A Methodology for Researching Autosomal DNA Results

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DNAAdoption Methodology for Analyzing DNA Results

Introduction

When I first joined DNAAdoption in 2012, I kept asking where are the instructions? It turned out that there were not any, so I recorded the methods I used to solve my first case. These have held up over the years with many refinements from all the experience we had gained and all the tools that were being developed. Most of these tools are thanks to the dedication of Rob Warthen.

What a long way we have come in 3 plus years. Autosomal DNA was just being explored for the purpose of family identification and we had the good fortune of being in at the start. We have learned and incorporated our experience into this document. The test vendors also often change their websites so if the wording does not exactly match, give us a little leeway!

The purpose of the methodology is as a guideline to working with your DNA Results when you first get them. They are not self-evident to most people. We understand. They were not obvious to us either!

Our goal at DNAAdoption is to provide guidance and education for your search for missing family members. Yes, we are not just for adoption any more. Check out our classes at DNAAdoption.com for additional help.

There is a lot of material that you will find useful on http://dnaadoption.com. In this document, you will be directed to certain documents on the website. We have a series of First Results classes there to use when you first get specific results.

Unfortunately this probably will not work as well with Ashkenazi lines or may be too difficult to work with them, due to the nature of Ashkenazi DNA.

DNA

There is DNA in all of your cells. It determines the characteristics of all living creatures.

Changes in DNA being passed down to descendants are called mutations. The testing companies use these variations to identify DNA segments for an individual through a saliva test. Mutation is not a negative thing here, it drives evolution.

It would be nice if everyone understood the difference between the different types of DNA tests before they order them, but from emails, it is obvious that it is not true.

Men can have Y DNA tests. Women do not have a Y chromosome so it does not apply to them. A Y DNA test can identify direct line male ancestors. This is not a guarantee of information it depends on who has tested.

The DNA segments that these tests identify are a type called autosomal DNA. Autosomal DNA for both men and women is used to analyze the DNA that you inherited from your ancestors. Autosomal DNA is considered to be useful within the last 7 generations, but it really is more like 5.

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Autosomal DNA can be passed down no matter what the sex. However, there is no real pattern as to how this occurs. Each parent passes DNA to a child, each contributing half. However, it is random as to what DNA is passed to each offspring. Thus, siblings do not exactly match each other, however, they will have a significant amount of matching DNA. Therefore, in most cases with each generation, the amount of matching DNA declines. So that the amount of DNA passed from a set of grandparents to their own offspring is greater than the amount of DNA passed to their grandchildren and the amount passed to each generation declines. This DNA is measure by segments and the longer the segment on the same chromosome, the closer the relationship.

The chromosomal browser on Family Finder shows us a graphic interpretation of these chromosomes. We are looking for overlapping segments which shows DNA segments at the same location on the chromosome.

Your DNA information is compared to all others who have tested with that company. The test will identify segments that you and another person(s) many have inherited from a common ancestor that you most likely never heard of even if you are not adopted.

Your job is going to be to identify people who are the best matches with you and to examine their family trees. You identify a common ancestor where 2 or more of your matches have trees that intersect. This is called Triangulation as they are compared with your results. This is the common ancestor. It takes a lot of work but in most cases it can be done. You will expand the tree of a person who matches you. You need to make sure the tree is about two generations further back than the prediction. So if is a 3rd cousin prediction, you would share great-great grandparents.. However……

DNA is very fickle and not passed down the same way every time so that may actually be a 2nd, a 4th, or a 5th cousin or even a 3rd cousin once removed. A prediction is a place to start looking. When you expand a tree first by going up like a traditional genealogical tree, then you find all the offspring, and all of their offspring and their spouses down to the time of the person that you are seeking. Sounds impossible we have a lot of people who can tell you that it is not!

What are the DNA tests?

Y-DNA:

- Only present in males.
- Passed directly from father to son.
- Any changes are due to mutations.

mtDNA:

- Present in both males and females.
- Passed directly from mother to children of either gender.
- Present in the mother's oocytes (eggs).

- Any changes are due to mutations.

