EFFECTIVE DNA PRESERVATION TECHNOLOGY FOR ROOM TEMPERATURE STORAGE

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The success of forensic genetics necessitates the preservation and storage of DNA samples to maintain their integrity as biological evidence. Additionally, the ability to retest the samples after several years of storage is a key factor in the selection of a preservation method. Typically, DNA extracts at forensic laboratories are stored in freezers at -80°C or -20°C, creating challenges due to the size and maintenance of cold storage facilities. DNAstable® from Biomatrica, Inc. is a chemical stabilizer for DNA extracts, which allows DNA storage at room temperature, saving the costs of freezers and their maintenance, as well as the need to transport extracts on ice. DNAstable® is mixed with DNA extracts, which are then dried and stored at room temperature. DNAstable® forms a protective coating around DNA during drying. To prepare for forensic testing, the dried extracts are simply rehydrated with water.

Introduced in 2007, DNAstable® has been used by forensic laboratories since 2010. Multiple publications demonstrate the efficacy of DNAstable® to protect DNA extracts both short-term and long-term (Donfack, FSI Genetics, 2013; Lee, FSI Genetics, 2011). Previously, Biomatrica has demonstrated through accelerated stability testing at 45ºC that DNAstable® can preserve purified DNA for >20 years without degradation. In the current study, Biomatrica investigated the ability of DNAstable® to protect DNA for six years in real time at room temperature. The quality of stored DNA was evaluated based on (1) the degradation index using an Innoquant™ kit and (2) quantitative peak height results from short tandem repeat (STR) genotyping and the number of observed alleles. Our results show that after 6 years of aging at room temperature, DNAstable®-treated samples at concentrations commonly encountered in forensics (≥ 0.20 ng/µl) performed similarly, in terms of recovery and quality, to untreated frozen control samples. In a blind study, all samples (treated and untreated) were sent to an outside forensic laboratory for STR analysis. No decrease in the number of observed alleles, nor in the peak height of these alleles in the DNAstable®-treated samples, were observed when compared to the untreated, frozen controls. In contrast, non-treated samples stored for the same length of time at room temperature showed signs of degradation, i.e., a decreased number of observed alleles and a decrease in the peak height of these alleles. Results from this study indicate that DNAstable® effectively protects DNA from degradation at room temperature and is beneficial for maintaining the integrity, quality and quantity of even very low-level DNA samples (< 0.20 ng/µl DNA) for at least 6 years.