

## **EVALUATION OF UTILITY OF HIGH-DENSITY DNA MICROARRAYS IN FORENSIC DNA SAMPLES**

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DNA microarrays can genotype high-density single nucleotide polymorphisms (SNPs) simultaneously and have a high discriminatory power for identification of human individuals. It has been reported that DNA microarrays are useful for kinship analysis, mixture interpretation, and phenotyping. However, SNP genotyping systems with microarrays need much larger amounts of DNA than currently used for short tandem repeat typing systems. For example, according to the manufacturer's protocol, Infinium HumanCore-24 BeadChip (Illumina) requires 200 ng of pristine DNA. Because we usually cannot obtain such DNA samples in actual forensic cases, the SNP profiles from DNA microarrays using these DNA samples may be partial and incorrect. In this study, we investigated the effects of decreasing the quantity and quality of DNA on the genotyping results.

We collected buccal cell DNA from three individuals. For samples with small amounts of DNA, the amount of each buccal cell DNA sample used for SNP typing was adjusted to 5, 10, 20, 50, 100, and 200 ng. Degraded DNA samples were obtained by artificially degrading three DNA samples (200 ng each) by sonication to obtain DNA fragments of < 150 bp, < 300 bp, and < 1000 bp. We then genotyped all DNA samples using Infinium HumanCore-24 BeadChip including approximately 300,000 SNPs. We checked the genotyping success rates and concordance rates by comparing the genotyping results of the small amounts of DNA and degraded DNA with those of 200 ng non-degraded DNA.

All the 200 ng non-degraded DNA samples produced high-quality genotyping results (genotyping success rates > 0.99). Although both genotyping success rates and concordance rates gradually decreased with a decrease in the DNA quantity, high-quality genotyping results were obtained using as little as 10 ng of DNA. On the other hand, the genotyping success rates clearly decreased to about 0.95 for the degraded DNA samples (< 300 bp). However, we confirmed that called SNPs had high concordance rates (> 0.999), even in samples with low genotyping success rates. These results suggest that we can potentially utilize DNA microarrays in forensic DNA samples such as teeth or bone remains after a long post-mortem interval.