

U.S. DEPARTMENT OF JUSTICE  
FEDERAL BUREAU OF INVESTIGATION  
LABORATORY DIVISION

Douglas R Hares, Ph.D.  
Rapid DNA Implementation  
Advisor  
Biometrics Analysis Section  
[RapidDNA@fbi.gov](mailto:RapidDNA@fbi.gov)  
[drhares@fbi.gov](mailto:drhares@fbi.gov)

FBI LABORATORY  
RAPID  
DNA  
CODIS

ISHI  
November 2, 2022

FEDERAL BUREAU OF INVESTIGATION  
LABORATORY DIVISION

**RAPID DNA UPDATE**

1

---

---

---

---

---

---

---

---

---

---

**Disclaimer**

- Names of commercial manufacturers are provided for identification purposes only, and inclusion does not imply endorsement of the manufacturer or its product or services by the FBI.
- Any reproduction, or other use of these presentation materials without the express written consent of the FBI is prohibited.
- The views are those of the author(s) and do not necessarily reflect the official policy or position of the FBI or the U.S. Government.

2

---

---

---

---

---

---

---

---

---

---

**Rapid DNA Act of 2017**

- Defines "Rapid DNA instruments"
  - "Instrumentation that carries out a fully automated process to derive a DNA analysis from a DNA Sample"
- Authorizes the FBI Director to:
  - Issue Standards and Procedures for the use of Rapid DNA instruments and resulting analyses for CODIS applications
- Rapid DNA Instruments can produce a CODIS DNA Profile in under 2 hours

3

---

---

---

---

---

---

---

---

---

---

### Rapid DNA Implementation

From a law enforcement perspective, there are three opportunities for implementation of Rapid DNA

Laboratory      Booking Station      Crime Scene

4

---

---

---

---

---

---

---

---

---

---

### Rapid DNA Systems – Laboratory Use

- 2 Rapid DNA Systems (**fully automated**) currently approved for **accredited laboratory use on reference sample buccal swabs**
- 2020 FBI Forensic and Database Quality Assurance Standards (QAS) addresses Rapid DNA use for Casework Reference and Database Reference Samples
- Only A-chip (ANDE) and ACE cartridge (Thermo) are included in NDIS approval
  - Reference Sample Buccal Swabs Only**

**Rapid DNA in an Accredited DNA Laboratory**  
 The following Rapid DNA Systems are approved for NDIS use by an accredited forensic DNA laboratory for single reference mouth swabs:

**DNAscan IC-Rapid DNA Analysis System**

Component	Name	Part/Version Number
Rapid DNA Instrument	ANDE IC Instrument	A0120007003
Typing Kit	FlexPlex27	FlexPlex27
Cartridge	ANDE A-chip (FlexPlex)	A0210001057
System Software	ANDE System Software	2.0.6
Expert System Software	ANDE Expert System	2.0.5

**Rapid4™**

Component	Name	Part/Version Number
Rapid DNA Instrument	Applied Biosystems™ Rapid4™ ID	A01810
Typing Kit	GlobalFiler™ Express	447609
Cartridge	Applied Biosystems™ Rapid4™ ID ACE GlobalFiler™ Express	A01801
System Software	Rapid4™ ID System Software	v1.3, v1.3.1, v1.3.2
Expert System Software	Rapid4™ ID Expert System Software	v1.0, v1.1

**Resources**  
 NDIS Operational Procedures Manual

5

---

---

---

---

---

---

---

---

---

---

### Modified Rapid DNA – Laboratory Use

- QAS defines internal validation requirements and NDIS Procedures define NDIS requirements for Modified Rapid DNA
  - Reference samples other than buccal swabs require internal validation and modified Rapid DNA
    - Examples: liquid blood, dried blood, FTA, Bode collector, etc.
  - Internal validations are required and must cover range of **casework/database reference sample types used**
- Validations must cover different chip/cartridge types used
  - Chip/cartridges types are very different (A-chip vs I-chip, ACE cartridge vs INTEL cartridge)
  - Must be a **NDIS approved PCR STR typing test kit**
    - DNA typing kit with corresponding part number or catalogue number
    - NDIS participating laboratory must have documentation that the chemistries and concentrations are exactly the same as the NDIS accepted PCR STR typing kit.
    - Kit must be listed in Appendix E of the NDIS Procedures.
      - ANDE, FlexPlex27 (A0210001057)
      - Life Technologies (AB), GlobalFiler® Express (Part Numbers 4474665 & 4476609)
- Rapid DNA section (4.6) of the NDIS Procedures

