Jewish DNA Testing Presentation Notes
slides at
http://slides.com/kittycooper/jewishdna#/

[chimp slide]

We all share about 98 to 99% of our DNA with every other human being and 97 to 98% with chimpanzees. It just depends how it is counted
Personal genome testing takes a sample of the remaining 1%

Personal genome autosomal testing tests around 600,000 of the 10 million SNPs (prounounced SNiPs) in your genome (some count to30,000) so 6% of your SNPs but that is less than 1% of your genetic material which includes many repeats and what was once thought to be junk DNA. The idea is to test the spots where we are likely to differ.

[detective slide]

DNA tests for genealogy are quite different from forensic DNA tests which are trying to identify a single person as opposed to genealogy tests which are helpful for identifying ancestral lines and ancestry composition.

A word of warning, if a surprise in your family tree will be a problem. DO NOT TEST

[DNA picture]

How much do you remember from high school biology about DNA? Maybe you have learned something since then. The field has changed and grown. Remember the blue eyes/brown eyes recessive and dominant example? Now we know its not that simple! Many genes account for eye color

We each have 22 pairs of autosomes and one pair of sex chromosomes (two X or an X and a Y) thus 46 chromosomes total. In addition, our mitochondria, symbiotic organisms living in our cells and providing energy to them, have DNA that can be tested.

[Slide of DNA strand with a raw data print out]

The famous twisted helix of a chromosome is made up of base pairs of either A (Adenine) with T (Thymine) or C (Cytosine) with G (Thymine) that are the rungs in the DNA ladder. Note that the curvy letters are together (C and G) which is how I remember the pairing. Those base pairs are grouped into alleles and those alleles into genes.

If you look at your raw data from a DNA test in a spreadsheet you will see pairs of these letters next to the the numbers and letters which indicate the location of the base pair in each chromosome. There are two because you have two chromosomes at each position but it will only show one letter of the AT or CG pair.

[family tree slide]

So what are the available tests and how can they help your research?

There are three kinds of commonly used tests for genealogy purposes: Y DNA (male line), mitochondrial DNA which abbreviated mtDNA (female line), and autosomal DNA (all your ancestors). Most of them require you to spit into a tube; only familytree DNA does a cheek swab which can be better for older folk (although 23andme has a special kit for old folk,).

[Y chromosome]

The clearest test is the Y chromosome test because that chromosome changes very little from generation to generation. The Y is what makes a person a male. Men have an X and a Y while women have two X chromosomes. The Y is a relatively small gene,about a third the size of the X

The Y is unique in that it is passed intact from father to son without any recombination, so the only changes it has are from mutations. Thus it can remain unchanged for hundreds of years. It contains about 59 million base pairs as compared to the largest chromosome, number 1 which has 549 million or the X which is almost 3 times larger at 155 million base pairs.

So you can see that it might be useful for proving or disproving a male line, perhaps a specific surname.

[slide of Y haplogroups]

There are two types of Y DNA testing. One is SNP testing which will give you your haplogroup; it is an indicator of deeper ancestry. (Note that the autosomal test at 23andme will give a Y haplogroup designation). The other is STR testing which will give you matches in a genealogical time frame. STR stands for short tandem repeats.

Approximately 35% to 43% of Jewish men are in the paternal line known as haplogroup J and its sub-haplogroups. This Haplogroup is particularly present in the Middle East, Southern Europe, and Northern Africa. Fifteen to 30% are in haplogroup E1b1b, (or E-M35) and its sub-haplogroups. Note that J1e is the haplogroup for the majority of Cohanim and R1a1 is that of about half of all Levites.. My own family has T1 (Phoenician), a E1a1 (from Timbuktu), and he more usual Cohanim J1e

The Europedia website can tell you more about your specific haplogroups. Their URL is in the handout under the J1 haplogroup

[Y matches slide]

The recommended testing company for Y testing is Family Tree DNA

They will give you a haplogroup but the focus is the STR testing which is the one that tells you if you are related to another male in a genealogical time frame. A match with only one or two differences is usually within a few hundred years. Many have used this test to break brick walls, myself included or to investigate a surname. An example, your surname is Kauffman and the guy next to you at work is also a Kauffman. Do you have a common male ancestor? Now you can find out!

[slide of Y colorized results]

FtDNA has various projects you can join by surnames, localities, and haplogroups for both Y and

mtDNA results. This example is for the Jewish E hapogroup for the Y. When you join a project you get to see your results compared against other project members in a nice colorized chart. The places that are colored are the spots are those that are different from the norm.

[mtDNA slide]

I have not discussed mtDNA because it changes so slowly that it is not usually useful for genealogy. It is interesting for knowing more about your deep ancestry. K1a9 and N1b2 are the two Ashkenazi maternal lineages which trace back to the near East but the others look to be European in origin. A 2010 paper claimed 40% came from 4 founding mothers, three of K lineage and one N1b

In genealogy it can disprove a maternal line but not prove one.

[slide of 4 generation DNA from Angie Bush]

The latest and greatest advance in personal genome testing is autosomal testing.

