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History

Earlier swab studies have shown that conventional DNA profile development methods extract only a small percentage of available cells from the cotton swabs most commonly used in collection of biological fluids.

Theory

The Applied Biosystems™ RapidHIT™ ID System allows a processed swab to be removed after testing. The extraction method used on the RapidHIT ID is not as rigorous as conventional DNA methods, potentially leaving sufficient DNA on a swab for reanalysis.

If a sample contains enough DNA, it may be possible to reanalyze the swab using conventional DNA methods after it has already provided a full profile via the RapidHIT ID. If so, a single swab may provide both quick investigative information and a confirmatory result.

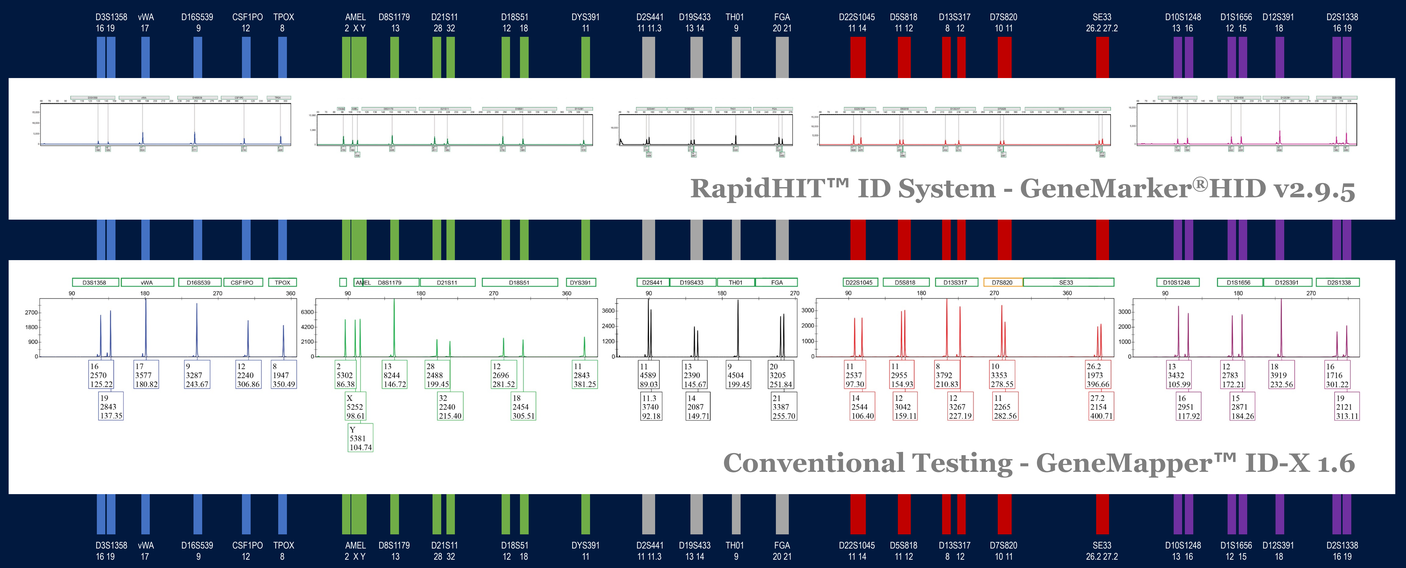
Methods

This study was designed to determine if, after rapid DNA testing, a standard cotton swab retains enough DNA to produce a full profile using conventional DNA analysis methods. Several samples were run using the RapidHIT ID including ACE Globalfiler Express and RapidINTEL sample cartridges, removed, allowed to dry, then reanalyzed using the conventional DNA methods of extraction, quantification, PCR amplification, and capillary electrophoresis.

Duplicate samples were also run using only the conventional DNA methods to check the accuracy of the data produced by the RapidHIT ID.

One Swab, Two Uses: Rapid and Conventional DNA Testing

Example profile comparison - Soda can swab



Results

Testing shows the RapidHIT™ ID System does not consume the entire sample on a swab, even with very low-level samples. Whether a buccal swab or a low-level blood sample, sufficient DNA remained on the swab after processing with the RapidHIT ID to produce a high-quality profile via conventional DNA methods. Furthermore, 100% concordance was obtained between the duplicate samples and those samples run the RapidHIT ID and reanalyzed using conventional analysis. Similarly, with crime scene-type samples, like cigarette butts and drinking containers, enough DNA was present after running the swab through the RapidHIT ID to produce, in most cases, a full profile using conventional DNA analysis methods.

These results, and the ease at which the swab can be removed from the RapidHIT ID cartridges, allow for a single swab, collected in the field or booking station, to have two uses: one processed at the scene with RapidHIT ID providing immediate information and investigative lead, and the second processed in the crime laboratory for court purposes.

Sample Breakdown

Sample	rDNA Cartridge	rDNA Loci Count	Post rDNA Qty ng	Conventional Methods Loci Count
6 swipes of 1 cheek	ACE	24/24	1195	24/24
4 swipes of 1 cheek	ACE	24/24	339	24/24
2 swipes of 1 cheek	ACE	24/24	1187	24/24
1 swipe of 1 cheek	ACE	24/24	600	24/24
4ul Blood	INTEL	24/24	8.5	24/24
2ul Blood	INTEL	23/24	3.9	23/24
1ul Blood	INTEL	23/24	2.4	23/24
5ng DNA from blood	INTEL	24/24	3.3	23/24
Cigarette butts	INTEL	24/24	37.9	24/24
Soda can	INTEL	24/24	17.5	24/24
Water bottles	INTEL	24/24	5.84	24/24
5mm² cutting of cloth with blood	INTEL	24/24	114.4	24/24

Further Study

More research is needed to determine the limitations of analyzing a single swab twice with low-level samples such as touch DNA. Investigation is also needed to develop best practices in preservation and transportation of a swab after processing on the Applied Biosystems™ RapidHIT™ ID System to minimize the chance of sample loss or contamination which could affect the conventional DNA analysis methods.

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