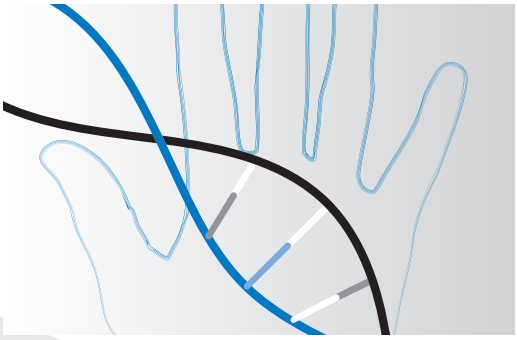
April 2005

Identifying Victims Using DNA: A Guide for Families



PRESIDENT'S DNA INITIATIVE

U.S. Department of Justice

Office of Justice Programs

810 Seventh Street, N.W.

Washington, DC 20531

Alberto R. Gonzales
Attorney General

Tracy A. Henke
Acting Assistant Attorney General

Sarah V. Hart
Director, National Institute of Justice

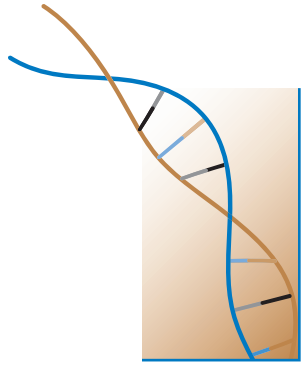
The National Institute of Justice is the research, development, and evaluation agency of the U.S. Department of Justice. NIJ provides objective, independent, evidence-based knowledge and tools to enhance the administration of justice and public safety. This and other publications and products of the U.S. Department of Justice, Office of Justice Programs, and NIJ can be found at *http://www.ojp.usdoj.gov/nij*.

The National Human Genome Research Institute (NHGRI) is one of 27 institutes and centers at the National Institutes of Health, an agency of the Department of Health and Human Services. NHGRI supports grants for research, training, and career development at sites nationwide and conducts research on its campus to develop and implement technology to understand, diagnose, and treat genomic and genetic diseases. Information about NHGRI can be found at *http://www.genome.gov*.

April 2005

Identifying Victims Using DNA: A Guide for Families

NCJ 209493



What is this brochure about?

Any circumstance in which lives are lost is a tragedy that can have immediate and lasting effects on our communities. We extend our most sincere condolences and sympathy to you at this difficult time. You have been given this brochure to help you understand the process of identifying the remains of a victim through DNA analysis.

Why go through the process of identifying remains?

The decision to pursue identification of the remains of a victim through DNA testing is very personal and may be different for each family. Some families may find comfort in knowing that the remains of their loved one have been identified and returned. These remains can be interred according to the family's traditions. This may help with the healing and adjustment to their terrible loss. For others, the testing process may interfere with their healing.

For DNA testing to work, it may be necessary to gather more information, samples, or personal items. Gathering these may cause your family further distress. If the testing does not identify your loved one's remains, it may be a disappointment, adding to your grief.

DNA testing can be provided to help those families who want it. If you choose not to, your decision will be honored. You may take time to talk about it with others who you feel are appropriate. People who can help include family, friends, religious leaders, health professionals, and victim advocates.

How is this testing done?

In many cases, DNA testing is one of the best methods to identify a victim or victims. DNA is the material in cells that stores the inherited traits that make up our bodies. In many (but not all) cases, DNA can be isolated from human remains or other samples. To identify the remains of a victim, DNA from remains found at the disaster or accident site must be matched to DNA known to be from the victim or the victim's relatives. Thus, it is necessary to collect DNA samples from family members and from personal items or prior medical specimens from the victim.

How long will the process take?

The process of identifying a victim might be relatively quick or it can be quite lengthy. In some instances, not every victim can be identified. When an identification is made, the next of kin will be notified and asked if they wish to be contacted if more remains are found in the future.

