A GUIDE TO DNA TESTING FOR GENEALOGISTS

Cass County Public Library, Genealogy Branch

GETTING STARTED

Before you take the test

- Be prepared for surprises in your results
    - Also be prepared for no surprises – sometimes there are no dramatic reveals
- Treat DNA testing is an addition to, not a replacement for, traditional research
- Determine which type of test you want to take and which test provider to use
- Have a *basic understanding* of genetics and inheritance
- Have a *thorough understanding* of the contract

Understand the agreement you are entering into with the provider:

- It is different for each provider
- It is often a license agreement
    - Meaning you retain ownership of your sample, but grant the company license to store and potentially use it for other purposes depending on your consent settings
- If they keep your sample in storage it can enable upgrades in your results and services
- Determine any privacy concerns or ongoing issues the provider may have – *do your research*

WHAT DNA TESTS CAN – AND CANNOT – TELL YOU

The Limitations of DNA Testing

- These estimates are less certain than the providers imply
- We don't know which DNA came from which parent
- Reference panels may not be as diverse and comprehensive as desired

It can be used incorrectly to imply there are genetic, scientific distinctions between races — there aren't

- All humans have DNA that is 99.9% identical
- The other .1% are tiny variations called "single nucleotide polymorphisms" or SNPs ("snips")

Reference Panels do not contain samples that represent historical populations

    - i.e. We do not have "pure" DNA samples from 11th century Anglo-Saxons of Northwestern Europe pre-Norman Conquest
- Instead, they use DNA samples from people with a long family history in one place or within one group
- In diverse populations, ethnic groups may historically intermarried
    - Meaning there is no discernable "pure" ethnic genetic sample to compare with
- It's easier to distinguish genetic samples between continents than modern countries
    - i.e. distinguishing between DNA from Europe and DNA from Africa is easier than DNA from France and Germany

Separate ethnic groups may share the same mutation

- DNA testing can only make educated guesses about which group you got it from
- The quality of the analysis process the test provider uses can affect how accurate that guess is
- Also, it may be difficult to determine if a mutation is the result of inheritance or randomly occurring

Companies often oversell how large, diverse, and robust their reference panel is

- They may claim to have a certain number of countries or regions represented – how many individual samples from each do they have?
    - Reference panels tend to skew toward European samples and have less samples from non-European populations

- You can view their reference panel ethnic group distribution before purchase (*though they don't make it easy to find*)

Where the reference panel samples come from?

- Human Genome Diversity Project (HGDP)
- 1000 Genomes Project
- A proprietary AncestryDNA reference collection
- AncestryDNA samples from customers
- Collaborations with academic researchers
- 23andMe samples from customers with four grandparents from the same location
- GeneByGene DNA customer database
- International HapMap Project

