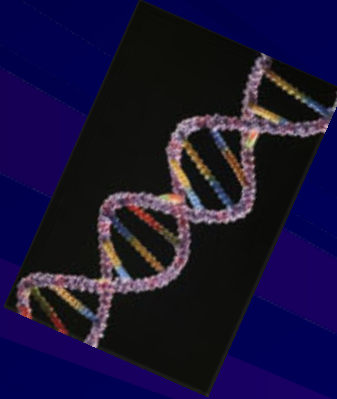# Familial DNA Searching

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Definition

Familial DNA searching is a process used to attempt to identify a close blood relative (typically a parent, child, or sibling) of a perpetrator of a crime when the DNA profile of the specific perpetrator is not identified in a routine search of the jurisdiction's DNA data base.

Data Bank Search

Item	Description	FGA	TPOX	D8S1179	vWA	Amelogenin	Penta E	D18S51	D21S11
2	Blood stain	20, 24	8, 12	10	17, 19	X,Y	10, 12	12, 21	28

Item	Description	TH01	D3S1358	Penta D	CSF1PO	D16S539	D7S820	D13S317	D5S818
2	Blood Stain	6, 9.3	14	10, 15	10, 12	9, 11	8, 11	8, 12	11, 12

No match at moderate stringency

DNA Within a Family

- A child inherits half of his/her DNA from each parent.

- Siblings, consequently, will tend to share a larger portion of their DNA types than unrelated people.

DNA Within A Family

Description	FGA	TPOX	D8S1179	vWA	Amelogenin	Penta E	D18S51	D21S11
Mother	24, 25	8, 9	10, 15	17	X,X	10, 19	14, 21	28, 29
Father	20, 23	11, 12	10, 13	16, 19	X,Y	12	12, 19	28, 30
Blood stain	20, 24	8, 12	10	17, 19	X,Y	10, 12	12, 21	28

Description	TH01	D3S1358	Penta D	CSF1PO	D16S539	D7S820	D13S317	D5S818
Mother	7, 9.3	14, 16	9, 10	10, 12	11, 12	8, 9	11, 12	12
Father	6, 9	14, 15	12, 15	11, 12	9, 13	10, 11	8, 12	11, 12
Blood Stain	6, 9.3	14	10, 15	10, 12	9, 11	8, 11	8, 12	11, 12

Searching a Data Bank for Relatives

- Not looking for an exact match to the evidence profile but looking for a partial match that follows genetic inheritance patterns

- As the number of profiles in a data base increases, such a search will identify more candidates.

- It's possible that none of the candidates returned by the search will be biologically related to the donor of the profile found on the evidence.

Data Bank Search

Item	Description	FGA	TPOX	D8S1179	vWA	Amelogenin	Penta E	D18S51	D21S11
2	Blood stain	20, 24	8, 12	10	17, 19	X,Y	10, 12	12, 21	28

Typical DB search
FGA

20, 24

20

24

Familial DB Search
FGA

20, 18	24, 18
20, 19	24, 19
20	24, 20
20, 21	24, 21
20, 22	24, 22
20, 23	24, 23
20, 24	24
20, 25	24, 25
20, 26	24, 26
20, 27	24, 27
20, 28	24, 28
20, 29	24, 29
20, 30	24, 30

History

- **United Kingdom - since 2002**
  - 176 searches, 35 familial relationships identified, (2004-2010)
- **United States**
  - California - since 2008
    - "Grim Sleeper" case - 2010
  - Denver, Colorado - since 2009
    - First success in the United States 2009 (automobile B&E)
  - Colorado - since 2009

Legal Authority

- **California and Colorado**
  - Familial Searching not addressed in state data bank laws
  - Set out in California Department of Justice and Colorado Bureau of Investigation policies

- **Federal DNA Identification Act**
  - 42 U.S.C. §14132 is silent as to familial DNA searching

Legal Authority

- **Maryland and DC have enacted legislation that prohibits familial searches.**

  - Maryland Public Safety Code § 2-506: "A person may not perform a search of the statewide DNA data base for the purpose of identification of an offender in connection with a crime for which the offender may be a biological relative of the individual from whom the DNA sample was acquired."

  - D.C. Official Code § 22-4151: "DNA collected by an agency of the District of Columbia shall not be searched for the purpose of identifying a family member related to the individual from whom the DNA sample was acquired."

- **According to information from NDIS, no other states have addressed familial searches in state law.**

Virginia Legislation

- Familial searches are not specifically addressed in the Virginia data bank statutes.