How can I help identify my loved one?

Accurate and complete information about the victim (unique physical characteristics, dental records, etc.) should be submitted. Sometimes this information will be sufficient to render an identification. In many cases, such information may have been provided prior to considering DNA testing. To have any success with DNA testing, samples from relatives of the victim will need to be collected to compare with the remains.

What are the sources of DNA samples that can be used?

DNA can often be obtained from the biological remains. This DNA will be compared to DNA known to be from the victim or to DNA from the victim's relatives.

What are the sources of DNA from the victim?

DNA from the victim's previously collected medical specimens or personal items can be used to make a direct match to remains. For example, if a loved one recently had surgery or blood work done, a specimen may have been stored at the hospital or clinic. You should provide any known medical specimens or ask for help in locating them. The first row of the table below provides examples of the kinds of medical specimens the laboratory can use.

DNA Sources	Examples	Degree of Usefulness
Medical specimens	Bone marrow donor sample Biopsy sample Newborn screen bloodspot	Most useful
Personal items	Toothbrush Hairbrush	Very useful
Close relatives	Biological parents of victim Children of victim Brother or sister of victim	Useful
Other relatives	Maternal relatives (aunts, uncles, cousins, half-sisters or -brothers on the victim's mother's side)	Less useful

DNA from the victim may also be found on their personal items. The second row of the table above gives some examples of these. A toothbrush or other items containing saliva are often good sources. However, it is very important that these items were used only by the victim or rarely used by anyone else. For example, a hairbrush used by the whole family would not be a good source of DNA from the victim.

How can DNA from relatives be used?

If personal items or medical specimens are not available or if the testing on them does not work, DNA testing can be done on samples from blood relatives. The DNA from adoptive parents, adopted children, stepparents, or other nonblood relatives cannot provide information on the genetic identity of a victim.

The ability to match victims to their relatives depends on how closely related they are to the victim. The most useful DNA samples are from close blood relatives such as the victim's biological mother, father, children, brothers, or sisters. This is because DNA of close relatives is more similar than the DNA of more distant relatives. The pictures on the following pages show the relatives who are most useful for identifying a victim. If DNA from the victim's children is used, it is helpful to have DNA from the children's other biological parent.

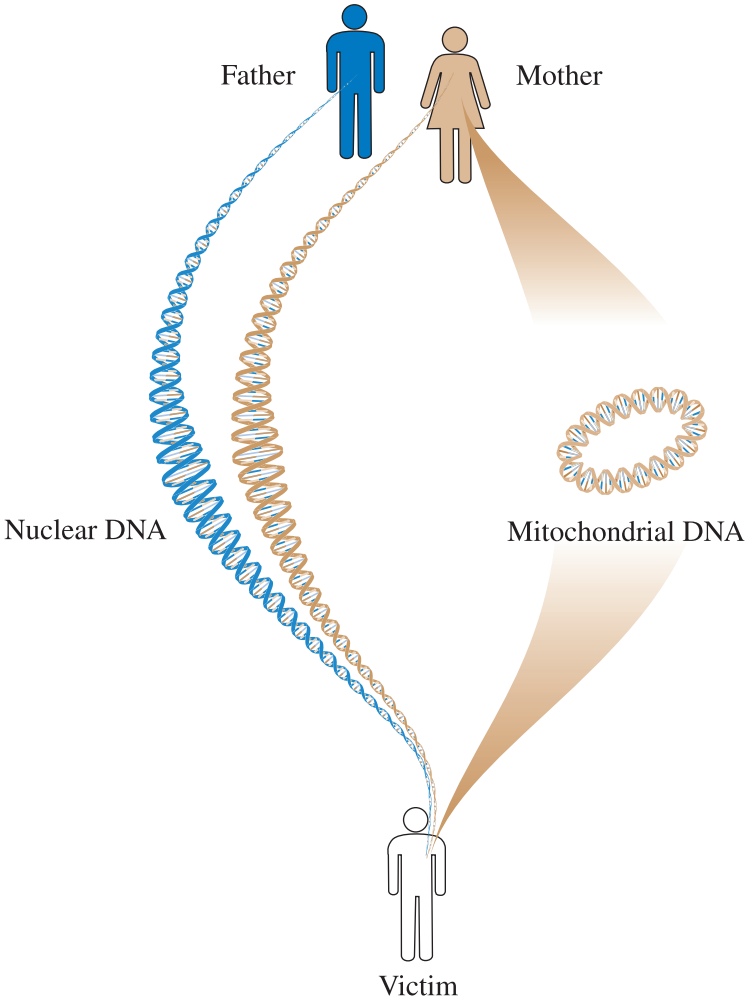
DNA from more distant relatives can be used, but this is more difficult. In some cases, samples may be requested from specific relatives. For example, DNA samples could be requested from a maternal relative of the victim such as the victim's aunt, uncle, or half-brothers or half-sisters on the mother's side of the family.

