

Montana Department of Justice

Sexual Assault Kit Initiative

Course “Forensic Genetic Genealogy”

Intro

Slide 2: Welcome to the course, Forensic Genetic Genealogy.

Slide 3: Content Warning: We will be talking about sexual violence which may trigger personal feelings. Please remember to take care of yourself and do what you need to help yourself.

Slide 4: Disclaimer: This project was supported by Grant No. 2017-AK-BX-0022 awarded by the Bureau of Justice Assistance. The Bureau of Justice Assistance is a component of the Department of Justice's Office of Justice Programs, which also includes the Bureau of Justice Statistics, the National Institute of Justice, the Office of Juvenile Justice and Delinquency Prevention, the Office for Victims of Crime, and the SMART Office. Points of view or opinions in this document are those of the author and do not necessarily represent the official position or policies of the U.S. Department of Justice."

Slide 5: In this course, you will learn about forensic genetic genealogy techniques and how they can be used in a sexual assault investigation.

Slide 6: Forensic Genetic Genealogy, or FGG, may also be referred to as Investigative Genealogy, since it may be conducted by law enforcement investigators, genealogists, and trained forensic persons. It is an advanced DNA technique used by law enforcement to help solve violent crimes. FGG techniques have proven to be a powerful tool in closing cold cases such as the Golden State Killer and restoring identities to unidentified remains cases. FGG is law enforcement's use of DNA analysis, combined with traditional genealogy research, to generate investigative leads for unsolved crimes. Additionally, FGG techniques may be useful when unmatched DNA has been in CODIS for a long time, or your agency received a forensic hit connecting two cases, such as two sexual assault cases.

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- [How to use FGG?](#)
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What is FGG?

Slide 8: Forensic genetic genealogy uses genetic information to match individuals to DNA samples. FGG relies on genetic relationships between a DNA profile for an unknown person and profiles of known people in genealogy databases, such as GEDmatch, FamilyTreeDNA, or DNASolves. The customers in these databases have "opted in" to share their information with law enforcement. Law enforcement does not access the DNA profile itself just the statistical probability of the relationship between the contributor and the suspect DNA profile.

Slide 9: This often means utilizing open-source databases, such as GEDmatch. While GEDmatch does not offer genetic testing itself, it does allow the upload and comparison of DNA data from third parties, including direct-to-consumers services, such as Ancestry.com or 23andMe. GEDmatch holds the genetic profiles of over 1.2 million individuals, which is enough to identify a third cousin (or closer) of a DNA sample in 90% of the US population. Law enforcement can then use this capability to begin building a family tree of a suspect and/or victim, aided by public records and traditional sleuthing.

Slide 10: Case Example.

Slide 11: You might have heard about: Catching the Golden State Killer

The first person that forensic genealogy put behind bars was a former police officer named Joseph James DeAngelo. As the Golden State Killer, he terrorized Californians off and on from 1973 to 1986: 13 murders, 50 rapes, 120 burglaries. His identity eluded law enforcement for decades.

In 2018, investigators pulled the Golden State Killer's DNA from a rape kit and uploaded it to GEDmatch. In return, they received over a dozen people who had the same great-great-great-grandparents as the killer. Working with a genealogist, the investigators began constructing a large family tree, ultimately narrowing their search to two possible suspects. When a follow-up DNA test ruled out one of those two, the investigators had their prime suspect: Joseph James DeAngelo.

After collecting a sample of DeAngelo's DNA from his car handle and another from a tissue he discarded, the team of investigators and genealogists ran further tests and found that these samples matched the DNA collected from the crime scenes of the Golden State Killer. DeAngelo was arrested on April 24, 2018, and was eventually sentenced to multiple consecutive life sentences, with no possibility of parole.

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How to use FGG?

Slide 12: FGG requires a new DNA analysis of a forensic DNA sample, to create a new type of DNA profile-- completely different than the CODIS profile normally extracted. This is called an SNP profile. The forensic DNA sample is biological material reasonably believed by investigators to have been deposited by a putative perpetrator, and that was collected from a crime scene, a person, an item, or a location connected to the criminal event.

Slide 13: When a DNA sample is extracted from a crime scene, it may identify a suspect through FGG. A DNA sample may include:

- DNA extract
- Saliva
- Tissue
- Blood
- Hair with or without roots
- Semen
- Sexual Assault Kit evidence
- And Bone

Slide 14: The forensic DNA sample's quality may be a mixture, degraded, contaminated, or low quantity. Most labs have implemented a quality control (QC) process to review the DNA sample to determine the likelihood of success going forward to FGG analysis. This process is beneficial because it ensures the most effective use of the limited DNA sample and financial resources.

Slide 15: Currently, no federal, state, or local law enforcement labs offer the DNA extraction and analysis required for FGG investigations. When pursuing a forensic genetic genealogy investigation, learn what services are offered by the private laboratory and which services they do in-house, and which are outsourced.

Slide 16: Talk to the lab about how the evidence will be processed, such as DNA extraction, SNP testing, and/or Whole Genome Sequencing to pursue FGG. If the laboratory outsources services, request the outsource lab's contact information, and call the additional lab to learn more about their processes and success stories.

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Genealogy Research

Slide 17: First, it is important for law enforcement investigators to be familiar with laws regarding FGG. You can find a link to House Bill 602 in the resources section at the end of this course.

Slide 18: Collaborate with your local County Attorney's office prior to initiating an FGG investigation. To find a close match, the DNA profile from the crime scene is uploaded to public databases such as GEDmatch. Once uploaded, the DNA "kit" is compared to the entire database, and a list of matches is returned, ordered by the amount of shared DNA.

Next, investigators will begin to build back the genetic relatives' family trees until a common ancestor is uncovered.

Then, they will build the family trees forward, identifying every descendent possible from that common ancestor, using traditional genealogy techniques. Once the trees have been fully built, investigators identify matches by cross-checking the location of the individual at the time of the crime, as well as age and gender, to match the description.

Once a genealogist or investigator identifies a shortlist of potential suspects, law enforcement must lawfully obtain a DNA sample.

When a person of interest has been identified, investigators will compare the new DNA sample. It is this one-to-one comparison that forms the basis for any official identification or arrest warrant.

Building the family trees can be manpower intensive. Some law enforcement cold case teams offer assistance to other departments via requests for mutual aid. Some labs offer resources and genealogy investigation assistance for an additional fee.

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RESOURCES

Slide 19:

- The Montana DOJ's Investigating Sexual Assault Field Guide: <https://dojmt.gov/wp-content/uploads/Investigating-Sexual-Assault-A-Field-Guide-For-Law-Enforcement-Officers.pdf>

- HB602: <https://dojmt.gov/enforcement/specialservices/saki/public-policy/>
- US Department of Justice Interim Policy – FGG DNA Analysis and Searching: <https://dojmt.gov/enforcement/specialservices/saki/responders/online-courses/>

Slide 20: In this course, you have learned about Forensic Genetic Genealogy techniques, and how they can be used in sexual assault investigations.

Slide 21: Thank you for completing this course. Select “Close” to exit.

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