



UNDERSTANDING DNA EVIDENCE: A Guide for Victim Service Providers



DNA evidence is playing a larger role than ever before in criminal cases throughout the country, both to convict the guilty and to exonerate those wrongly accused or convicted. This increased role places greater importance on the ability of victim service providers to understand the potential significance of DNA evidence in their clients' cases.

What Is DNA?

DNA, or deoxyribonucleic acid, is the building block for the human body; virtually every cell contains DNA. The DNA in people's blood is the same as the DNA in their saliva, skin tissue, hair, and bone. Importantly, DNA does not change throughout a person's life.

The Value of DNA Evidence

DNA is a powerful investigative tool because, with the exception of identical twins, no two people have the same DNA. Therefore, DNA evidence collected from a crime scene can be linked to a suspect or can eliminate a suspect from suspicion. During a sexual assault, for example, biological evidence such as hair, skin cells, semen, or blood can be left on the victim's body or other parts of the crime scene. Properly collected DNA can be compared with known samples to place a suspect at the scene of the crime. In addition, if no suspect exists, a DNA profile from crime scene evidence can be entered into the FBI's Combined DNA Index System (CODIS) to identify a suspect anywhere in the United States or to link serial crimes to each other.

The effective use of DNA as evidence may also require the collection and analysis of elimination samples to determine the exact source of the DNA. Elimination samples may be taken from anyone who had lawful access to the crime scene and may have left biological material. When investigating a rape case, for example, it may be necessary to obtain an elimination sample from everyone who had consensual intercourse with the victim within 72 hours of the alleged assault to account for all of the DNA found on the victim or at the crime scene.

Comparing DNA profiles from the evidence with elimination samples may help clarify the results.

Evidence Collection

Victim service providers, crime scene technicians, nurse examiners, and other medical personnel should be aware of important issues involved in identifying, collecting, transporting, and storing DNA evidence. If DNA evidence is not initially identified at the crime scene or on the victim, it may not be collected, or it may become contaminated or degraded.

To assist in collection, victims of sexual assault should not change clothes, shower, or wash any part of their body after the assault. Such evidence as semen, saliva, and skin cells may be found on clothing or bedding, under fingernails, or in the vaginal, anal, or mouth region.

Evidence on or inside a victim's body should be collected by a physician or sexual assault nurse examiner. A medical examination should be conducted immediately after the assault to treat any injuries, test for sexually transmitted diseases, and collect forensic evidence, such as fingernail scrapings and hair. Typically, the vaginal cavity, mouth, anus, or other parts of the body that may have come into contact with the assailant are examined.

The examiner should also take a reference sample of blood or saliva from the victim to serve as a control standard. Reference samples of the victim's head and pubic hair may also be collected if hair analysis is required. A control standard is used to compare known DNA from the victim with that of other DNA evidence found at the crime scene to determine possible suspect(s).

Given the sensitive nature of DNA evidence, victim service providers should always contact crime laboratory personnel or evidence technicians when procedural collection questions arise.

Contamination and Preservation Issues

DNA evidence can become contaminated when DNA from another source gets mixed with DNA relevant to the case. For this reason, investigators and laboratory personnel

should always wear disposable gloves, use clean instruments, and avoid touching other objects, including their own body, when handling evidence.

Environmental factors, such as heat and humidity, can also accelerate the degradation of DNA. For example, wet or moist evidence that is packaged in plastic will provide a growth environment for bacteria that can destroy DNA evidence.

Therefore, biological evidence should be thoroughly air dried, packaged in paper, and properly labeled. Handled in this manner, DNA can be stored for years without risk of extensive degradation, even at room temperature. For long-term storage issues, contact the local crime laboratory.

DNA Testing

The most common form of DNA analysis is called polymerase chain reaction (PCR). PCR has allowed investigators to successfully analyze evidence samples of limited quality and quantity. The PCR process makes millions of copies of very small amounts of DNA. This enables the laboratory to generate a DNA profile, which can be compared with the DNA profile from a suspect. A statistic is then generated to reflect how often one would expect to find this particular DNA profile in the general population.

Interpreting DNA Test Results

Three types of results can occur in DNA testing: inclusion, exclusion, and inconclusive. It is important that victim service providers understand the meaning of these terms and be able to explain their implications.

Inclusion. When the DNA profile of a victim or suspect is consistent with the DNA profile from the crime scene evidence, the individual is “included” as the possible source of that evidence. However, the strength of inclusion depends upon the number of loci (locations on the DNA strand) examined and how common or rare the resulting DNA profile is in the general population.