Why might DNA analysis not work?

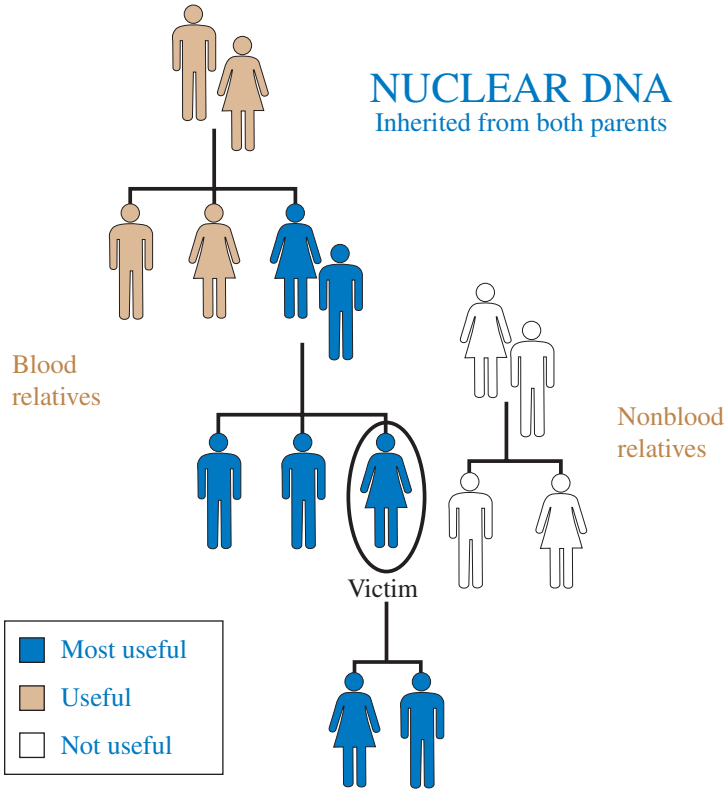
DNA testing might not be able to identify your loved one. The most likely reason would be that there is no usable DNA in the recovered remains. Some victims' remains may not be found. Also, DNA testing may not work if no usable DNA can be found on personal items submitted.

How does DNA testing work?

DNA is the hereditary material that contains instructions to build a human being. DNA can be collected from very small amounts of blood, mouth (cheek) scrapings, hair roots, or other samples. There are two kinds of DNA in the body: nuclear DNA and mitochondrial DNA. Both kinds of DNA can be used for DNA identification.