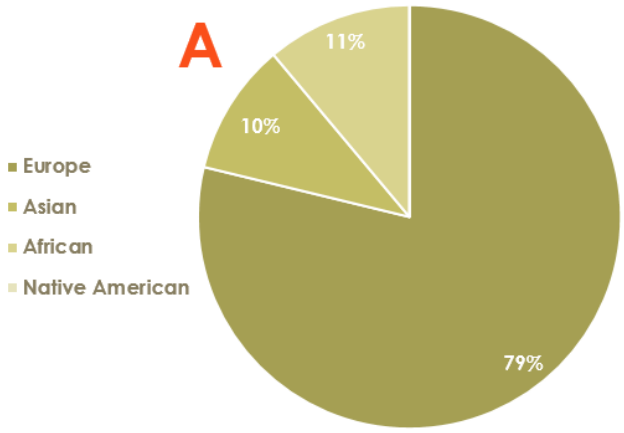
Accurate vs. Specific

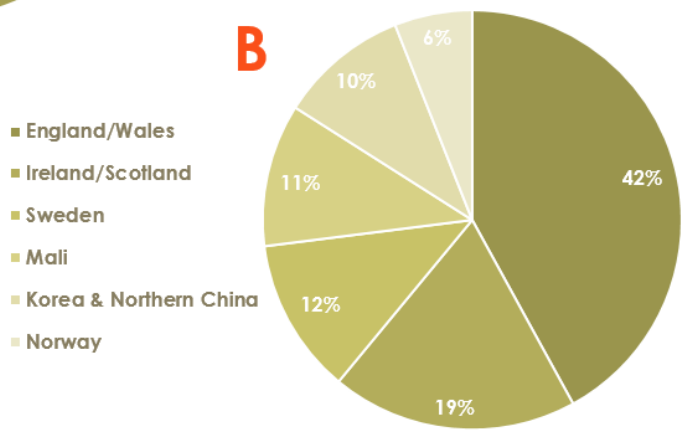
- Just because your results are more specific, does not mean they are more accurate
  - Experiment with the "confidence" sliders
- Broader categories are more accurate
- It's easier to distinguish genetic samples between continents than modern countries
  - *i.e. distinguishing between DNA from Europe and DNA from Africa is easier than DNA from France and Germany*

Known Accuracy Problems

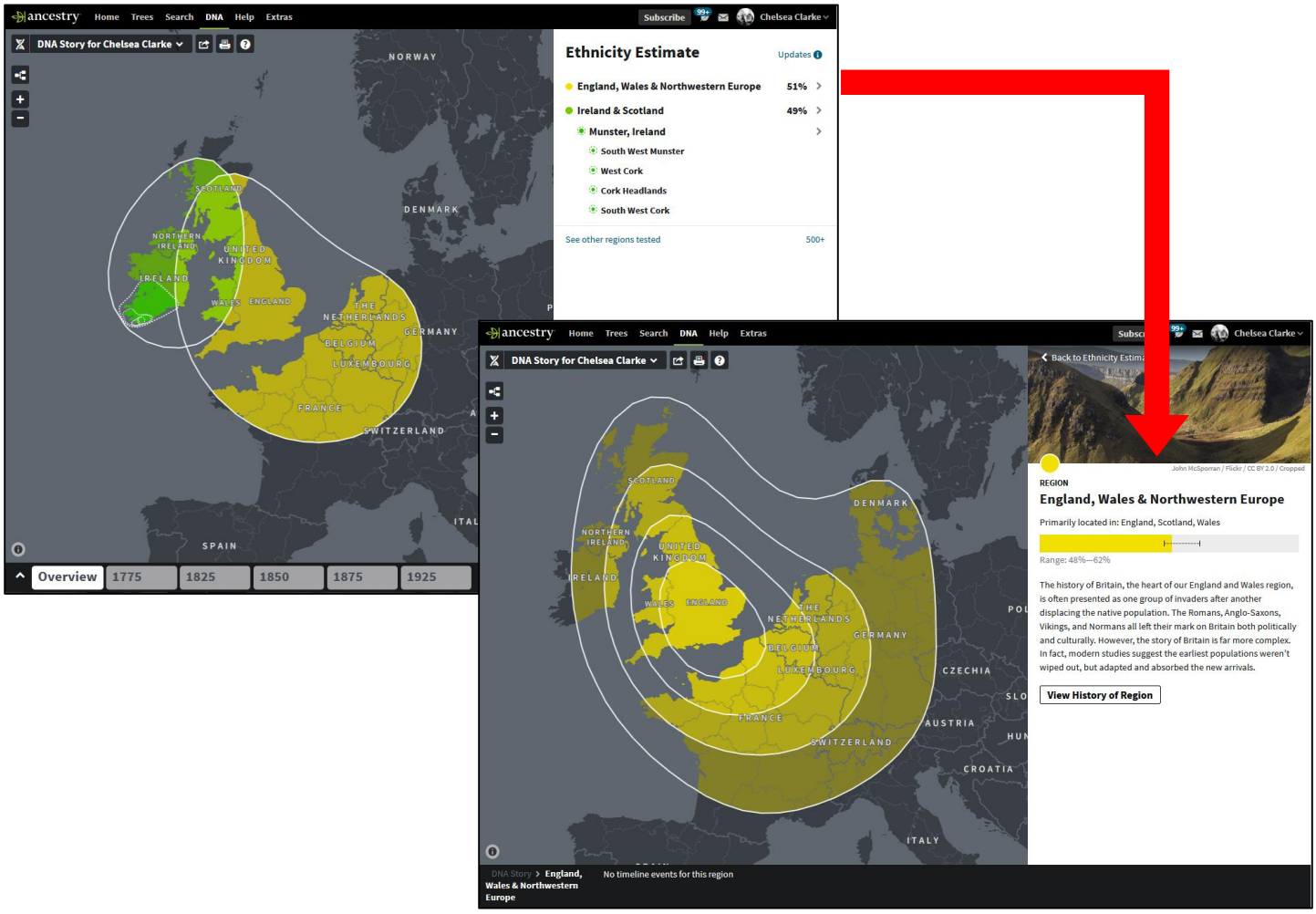
- Almost every company consistently *overestimates the amount of European ancestry*
  - *Specifically overestimating English ancestry for people with ancestors from Northwest Europe*
- AncestryDNA often overestimates Scandinavian ancestry for the British Isles
- 23andMe sets your results at 50% (speculative) certainty by default without making that clear

