

The Continued Use of Familial DNA Searching Post Protection of Freedoms Act 2012

Martin Bottomley and Chris Holt

Executive Summary

Between 2003 and 2013, over 100 serious offences including murder, rape and other sexual assaults have been detected as a result of familial DNA searching. The vast majority of these crimes would have otherwise remained undetected.

However, following the enactment of the Protection of Freedoms Act 2012, which removed the investigative option to utilise an individual's DNA B scrape within a familial DNA search strategy, the use of Y STR profiling within the tactic has been made more difficult, causing some commentators to even consider whether familial searching is still viable. This paper outlines key research findings and up to date investigative advice on the use of familial DNA searching including guidance on the decision about whether to start working with either the sibling list or the parent/child list and how this decision may depend on the age of the case under investigation. Additionally, in 95% of cases examined, where a relative of the offender appears on a prioritised list, they appear within the top 30 names.

This research provides key support for the continued use of familial searching as an effective investigative tactic and for practical policy decisions which allow the continued use of Y STR profiling within a familial DNA strategy. This paper has been signed off as a guidance document by the National DNA Operations Group in support of the National DNA Database Strategy Board.

Contents

1. Principles of Familial DNA Searching
2. Information on Successful Cases
3. Information on Cases Detected by Other Means
4. Summary of Statistics and Research
5. Y STR Profiling and the Position Post the Protection of Freedoms Act 2012 (PoFA)
6. Cold Cases and Live Cases
7. New Advice for Investigators
8. Methodology for the Continued use of Familial Searching Post PoFA
9. Conclusion

1. Principles of Familial DNA Searching

Familial DNA searching as a police tactic capitalises on the fact that DNA is inherited from our parents, half from each. An extension of this genetic principle is that full siblings, because they inherit their DNA from the same two parents, generally share more DNA with each other than with unrelated strangers. Thus, when the police are faced with an unidentified DNA profile (target profile) which does not match anyone on the National DNA Database (NDNAD), it is possible to search for people who may be related to the unknown offender. This potential relationship is usually either a parent or child of the offender for individuals who share half their DNA with the target profile, or a potential sibling for those who share a relatively large amount of DNA with the target profile.

Therefore, the product of the search is two separate results lists. One list contains potential parents or children of the unknown offender and the other list contains potential siblings. These lists are **not** comparable in terms of the ranking scores and cannot be combined in any meaningful way.

Because a 'familial search' is looking for people who only have some DNA in common with the target profile, there are usually several hundred and sometimes thousands of individuals who meet the criteria to be a potential relative. In the absence of an obvious candidate, it is then necessary to prioritise both the parent/child and the sibling lists using geography and age in addition to the original genetic ranking to focus on the individuals most likely to actually be related to the unknown offender.

Once the familial lists have been prioritised, the most effective next step in the process is to utilise Y STR DNA profiling, the advantage of which is summarised here:

"The Y-STR profile is generally inherited unaltered from father to son. Thus, if a male appears on the familial lists as a possible parent, child or sibling of the offender, his biological father, his sons and his male siblings can be eliminated if his Y-STR does not match that of the offender."¹

The decision about which list to action first takes on increased importance now that we have to visit and re-swab the males on the lists in order to use Y STR comparison. Before the Protection of Freedoms Act, we could simply ask for the B scrapes held at the forensic service provider to be compared as a bulk submission.

Equally, given that there is now limited central funding available to assist with familial DNA search related testing, alongside reduced force budgets and the greater cost and resources now required to eliminate individuals as potential relatives via Y STR testing, informed

¹ Bottomley, M. and Holt, C. (2011) Familial DNA: A Relative Success? Journal of Homicide and Major Incident Investigation. Vol 7 Issue 2. Autumn 2011

advice about how many persons investigators should be looking at from a familial DNA search results list has never been so important.

The authors of this paper do not claim that relatives of the unknown offender will never be a considerable way down the results lists. This can be the case and it may be the case for your investigation. However, the aim of this advice, based upon research on the outcomes of past cases, is to recommend how many nominals you should realistically be pursuing to maximise the investigative value of familial DNA searching alongside cost effective use of the tax payer's money.

