



## National Technology Validation and Implementation Collaborative (NTVIC) policies and procedures for Forensic Investigative Genetic Genealogy (FIGG)

### ABSTRACT

In 2022, the National Technology Validation and Implementation Collaborative (NTVIC) was established. Its mission is to collaborate across the US on validation, method development, and implementation. The NTVIC is comprised of 13 federal, state and local government crime laboratory leaders, joined by university researchers, and private technology and research companies. One of the NTVIC's first initiatives was to generate this draft policy document. This document provides guidelines and considerations for crime laboratories and investigative agencies exploring the establishment of a forensic investigative genetic genealogy (FIGG) program. While each jurisdiction is responsible for its own program policy, sharing minimum standards and best practices to optimize resources, promote technology implementation and elevate quality is a goal of the NTVIC.

#### Policy and Procedure Committee Members are:

Chair: Dr. Ray Wickenheiser – New York State Police Crime Laboratory System.

Jennifer Naugle – Wisconsin Department of Justice Division of Forensic Sciences.

Brian Hoey – Missouri Highway Patrol Crime Laboratory Division.

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Claire Glynne – University of New Haven, Henry C Lee Institute of Forensic Science.

#### Founding members of the NTVIC are:

- Idaho State Police Forensic Services (Matthew Gamette—Chair)
- California Department of Justice Bureau of Forensic Services (Barry Miller)
- Colorado Bureau of Investigation Forensic Services (Lance Allen)
- Department of Defense DNA Operations for the Armed Force Medical Examiner Service (Dr. Timothy McMahan)
- Kentucky State Police Forensic Science Laboratory (Laura Sudkamp)
- Miami-Dade Police Department, Forensic Services Division (Stephanie Stoiloff)
- Minnesota Bureau of Criminal Apprehension Forensic Science Services (Catherine Knutson)
- Missouri Highway Patrol Crime Laboratory Division (Brian Hoey)
- New York City Office of Chief Medical Examiner's Office (Timothy Kupferschmid)
- New York State Police Crime Laboratory System (Dr. Ray Wickenheiser)
- Ohio Bureau of Criminal Investigation (Roger Davis)
- Texas Department of Public Safety (Brady Mills)

- Wisconsin Department of Justice Division of Forensic Sciences (Jennifer Naugle)

#### Requirements on Policy and Procedure:

Forensic Investigative Genetic Genealogy (FIGG) is a technique that combines genetic testing with traditional genealogical research to generate investigative leads in unsolved violent crimes and cases of unidentified human remains. FIGG incorporates a deliberate search for potential biologically related individuals of a contributor to an evidentiary single nucleotide polymorphism (SNP) deoxyribonucleic acid (DNA) profile. The scientific technique and subsequent search are conducted by trained professionals and may provide significant investigative information in unsolved cases in which all other investigative leads have been exhausted [1–3].

This document outlines the policies and procedures for developing forensic genetic genealogy (FGG) SNP profiles and subsequent investigative genetic genealogy (IGG) searching that should contain the information detailed in this document. These two components, FGG and IGG, comprise the FIGG technique of developing investigative leads from SNP profiles using genealogical researching. To aid the public and law enforcement in understanding the laboratory's program, policies, and methodologies, the FIGG policy and procedures will be publicly available. This document is provided for reference and guidance only, and each jurisdiction will retain sole responsibility for its policy, procedures, and performance. The term FIGG Responsible Authority (FIGG RA) is used herein to refer to the body responsible for the conducting and oversight of FIGG in a particular jurisdiction.

#### 1. Laboratories and accreditation

FGG is currently not within the scope of an accredited forensic public laboratory. Forensic laboratories participating in the Combined DNA

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Index System (CODIS) are accredited as well as audited to the FBI Quality Assurance requirements for forensic DNA laboratories as a requirement of participation. FIGG should only be conducted in a laboratory that is accredited and operates under a quality assurance system.

## 2. Case category

Case categories have been recommended in various letters of support and background documents, including surveys of public opinion [4–10]. Policy on Familial Searching has been recommended as a template to guide Forensic Investigative Genetic Genealogy (FIGG) policy [11].

Maryland House Bill 240 Criminal Procedure – Forensic Genetic Genealogical DNA Analysis, Searching, Regulation, and Oversight is the most specific and extensive oversight legislation governing FIGG. On the topic of case category, the law includes the following case description: “The commission of or attempt to commit murder, rape, a felony sexual offense, or a criminal act involving circumstances presenting a substantial and ongoing threat to public safety or national security.” [5] Unidentified Human Remains (UHR) cases should also be considered, particularly when the UHR is a potential homicide victim.