Example: *Despite being less specific, Result A is technically more accurate than Result B.*

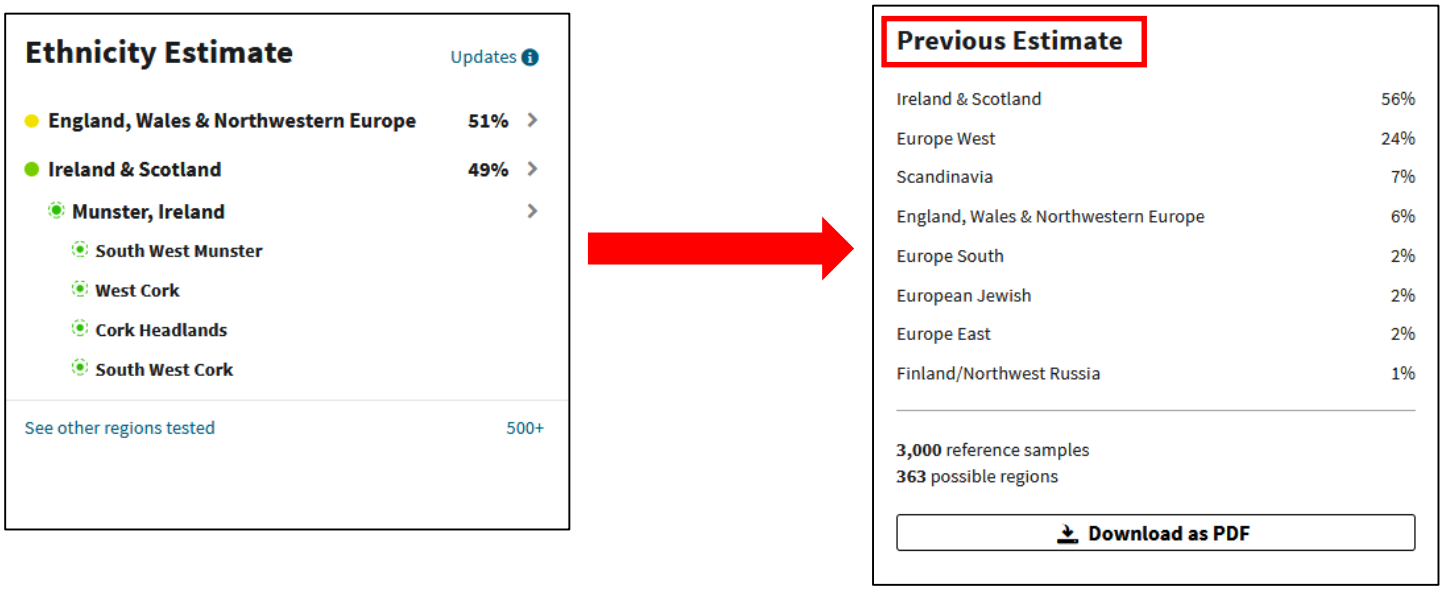




Example: *These tests have a margin of error, but providers often hide or downplay that. On AncestryDNA, clicking on an individual ethnic group opens up a second window that shows a range of possible results. Here 51% becomes anywhere from 48%–62% and the area of coverage widens.*



Example: *As the reference panel grows and the provider updates its algorithm, your results may change, sometimes quite drastically.*



How to Approach These Limitations

- *Negative:* "genetic astrology" **or** *Positive:* "genetic gossip"
- *Negative:* Poorly Executed and Misunderstood Genetic Science **or** *Positive:* New and Unique Field of Sociology
- Consider it yet another tool in your genealogy tool kit, *not the only tool*

