

United States House Committee on the Judiciary,
Subcommittee on Crime, Terrorism, and Homeland
Security on Utilizing DNA Technology to Solve Cold
Cases Act of 2011

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Mr. Chairman and Members of the Committee:

Thank you for inviting me to speak. I am Peter Marone, Director of the Virginia Department of Forensic Science. The issue I have been specifically requested to speak on is familial Searching. Although Virginia officially began familial searching in April, 2011, that date was preceded by substantial technical and more importantly, policy and logistical discussions. I strongly support the use of familial searching as a means of identifying perpetrators of serious crimes against a person after all investigative leads have been exhausted. Having said that, I feel it is important for all to understand the many logistical as well as technical issues involved in being able to implement this program.

What is Familial DNA Searching?

Familial DNA searching is an intentional or deliberate search of a DNA database designed to identify relatives of offenders as possible perpetrators

DNA is inherited by members of a family. Children will inherit ½ of their DNA from each of their biological parents. Siblings consequently, will tend to share a larger portion of their DNA types than unrelated people.

Under current procedures, a typical search of a database that results in a databank “hit” means that there is a match between the crime scene evidence sample and an offender sample. A match is defined, in this example, as the DNA types (profile) from the evidence are identical to the DNA types from an individual (offender or arrestee).

When there is not a match between the evidence and an offender, a search of the database can be conducted to determine if an individual has a similar, but not a matching, DNA profile. This second, deliberate search of a DNA database is a familial search. A search such as this would likely yield multiple candidates, because the search requirements are less stringent.

It is important to understand is that the larger the database searched the greater the number of potential relatives generated. These candidates who have been identified by the familial search, may have a biological relationship to the evidence (e.g. a sibling or a parent of the individual who deposited the evidence). But, it is more likely that none of the candidates identified in a “familial search” will be relatives of the individual who deposited the crime scene evidence. Just because there are a number of candidates produced, does not mean that an individual will be identified as a possible relative. Distinguishing between an identified candidate who is a biological relative of the perpetrator and another whose DNA profile is similar merely by chance and is not biologically related at all, requires additional DNA testing and in some instances (such as in the United

Kingdom), investigations of non-forensic information (e.g. date of birth and geographical location) to determine if a biological relationship exists.

History

Familial DNA searches in forensic casework have been conducted in the British legal system since 2002¹ with the first successful prosecution in 2004². The British have completed 70 such searches since 2004, leading to 18 matches and 13 convictions³. More recently, in the United States, the City of Denver, Colorado and the states of California (2008⁴) and Colorado (2009⁵) have started familial search programs. The Grim Sleeper case from California has recently dominated the news⁶ and is an example of familial searching within the United States.

Legal Authority to Conduct Familial DNA Searches

Currently, there appear to be no states that have specific written authority to conduct familial searches within their databank legislation. Familial DNA searching is not expressly authorized by the Federal DNA Identification Act 42 U.S.C. §14132.

Conversely, two jurisdictions, Maryland and the District of Columbia, have specific wording in their databank legislation prohibiting familial searches⁷. Most states do not currently address this issue explicitly.

Application of Familial Searches

National recommendations⁸ state that if a laboratory decides to perform familial searches, familial searches should generally be conducted on DNA profiles that are single source and not DNA mixture profiles. DNA mixtures are samples which have 2 or more DNA donors. Searching DNA mixtures in a familial DNA setting can result in numerous matches to unrelated individuals increasing false positive matches.

¹ FSS, "Key" Unlocks Triple Murder Investigation, , 2002 [cited 5th June 2007]; Available from: www.forensic.gov.uk/forensic_t/inside/news/list_press_release.php?.

² FSS, First Successful Prosecution After Use of Pioneering DNA Technique, 2004 [cited 5th June 2007]; Available from: www.forensic.gov.uk/forensic_t/inside_news/list_press_release?case.

³ Genetic Surveillance For All, The Slate, March 2009, by Jeffery Rosen

⁴ DNA Partial Match Policy, California Department of Justice, April 2008

⁵ DNA Familial Search Policy, Colorado Bureau of Investigation, October 2009

⁶ In Grim Sleeper Case, a new track in DNA searching, Los Angeles Times, July 2010, by Maura Dolan

⁷ Maryland SB 211 "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."

⁸ SWGDAM recommendations on partial matches, July 2008

Because of the resources and investigative work involved, familial searches are typically reserved for violent cases where all other investigative leads have been exhausted⁹.

Since the purpose the current databank search software (CODIS) is to identify only individuals whose DNA profile matches the evidence DNA profile, it is not effective for conducting familial searches. Alternative software must be developed or purchased for familial search purposes and will need to be validated.

A familial search of a DNA profile is conducted in a DNA databank looking for “similar” DNA profiles. One approach is to then rank the returned candidates statistically to determine how likely they are to be related to the person who deposited the biological evidence. A ranking of the individuals is conducted by computer software, and then the top candidates are subjected to additional DNA testing. The additional DNA testing is conducted on the evidence and on the returned ranked candidates.

Lineage markers are used for the additional DNA testing. These are DNA types that are passed on within a family. A specific marker or test will identify DNA that is passed on from a father to his sons (Y STR). This additional DNA test is conducted on the evidence and the ranked candidates from the database. If individuals are related, they will share these same lineage DNA markers and thus have the same lineage DNA type.

Familial Search Example

California has a databank size of approximately 1.2 million offenders. A familial search of an evidence profile against this database will generate many potential relatives. The top candidates (approximately 200) are subjected to the additional lineage test as well as the evidence.

If the individual and the person who deposited the DNA evidence are related they will share the same DNA type.

If a family member is identified who appears as a possible person of interest in the case, a DNA sample is collected from the individual. Traditional DNA testing (STR) is conducted on the individual and this generated profile can be compared to the original DNA profile generated from the evidence.

Disclosure of information to law enforcement

Since familial DNA searching involves identifying and investigating persons who are unconnected to the crime being investigated, criteria must be established for

⁹ Using Familial DNA Intelligence Products in Serious Crime Investigations, Police Standards Unit, British Home Office, May 2006

implementing the procedure that balances the need against the use of resources and the infringement on personal privacy.

Although offenders have, to a certain extent, relinquished their privacy rights in providing required samples for inclusion in the DNA databank, their innocent family members have not given up their rights to privacy or given prior consent to be investigated.

Unrevealed or unexpected family relationships could be discovered or disclosed in this process. These might lead to incorrect conclusions affecting either laboratory analyses or the law enforcement investigative processes.

The opportunity for a successful outcome is very limited. It is entirely dependent upon a perpetrator having a close relative – a sibling, parent, or child – with a DNA profile in the databank.

Issues for a National system

National development of a familial search software program is the first step; however national searching is not necessarily the immediate answer.

Knowing that validation studies in states with databases of approximately 350,000 to 1.2 million utilizing familial searches produce 100 to 200 “possible candidates”. The number of possible candidates produced using a database of 10,000,000 may be in the thousands. This number is just too large to perform additional lineage testing on.

Additionally, the samples whose profiles are contained in the national database are located in the various state database locations. As part of the lineage testing process, how are the analyses run and by whom? The samples are the responsibility of the individual states.

The United Kingdom has had relative success with familial searching. The database size is approximately 4 million. However, they utilize both age (date of birth) and geographical filter to aid in reducing the size of the possible candidate pool. I would equate this to performing the search at the state level. CODIS hits over the years have consistently demonstrated that 85% to 90% of such hits occur at the state level.

The Scientific Working Group on DNA Methods Analysis (SWGDM) currently has a subcommittee which is just beginning to address these various issues.