B19 Storage of DNA Samples at Ambient Temperature Using DNA-SampleMatrix®

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After attending this presentation, participants will learn about optimizing DNA storage of Forensic samples in a new matrix that may result in an increased ability to re-test crime scene samples.

This presentation will impact the forensic science community by demonstrating how the ability to re-test samples is an important part of forensic work and may lead to exoneration of the innocent or the identification of a suspect. Good storage of samples containing small amounts of DNA is important for maintaining the quality of the samples over time. The current work focuses on forensic DNA samples; however this technology is applicable to all DNA laboratories.

Biological samples collected and stored for diagnostic and research purposes include cells, viruses, and DNA/RNA. Advances in PCR technology have enabled successful analysis of minute quantities of these samples, including low quality and quantity DNA, which is commonly encountered in forensics. For example, DNA samples from bone and teeth recovered following large scale mass disasters and terrorist acts, as well as crime scene samples from sexual assault and touch evidence, such as fingerprints, can yield less than 100 pg of DNA. The ability to re-test samples is a critical component of forensic work, where trace evidence can lead to exoneration of the innocent or the identification of a suspect. Thus, proper storage of samples containing small amounts of DNA is important for maintaining sample integrity over time. The objective of this study is to develop an efficient, long-term storage strategy for DNA samples. The current work focuses on forensic samples; however this technology is applicable to all DNA laboratories.

The ability to consistently recover and re-test forensic DNA samples may be affected by variables such as storage temperatures and repeated freeze-thaw cycles. Biomatrica, Inc. has developed a technology that allows for the stable, dry storage of biological materials at ambient temperatures. DNA-SampleMatrix® works by forming a protective shield around the sample that prevents further damage and degradation over time.

An international consortium of leading forensic, academic, and government laboratories has been formed to evaluate DNA- SampleMatrix® as an alternative to conventional freezer storage. In one study, the quality of control DNA (K562) recovered from room temperature dry storage in DNA-SampleMatrix® at various time intervals is being assessed. A comparison of samples stored in standard microfuge tubes at room temperature also is being conducted. Experiments comparing storage at -20◦C of samples maintained either in DNA-SampleMatrix® in a 96-well plate format (SampleGard®) or microfuge tubes is on going. Recovered samples will be quantified using qPCR and agarose gel electrophoresis. Preliminary results indicate that the integrity is maintained of DNA samples stored dry in DNA-SampleMatrix® over three months as compared to samples stored in standard microfuge tubes.

Samples stored in DNA-SampleMatrix® e were amplified using a variety of STR multiplexes including Powerplex16®, Identifiler™, and Profiler Plus®. No detectable inhibition to PCR amplification of the STR multiplexes was observed even in the presence of high concentrations of the DNA-SampleMatrix®.

Preliminary results also will be presented from additional consortium studies evaluating the ability of DNA-SampleMatrix® to store and protect samples previously extracted and typed from proficiency tests, degraded DNA samples, DNA extracted from bones and teeth, low copy number samples, samples that have been sent through the U.S. mail, and sample stability following multiple freeze-thaw cycles.

DNA Stability and Storage, Matrix, Degraded DNA

 ** Presenting Author*