Limitations for Native American DNA Testing

- Fear of DNA testing (outside authority) being used to invalidate tribal citizenship and protections
  - "Who is defining what it means to *be Native American*?"
- Complex, problematic history with outside groups that causes distrust
  - Which has effected the ability to create reference panels
  - Most companies draw heavily upon DNA samples collected from South American native populations
- DNA testing is not the best means of determining Native American ancestry
  - Traditional research and substantiated, record-based evidence is always better
- Ask yourself:
  - What are my goals?
  - How do I plan to use the results?
  - Am I trying to pursue tribal citizenship?

Tips for Adoption Research

- Matching features can help connect you to biological relatives
- If you're looking for relatives, select a provider with a large pool of users for cousin matching
- Be careful when contacting those relatives through these databases

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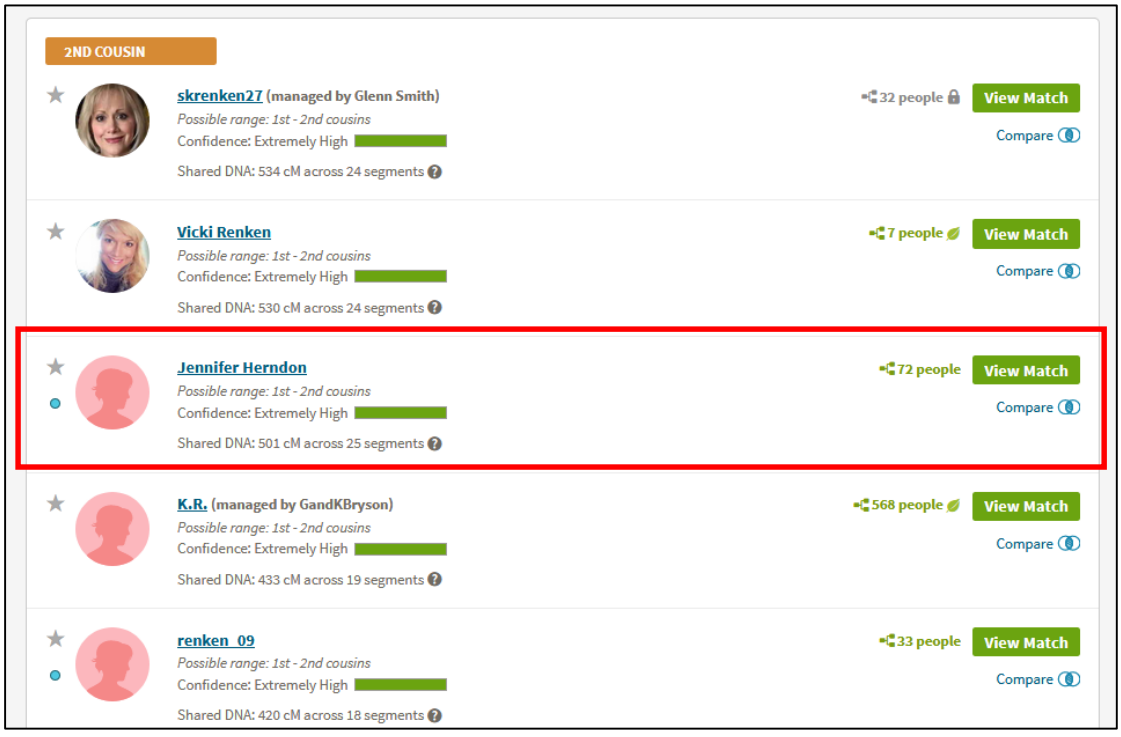
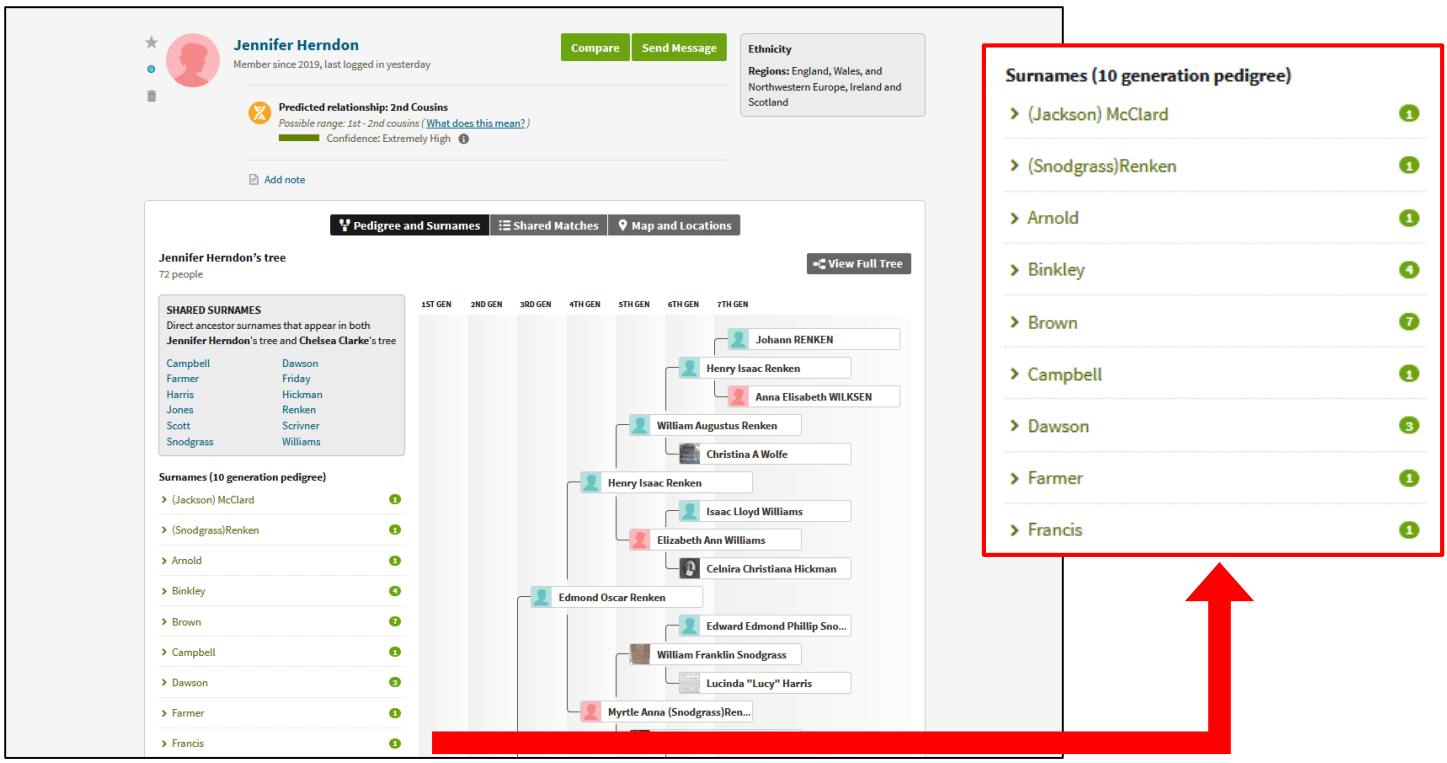
The Benefits of DNA Testing

