COMPARISON OF THERMAL CYCLERS AND THE AMPLIFICATION KITS TO ASSESS THE ANALYSIS OF LOW COPY NUMBER DNA

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Often times, forensic DNA samples are not composed of pristine DNA, but are degraded, contain very small amounts of DNA, or both. With such samples, it can be difficult to develop a full DNA profile. One way to try to elicit a more complete profile is to employ more rigorous amplification techniques, such as increasing the PCR cycle number or post-PCR purification. This study took into consideration methods that are not usually considered by looking at different thermal cyclers and the PCR kits used, to determine a more efficient and effective amplification technique for low template samples. The Qiagen Rotor-Gene Q, an oven based thermal cycler system, was first compared to the Applied Biosystems 9700 thermal cycler using pristine DNA samples. A comparison was run between the AmpFℓSTR® Identifiler® PCR Amplification Kit and the AmpFℓSTR® Identifiler® Plus PCR Amplification Kit on both of these instruments. It was found that the AmpFℓSTR® Identifiler® Plus PCR Amplification Kit routinely outperformed the AmpFℓSTR® Identifiler® PCR Amplification Kit, so all further studies were performed using the Plus kit. The thermal cyclers were further compared to determine their ability to produce quality STR profiles from low template samples. The results thus far show the two thermal cyclers produce statistically similar amplification results. Products from both instruments show similar peak heights, heterozygote balance, and rates of dropout for products with lower starting template. Further experiments were performed using smaller amounts of input DNA to determine which thermal cycler produces the most robust amplification results for low template samples.