The DOJ Interim Policy on Forensic Genetic Genealogical DNA Analysis and Searching states “[i]nvestigative agencies may initiate the process of considering the use of [FIGG] when a case involves an unsolved violent crime and the candidate forensic sample is from a putative perpetrator, or when a case involves what is reasonably believed by investigators to be the unidentified remains of a suspected homicide victim (‘unidentified human remains’). In addition, the prosecutor, as defined in footnote twenty of this interim policy, may authorize the investigative use of [FIGG] for violent crimes or attempts to commit violent crimes other than homicide or sexual offenses (while observing and complying with all requirements of this interim policy) when the circumstances surrounding the criminal act(s) present a substantial and ongoing threat to public safety or national security.” [4]

Unless the crime being investigated presents an ongoing threat to public safety or national security concerns, reasonable investigative efforts must have been pursued and failed to identify the perpetrator. The following may be considered when evaluating case acceptance:

- a) seriousness or seriality of the crime;
- b) commitment by the jurisdiction to proceed with investigation and prosecution;
- c) case metadata and laboratory notes provided as available;
- d) investigative stage to initiate a FIGG, such as, when viable reasonable investigative strategies have been exhausted;
- e) quality and quantity of available DNA; and
- f) the availability of additional DNA evidence.

## 3. Roles and responsibilities

Roles and responsibilities for the FIGG collaboration should be delineated to ensure clear lines of accountability and communication. Suggested roles include individuals in the following areas.

- a) an individual or committee who has the ultimate control for the case acceptance, evaluation, prioritization, and search;
- b) an individual or committee that directs the release of investigative lead(s) and any follow-up, including conducting an administrative and technical review of the FIGG analysis prior to release of an investigative lead;
- c) an administrative representative from the source testing laboratory (DNA expertise);
- d) an administrative representative with genealogical research expertise with appropriate documented training;
- e) a representative with access to investigative databases (metadata) and crime analysis;

- f) a representative from the requesting law enforcement agency who can commit to surveillance and collection of covert samples;
- g) a representative from the prosecuting agency that can provide legal expertise; and
- h) a program/project lead.

It is recommended that FIGG be conducted by established teams and that roles and responsibilities are documented through job descriptions and requirements. It is recommended that through job description or a RACI matrix (responsible, accountable, consulted and informed document) the interactions between the individuals are defined to safeguard privacy. The policy may include the use of a documented memorandum of understanding (MOU) or equivalent.

## 4. MOUs/contracts with law enforcement and prosecutorial agencies (see example in Appendices 1 and 2)

Prior to conducting FIGG, a MOU will be established between the Forensic Science Service Provider (FSSP), law enforcement, and prosecutorial agencies. The MOU will include an understanding that investigative leads provided will be followed up, charges laid, and actively prosecuted, if warranted.

## 5. Sample/specimen requirements

A forensic sample means biological material collected from a crime scene, person, item, or location connected to the criminal event and reasonably believed by investigators to have been deposited by a putative perpetrator.

A forensic sample also includes the biological material from unidentified human remains (UHR).

Sample types include blood, semen, saliva, tissue, bone, hair, touch DNA and any other component of the human body which bears DNA.

Mixed samples can be successfully processed; however, additional testing requirements will be required. Quantity and quality of sample for successful profile generation varies. Good quality single source samples require less sample than degraded samples. Validated methods which have demonstrated successful analysis of samples similar to the forensic sample should be used in FIGG.

A procedure should be in place for sample consumption considerations. A separate approval should be included when the entire sample will be consumed in analysis.

## 6. Third-party samples

A third-party means a person who is not a suspect in an investigation. A third-party may be an individual who was identified during the genealogical research process as being potentially biologically related to a putative perpetrator. Collection of a reference DNA sample from the third-party may provide additional leads to reach a candidate identification. Third parties should be contacted by law enforcement rather than genealogists or forensic laboratory personnel, who can use a blank pedigree chart to engage family members for additional information.

If overt collection of a reference DNA sample is pursued, written-informed consent should be collected from the third-party. If the third-party has previously taken a Direct-To-Consumer (DTC) DNA test (e.g., AncestryDNA, etc.), the third-party may be requested to voluntarily provide their DNA data file for upload to the genetic genealogy database(s). Alternatively, a buccal sample can be collected from the third-party for SNP sequencing to generate a SNP profile for upload and comparison.

Third-party consent is required for upload into a genetic genealogy database. If the third-party does not consent to providing a reference sample for an FIGG investigation, law enforcement may not upload a covert reference sample from the individual into a genetic genealogy database without prior court approval.

