

DNA, or deoxyribonucleic acid, is the fundamental building block for an individual's entire genetic makeup and each person's DNA is different from every other individual's, except for identical twins. It is a component of virtually every cell in the human body, but only one-tenth of a single percent of DNA (about 3 million bases) differs from one person to the next. Scientists can use these variable regions to generate a DNA profile of an individual, using samples from blood, bone, hair, and other body tissues and products. Recent advancements and innovations in DNA technology are enabling law enforcement to solve cases previously thought to be unsolvable and providing the criminal justice field with a powerful tool for convicting the guilty and exonerating the innocent.

Physical evidence is any tangible object that can connect an offender to a crime scene. Biological evidence, which contains DNA, is a type of physical evidence. All biological evidence can be subjected to DNA testing and the resulting profile can then be compared with DNA profiles from convicted offenders and arrestees; DNA recovered from other crimes; and DNA obtained from a suspect. Further, DNA does more than just identify the source of the sample - it can place a known individual at a crime scene, in a home, or in a room where the suspect claimed not to have been. It can refute a claim of self-defense and put a weapon in the suspect's hand. It can change a story from an alibi to one of consent. However, several factors can affect the DNA left at a crime scene, including environmental factors (e.g., heat, sunlight, moisture, bacteria, and mold). Therefore, not all DNA evidence will result in a usable DNA profile.

- The DNA Identification Act of 1994 authorized the creation of the National DNA Index System (NDIS). All 50 states, the District of Columbia, the federal government, the U.S. Army Criminal Investigation Laboratory, and Puerto Rico participate in NDIS.¹
- NDIS is the national level component of the Combined DNA Index System (CODIS) and was created by the FBI in October of 1998.² NDIS contains DNA profiles contributed by federal, state, and local participating forensic laboratories.

1 Federal Bureau of Investigations. *Frequently Asked Questions on the CODIS Program and the National DNA Index System*, accessed August 5, 2014, <http://www.fbi.gov/about-us/lab/biometric-analysis/codis/codis-and-ndis-fact-sheet>.

2 Ibid.

- CODIS is the software that connects NDIS with state and local databases that contain DNA profiles from known criminal offenders (and arrestees, where applicable) and DNA evidence from crime scenes.³ CODIS routinely compares DNA profiles from crime scenes against the DNA profiles of known offenders, searching for matches or “hits” and generating leads for law enforcement to investigate. As of August 2014, the NDIS contains more than 11 million (11,175,266) offender profiles, almost 2 million (1,987,174) arrestee profiles, and 596,263 forensic profiles.⁴
- As of August 2014, CODIS has produced more than 257,921 hits, assisting in more than 246,334 investigations.⁵
- All 50 states require the collection of DNA from felony convicts. In addition, 29 states and the federal government have adopted laws which authorize the collection of DNA from persons arrested for certain crimes.⁶

Sexual Assault Nurse Examiners or SANE are employed in some hospitals and are the nurses who handle sexual assault cases and gather evidence through sexual assault kits.

- One study looking at the effectiveness of SANE programs found that the probability of a sexual assault case being prosecuted and an offender being convicted increases when a SANE collects the forensic evidence, despite victim and assault characteristics.⁷

3 Ibid.

4 Federal Bureau of Investigation, *CODIS-NDIS Statistics*, accessed October 15, 2014, <http://www.fbi.gov/about-us/lab/biometric-analysis/codis/ndis-statistics>.

5 Ibid.

6 DNA Saves. “29 States Have Passed the Law,” accessed October 15, 2014, <http://dnasaves.org/states.php>.

7 Rebecca Campbell, Debra Patterson, Deborah Bybee, and Emily R. Dworkin, “Predict Sexual Assault Prosecutions Outcomes: The Role of Medical Forensic Evidence Collected by Sexual Assault Nurse Examiners,” *Criminal Justice and Behavior* 36, no. 7 (2009): accessed August 5, 2014, http://responsesystemspanel.whs.mil/public/docs/meetings/20131107/Background_Materials/Rebecca_Campbell/Predicting_Sx_Asslt_Cases_Outcomes_2009.pdf.