6

---

---

---

---

---

---

---

---

---

---

### Benefits of Laboratory Use

- Benefits of Integrating Rapid DNA for Casework Reference Samples
  - Streamline workflow for casework reference samples
    - Allows DNA analysts to focus on evidence samples
    - Suspect and elimination samples submitted after the evidence don't disrupt analyst's workflow
    - DNA data/profiles are quickly available for comparison

7

---

---

---

---

---

---

---

---

---

---

### Rapid DNA Implementation at the Booking Station

- A mouth swab is taken after a qualifying arrestee is identified via fingerprints
- A CODIS DNA profile is automatically developed by the Rapid DNA Booking System
- The qualifying arrestee's DNA profile is immediately enrolled in the State and National DNA Database
- DNA Profile is immediately searched against the DNA Index of Special Concern (unsolved "DNA Watchlist")
  - Arrestee profile searched against all other forensic profiles within 24 hours
- Hits to DNA Index of Special Concern are immediately disseminated via Nlets

8

---

---

---

---

---

---

---

---

---

---

### Rapid DNA Booking Station Implementation Timeline

- 2009:** DoD/DoJ/DOHS deployment contract for Rapid DNA
- 2010:** April 2010: CIS AP8 Rapid DNA Task Force formed
- 2012:** September 2012: First Rapid DNA prototype devices delivered
- 2016:** March 2016: first Rapid DNA device approved for Accredited Laboratory use on reference samples
- 2017:** Rapid DNA Act of 2017 enacted August 18, 2017
  - Publication of CIS AP8 Booking Station Requirements
  - Publication of CODIS Rapid DNA Interface Specifications
  - Formation of Rapid DNA Pilot Steering Committee
- 2018:** October 2018: CODIS 8.0 deployment completed containing Rapid DNA capability
  - CODIS Rapid Enrollment Application development completed for Booking Stations to communicate with CODIS
  - CIS Message Manager development completed for transmission of Rapid DNA hit information via Nlets
- 2019:** April 2019: Communications testing of IT networks completed
  - September 2019: First Rapid DNA Pilot sample uploaded to CODIS from an FBI booking station
- 2020:** February 2020: Completion of Rapid DNA Booking Station Pilots by 4 state/local partners (AZ, FL, LA and TX) and the FBI
  - August 2020: Publication of National Booking Station Standards and Procedures in compliance /execution of Federal Law
- 2021:** February 2021: FBI approval of first Rapid DNA Booking device for use in Booking Stations, second approved July 1, 2021
  - ANCE 6C Series G
  - Rapid ID DNA Booking System v1.0

9

---

---

---

---

---

---

---


---

---

---

**Rapid DNA Booking Station Implementation Timeline**

- First Authority to Operate Rapid DNA issued to Louisiana on April 27, 2022
- The Louisiana State Police Crime Laboratory went online with a single booking station on August 2, 2022



10

---

---

---

---

---

---

---

---

**Benefits Arrestee Collection and Booking Station Rapid DNA**

- Benefits of Rapid DNA at the Booking Station
  - Improves sample collection compliance
    - Prevents missed collections
    - Prevents duplicate collection of samples already in the database
    - Allows for collection of qualifying arrestees only
  - DNA results loaded into CODIS while arrestee is in custody
    - Immediate searching of high interest unsolved crimes
    - Searching of all crimes within 24 hours
    - Quick investigative leads
  - Release of Hit information faster due to qualifying offense and confirmation of identity at time of collection
- Resource Needs
  - Requires upgrading and integrating Rapid DNA into electronic booking process