X-DNA:

- Present in both males and females.
- Males have one copy - from their mothers.
- Females have two copies - from both parents.
- Fathers only pass their X-DNA to their daughters. Their sons receive Y-DNA.
- Passed unchanged (except for mutations) from father to daughter.
- Passed from mother to children of both genders as a mix of the mother's two copies (recombined).

Autosomal DNA (atDNA):

- Present in both males and females.
- Two copies each of Chromosomes 1 through 22.
- One copy received from father. One copy received from mother.
- Passed from parent to child as a mix of each parent's two copies.
- Copy received from father will be a mix of paternal grandparents' DNA.
- Copy received from mother will be a mix of maternal grandparents' DNA.
- This is what is tested in FTDNA tests.

What do I do with the Results?

You received an email that your results are ready. You login to the site and you see a bunch of names and some other information. Exactly what you see depends on where you tested.

Here are the links to the information for a person looking at their results for the first time. We used to give these as classes but decided to just post them for everyone to see. You need to get used to the site first.

- FTDNA First Results
- AncestryDNA First Results
- 23andme is not currently available due to transition in the company.

- Gedmatch - not a vendor but you need to become familiar with this.

Summary of Process for FTDNA

- Download your FTDNA results using the server DNAGedcom.com This server has nothing to do with FTDNA, Rob who owns it has written programs to assist you.
- Identify longest segments on each chromosome and then group those with overlapping segments. We now have a nifty little program that will do this for you. JWorks is for people using Excel and KWorks is for everyone. The two programs are found on – you guessed it – DNAGedcom.com. Instructions for using the programs are on these pages.
- Overlapping Segments show that you share at least a part of that DNA segment with the person you overlap with. And that means you have a common ancestor – IF – you are blood related or In Common With. (ICW)
    - In Common With means you have a blood relationship to that person.
    - As the owner of all these matches, you are ICW with your parents, your grandparents, your cousins, etc. all the way back on your side of the tree.
    - As the owner of all these matches, you have overlapping DNA segments with all of your matches.
    - The longer the segment the closer the match.
    - However, your mother on your side of the tree is not blood related to your father's grandfather, or your father's aunt is not blood related to your mother
    - The reason this is important is that in order to have a Common Ancestor (CA) you must be:
        - Blood related (ICW) with a person and
        - Have overlapping DNA segments and
        - Have access to the person's tree information

      There are two sides to the chromosome. This is not exactly what one looks like but it demonstrates what we mean.

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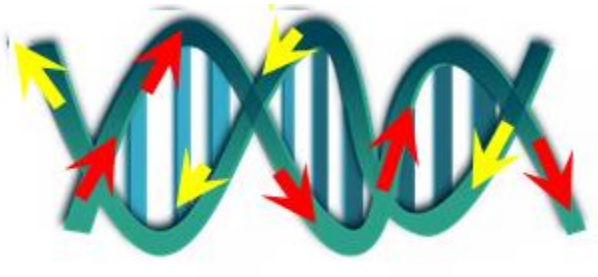

- The ribbons on the sides are like rails on a ladder. They both have numbers like street addresses. The difference is that that both sides have the same number series. One goes left to right, the other right to left. So if one of your matches has a DNA segment at 500 – 3 million and the other person has one at 2 million – 3 million, then the numbers look like they overlap, but if you are not ICW with each other, then the numbers are on opposite sides of the chromosome. In the example above, the red arrows are one side and the yellow arrows are the other side. You can think of one side as your paternal side and one as your maternal side, but for now you do not know which is which.

- Identify In Common With Matches. This is done in the JWorks or KWorks programs now
- Separate those with overlapping segments into those with ICW status. This is done in the JWorks or KWorks programs now.
- Identify the longest chromosome segments over all, these are the closest relatives
- Identify those with available trees or try to get them by emailing.
- Start with those with longest segments, look in the set of matches for two with overlapping segments on the same chromosome that are over 10 cM in length and who are ICW and who have gedcoms. Always work within these sets.
    - A set looks like this

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						Al Clements	Mike Donnelly Pickett	Sean Kehoe	Rex Salter	Dr. Rita Howard Mullins
Al Clements	2	50979064	61792229	8.01	Al Clements		x	x		
Mike Donnelly Pickett	2	50979064	64759233	9.76	Mike Donnelly Pickett	x		x		
Sean Kehoe	2	50979064	66131165	11.78	Sean Kehoe	x	x		x	
Rex Salter	2	53926280	66131165	8.9	Rex Salter			x		
Dr. Rita Howard Mullins	2	53926280	66868265	10.05	Dr. Rita Howard Mullins					