- Virginia law clearly authorizes DFS to search the data bank for the purpose of potentially identifying a profile that is consistent with the profile of a DNA sample deposited on an item of submitted evidence. Va Code §19.2-310.5

Is Legislation Needed?

- Va Code § 19.2-310.5 provides that "…The results of an analysis and comparison of the identification characteristics from two or more samples of human biological evidence shall be made available directly to federal, state and local law-enforcement officers upon request made in furtherance of an official investigation of any criminal offense, or to an accused or his attorney pursuant to § 9.1-1104."

- Va Code § 19.2-310.6 currently authorizes criminal penalties for the unauthorized dissemination of data bank information.

Is Legislation Needed?

- DFS has been advised by counsel that no legislative changes are required to perform familial search comparisons and release partial match results as provided in Va Code § 19.2-310.5.

- Because the authority to conduct analyses is so broad and this process so resource-intensive, legislation may be advisable to establish case criteria for the type of investigation in which familial DNA searching is used.

Scientific Working Group on DNA Analysis Methods (SWGDAM)

- Allows states to make their own decisions regarding familial searches

- SWGDAM made recommendations in 2008:
  - Current Combined DNA Index System (CODIS) software is not very effective for these types of searches.
  - The evidence must be a relatively complete DNA profile and not a mixture.
  - Search must be conducted at a local or state level.
  - *All available DNA data should be used for searches (test 16 areas; use all of this data for searches).*

SWGDAM Recommendations
(continued)

- Lineage DNA testing (Y-STRs or mtDNA) should be conducted on candidates identified through a familial search.

- A kinship statistical analysis should be performed to determine the significance of the findings.

- Staff should be trained in evaluating the genetics of potential familial relationships developed through these types of data bank searches.

Additional Considerations

- California and the UK have limited familial searches to the investigation of violent crimes, when all other investigative leads have been exhausted.

- These limitations apply because significant scientific and investigative resources are expended to conduct familial searches.

- The limitations also minimize intrusions on innocent parties.

Selecting Cases for Familial Searching

- California DOJ and Colorado CBI policies are provided.
  - Case represents a significant public safety concern
  - Other investigative tools have been exhausted
  - Single source profile
  - Investigating agency will follow up on the investigation

Disclosure of Information to Law Enforcement

- California has a committee that reviews all the data available (scientific and non-forensic data)

  – May review birth records of a candidate to determine the father or if siblings exist

- California has an approval process to release the information to law enforcement

Practical Example - California

- California data bank size is approximately 1.2 million profiles

- A familial search is conducted

- Lineage DNA testing is conducted on the evidence and on the top-ranked candidates identified from the search

- Lineage testing may be conducted on approximately 170 individuals per case

Practical Example
Lineage testing

- If individuals are related, they will share the same DNA lineage markers and thus have the same DNA type.

- It should be noted that some unrelated database profiles may have the same lineage DNA type by chance.

Practical Example
Investigation and Review (CA)

- The investigators review any candidate that has matching lineage markers

- Non-forensic records are reviewed

- For example, it's determined that a candidate has a brother who lives in the area where the crime occurred

- Decision is made to provide the identifying information to local law enforcement agency

- Conventional DNA testing is conducted on a sample from the candidate's brother

Cost Estimates to Implement Familial DNA Searching in Virginia

- Virginia's data bank has approximately 300,000 profiles

- Estimate based on approximately 50 samples requiring lineage testing per familial search
  - Acquire Computer Software and Training $100,000
  - Current known cost for reagents per case $ 3,500
  - Personnel cost per case $ 1,920

  - Reagents+Personnel for 12 cases per year $ 65,040

  Total first year costs $165,040

Considerations

- Law enforcement resources are necessary to follow-up on potential investigative leads.

- Unrevealed or unexpected family relationships could be discovered or disclosed in this process.

Considerations

- A successful outcome is dependent upon a perpetrator having a close relative – a sibling, parent, or child – with a DNA profile in the databank

- California reportedly has conducted eleven familial searches and has succeeded with one case in which a family member of a suspect was identified (serial homicide case)

- Privacy concerns have been raised regarding investigations of innocent persons

Conclusions

- Familial DNA searches have been used in UK and the United States to develop investigative leads in criminal cases.

- The Department can implement familial DNA searches of the state data bank.

- Changes to the Virginia data bank laws may need to be considered