

V15. Genealogical DNA Testing for Beginners

by: Kelli Bergheimer

What is consumer-to-direct DNA testing?

Kelli Bergheimer
kbergheimer@gmail.com

Cautionary tale

- Can you handle the results?

DNA is part of the story

DNA is only part of the story
Still need genealogical research
Still need to learn the culture and stories of lives of people
Still need records and photos and documents

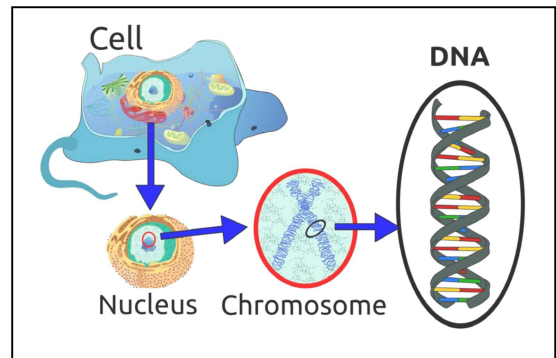
What do we know about DNA?

Offspring looks like parents
We know there are inherited traits

What is the human genome?

Think of a blueprint
The Human Genome Project

- In 1990 scientists set out to map all of the Human Genome—sequencing and mapping genes. Completed in 2003.



What was the goal?

- Find the complete sequence of about 3 billion base pairs in humans
- Identify the 20,000-25,000 genes in humans
- Find the complete sequence of many other species
- Identify genes that are critical for life
- Identify functions of particular genes

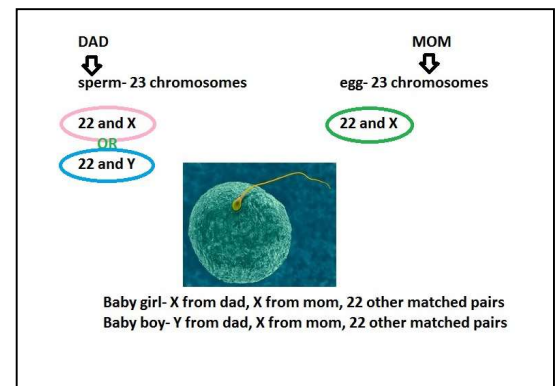
What is DNA?

DNA strands are made of base pairs.

How do we get our DNA?

During sexual reproduction, the egg contains the mitochondrial DNA and the sperm does not.

How do we inherit 23 pairs of chromosomes?



How are you a match with someone else?

- **Each location tested is called a SNP**– single-nucleotide polymorphism (a change at a single point in the genetic code).
- Sites in the genome where the **DNA sequences of many individuals vary by a single base** are called single nucleotide polymorphisms.
- Where two individuals share in common a number of **consecutive SNPs**, it can be *projected* that they share a segment of DNA at that part of their genomes.
- If the segment is longer than a **threshold amount** set by the testing company, then these two individuals are considered to be a match.

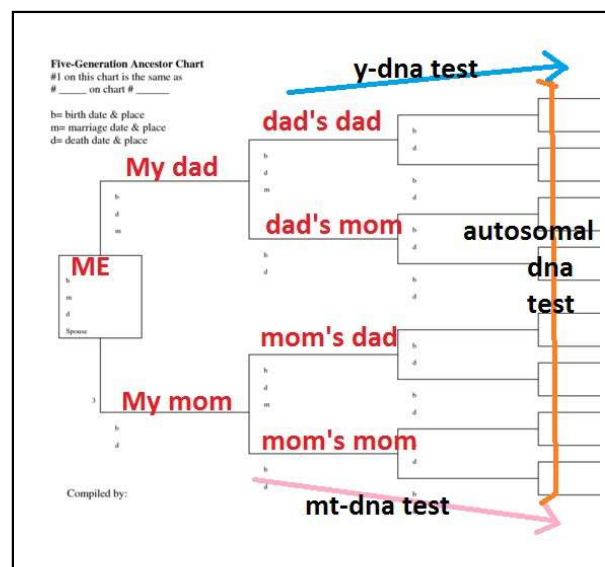
3 kinds of Genealogical DNA tests

Which test tests which DNA?

Y-DNA Test

Y-DNA (only men have y-DNA)

Tests the male line only – sometimes called surname line
Y-chromosome passed on from grandfather to father to son
Y-DNA remains unchanged for tens of thousands of years
Y-DNA has about 58 million base pairs



Mitochondrial DNA Test

MT-DNA (everyone has mt-DNA from their mother)
Tests the mother's DNA from grandmother to mother to daughter
Mitochondrial DNA remains unchanged for tens of thousands of years
Mitochondrial DNA has about 16,569 base pairs

Autosomal DNA Test

AT-DNA (a small sample of each of the other 22 pairs of chromosomes)
Approximately 700,000 locations are tested of the 3.2 billion base pairs

How many Ancestors are we talking about?

Name of Generation	Numbers	Year	
self	1	1950	
parents	2	1920	50% from each
grandparents	4	1890	25% from each
great-grandparents	8	1860	12.5% from each
2 nd great-grandparents	16	1830	6.25% from each
3 rd great-grandparents	32	1800	3.125% from each
4 th great-grandparents	64	1770	1.5625% from each
approximate autosomal accuracy line			
5 th great-grandparents	128	1740	Matches in this range might be difficult to figure out. Most people don't have trees accurate back this far.
6 th great-grandparents	256	1710	

How are those relationships determined in Ancestry? What do percentages mean?

Relationship chart based on shared percentage of DNA:

Relationship to ME	Approximate Shared Percentage of DNA	Others Sharing Approximately the Same Percentage of DNA
Parent	50%	Full sibling Son Daughter
Grandparent	25%	Half sibling Niece Nephew Aunt Uncle Grandson Granddaughter
Great Grandparent	12.5%	Grandniece Grandnephew Great aunt Great uncle First cousin
2 nd Great Grandparent	6.25%	Great grand aunt Great grand uncle First cousin 1R
3 rd Great Grandparent	3.125%	Second cousin First cousin 1R
4 th Great Grandparent	1.5625%	Second cousin 1R

Learn More- ISOGG

<http://isogg.org/>

Learn More at a DIG group: Genetics, Genealogy, and You
YouTube channel:

<https://www.youtube.com/channel/UCvNrudGjNxizeNCG-1abajQ/video>