DEVELOPMENT OF THE POWERQUANT™ SYSTEM FOR QUANTITATION OF HUMAN AUTOSOMAL AND MALE DNA WITH DETERMINATION OF DNA DEGRADATION

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Current qPCR based quantitation systems allow forensic DNA analysts to determine the optimal amount of human DNA to add to an STR amplification reaction and whether autosomal or Y-STRs are likely to be more informative based on the auto/Y quantitation ratio. The PowerQuant™ System meets these requirements using multi-copy targets for autosomal and Y quantitation, and assesses the degree of a DNA sample's degradation using a larger amplicon from a separate region of the same multi-copy autosomal quantitation target. These multi-copy targets allow sensitivity of detection down to 0.1pg/µL DNA while minimizing auto/Y ratio variation in male DNA samples. The design of the PowerQuant™ System master mix and internal PCR control (IPC) delivers sensitivity to PCR inhibitors comparable to newer STR amplification systems. The use of a larger amplicon to evaluate the degree of DNA degradation intrinsically increases the amplicon's susceptibility to inhibition. To mitigate the potential for inhibitors falsely flagging a sample as degraded, the IPC is designed to be similarly affected by inhibitors as the degradation amplicon. We present data demonstrating sensitivity, consistency of auto/Y ratio in male samples, resistance to inhibitors, ability to detect DNA degradation, species specificity, and male specificity at various ratios of male to female DNA.

Key Words: qPCR, quantitation, zero quant, PowerQuant™, Auto/Y, inhibitors, degraded DNA