Those first 22 pairs of chromosomes get recombined by your parents so that they each give you a single chromosome, their half of each pair, which is a mix of the two they got from their parents. As DNA is passed down through the generations it gets more and more mixed.

This chart is a real image showing where a specific person's DNA came from. This is the family of a genetic genealogist who was able to test four generations of her family. We each get 50% from each parent except boys who get slightly more from Mom since the X is so much bigger than the Y. But we may not actually get 25% from each grandparent. Personally I know that I got 28% from my jewish grandfather while my brother only got 21%.

If you can test lots of close family perhaps you too can produce this chart. What else can you do with your test result?

[slide of admixtures]

Another thing you can do with your DNA results is look at your ancestry composition. These pictures are of an person who shows as 98% Ashkenazi at 23andme.com. Look at the different breakouts these calculators at GEDmatch produce. Predicting ancestral mixtures is still a fairly new science and far from accurate. The Jtest calculator is useful for someone who thinks they might have some jewish ancestry but is less useful for those of us who know we have it. For example my Jtest shows 12% ashkenazi at GEDmatch but 28% at 23andme.com. Some of that middle eaat and Mediterranean is actually Ashkenazi. The testing companies are typically looking further back in time than the calculators at GEDmatch which tend to be based on recent self reported ancestry

{Elizabeth photo]

The big question is can DNA find lost relatives. How many of you know all your first cousins? 2nd cousins? 3rd cousins? Most non-genealogists know their first cousins and some of their seconds but by the third cousins they lose track unless they are in the same town.

The Holocaust separated many a family who thought all their relatives had died only to rediscover them with DNA. This photo is the g-grandmother of a friends husband. It was obtained from a 3rd cousin

found with DNA. I have a number of links to success stories in the handout.

{slide with my family statistics]

But in all honesty for every success story, there are far more people who appear to be related in the DNA but the relationship cannot be found. The reason is that Ashkenazim share enough DNA with each other to all look like at least 5th cousins to each other if not closer.

There are several reasons for that. The latest research is that Ashkenazim are descended from around 350 people in about 1300 AD. Add to that many cousin marriages and you get a lot of shared DNA. This amount of endogamy has also lead to a number of genetic diseases. Fortunately they can be tested for these days.

So look at how many 2nd and 3rd cousins my ashkenazi husband has by comparison to me or my non ashkenazi Dad. Since my love knows very little about his family tree, some of those folk could be real 3rd cousins but I suspect they are more distant. Those I have been in touch with do not seem to share any surnames or locations with my husband. But I have not worked vigorously with his DNA.

[slide of FF accuracy]
How useful is DNA testing for jewish genealogy?

A wonderful scholarly paper was published in Avotaynu and is now online did some serious research into this problem and here are the accuracy numbers they came up with. Notice how the accuracy drops off for Ashkenzim at 2nd/3rd cousin. I have a link to that paper on my blog and in the handout

Endogamy can make relationships look closer. On my Norwegian side my Dad had a predicted 2nd/3rd cousin who turned out to be a 5th cousin twice and a 6th cousin once. So lots of DNA got doubled up. I suspect that is what is happening on the jewish side but most of our trees are not deep enough to find that.

Basically in autosomal DNA, the closer the relationship, the more accurate the prediction. So if you start working with your DNA results my advice is ignore the matches that do not start with at least 2nd cousin. Share names and locations and do not get discouraged when you find nothing in common. Move on to the next match. Another strategy is to search for surnames and localities that match yours. I actually found a 5th cousin on my jewish side at 23andme by searching on surnames.

[testing numbers]

So which company to test at? Many bloggers have opinions and there are links to those from my DNA page and from the ISOGG wiki. ISOGG is the International Society Of Genetic Genealogists and the keep lots of current information in that wiki. Note that the statistics quoted on this slide are from the ISOGG page comparing DNA testing companies.

Here are some statistics from the three testing companies

A quick overview for Jewish genealogists is that if you want to know if you carry harmful genes are other health results, then test at 23andme. While they cannot give you your health results due to an issue with the FDA, they do test those SNPs. Thus you can upload the raw data to other web sites like

Promethease.com to get your health information. They also have the largest database at the moment, although ancestry may well overtake them soon

If you want to do a family project or do Y DNA testing, then test at Family Tree DNA. It has excellent tools for autosomal DNA and is the only place to do Y.

Ancestry.com has attempted to dumb down DNA testing and they do a great job of matching family trees and DNA for you but you have to upload your data elsewhere to see the actual places on the chromosome where you match.

[slide of relationships]

ISOGG (the International Society Of Genetic Genealogy) has a wonderful resource, a wiki, with many DNA testing definitions and explanations. This chart of relationships is from that wiki. The amount of shared DNA is very useful but because of endogamy start doubling those numbers at about the third cousin level when working with jewish DNA.

Working with DNA testing presents unique challenges to the Jewish genealogical community due to the close relatedness of their DNA and the fact that many lack deep family trees. If you do not know who your gg-grandparents were it is hard to determine if you are really 3rd cousins.