2. Information on Successful Cases

The information collated as the basis for the research behind this paper has been gathered from a number of sources including forensic service providers, the National DNA Database, SOCA and the police forces and investigators from across the UK who have used familial DNA searching within their investigations.

From 1/1/2003 to 1/7/2013, the statistics for familial searching within the UK are:

- 260 investigations have commissioned a familial DNA search;
- 54 of these investigations have identified a relative of the offender on the NDNAD;
- 62 relatives have been found in total (eight investigations found two relatives);

Of the 62 relatives found, all but three were within the **top 30 of a list prioritised using geography and age in addition to genetics.**

The research shows, in cases where familial searching has been used as an investigative tool, that **where a relative of the offender appeared on a prioritised list, in 95% of cases they were within the top 30 names.**

The positions of these 62 relatives on the initial or raw genetic based lists when the search was run across the whole of the NDNAD vary from number one on the list down through the hundreds and, in some cases they were outside the top 1000. For those that were in the hundreds or thousands, the additional prioritisation using geography and age² was the key to success. In a successful GMP case from April 2013 which related to a rape from 1989, the relative of the offender was at position 483 on the purely genetic ranking but rose to position 27 when the lists were prioritised using geography and age.

² Gregory, A. and Rainbow, L. (2011) *Enhanced Prioritisation of Familial DNA Searches*. Journal of Homicide and Major Incident Investigation. Vol.7 Issue 1. Spring 2011.

3. Information on Cases Detected by Other Means

Based on the findings of the research, it is proposed that going beyond the top 30 of a prioritised list is less likely to locate a relative of the offender and is therefore not a good investment of force resources. A relative of the offender has after all, so far, only been found outside of the top 30 on three occasions in 260 investigations. But what if there is a self fulfilling aspect to this? What if we generally only find relatives of an offender within the top 30 because that is where we start to look and usually do not go much further down the list? Could it be the case that within the 206 crimes that did not identify the offender via the familial search, that there were actually relatives on the lists but they were so far down the list that we never got to them?

Clearly, where a case remains undetected and the 'familial' aspect of the investigation has run its course, there is no way of identifying whether there is a relative of the still unknown offender further down the list. However, the authors have identified a further 35 detected investigations which sit within the first 260 to have used familial searching within the UK. Each of these 35 cases commissioned a familial DNA search during the investigative phase and when the case was still undetected. They have all been subsequently detected but by means other than the familial DNA search, such as a routine load and hit or as part of a mass screen. These 35 cases are therefore not included within the 54 cases successfully detected using familial searching, referred to earlier.

In all 35 crimes we now know the identity of the offender and the source of the DNA which was used as the target profile for the earlier familial DNA search. In each of these cases, although we know the familial DNA search was not the route to detection, we have been able to find out whether the offender actually had a relative on the NDNAD at the time of the search and, if so, how far down the list the relative was.

Prior to the results of this research being known, it was hypothesised that if there were indeed relatives of offenders sitting well below the top 30 of the prioritised lists, a sample size of 35 gave a reasonable opportunity to find some of these.

However, in only two of the 35 cases was a relative identified and, on both occasions, the relative was within the top 30 of the prioritised list.

4. Summary of Statistics and Research

When we look at the 54 successful familial searches together with the 35 investigations which were solved by other means, we have a total of 89 investigations in which we now know the identity of the offender, whether there was a relative of the offender on the familial search lists and, in the cases where there was a relative, at what position the relative was found. There are 56 cases where a relative of the offender has been identified within the lists. From those 56 familial searches, on only three occasions was the relative of

the offender outside the top 30 of a list prioritised using geography and age alongside genetics.

From this, we can see that where a relative of the offender appeared on a prioritised list, in 95% of cases they were within the top 30 names.

While it is important to stress that it can never be said that a relative of an offender will not be found outside of the top 30 prioritised nominals³, there is, in the opinion of the authors, good evidence to support the advice to investigators that in order to optimise the investigative value of a familial search, research and resources should be concentrated on the top 30 names of both the parent/child list and the sibling list.

