Forensic Casework Using PowerPlex™: from the Miniscule to the Mixed

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Our experience with the *GenePrint*® PowerPlex™ STR multiplex indicates that it is a powerful technology that has significantly improved the utility of DNA PCR testing for the criminal justice system. GeneLex Corporation has successfully used the PowerPlex™/ Amelogenin STR multiplex in combination with the Hitachi FMBIO® II for forensic casework, offender databanking and parentage testing since mid-1997. This technique combines the amplification of a gender-specific locus with 8 STR loci in a single amplification with detection in a single gel lane.

Over a year of casework experience indicates that the PowerPlex™ multiplex has significant advantages over the other methods we have used for forensic casework, including RFLP, DQA1, Polymarker, D1S80 and the CTT STR triplex. Notably, this multiplex offers a high matching probability, rapid testing, sensitivity and low sample consumption. It offers an increased chance of excluding a falsely accused individual, an excellent chance of determining whether a sample is a mixture and an increased ability to determine the individual contributors to complex mixtures.

A variety of casework results will be presented to provide examples of the effectiveness of PowerPlex™ in regard to its sensitivity, its utility in the analysis of mixtures and the range of evidence tested. The case "Oregon State vs. Hale" involved two men who were accused of killing three teenagers. The crime scene was complex: the victim's clothing had been removed, the bodies had been moved, and one of the victims had been sexually assaulted. Hundreds of items of evidence were examined. The State Police Crime lab performed RFLP, DQA1 and Polymarker testing. GeneLex Corporation performed presumptive body fluid identification testing and STR DNA analysis for the defense. A team of forensic consultants also provided expertise in order to reconstruct the crime scene and establish the actual chain of events. STR analysis was complex but highly effective. Computer traces of STR profiles could be used to identify major and minor contributors to a mixture based on the intensity of the signals. Mixtures of more than three people could be resolved. Multiple individuals could be excluded. Direct sample comparisons with Polymarker/DQA1 results clearly indicated that STR analysis provided more information in the resolution of complex mixtures. The jury was in recess for one day and Hale was given the death penalty.