Starting Out with DNA: Using DNA to Expand Your Family Tree

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Are you curious about your roots, but feel overwhelmed by the complex world of genetics? More importantly, are you looking to prove your familytree or discover an unknown ancestor? DNA can help you do both.

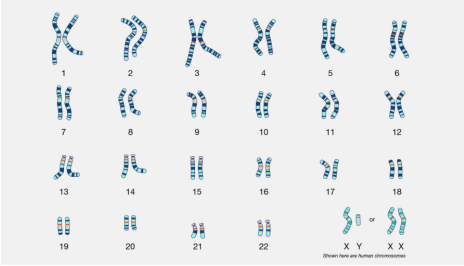
What is DNA

DNA, an acronym for deoxyribonucleic acid, is the material in our cells that carries genetic information. This determines an organism's biological features and is passed from an individual to its offspring.

This is useful for family history because it allows us to compare our DNA with others who have already been tested. The more similar our DNA is to another person's DNA the closer we are related. Your DNA research is totally dependent on who else has tested.

Types of Human DNA

Our DNA is found in all our cells except our red blood cells. The typical person has 23 pairs of nuclear chromosomes for a total of 46. Of these, 22 pairs are called autosomal chromosomes and 1 pair are the sex chromosomes. These strands or sets of chromosomes come one from your mother and one from your father.



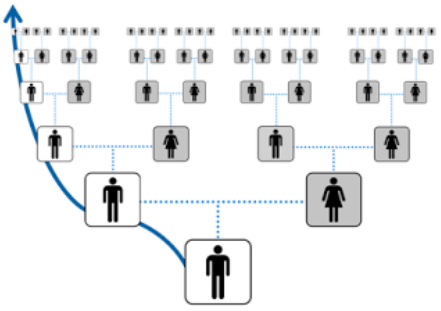
https://www.genome.gov/genetics-glossary/Karyotype

There are two types of sex chromosomes, X and Y. Biological men have 1 X and 1 Y chromosome. Biological women have 2 X chromosomes.

Mitochondrial DNA (mtDNA) is found outside the cell's nucleus in the Mitochondria. It is passed from the mother to all of her children.

YDNA Testing

YDNA is a paternal test. It tells you about your father's, father's, father's line. Because of this, it is frequently called a surname test. Only males can take a YDNA test. Women will have to get a brother, father, paternal grandfather, uncle, or paternal male cousin with the surname line you want to research to take the test.



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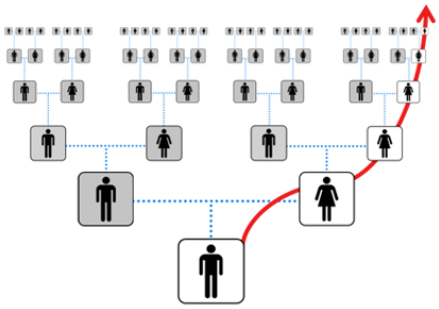
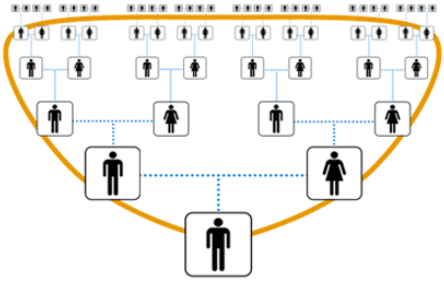
mtDNA Testing



mtDNA or mitochondrial DNA is a maternal test. It tells you about your mother's, mother's, mother's line. Because of this, the surnames will usually change with each generation. Mothers pass their mitochondrial DNA on to both their sons and daughters but sons do not pass on their mother's mitochondrial DNA to their children. Anyone can take a mtDNA test.

Autosomal DNA - atDNA also called a Family Finder test or Relative Finder



Autosomal DNA can potentially find information on all the people in your family tree back, reliably, about five or six generations. Autosomes are the 22 pairs of chromosomes we inherit from our parents. In addition there are two sex chromosomes. Females have two X-chromosomes and males have one X-chromosome and a Y-chromosome. You receive about 50% of your atDNA from each of your parents but it is not the same 50% as your siblings receive. You will get about 25% of your atDNA from each grandparent and 12.5% from each great-grandparent. Anyone can take an atDNA test.

Who sells these tests? Ancestry DNA — FamilyTree DNA — 23 and Me — MyHeritage DNA — Living DNA are the main testers

Who should you choose?
Largest Database — Ancestry DNA
Focus outside of the US — MyHeritage DNA
UK based — Living DNA
Best Tools — Ancestry DNA and MyHeritage
Trees — Ancestry DNA — MyHeritage
Y DNA and mtDNA —FamilyTree DNA

Who should you test? Test your oldest relatives first and then as many relatives as you can afford.

What test should you take?

- If you are a male and looking for an unknown father or grandfather along your paternal line — YDNA
- If you have a specific question about a maternal ancestor — was Jane Smith, your great grandmother on your maternal line, the sister of Susan Smith — mtDNA
- Use Autosomal DNA to find unknown ancestors back to 3X great grandparents
- To prove your pedigree — Autosomal DNA

Ethnicity Estimates

- Differ by company and over time.
- Based on the company's base population or reference group
- Shows your ethnicity from 100-500 years ago
- As more people are added to the reference group and as technology gets better — estimates change
- Ethnicity by continent is most accurate.

Shared DNA

Shared DNA estimates are a range. You do not inherit exactly 50% of your DNA from each parent. It may be 49% to 52% or somwewhere inbetween. Full siblings can share a range of 2,200 to 3,384 cM with each other. These numbers will vary by testing company.

