

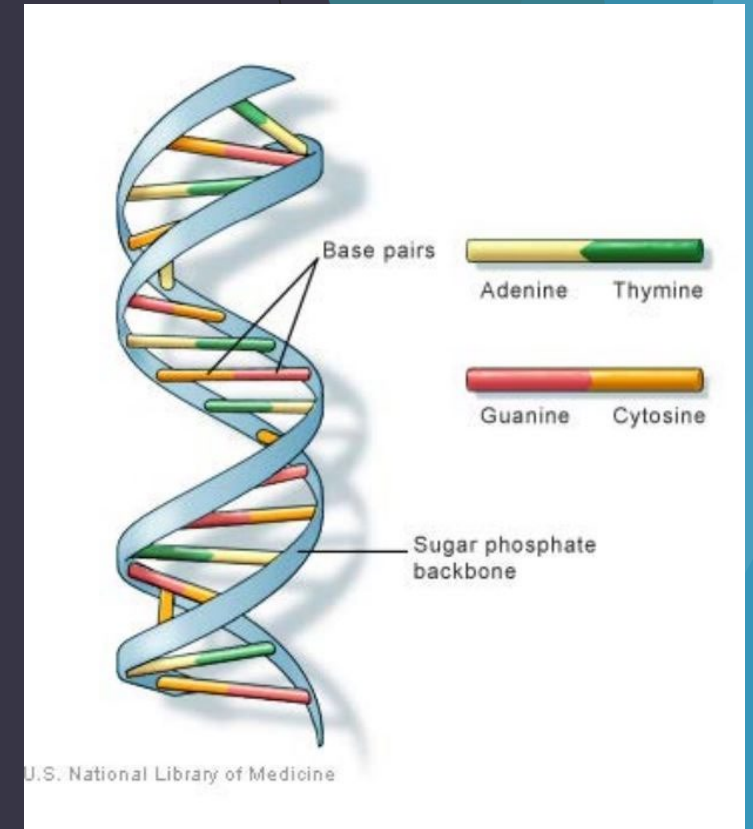


Genetic Genealogy

How Can It Assist With Missing and Unidentified Persons Investigations?

What is DNA?

- ▶ Deoxyribonucleic Acid
- ▶ A molecule composed of two chains that wrap around each other consisting of sugars, phosphates, and nucleotide bases (adenine, guanine, thymine, and cytosine)
- ▶ Acts as the store of genetic and hereditary information within a cell (“blueprint of a person”)
- ▶ All cells in the body contain DNA except red blood cells (they have no nucleus)
- ▶ Half of a person’s DNA is inherited from their mother (egg) and half from their father (sperm)
- ▶ No two people have the exact same DNA except for identical twins



CODIS Combined DNA Index System

- ▶ CODIS (FBI's Combined DNA Index System) is a group of databases that contain the DNA profiles of convicted offenders or arrestees, unknown crime scene profiles, DNA from unidentified deceased persons, and DNA from families of missing persons
- ▶ Investigators may ask close family members of missing persons to provide a DNA family reference sample to be entered into the CODIS database as part of the missing person investigation. Family reference samples are ONLY compared to the DNA profiles in the unidentified deceased person database
- ▶ When unidentified deceased persons (John or Jane Does) are found, a tissue sample from the unidentified person is submitted to a DNA lab to develop a DNA profile for entry into CODIS
- ▶ Sometimes submitting DNA from an unidentified deceased person to CODIS results in no "hits" or identifications

Why No Hit in CODIS?

- ▶ The lack of hits in CODIS might mean there is **no corresponding family reference sample DNA** in the missing persons' database in CODIS
 - ▶ The family may not be aware they can submit DNA, or they may be unaware their family member is missing, or there may be no living close relatives of the missing person to provide DNA
- ▶ The sample from the unidentified person may be too degraded or too old to provide a sufficient DNA profile for comparison in CODIS
- ▶ Investigators can now seek additional assistance with identification using Genetic Genealogy

New DNA Profile Developed

- ▶ Law enforcement investigators can submit another sample, collected from the unidentified deceased person or crime scene, to a DNA lab that specializes in developing DNA profiles for Genetic Genealogy
- ▶ Some of the labs specialize in processing degraded and/or small samples
- ▶ These DNA profiles are different from those developed for CODIS and use different segments of DNA
- ▶ The new DNA profile developed by the lab will be in a “format” that can be compared to public DNA databases

What Are Public DNA Databases?

- ▶ Public DNA databases (like GEDmatch and FamilyTreeDNA) contain the profiles of people who have voluntarily submitted their information to find distant relatives, determine where their family originated, build a family tree, or to find birth relatives for adoptees
- ▶ In order for people to submit their information to a public DNA database, they first provide saliva samples using “direct-to-consumer” DNA kits from companies like 23andMe or AncestryDNA. When they receive their DNA profiles from those companies, they can then choose to upload those profiles to a public DNA database to compare their DNA to a larger number of profiles
- ▶ GEDmatch.com lists several independent direct-to-consumer kits that can be uploaded into the GEDmatch database for comparison

Is Everyone's DNA Compared?

- ▶ Many people who join the public DNA databases choose to “opt in” for their DNA profiles to be compared to profiles entered in the database by law enforcement
- ▶ Those who do not opt-in will NOT have their DNA profiles compared to the profiles entered by law enforcement for perpetrator or suspect kits
- ▶ However, unidentified remains kits will be compared to all profiles regardless of the “opt-in” status.

Law Enforcement Case DNA

- ▶ After law enforcement investigators submit their unknown person profile to the public DNA database, it is compared to the profiles of individuals who have opted-in
- ▶ The investigators will receive a list of profiles/people in the database that are closely, or distantly, related to their unknown profile
- ▶ Typically, the list will not contain an exact match to the unknown profile
- ▶ The list of possible relatives can be provided to a person trained in genetic genealogy to create a family tree for the unknown profile

Genetic Genealogists

- ▶ Genealogists are well-versed in researching family histories using traditional means- birth/death records, marriage records, family trees, old newspapers, military records, census records, etc
- ▶ Genetic Genealogists use the results of DNA comparisons (estimations of relatedness) to build family trees for unknown profiles
- ▶ Trained genetic genealogists can assist investigators in narrowing down the list of possible relatives for the unidentified profile by conducting extensive research and building a family tree that will help point toward a possible identification

Final Identification

- ▶ Once a possible identification has been proposed by the genealogist, it must be confirmed by investigators using further DNA testing and traditional investigative methods
- ▶ Many long-term unidentified deceased/missing person cases have been resolved using genetic genealogy
- ▶ To learn more about some genetic genealogy successes visit:

[Success Stories - DNA Doe Project](#)

[Solved Cases \(dnasolves.com\)](#)