

# The Italian Carabinieri achieves success using rapid DNA technology



## Summary

- In 2019, Italy's national law enforcement agency seeks and receives ISO/IEC 17025 accreditation of the Applied Biosystems™ RapidHIT™ ID System
- They achieve considerable success using the instrument to help solve cases quickly and begin uploading profiles to the nation's genetic database, the Banca Dati Nazionale del DNA
- Impressed with its ease of use, rapid analysis, and accurate results, the agency recommends the RapidHIT ID System as part of routine lab work, particularly for analysis of urgent samples, and to help reduce casework sample backlog

## Overview

Like many of the world's law enforcement agencies, the Italian national police force, known as the Carabinieri, added new forensic investigative capabilities in the mid-twentieth century to help apply the era's advances in science to law enforcement. Their Scientific Investigation Group (Raggruppamento Carabinieri Investigazioni Scientifiche (RACIS)) grew into a robust department, now comprising more than 400 experts distributed over four municipalities, with departments of specialization in digital forensics, criminal casework, and human identification. In keeping pace with the evolution of forensic analysis methods, the Carabinieri have made it part of their mission to continue to implement new technologies. This will help expand their ability to extract information from collected data and identify and characterize traces of evidence.

Recently, RACIS perceived the unique advantages that a rapid DNA platform had to offer and decided to add this

technology to their crime lab. They installed the RapidHIT ID System in 2019, with the goal of achieving ISO/IEC 17025 accreditation so that the system's notably fast and efficient DNA analysis power could be applied to real casework. It would also enable easier uploading of genotyped profiles to the nation's genetic database, the Banca Dati Nazionale del DNA.



Andrea Berti, PhD

## Implementing the rapid DNA program

A working group for ISO/IEC 17025 accreditation of the RapidHIT ID System was established in January 2019. A review of the available literature on law-enforcement uses of the new instrument was performed, with a focus on papers documenting casework performed with it. An internal validation plan was then arranged in accordance with the international guidelines of SWGDAM, ENFSI, and ISFG. Reproducibility, accuracy, and repeatability parameters were tested in March 2019, followed by the analysis of more than 50 forensic samples. These included other saliva reference samples and traces of blood and seminal fluid, which had been analyzed previously by using the Carabinieri's accredited internal method.

A final validation report, together with the analysis of the acquired data, was subsequently submitted to Italy's National Board of Accreditation for ISO/IEC 17025, and the confirmation of accreditation was obtained in October 2019. Within weeks, the RapidHIT ID System was

# applied biosystems

used to obtain a genetic profile derived from a trace of blood that was discovered at a crime scene after a house burglary; this became the first profile using the new method added to the Banca Dati Nazionale del DNA.

## Case studies

Many of the case studies detailing uses of the RapidHIT ID System by law enforcement have focused on its ability to quickly obtain reference samples using the Applied Biosystems™ RapidHIT™ ID ACE GlobalFiler™ Express Sample Cartridge. For example, buccal/cheek swab samples from suspects have been used to generate results in only 90 minutes—these results have then been run through databases to obtain search results while a suspect is still in custody. In the Carabinieri case studies, samples taken directly from human remains and crime scene evidence were also processed, generating rapid results leading to quick human identification and crime-solving capabilities.

### Case study 1

The body of an Italian citizen who died in the war in Syria in February 2019 was repatriated to Italy 3 months after his death for return to his family. However, the Italian government required both forensic medical examination and genetic analysis before the restitution of the body, which had been stored using formalin before arriving in Italy. A portion of the femur was sent to the RACIS laboratory for genetic analysis, and the RapidHIT ID System was used to analyze a sample taken from the bone marrow. The analyzed sample provided a complete DNA profile that was then compared with the victim's parents, confirming the identity of the body.

### Case study 2

In April 2019, a woman was found dead in her home in a town in central Italy after being repeatedly stabbed. The investigative activities focused on the victim's son, who had a history of intense conflict with his mother. During a search in the home of the victim's son, a knife was found with

traces of blood on it. The knife was immediately sent to the RACIS laboratory for an urgent analysis that was performed using the RapidHIT

ID System. The genetic profile obtained was of excellent quality and matched perfectly with the genetic profile of the victim. Thus, analysis using the RapidHIT ID System succeeded in providing investigators with a decisive element for solving the case in just a few hours.

## Conclusions

The Carabinieri's scientific investigation unit implemented the RapidHIT ID System in their lab and were able to achieve ISO/IEC accreditation in less than nine months. The rapid DNA methodology the system uses allowed them to process samples and solve cases shortly thereafter. According to the RACIS report on the use of the system:

"The extreme ease of its use, the quickness of the analyses, and the accuracy of the results proved the RapidHIT ID System to be a trustworthy technology for immediate use as part of our laboratory's routine. We believe that it can satisfy multiple needs that we face every day during our work; in particular, the analysis of urgent samples (for comparison with references or single biological traces). Moreover, we are confident that it can also represent a valid alternative to help reduce our backlog of samples from cases of crimes of low entity, which constitute a significant percentage of our activity."

– Andrea Berti, PhD  
Forensic Biologist and Lgt. Colonel of the Carabinieri,  
Forensic Scientific Centre, Rome, Italy



Find out more about the RapidHIT ID System at  
[thermofisher.com/rapiddna](https://thermofisher.com/rapiddna)

**ThermoFisher**  
SCIENTIFIC