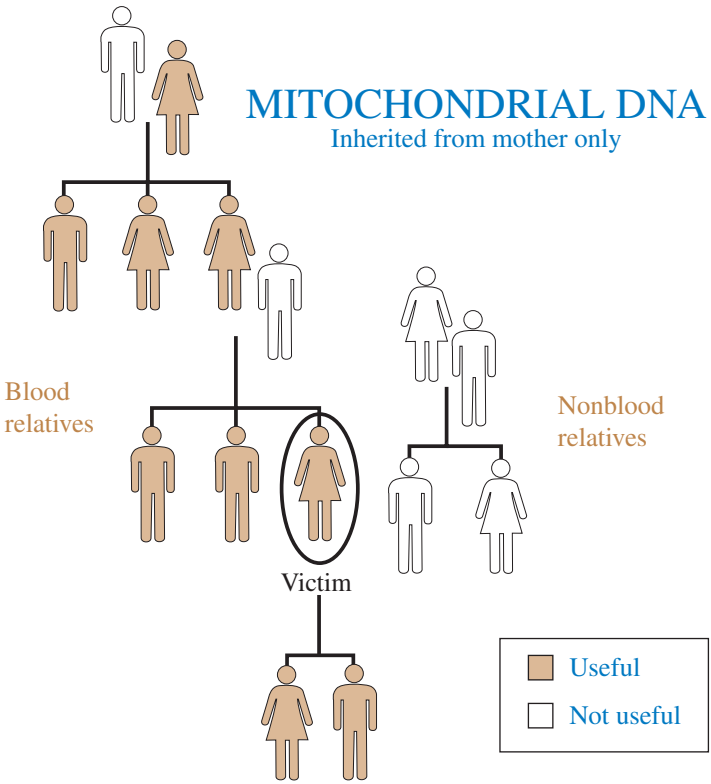
Nuclear DNA comes from the cell nucleus and is inherited from both parents, half from the mother and half from the father (see figure below). Each person's nuclear DNA is unique—except for identical twins, who have the same DNA. When a sufficient nuclear DNA profile from the victim's remains matches the nuclear DNA profile from a sample known to have come from the victim, we can be very sure of the identity of the victim.



Because of the way it is inherited, DNA from blood relatives is somewhat similar. Nuclear DNA from the victim's remains can be compared to nuclear DNA from family members to identify the victim in some circumstances.

The second kind of DNA is called mitochondrial DNA (mtDNA). It is inherited only from the mother (see figure on page 7). Fathers never pass on mitochondrial DNA to

their children. However, mitochondrial DNA typically is not as powerful for making identifications as nuclear DNA. This means that in some instances two unrelated people may have similar mitochondrial DNA. Because of the way it is inherited, only maternal relatives, such as a brother, sister, or mother, can be used for mitochondrial DNA testing.



Nuclear DNA can be easily damaged by extreme heat and other conditions and therefore is not always available to be used for an identification. Mitochondrial DNA, however, can often be found in very small or damaged DNA samples. Typically, scientists test nuclear DNA first. If there are insufficient results for an identification, they will attempt mitochondrial testing. Despite best efforts, some testing may not be successful. But the scientists seeking to identify your loved one will work hard to do so and provide closure for your family.

The National Institute of Justice is the research, development, and evaluation agency of the U.S. Department of Justice. NIJ provides objective, independent, evidence-based knowledge and tools to enhance the administration of justice and public safety.

NIJ is a component of the Office of Justice Programs, which also includes the Bureau of Justice Assistance, the Bureau of Justice Statistics, the Office of Juvenile Justice and Delinquency Prevention, and the Office for Victims of Crime.

U.S. Department of Justice
Office of Justice Programs
National Institute of Justice

Washington, DC 20531

Official Business
Penalty for Private Use $300

NCJ 209493

PRESORTED STANDARD
POSTAGE & FEES PAID
DOJ/NIJ
Permit NO. G-91

Department of Health and Human Services

National Institutes of Health

National Human Genome Research Institute

President's DNA Initiative Partners

Office of Justice Programs

National Institute of Justice

Office on Violence Against Women

Bureau of Justice Assistance

Office of Community Oriented Policing Services

Federal Bureau of Investigation

Office for Victims of Crime

Office of Juvenile Justice and Delinquency Prevention