Exclusion. When the DNA profile from a victim or suspect is inconsistent with the DNA profile generated from the crime scene evidence, the individual is “excluded” as the donor of the evidence. However, exclusion does not imply innocence. In a rape case, for example,

a perpetrator wearing a condom could be excluded as a suspect because no semen was found at the crime scene, but evidence found elsewhere at the crime scene may include that same person as a suspect.

Inconclusive. Inconclusive results indicate that DNA testing could neither include nor exclude an individual as the source of biological evidence. Inconclusive results can occur for many reasons: for example, the quality or quantity of DNA may be insufficient to produce interpretable results, or the evidentiary sample may contain a mixture of DNA from several individuals (e.g., a sample taken from a victim of a gang rape).

As with all DNA testing results, additional testing may be needed and findings should be interpreted in the context of other evidence in the case.

DNA Evidence in Unsolved and Postconviction Cases

Advanced DNA technology, such as PCR, makes it possible to obtain conclusive results in cases in which previous testing might have been inconclusive. This can result in the identification of suspects in previously unsolvable cases or the exoneration of those wrongfully convicted. It is important to realize that while testing or retesting may exonerate an individual, exclusionary results may not necessarily prove actual innocence. Prosecutors, defense counsel, the court, and law enforcement should confer on the need for testing on a case-by-case basis.

Using CODIS To Solve Crime

CODIS uses two indexes to generate investigative leads in crimes that contain biological evidence. The forensic index contains DNA profiles from biological evidence left at crime scenes, and the offender index contains DNA profiles of individuals convicted of violent crime. Each State in the Nation has a DNA database law that defines which convicted offenders must have their profiles entered into CODIS; some States even require that DNA profiles from *all* felons be entered into the database. CODIS enables Federal, State, and local forensic crime laboratories to work together—between jurisdictions and across State lines—to solve crimes.

Identifying DNA Evidence

Since only a few cells are needed for a useful DNA sample, the list below identifies some areas at the crime scene or on the victim that may contain valuable DNA evidence. Remember, even though a stain cannot be seen, there may be enough cells for DNA typing. Furthermore, 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. The more victim service providers know about properly identifying, collecting, and preserving DNA evidence, the more powerful a tool it becomes.

Possible Location of DNA Evidence

Source of DNA

Bite mark or area licked	Saliva
Fingernail scrapings	Blood or skin cells
Inside or outside surface of used condom	Semen or skin cells
Blankets, sheets, pillows, or other bed linens	Semen, sweat, hair, or saliva
Clothing, including under- garments worn during <i>and</i> after the assault	Hair, semen, blood, or sweat
Hat, bandanna, or mask	Sweat, skin cells, hair, or saliva
Tissue, washcloth, or similar item	Saliva, semen, hair, skin cells, or blood
Cigarette butt; toothpick; or rim of bottle, can, or glass	Saliva
Dental floss	Semen, skin cells, or saliva
Tape or ligature	Skin cells, saliva, or hair

Suggested Resources

Agencies and organizations

American Prosecutors Research Institute

99 Canal Center Plaza, Suite 510
Alexandria, VA 22314
703-549-4253
www.ndaa-apri.org/apri/Index.html

Federal Bureau of Investigation

J. Edgar Hoover Building
935 Pennsylvania Avenue N.W.
Washington, DC 20535
202-324-3000
www.fbi.gov

National Center for Victims of Crime

2111 Wilson Boulevard, Suite 300
Arlington, VA 22201
703-276-2880
www.ncvc.org

National Commission on the Future of DNA Evidence

Office of Justice Programs
National Institute of Justice
810 Seventh Street N.W.
Seventh Floor
Washington, DC 20531
202-307-0645
www.ojp.usdoj.gov/nij/dna

National Criminal Justice Reference Service (NCJRS)

P.O. Box 6000
Rockville, MD 20849-6000
800-851-3420
www.ncjrs.org

Office for Victims of Crime

U.S. Department of Justice
810 Seventh Street N.W.
Washington, DC 20531
202-307-5983
www.ojp.usdoj.gov/ovc

Office for Victims of Crime Resource Center

P.O. Box 6000
Rockville, MD 20849-6000
800-627-6872
www.ojp.usdoj.gov/ovc/ovcres

Rape, Abuse & Incest National Network

635B Pennsylvania Avenue S.E.
Washington, DC 20003
800-656-HOPE
www.rainn.org

Sexual Assault Nurse Examiner (S.A.N.E.)-Sexual Assault Response Team (S.A.R.T.)

www.sane-sart.com

Speaking Out About Rape Inc. (S.O.A.R.)

69 East Pine Street

Orlando, FL 32801

407-836-9692

www.soar99.org

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