Use of all samples collected for forensic casework, including violent crime samples, UHRs, reference samples, target testing samples should be aligned with the terms of service (TOS) of the FGG database vendor. The authorizing court shall be notified prior to the covert collection of the third-party's reference sample. If investigative authorities provide an affidavit to the court demonstrating that seeking informed consent from a third-party creates substantial risk that a putative perpetrator will flee, that essential evidence will be destroyed, or that other imminent or irreversible harm to the investigation will occur, the court may authorize covert collection of third-party samples.

Investigative authorities shall provide an affidavit in support of a warrant to the court explaining how they plan to conduct the covert collection in a manner that avoids unduly intrusive surveillance of individuals or invasions to their privacy and follows the law.

Mere anticipation that a third-party will refuse informed consent may not constitute a basis for seeking covert collection of a DNA sample from a third-party.

### 7. Genetic genealogy database terms of service

The genetic genealogy database terms of service must be adhered to. Genealogy databases are provided by independent vendors, and the uploaded genetic profiles are used with informed consent by members of the public. Hence, their trust must be maintained, or access to samples will be limited and jeopardize the ongoing development and success of FIGG.

### 8. Putative perpetrator samples

Any putative perpetrator DNA sample that is collected covertly may only be subjected to a short tandem repeat (STR) analysis to see if it matches an STR DNA profile obtained from the forensic sample.

### 9. Data protection

No data generated from the biological samples subjected to FGG analysis, whether the forensic sample or third-party reference samples, may be used for other purposes such as to determine the sample donor's genetic predisposition for disease, any other medical conditions, psychological trait, or research purposes.

Forensic samples may, however, be analyzed to provide potential eye color, hair color, skin color and physical traits such as age estimation for the purpose of investigative intelligence. Third-party samples should not be analyzed for physical appearance.

IGG may only be conducted using a direct-to-consumer or publicly available open-data personal genomics database(s) that:

1. Provides explicit notice to its service sites to investigate crimes or identify human remains, and
2. Seeks acknowledgement and consent from its service users regarding the substance of the notice described above.

No person may disclose genetic genealogy data, FGG profiles, or DNA samples except where required by law or order of a court of competent jurisdiction.

### 10. Data retention and deletion

All FGG data retention and deletion must adhere to the corresponding state and/or federal law.

Any covertly collected DNA suspect sample, including raw sequencing or genotyping data, SNPs and other genetic profiles, and related information, that does not match the STR DNA profile obtained from a forensic sample shall not be uploaded to any DNA database, including local, state, or federal DNA databases within CODIS, or any DNA database not authorized by local, state, or federal law. A quality

assurance index search for contamination purposes may be conducted.

A person, agency or laboratory may not willfully retain or fail to destroy genetic genealogy information, FGG profiles, DNA samples or DNA data generated during the course of the FIGG process that are required to be destroyed.

### 11. Release of case/public information

Upon successful completion of the FIGG investigation, the genealogist participating in the FIGG shall turn over to the investigator all records and material collected in the course of the IGG, including material sourced from public records, family trees constructed, and any other genetic or nongenetic data collected in the IGG.

The genealogist or private laboratory may not keep any records or materials in any form, including digital or hard copy records unless statutorily required, as required by the agency's retention policy, or as required by a criminal justice agency.

The genealogist or investigative agency shall ensure that all records have been deleted or removed from any website/platform where the IGG investigation was developed e.g., family trees built in platforms such as [ancestry.com](https://www.ancestry.com) or [lucidchart](https://www.lucidchart.com). Transfer of ownership/log-in credentials for such sites must be performed.

The prosecuting agency shall retain and disclose any records or material as required under the applicable state and federal regulation, the rules of discovery, or other court orders, but may not otherwise use or share the records or materials.

Neither the laboratory conducting SNP or other DNA analysis, nor a law enforcement official or a genealogist may disclose genetic genealogy information or details associated with an ongoing investigation without authorization from the prosecuting jurisdiction.

Personally identifiable third-party information should not be included in warrants and other legal documents which could reveal the identity of related individuals prior to trial.

### 12. Outsource contracts with vendor laboratories

The laboratory generating SNP profiles with genotyping or sequencing-based workflows, and the genealogist participating in FIGG shall be approved by the FIGG Responsible Authority (FIGG RA).

Qualifications of vendor laboratories will be determined by the FIGG RA.

Vendor laboratories shall provide documentation regarding their Quality Assurance Systems, upon request from the FIGG RA. Vendor laboratories shall also compare genetic profiles against a staff elimination database for contamination checks prior to the release of the sequencing data to the agency.

The vendor laboratory shall electronically transfer the generated SNP data file/profile to the investigating agency/Designated Laboratory Official (DLO) (see section 22) only and not to any contracted genealogist.