5. Y STR Profiling and the Position Post the Protection of Freedoms Act 2012 (PoFA)

The use of Y STR profiling has been a significant factor in investigations being able to manage the workload of progressing and eliminating individuals identified within a familial DNA search results list when trying to establish whether they are a relative of the unknown offender. The Y STR process utilised the second swab or 'B scrape' which is taken when a person is DNA swabbed in the custody office. These swabs have, until recently, been retained by the forensic supplier who processed the DNA profiling and were accessible for Y STR profiling once authority was obtained from the DNA Strategy Board. By this route investigations have been able to very efficiently and covertly eliminate many of the people contained within the results lists as potential relatives of the offender using the theory described in italics at Section 1 above.

Even more importantly, where the Y STR profile of the person on the list matches that of the target profile, the technique has led to the identification of verifiable relatives of the offender and thereby led to the identity of the perpetrator.

The use of Y STR profiling within a familial search strategy has therefore led directly to the detection of many murders, rapes and serious sexual assaults with all the associated benefits including the prevention of further offending and victim satisfaction that their attacker has been brought to justice.

The introduction of The Protection of Freedoms Act, which removed access to the B scrapes, has made the use of Y STR profiling more problematic and far less efficient than was previously the case. However, **the use of Y STR profiling is still possible**. Investigators will need to visit the persons within the familial search results lists and re-swab them.

³ The three individuals who were related to the offender and were outside of the top 30 on the prioritised list were actually outside of the top 60 and in one case outside the top 100.

6. Cold Cases and Live Cases

It has long been considered by the authors of this paper that familial DNA searching has a greater chance of success on cold cases rather than live cases because, with the passage of time, there is more opportunity for a relative of the offender to have been loaded onto the NDNAD. In fact, it is probably more accurate to say that whether it is a live case or a cold case, **if you think your offender is now over 40, familial DNA searching is more likely to succeed because there is a greater chance of the offender having had children who may have gone on to commit a crime and had their DNA profile loaded onto the NDNAD.**

The research findings do indeed show that cold cases account for a significant proportion of the familial DNA searches to have been conducted to date and, as a result, the successes. The fact that the tactic has been used more during the investigation of cold cases than live cases is because many live cases are solved in a relatively short time by other means, together with the fact that when a cold case with a full DNA profile is reviewed, other lines of enquiry, such as the swabbing of TIE nominals are often already exhausted and the commissioning of a familial search is a logical investigative option. However, it is important to recognise that there are a number of successes where familial searching was used on a live case and the tactic is undoubtedly viable in both cold and live cases.

Breakdown of successful familial DNA cases as of 1/7/2013:

Table 1.

	Cold Case	Live Case	Total
Number of Successful Cases	40	14	54
Number of Relatives Found	46	16	62

Table 2.

	Cold Case	Live Case	Total
Parent/Child List	28	5	33
Son	21	2	23
Daughter	5	0	5
Father	2	2	4
Aunt	0	1	1

Table 3.

	Cold Case	Live Case	Total
Sibling List	18	11	29
Brother	9	8	17
Sister	7	3	10
Nephew	2	0	2

7. New Advice for Investigators

Based upon the research and findings discussed within this paper, it is recommended that the following updated advice is considered by senior investigating officers (SIOs) when utilising a familial DNA search.

A case by case discussion will be required with your forensic service provider and your forensic submissions manager to establish whether there are any potential cost benefits in bulk submissions for Y STR analysis. The below observations are outside of such considerations. A decision to collect 50 or more swabs before submitting en masse will probably negate the requirement to decide which list to start working with.

It is likely that some individuals, although clearly present on the NDNAD, may not have come to police notice for several years and may prove difficult to trace in the initial stages, so any policy decision to collect all the swabs from all the males within the top 30 of both the parent/child and sibling lists before submitting them may not be easily achieved within an acceptable timescale.

If a decision is to be made about whether to start with the parent/child list or the sibling list when utilising familial DNA searching, when we look at **all** the detected cases, the simple breakdown between parent/child and sibling lists shows only a slight leaning towards the parent/child list and demonstrates that both lists have yielded success in fairly even measures. This is not particularly helpful when deciding which list is more likely to contain a relative of the offender.

