

## **DEVELOPMENTAL VALIDATION OF AN INNOVATIVE DNA QUANTIFICATION SYSTEM**

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Recently introduced next generation STR kits are more sensitive, highly robust to inhibitors and highly discriminating. The result of these changes is that useful STR profiles can now be obtained from previously untypeable forensic DNA samples. Such casework samples often have low quantity and/or degraded DNA, PCR inhibitors, and, in sexual assault samples, a high quantity of female DNA compared to male DNA. These factors can make it difficult to decide whether to continue with STR analysis, which STR kit to use and how much DNA to add to the STR amplification reaction. To address these factors, we have developed a new DNA quantification and assessment kit to provide better correlation between the DNA sample and resulting STR profile. The Quantifiler® HP and Trio DNA Quantification kits enable efficient and accurate quantification of human DNA and are the first kits to provide a Quality Index to detect the presence of degraded DNA along with PCR inhibitors. In addition, the Quantifiler® Trio kit determines the quantity of male DNA present in samples. All of these results guide the selection of the most appropriate STR kits in order to help maximize the chances of casework sample analysis success. These new kits provide a quantitative measure of the degree of DNA degradation, useful for the determination of how much DNA to add to the STR reaction and which STR kit to use in order to deliver the most informative results. Through our developmental validation studies we show how degradation predicts the ski slope effect with downstream STR PCR amplification kits and how the addition of more DNA can recover the lost alleles. We also show how the increase in assay sensitivity and the improved inhibitor tolerance can be used as a decision making tool to obtain complete profiles from challenging casework samples. These samples include trace DNA samples, highly degraded DNA samples, low quantity of male DNA in high level of female DNA as well as samples contaminated with PCR inhibitors. The developmental validation data also demonstrates how these new quantification kits provide critical decision making tools as part of the forensic casework workflow using AmpFLSTR® MiniFiler™, Identifiler® Plus and the GlobalFiler™ Kits , illustrating how this approach can facilitate enhanced efficiency and first pass success rates.

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