- Ethnicity **Estimates***
- Cousin Matching
- *Limited** Health Information
- If you have little to no information about your background, this can be a good starting place to find leads

Example: *Use Cousin Matching features to get in touch with relatives who are researching the same lines as you and may have information to share. These matching features may also help expand your understanding of connected surnames, family trees, and new lines to look into.*



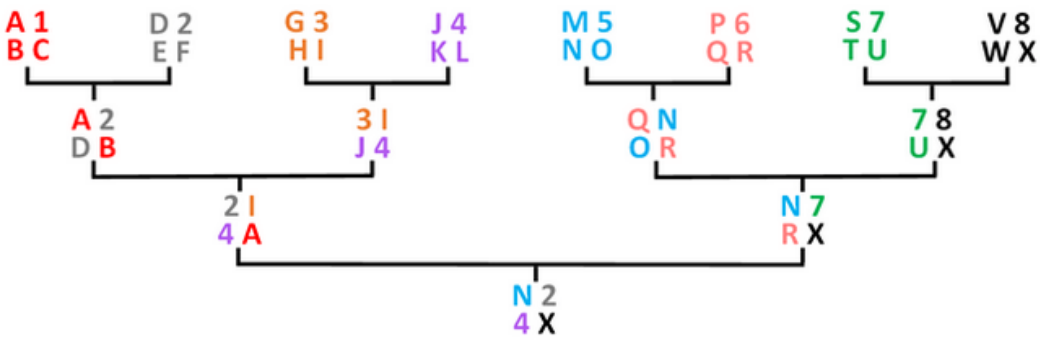


BASIC GENETICS FOR GENEALOGISTS

How DNA is Inherited

- A **gene** is a segment of DNA that determines individual characteristics (such as height and hair color).
  - Humans have about 20,000 genes.
- Genes are passed between generations in the form of **chromosomes**.
  - Each chromosome contains hundreds to thousands of genes.
- People typically have 23 pairs of chromosomes, **with one chromosome in each pair coming from the father and one coming from the mother.**
  - *Because people usually have 46 chromosomes and only 23 are passed on to a child,* ***half of the parent's chromosomes are not passed on to his or her child.***
- ***During the biological processes that result in the formation of the sperm and egg, DNA is randomly shuffled and recombined.***
  - *Over several generations, this results in that sperm and egg containing DNA from many different ancestors.*

Example*: If chromosomes were passed on without being altered in any way, inheritance would typically look like the chart below, with genes from some ancestors being completely lost within a couple of generations. [Though theoretically possible, this situation is extremely unlikely, due to the recombination process mentioned above.]*



How do these tests work?

- First, they map that unique 0.1% of your DNA
- Then they put your **Raw Data** into the company's customized, proprietary **algorithm**
- The genetic information from your sample is compared to the samples in the **reference panel**
    - This comparison test is typically done dozens of times to get an average of all the results
- Your sample is compared to all other samples provided by customers
    - Based on shared **centimorgans** and **SNPs**, you are then matched with relatives by degree of relation

What are SNPs?

"Single nucleotide polymorphisms" / "snips"

- Genetic "typos" when copying DNA; sometimes referred to as genetic "*variances*"
- Some SNPs can affect:
    - Appearance (height, complexion, etc.)
    - Susceptibility to responses to drugs (also alcohol flush)
    - Predisposition to certain diseases (i.e. Sickle cell anemia)
- Most SNPs have no observable effect
- Some SNPs are **associated** with physical traits and diseases
    - *But are not definitively linked as a cause*
- Children inherit SNPs from their parents
- The number of shared SNPs between two people can help determine how closely related they are

What are centimorgans?

- Centimorgans (cM) are the unit of measurement for *genetic linkage*
    - Measures probability of a crossover in recombination
- **Used to determine how closely related two people are**
    - The larger the amount of cM, the closer the relation
    - One centimorgan corresponds to about 1 million base pairs

Average autosomal DNA shared by pairs of relatives, in percentages and centiMorgans

% shared	Total cM shared half-identical (or better)	Relationship	Notes
100% (Method I)/50% (Method II)	3400.00	Identical twins (monozygotic twins)	Fully identical everywhere.[2]
50%	3400.00	Parent/child	Half-identical everywhere
50% (Method I)/37.5% (Method II)	2550.00	Full siblings	Half-identical on 50%/1700 cM and fully identical on a further 25%/850 cM.
25%	1700.00	Grandparent/grandchild, aunt-or-uncle/niece-or-nephew, half-siblings	
25% (Method I)/23.4375% (Method II)	1593.75	Double first cousins	Half-identical on 21.875%/1487.5 cM and fully identical on a further 1.5625%/106.25 cM
12.5%	850.00	First cousins, great-grandparent/great-grandchild, great-uncle or aunt/great-nephew or niece, half-uncle or aunt/half-nephew or niece	
6.25%	425.00	First cousins once removed, half first cousins, great-great-grandparent/great-great-grandchild, great-great-aunt/uncle, half great-aunt/uncle	
6.25%	425.00	Double second cousins	
3.125%	212.50	Second cousins, first cousins twice removed, half first cousin once removed, half great-great-aunt/uncle, great-great-great-grandparent/great-great-great-grandchild	
1.563%	106.25	Second cousins once removed, half second cousins, first cousin three times removed, half first cousin twice removed	
0.781%	53.13	Third cousins, second cousins twice removed	Up to 10% of third cousins will not share enough DNA to show up as match. See cousin statistics