The X s show ICW status. Thus, Clements is ICW with Picket. Clements is NOT ICW with Salter. As described in the First Results class, upload your raw data to Gedmatch.com. This is a free service with more analysis tools. You only have to upload your raw data once. It describes your DNA segments. They don't change. The section on the left shows matches, on Chromosome 2, a start address, and end address and a total length of the segment in cM (Centimorgans)

Triangulation

Triangulation involves matching results among 3 people, you and two others, to determine your common ancestors. What you are doing here with the FTDNA results is triangulation.

The 23rd Chromosome

The 23rd chromosome is different than the other 22. It is the sex chromosome, it holds together better than the other 22 chromosomes and is not suitable for predicting a relationship because of that. It is however useful sometimes it patterning certain matches.

A female gets an X from her mother and one from her father. Her X from her father will exactly match his. The X from her mother is a recombination of DNA from several relatives that her mother inherited her X from so it will not be a perfect match.

A male gets an X from his mother. It is also a recombined X and he gets a Y from his father. The Y enables a Y-DNA test to identify the male line of the ancestry. However, it often does not give all the answers due to the limited number of people who have taken the test of because of an NPR (non-parental event).

So if you share an X with a male you know, it comes from his maternal side and not his paternal. An X shared with a female, if you are a male, yours also came from your maternal side.

If you are have an X match with a female it can come down in this manner. Note 2 males in a row ends the inheritance string.

Corrections made 10/7/2016

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Don't get carried away by this, many people spend far too much effort on trying to use the X. It is supplemental to your other analysis not instead of.

Ancestry DNA Results

Unless you can get your Ancestry matches to upload to FTDNA or to Gedmatch, you need to work them differently from FTDNA. If your matches upload to Gedmatch you can work them the same as FTDNA.

Otherwise, you must look for matches between trees. It is a good idea to subscribe to DNAGedcom.com's Client ($5 a month or $50/year). To use that link you must first create your DNAGedcom.com account. By using the Client you can get a list of your matches and the direct ancestors of all of your matches as well as an In Common With (ICW) file of which matches are ICW with other matches. The last is just a reference file.

The First Results paper on our web site, DNAAdoption.com will give you the remainder of the information on using these matches.

Ancestry uses a completely different algorithm to match DNA Results so you may find some differences if your match has tested elsewhere. The company has consistently refused to provide a chromosome browser so we cannot compare with their competitors.

23andme Results

There is a First Results paper on our website. However, they have just begun transition to a new way of doing business and a new format and we have no information on what that will be. The start has been very rocky. We will update when it is stable.

Gedmatch Comparisons

Gedmatch.com is a free server that you can upload your results to and compare them with other uploaded results from Ancestry, FTDNA and 23andme. It is run by volunteers and is free except for a Tier 1 subscription service for a few more advanced utilities.

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Useful Information

Chronological Reference

cousin	Common grandparents	Born 1890s
2nd cousins	Common great grandparents	Born mid 1800s
3 rd cousins	Common 2nd great grandparents	Born early 1800s
4th cousins	Common 3rd great grandparents	Born mid to late 1700s
5th cousins	Common 4th great grandparents	Born mid 1700s
6th cousins	Common 5th great grandparents	Born early 1700s

Cousin chart

Prediction Chart

This chart gives you the average values for predicted relationships. DNA transmission varies and it is only a place to start. It is not the exact answer. DNA analysis interpretation uses averages and probabilities and there is always a large possible range involved.

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http://www.dnaadoption.com/uploads/DNAAdoption/DNAAdoption_files/DNAAdoption/DNA_prediction_chart_10-28-2014.xls

Instructions for Prediction Chart

This gives you some ideas of how to work with the prediction chart.

Glossary

Glossary of DNA Terms

Genetics Glossary - ISOGG

Acronyms

More Information

DNAAdoption.com

Many how-to articles. Links to Hundreds of information sources. Class List.

DNAGedcom.com

Tools and instructions on using them

Corrections made 10/7/2016