11

---

---

---

---

---

---

---

---

**Rapid DNA and Forensic Samples – Challenges**

- DNA Advisory Board (established by the DNA Identification Act of 1994 and passed to SWGDAM) created separate Quality Assurance Standards (QAS) for Databasing and Forensic Laboratories due to **inherent sample differences**
- House Committee Report accompanying H.R. 510 (Rapid DNA Act of 2017)
  - **“At present, Rapid DNA technology can only be used for identification purposes, not crime scene analysis.”**
- Crime scene samples present many challenges that must be overcome
  - Many challenges require interpretation by a trained DNA analyst
    - **Mixtures** – (greater than 50% of crime scene samples analyzed)
    - **Low quantity DNA**
    - **Degraded DNA**
  - Forensic QAS requires **quantitation** of forensic samples
  - **No Expert System for crime scene samples** (requires DNA Analyst interpretation)
  - Evidence retention laws and preservation of evidence policies

12

---

---

---

---

---

---

---

---



**FBI-NIJ Multi-lab Study**

- **Main objectives of the multi-lab study are:**
  - Determine the limitations of the enhanced technology through sensitivity and mixture studies involving the extraction process
    - Target DNA concentrations will be calculated by the number of cells present in each sample
  - Determine the variability between the instruments of the same manufacturer
  - Publish independent articles

16

---

---

---

---





---

---

---

---

**Path for Rapid DNA Crime Scene Sample Use for CODIS**

- 
**CJIS Advisory Policy Board (APB) Rapid DNA Task Force**
  - Develop Law Enforcement Agency requirements for use of crime scene Rapid DNA and CODIS
- 
**FBI Rapid DNA Crime Scene Task Force – Technology Advancement Task Group**
  - *Published Rapid DNA for crime scene use: Enhancements and data needed to consider use on forensic evidence for State and National DNA Databasing - An agreed position statement by ENFSI, SWGDAM and the Rapid DNA Crime Scene Technology Advancement Task Group (FSI-Genetics 48 (2020) 102349)*
    - Identified five major areas that must be addressed before Rapid DNA instruments can be tested and considered for the analysis of forensic evidence for State and National databasing purposes.
  - Coordinate multi-laboratory study on the enhanced crime scene Rapid DNA technology and make recommendations to SWGDAM based on the results of the study
- 
**SWGDAM - Casework Expert Systems Working Group and Rapid DNA Committee**
  - Develop Guidance and Standards for use of Expert Systems on single source crime scene samples in an accredited laboratory
  - Develop Quality Assurance Standards for crime scene Rapid DNA use
- 
**NDIS Board**
  - Approve enhanced Rapid DNA STR typing kits for use on crime scene samples
    - For use with Modified Rapid DNA analysis
  - Approve crime scene Rapid DNA System(s) for use on single source crime scene samples

17

---

---

---

---

---

---

---

---

**Path for Rapid DNA Crime Scene Sample Use for CODIS**

- **The FBI envisions the development of a crime scene Rapid DNA program that is covered under the accreditation umbrella of a CODIS laboratory. This provides the quality structure needed to:**
  - Dramatically increase the capacity of an accredited CODIS laboratory by increasing the number of trained technicians available (remote processing)
  - Address the need for qualified DNA analyst data review required for crime scene sample data (laboratory reach back capability)
  - Provide ability to search crime scene Rapid DNA profiles in CODIS
- Both Accrediting bodies have mechanisms to add additional locations to the Laboratory's Accreditation through scope extension.

18

---

---

---

---

---

---



---

---




UNCLASSIFIED

**Contact Info**



FBI Laboratory, Quantico Virginia  
Biometrics Analysis Section  
[RapidDNA@fbi.gov](mailto:RapidDNA@fbi.gov)  
[drhares@fbi.gov](mailto:drhares@fbi.gov)



---

---

---

---

---

---

---

---