#	Relationship	DNA Inherited	Est. cMs Shared	Cousins	Shared DNA avg
1	You	100.0%			
2	Parents	50.0%	3486	Siblings	50%-2550 cM
4	Grandparents	25.0%	1754	1	14.4%-850 cM
8	Great Grandparents	12.5%	887	2	3.4%-213 cM
16	2nd Great Grandparents	6.3%		3	.8%-53 cM
32	3rd Great Grandparents	3.2%		4	.27%-13cM
64	4th Great Grandparents	1.6%		5	.1%-25cM
128	5th Great Grandparents	0.8%		6	.01%-18cM
256	6th Great Grandparents	0.4%		7	<.01% varies
512	7th Great Grandparents	0.2%		8	<.01% varies
1024	8th Great Grandparents	0.1%		9	<.01% varies

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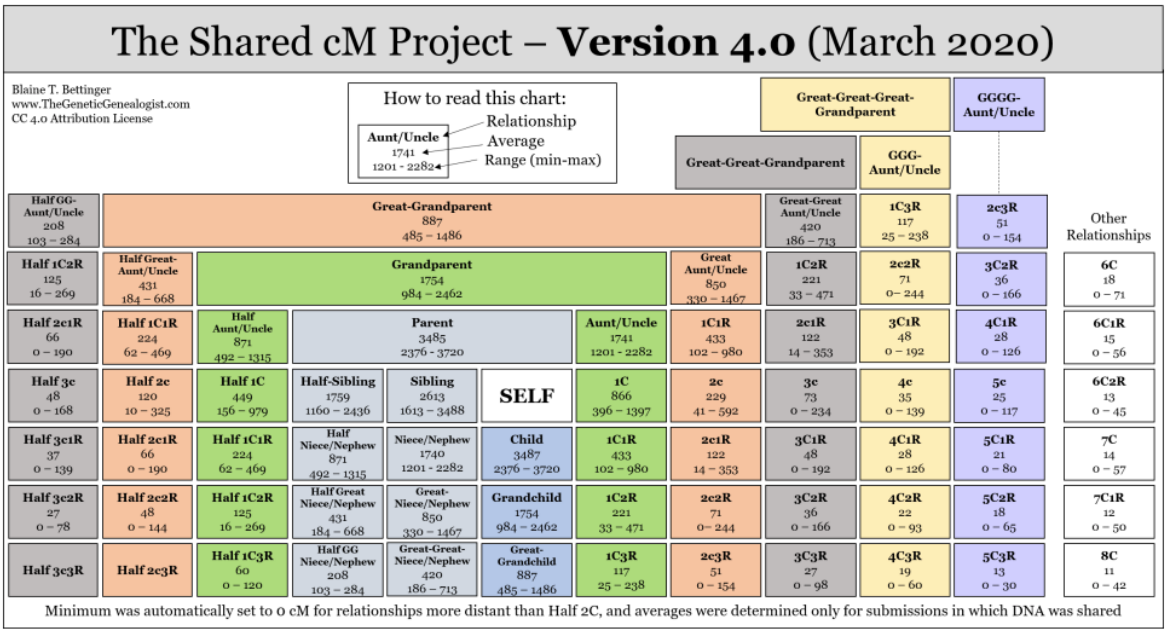
The Shared cM Project – Version 4.0 (March 2020)

The Relationship Chart



NOTE: for this and other charts or diagrams in this document, the minimum was automatically set to "0 cM" for relationships more distant than Half 2C, and averages were determined only for relationships in which DNA was shared.

Shared matches — What each company provides

FamilyTreeDNA - Family Finder Matches

Matches Name
Ancestral Surnames
Haplogroup
Relationship Range
Shared DNA
Longest Block
X-Match

Once you have a match you can find the matches you share with that match. FamilyTree DNA also allows chromosome mapping.

23andMe - DNA Relatives

Name
Birth Year
Location
Predicted Relationship – Common ancestor
Shared DNA as a percent
Family Background
Ancestry Composition Comparison
Haplogroups
Relatives in Common

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MyHeritage - DNA Relatives

- Testers name
- Probable relationship and possible relationships
- Age range of match
- Contact tester or manager
- Shared DNA as % and cM
- Shared segments
- Largest segment
- Shared matches (can sort by closest match to your shared match)
- Chromosome Browser

Theory of Family Relativity – shows a theory of how you and a match are related.

AutoClusters – an automated tool that organizes your matches into clusters that likely descend from common ancestors.

Chromosome Browser – compare up to 7 DNA matches to find triangulated segments. These are segments that you and at least two other DNA testers match suggesting a shared common ancestor.

Ancestry - DNA Matches

Matches -

- Name
- Predicted Relationship
- Paterenal/maternal side
- Common ancestor – if available
- Shared DNA as cM - # segments
- Your matches tree if provided
- Contact link through Ancestry messages
- Create and assign to groups
- Notes

Thrulines – Shows how you may be related to your DNA matches through ancestors you share. Thrulines uses trees linked to your matches to compare with your tree.

You need to have a tree to use this feature effectively, although Ancestry will create a theoretical tree with potential ancestors using other trees

Sort by Paternal/Maternal sides — Sort by ancestor — Search by location

Ancestry Pro Tools– additional charge

- Cluster matches
- Create custom clusters
- Add sidekicks to clusters
- Enhanced Share Matches – Compare DNA of common matches
- Identify a mystery match throu shared DNA
- Sort DNA by yourself or your match
- Tree checker
- Smart filters
- Tree mapper – Search for answers by location of events
- Additional Charts and reports

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Recommended Resources