- Another study of 530 sexual assault cases from three jurisdictions, indicated that SANE and SART (Sexual Assault Response Team) programs were beneficial in investigation and prosecutions of sexual assault cases because DNA collection by SANEs is more effective.⁸

Municipalities across the United States are working to identify untested sexual assault kits (SAKs) in law enforcement evidence storage. There is no current national count of how many untested SAKs there are, however, several major U.S. cities have reported having thousands.⁹

- New York City (NYC) was the first city to discover a large number of untested sexual assault kits. In 1999, the city had approximately 17,000 untested SAKs. However, by 2003, NYC was able to eliminate the backlog and 200 sexual assault offenders were arrested.¹⁰
- After the success of the backlog reduction program in NYC, the city adopted a policy of testing every sexual assault kit booked into evidence, and the arrest rate for rape subsequently increased from 40 to 70 percent.¹¹
- In one government study that looked at forensic evidence submission, researchers found that evidence was not submitted in 18 percent of unsolved sexual assaults, 14 percent of unsolved homicides, and 23 percent of unsolved property crimes.¹²

- In May 2014, Cuyahoga County, Ohio, prosecutor's office announced its 100th indictment resulting from the county's efforts to eliminate its rape kit backlog. Out of the 100 indictments, 30 percent involved serial rapists. In 70 percent of the cases, the attacker was a stranger to the victim.¹³
- Some progress has been made in preventing backlogs of SAK kits in the future. For instance, in 2010, Illinois passed the Sexual Assault Evidence Submission Act. The act requires law enforcement officials to submit sexual assault evidence kits to the Illinois State Police within 10 days of receiving the kits, and requires the Illinois State Police to analyze these kits within 10 days.¹⁴
- In 2011, Texas passed a similar law, and in 2013 Colorado did as well.^{15,16} California became the fourth state to pass a mandatory SAK testing law on September 30, 2014.¹⁷

DNA is effective in helping to solve property crimes.

- A pilot study in New York City, the Biotracks program, found that using DNA in burglary cases was effective in identifying suspects and generating leads.¹⁸ As part of the NYC Biotracks program, over 3,430 crime scenes were processed and 6,391 items of DNA related evidence were collected.¹⁹ As of April 2008, 1,558 CODIS-eligible profiles were generated, leading to 692 case-to-offender matches to 548 offenders.²⁰

8 M. Elaine Nugen-Borakove et al., *Testing the efficacy of SANE/SART Program: So they make a difference in sexual assault arrest and prosecutions outcomes?* (Washington, DC: National Institute of Justice, NIJ Award Number 2003-WG-BX-1003), accessed August 5, 2014, <https://www.ncjrs.gov/pdffiles1/nij/grants/214252.pdf>.

9 Currently there is little government and academic research on this issue. As a result, data for this section is compiled from a variety of sources including Think Tanks, media organizations, and advocacy groups.

10 EndTheBacklog. *The Backlog: New York City*, 1, accessed August 5, 2014, <http://endthebacklog.org/New-York-City>.

11 Ibid.

12 Kevin J. Strom et al., *The 2006 Survey of Law Enforcement Evidence Processing*. (Washington DC: National Institute of Justice, NCJ 228415), vii, accessed November 1, 2014, <https://www.ncjrs.gov/pdffiles1/nij/grants/228415.pdf>.

13 Timonth J. McGinty, *100th Indictment for DNA Cold Case Task Force Targets Murder and Serial Rapist*, (May 2, 2014), accessed August 6, 2014, <https://www.documentcloud.org/documents/1151566-100th-dna-cold-case-indictment-release-5-2-2014.html>.

14 Illinois General Assembly, *Sexual Assault Evidence Submission Act § 725 ILCS 202/5*, accessed October 15, 2014, <http://www.ilga.gov/legislation/ilcs/ilcs3.asp?ActID=3240&ChapterID=54>.

15 Texas Government Code § 420.041-.043, .0735.

16 Colorado General Assembly, *Colorado Revised Statute § 24-33.5-113*, accessed October 15, 2014, http://www.leg.state.co.us/clics/clics2013a/csl.nsf/fsbillcont/81D352C1BB84F08587257AEE00570221?Open&file=1020_enr.pdf

17 State of California, "An act to amend Section 680 of the Penal Code, relating to DNA evidence," accessed November 5, 2014, http://www.leginfo.ca.gov/pub/13-14/bill/asm/ab_1501-1550/ab_1517_bill_20140930_chaptered.pdf.

18 Joseph Blozis. "Using DNA to Fight Property Crime", *Evidence Technology Magazine*: accessed August 8, 2014, http://www.evidencemagazine.com/index.php?option=com_content&task=view&id=1031.

19 Ibid.

20 Lisa Calandro, Lynne Burley, Joseph Blozis, Lisa Lane Shade, "Property Crime Sample Processing: Law Enforcement Experiences and Crime Laboratory Efficiencies," *Forensic Magazine*: accessed August 8, 2014, <http://www.forensicmag.com/articles/2010/08/property-crime-sample-processing-law-enforcement-experiences-and-crime-laboratory-efficiencies>.

