

White Paper: Results from Rapid DNA Multi-Laboratory Study Published – Showing Noteworthy Technology Advancements and Platform Differences

Robert O'Brien, *Biology Section Lead*, Global Forensic and Justice Center at Florida International University
January 29, 2025

The results of a multi-laboratory study were recently published in the journal *Forensic Science International: Reports*, highlighting significant advancements in Rapid DNA technology that support its utility as a reliable and effective tool for forensic evidence analysis.

Rapid DNA refers to the fully automated process of generating a DNA profile from a forensic sample within as little as 90 minutes, using a compact instrument that can be deployed outside traditional crime lab environments. The technology has already proven powerful for hundreds of agencies worldwide to dramatically accelerate the elimination and identification of potential suspects, to generate investigative leads, and identify victims of crimes and disasters.

However, a set of enhancements was requested from manufacturers in 2020 by the Rapid DNA Crime Scene Technology Advancement Task Group established by the FBI to enable its approved use on crime scene samples for profile comparisons in authorized State and National DNA databases, i.e. CODIS.

The multi-laboratory study was started in 2023 to test the performance of the Rapid DNA enhancements made by the two manufacturers, Thermo Fisher Scientific and ANDE. The 12 participating forensic laboratories across the United States and Europe each tested identical sensitivity and mixture sample sets using either the RapidINTEL Plus cartridge with the RapidHIT ID System from Thermo Fisher Scientific or the ANDE I-Chip run on the ANDE platform from ANDE corporation. Results were published in two separate papers, one for each system, with key findings summarized below.

Key findings:

1. The enhanced systems showed consistent performance across different laboratories and instruments from the same manufacturer. This high reproducibility supports use in validated forensic workflows.
2. The enhancements enable improved data recovery, data quality and profile interpretation from forensic samples -- especially important for crime scene evidence that often have limited DNA, degraded DNA or DNA from multiple contributors (mixtures).
3. One manufacturer's solution demonstrated significantly better data recovery capabilities than the other in critical areas such as sensitivity, peak height balance and mixture performance.
 - **Sensitivity:** the RapidINTEL Plus cartridge showed approximately 3 times more sensitivity than the ANDE I-Chip, consistently recovering complete DNA profiles from samples with about 3 times less DNA.
 - **Peak Height Ratio (Balance):** Balanced DNA results are important for interpreting complex profiles, especially from samples with mixed, degraded or low level DNA. The optimal peak height ratio typically ranges from 0.6 to 1.0. The RapidINTEL Plus cartridge showed an average 0.75 peak height ratio versus 0.5 for the Ande I-Chip.
 - **Mixture Performance:** Due to its increased sensitivity, the RapidINTEL Plus cartridge was significantly more effective in identifying the minor contributor in 2-person and 3-person mixtures with lower DNA input amounts. This enhances the capability to interpret more complex forensic samples.

Overall, the multi-laboratory study results highlight the significant recent advancements in Rapid DNA technology, providing a basis for agencies to validate and implement these enhancements for use on crime scene evidence.

Publication Links:

- [Results of the 2023 rapid DNA multi-laboratory study – RapidINTEL Plus sample cartridge - ScienceDirect](#)
- [Results of the 2023 rapid DNA multi-laboratory study – I-Chip – ScienceDirect](#)