, while the SM samples were dried overnight in a laminar flow hood and stored in their respective conditions.

SM samples were rehydrated with 20µL of autoclaved water for sample recovery. All recovered DNA samples were quantified using Applied Biosystems Quantifiler™ Human DNA Quantification kit on the ABI 7000 and compared to determine if DNA stored on the SM was recovered at the same or higher concentrations than those in the IHC condition. Both the SM samples and the IHC samples were also compared to a baseline created of the original DNA stock tube at the time samples were plated. The remaining sample was amplified using Promega's multiplex STR PowerPlex® 16 system. Once amplified, the samples were run on Applied Biosystems 3130xl Genetic Analyzer to analyze the integrity of the DNA after storage on the SM.

The integrity of the sensitivity samples was determined by observing the complete loci calls and comparing the average relative fluorescence unit (RFU) values of each allele at each locus. Complete loci calls were determined by overlapping the replicate electrophoregrams for each sample. The mixture samples were evaluated by observing the complete loci calls from each donor, whether a minor contributor could be identified, and if dropout was observed.

The data shows SM individual tubes did not perform as well as the SM 96-well plates. Analysis of the qPCR data is currently being completed to determine if DNA can successfully be stored at ambient temperatures. Further studies need to be conducted to evaluate if DNA can be stabilized at periods longer than 3 months, and what effects of repeated cycles of rehydrating and drying of the SM would have on the DNA sample.

#### DNA Storage, DNA SampleMatrix®, Biomatrix