However, when we look at the breakdown of cold cases and live cases, it can be seen from the tables above that there is a greater percentage of success with **cold cases from the parent child list** and a slightly greater success rate in **live cases from the sibling list**. This is unsurprising given the earlier observation about the increased opportunity for the children of the offender to be loaded onto the NDNAD if the offender is over 40, and is something for

investigators to consider when deciding whether to start by researching the top 30 from the sibling list or the top 30 from the parent/child list.

Previously, because it was possible to pursue the males on the lists in a very efficient and covert manner by using the B scrapes, it was often the case that the males of interest were researched first followed by the females if there was no positive result from the Y STR submissions.

It is important to note that females, although represented in fewer numbers, once they appear within the top 30 of a prioritised list are equally as likely to be related to the offender as males. A typical 'top 30' list will contain six or seven females and 23 or 24 males. These proportions reflect the demographics of the NDNAD. Considering that we now have to visit the males and re-swab them as well as draw up a family tree, **it is advised that both males and females are traced in their ranked order**, allowing where appropriate, an early assessment of the family trees of the females within the list rather than leaving them until last, as may have been the case previously.

From the research data gathered, it can be seen that over 50% of the identified relatives of offenders were actually within the top 10 of a list prioritised by the addition of geography and age to the original genetic based lists. This is true of both the parent/child and the sibling lists. This suggests that a sensible strategy would be to pursue the top ten from one list, followed by the top 10 from the other list, then numbers ten to twenty and so on, rather than pursue the full top 30 from one list before moving on to the next. These decisions will be case specific dependant on the believed age of the suspect and whether it is a cold case or a current case.

There is no doubt that the need to locate and re-swab individuals requires additional resources and staff at a time when force budgets are reducing, but this updated information and advice to investigators provides the necessary rationale and evidence for SIOs to set an investigative policy which keeps work within a manageable level by targeting only those individuals who are **most likely** to be a relative of the offender.

8. Methodology for the Continued use of Familial DNA Searching Post PoFA

This final section provides a viable and logical process for investigators to follow when pursuing a familial DNA search strategy. This series of chronological steps builds upon the existing guidance⁴ which should be referred to for more detail when required. This updated advice takes into account the results of the research and the current legal position:

1. Familial DNA Search conducted by your forensic service provider;
2. Analysis of the raw, unprioritised national list to identify any **obvious** candidates for being a relative of the offender, for example persons who were swabbed local to the crime scene and are very high on the list;
3. Prioritisation of the lists by SOCA Crime Operations Support/Serious Crime Analysis Section;
4. Policy decision made on whether to start with the parent/child list or the sibling list using the research which shows greater success with **cold cases from the parent child** list and a slightly greater success rate in **live cases from the sibling** list. A further consideration at this stage is to pursue the top ten from one list, followed by the top 10 from the other list, then numbers ten to twenty and so on, rather than pursue the full top 30 from one list before moving on to the next.
5. Locate and visit the individuals within the top 30 of the prioritised lists in accordance with the policy decision made at 4 above. Males and females should now be visited in ranked order and a family tree obtained. Males should be consensually re-swabbed to allow submission for Y STR comparison with the crime scene Y STR profile.
6. Submit the male swabs for Y STR comparison with the crime scene profile.
7. Research any positive Y STR male matches and all females within the top 30 using both the family tree provided by the individual and enquiries with the General Register Office (GRO) of births, deaths and marriages. Experience has shown that such research is not infallible and a combination may reveal either gaps in the information provided by the GRO or relatives missed off the family tree by the individual concerned.
8. Swab potential offenders identified from the research at 7 above who require elimination.

⁴ NPIA (2011) Using Familial DNA Intelligence Products in Serious Crime – Tactical Advice.

9. Conclusion

Post implementation of the Protection of Freedoms Act 2012, familial DNA searching remains a viable tactical option. Furthermore, the updated advice contained within this paper, which is evidence based, provides SIOs with the necessary rationale for setting policy around researching no more than 30 individuals per results list. This not only ensures the use of the tactic targets only those who are most likely to be related to an unidentified offender, but also, for the first time, provides a clear framework for quantifying the maximum investigative and financial resources required to pursue a familial DNA search as a line of investigation.

Martin Bottomley martin.bottomley@gmp.pnn.police.uk

Chris Holt chris.holt@gmp.pnn.police.uk

September 2013