### 13. Genealogist qualifications

Qualifications of genealogists will be determined by the FIGG RA. Only qualified genealogists will be used for FIGG. A list of qualified genealogists will be retained by the FIGG RA.

### 14. Education/training provided upon data/results release

IGG education must be provided with the release of FIGG investigative leads. Education should be provided when the case is initiated to assist with the investigation and also after the case is completed as lessons are learned.

## 15. Quality Assurance/Performance improvement

All laboratories conducting DNA analysis for FIGG must be accredited. Acceptable standards include ISO-17025 and those determined by the FIGG RA.

## 16. Proficiency testing

All laboratories and personnel providing DNA analysis utilized by FIGG must be subject to proficiency testing at least once annually. Proficiency test samples must mimic the sample type and concentration found in FIGG cases. Simulated pedigree samples should also be included to evaluate the ability to upload and determine accuracy and precision of matches.

## 17. Handling and privacy protection of third-party reference samples

Once the FIGG has been concluded, all third-party reference samples and all associated data will be destroyed. Identifying information of all third parties must be kept strictly confidential.

## 18. Warrant guidelines

Identifying information from the FIGG investigation should not be included in warrants involving third parties, unless specified by the court.

## 19. Courtroom best practices for prosecutors

Prosecutors using FIGG should be trained in best investigative practices, which should include all of the elements of this policy, including but not limited to sample and case requirements, MOUs, privacy, maintenance of quality, theory, and documentation.

## 20. Training

Defined and documented training should be provided to each FIGG team member commiserate with their roles and responsibilities.

## 21. Metrics

Data should be kept on the number and type of FIGG cases (SNP, WGS, or other) conducted, sample (biological material, amount and quality) and offense case types so continuous improvement can be pursued. Data can include the following.

- Number of FIGG cases investigated
- Number of FIGG cases accepted by genetic genealogy databases
- Number of perpetrators and unidentified human/remains identified
- Number of covert collections of reference samples from putative perpetrators
- Description of the sample type collected in covert surveillance
- Time required to conduct the covert surveillance
- Complaints from individuals subject to surveillance during the covert collection
- Any complaints or suggestions from judges
- Evaluation of the pursued investigative leads arising from FIGG
- Costs of FIGG procedures
- Race and age of those identified as the putative perpetrators
- Number of times a third-party reference sample was requested and collected, and the race and age of the third parties
- Number of FIGG requests made by defendants and post-conviction attorneys to the authority responsible for oversight of FIGG.
- The case outcomes of each FIGG

## 22. Designated laboratory official (DLO)

Forensic laboratories and law enforcement agencies that are implementing FIGG should have a designated laboratory official (DLO). The DLO will have training in the areas of forensic DNA, investigation and FIGG and will be a single point of contact acting as a liaison between law enforcement, forensic laboratories, private laboratories, genealogical researchers, justice system officials and other FIGG stakeholders. The DLO will provide information and education to key stakeholders, ensure compliance to laboratory policy and quality standards, maintain documentation of case records and recommendations, and perform other duties such as a CODIS administrator position currently requires.

## 23. Oversight

Oversight of a FIGG program may be provided by a diverse panel. A panel comprised of judges, prosecutors, defense attorneys, public defenders, law enforcement officials, crime laboratory directors, bioethicists, racial injustice experts, criminal justice researchers, civil and privacy rights organizations, and organizations representing the families impacted by the criminal justice system, including victims' rights advocates, may be convened to review the annual report each year and make policy recommendations.

## 24. Definitions

**Criminal proceeding:** means the adversary judicial process prosecuted by a public officer and initiated by a formal complaint, information, or indictment charging a person with an offense denominated criminal by applicable law and punishable by death, imprisonment, or a jail sentence [12].

**Forensic Investigative Genetic Genealogy (FIGG):** is a technique that combines genetic testing with traditional genealogical research to generate investigative leads in unsolved violent crimes and cases of unidentified human remains.

**Forensic Genetic Genealogy (FGG):** the laboratory DNA analysis to develop the DNA (SNP) profile for upload into a genealogical database.

**Investigative Genetic Genealogy (IGG):** the investigative portion of FIGG, to include DNA profile upload into a genealogical database, family tree creation, and investigation of leads.

**FIGG Responsible Authority (FIGG RA):** the body responsible for the conducting and oversight of FIGG in a particular jurisdiction.

**Forensic sample:** biological material reasonably believed by investigators to have been deposited by a putative perpetrator collected from a crime scene, or person, an item, or a location connected to the criminal event. A forensic sample also includes the biological material from unidentified human remains (UHR).

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. Swathi A. Kumar is an employee of Verogen and provided input on the use of the GEDmatch database.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.fsisyn.2023.100316>.

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