EXPERIMENTAL STUDY: THE EFFECTS OF EXCESSIVE FEMALE DNA IN SEXUAL ASSAULT SAMPLES AMPLIFIED USING POWERPLEX® Y23 SYSTEM

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NMS Labs recently conducted a validation of the PowerPlex® Y23 System using the Applied Biosystems 3500 platform. As part of the Mixture Study, samples were prepared to mimic those that would typically be encountered in casework, specifically when processing intimate sexual assault type samples. Extract from a male buccal swab with varying quantities of DNA from the Sensitivity Study (4 ng to 16 pg) were spiked with excessive amounts of female DNA (4 µg – 7.6 µg total input). Additionally, as part of the Contamination Study, five vaginal swab extracts, containing excessive quantities of female DNA (0.6 µg – 14.1 µg total input), were amplified to assess cross reactivity artifacts.

The results indicated that samples amplified with an excessive amount of female DNA (≥7.6 µg total input) can either overwhelm the reaction entirely, essentially inhibiting the amplification of the male DNA or produce artifacts. In almost every sample containing a mixture of male and excess female DNA, the expected average peak height of the male was significantly less than the peak height of the male when run as a single source. For samples where the male input was ≥1 ng total input, the male component was lost entirely.

There have been papers published regarding the artifacts that are commonly observed in samples typed with Promega's PowerPlex® Y23 System, including those observed with excessive amounts of female DNA. Many of these artifacts are published in the kit's manual and can be attributed to the input of excessive amounts of female DNA, typically encountered in intimate sexual assault type samples. Some of these artifacts appear as actual alleles and fall within bins, making interpretation of profiles difficult if analysts are not aware of the female artifacts. This could potentially lead to false inclusions or exclusions.