- An NIJ funded study in five communities focused on using DNA in high-volume crimes (e.g., burglary and automobile theft). According to the study, DNA is five times as likely to result in identifying the suspect compared to fingerprints.²¹
- The same study also found that more than twice as many suspects were identified in property crime cases where DNA evidence was used and entered into CODIS compared to traditional investigations.²²
- Another NIJ study demonstrated that analyzing DNA from property crimes can be useful to police. Miami-Dade County Police, New York City Police and the Palm Beach County Sheriff's office all used DNA analyses and were successful in solving high-volume property crimes.²³
- In Palm Beach County, analysis on DNA profiles from 572 property crimes was uploaded to CODIS and 40 percent matched a suspect.²⁴
- In a similar study, Denver experienced a 41 percent match rate in the CODIS database for property crimes.²⁵
- The eight offenders in Chicago accumulated a total of 21 felony arrests before law enforcement officials were finally able to convict them of violent crimes.²⁸
- By November 2012, just few years after California began collecting DNA from felony arrestees, the clearance and investigations aided rate rose to 67.9 percent, up from 35 percent when the State database program included only convicted offenders.²⁹
- A California Department of Justice study examined 100 cases in which a person's DNA was taken upon felony arrest and was linked to a violent crime, including murder, rape, and robbery. In the majority of these cases, the qualifying crime (for taking DNA upon arrest) was for DUI, fraud, property crimes, and drug offenses.³⁰

DNA can also be used to exonerate those who were wrongfully convicted.

- According to the Innocence Project, 316 people in 36 states have been exonerated through DNA testing in the United States; 249 exonerations since the year 2000.³¹
- In almost half of these cases, the real perpetrator has been identified by DNA.³²
- In Capital cases (death penalty), dating back to 1973, there have been 18 people exonerated because of DNA evidence.³³ ★

Collecting DNA upon arrest can solve and prevent crime.²⁶

- A City of Chicago study in 2005 found that taking DNA upon arrest can prevent crime. Reviewing the criminal history of eight convicted felons uncovered that 60 violent crimes, including 22 murders and 30 rapes, could have been prevented had DNA been collected for a prior felony arrest and compared against the DNA database, thereby identifying and potentially apprehending offenders sooner.²⁷

²¹ John K. Roman et al., *The DNA Field Experiment: Cost-Effectiveness Analysis of the Use of DNA in the Investigation of High-Volume DNA Crimes*, (Washington, DC: National Institute of Justice, NCJ 22318), 4, accessed August 8, 2014, <https://www.ncjrs.gov/pdffiles1/nij/grants/222318.pdf>.

²² Ibid.

²³ Edwin Zedlewski and Mary B. Murphy, *DNA Analysis For "Minor" Crimes: A Major Benefit for Law Enforcement*, (Washington, DC: National Institute of Justice), accessed August 8, 2014, http://www.nij.gov/journals/253/Pages/dna_analysis.aspx.

²⁴ Ibid.

²⁵ Simon Ashikhmin et al., "Using DNA To Solve High-Volume Property Crimes In Denver: Saving Money, Lowering Crime Rates and Making Denver Safer," *The Prosecutor* 42, no. 3 (2008): 34 – 43, accessed August 8, 2014, http://www.denverda.org/DNA_Documents/Denver%20Burg%20Project%20NDAA.pdf.

²⁶ Supreme Court of the United States, *Maryland v. King*, 12-207, S (2013), accessed October 31, 2014, http://www.supremecourt.gov/opinions/12pdf/12-207_d18e.pdf. The Supreme Court decided 5-4 in favor of allowing police to collect DNA when a suspect is arrested for certain serious crimes.

²⁷ City of Chicago. "Chicago's Study on Preventable Crimes," accessed October 14,

2014, <http://dnasaves.org/files/ChicagoPreventableCrimes.pdf>.

²⁸ Ibid.

²⁹ California Office of the Attorney General, "Effects of the All Adult Arrestees Provision," accessed October 8, 2014, <http://oag.ca.gov/bfs/prop69/faqs>.

³⁰ California Office of the Attorney General, "Arrestee Hits to Violent Crimes: Qualifying Offenses for DNA Collection," accessed October 4, 2014, http://oag.ca.gov/sites/all/files/agweb/pdfs/bfs/arrestee_2013.pdf.

³¹ The Innocence Project. "DNA Exoneree Case Profiles," accessed August 14, 2014. <http://www.innocenceproject.org/known/>.

³² Ibid.

³³ Death Penalty information Center, *Innocence Database*, accessed August 8, 2014, http://www.deathpenaltyinfo.org/innocence?inno_name=&exonerated=&state=innocence=All&race=All&dna=1.