EVALUATION OF THE EXPERT SYSTEMS OF RAPID DNA INSTRUMENTS

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This study is aimed to evaluate the quality of STR profiles generated by modified rapid DNA analysis which are integrated and automated systems to process forensic DNA samples with expert systems and manual review by qualified DNA analysts. We present the results from our early validation study especially in terms of the successful genotyping rate of the expert systems implemented in Rapid DNA instruments.

Non-allelic artifacts such as pull-up peaks, spikes, dye blobs observed in the STR profiles generated by the modified rapid DNA analysis may hinder the correct genotyping. The quality flags of non-allelic artifacts or error in peak detection indicate that manual data review by an analyst is required. For the purpose of evaluating the potential use of the expert systems as hands-off, buccal swab samples were analyzed and the success rate to obtain full genotype free from any non-allelic artifacts without manual data review was determined. And we also calculated the percentages of samples with various quality flags that required manual data review.

We re-analyze the electronic data exported from rapid DNA instruments to evaluate intra- and inter-loci peak height balance, stutter ratio and pull-up ratio to establish appropriate peak detection threshold and other criteria for concordance with conventional capillary electrophoresis system.

In this experiment, some mock evidence samples such as old bloodstains and saliva stains as well as buccal swabs and buccal suspension were processed to evaluate the potential use of the modified Rapid DNA analysis for crime scene samples.