How Sex Chromosome DNA Inheritance Works

Typically, each child gets one sex chromosome from each parent

- The most common arrangements of sex chromosomes are XX ("*female*") and XY ("*male*")
- However, there some individuals, like those with Klinefelter Syndrome, who inherited multiple sex chromosomes from a single parent (XXY) or have mosaic sex chromosomes

Mitochondrial DNA or mtDNA testing *traces your direct matrilineal line through the* ***X chromosome***

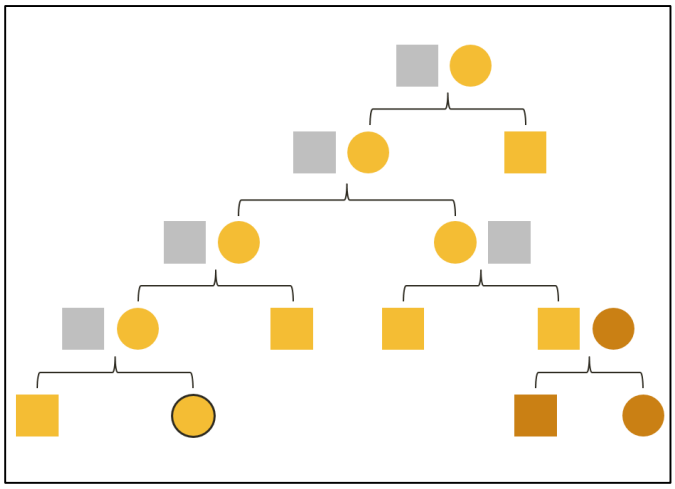
- This kind of DNA is passed down from mother to child (both male and female)
- Unlike other DNA, it does not change or recombine in any way
- This test shows which *haplogroup* [*see page 10 of this guide*] you belong to
- It can be taken by anyone with an X chromosome

Y-DNA testing *traces your direct patrilineal line through the* ***Y chromosome***

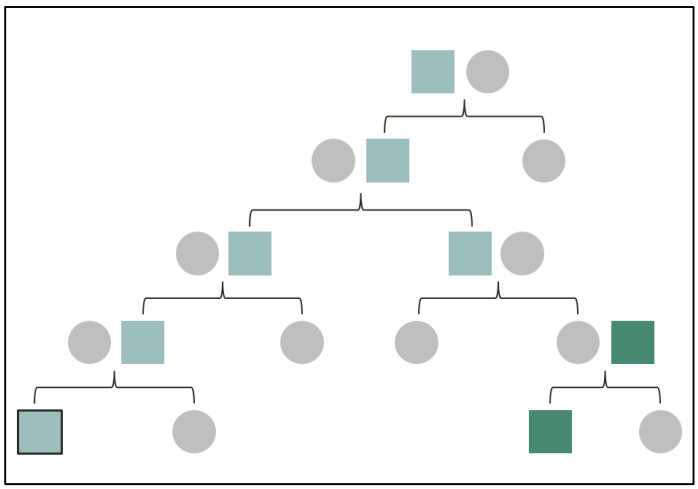
- This kind of DNA is passed down from father to son
- While this DNA does change slightly from generation to generation, it remains largely the same
- The amount of difference present in the Y chromosome DNA sample from an individual can help determine how distant the relation is between generations and most recent shared ancestor
- It can only be taken by individuals with a Y chromosome
- This test also provides a *haplogroup*, which will be different from the result of an mtDNA test

Example: *Below are diagrams showing how chromosomal DNA is inherited. Squares represent males and circles represent females.* ***The square or circle with the black border represents the individual whose DNA was tested.*** *The squares and circles with darker colors represent a different source of chromosomal DNA being introduced to this particular family group.*

mtDNA



Y-DNA



● **Female** ■ **Male**

Additional Information

- Explore the in-house learning centers and FAQs before analyzing your results
  - Most providers have a wide variety of helpful information regarding their testing process, using their features, and how to understand your results – take advantage of it
- *Why are my AncestryDNA results not what I expected?:* https://bit.ly/1TvfFE4
- *Unexpected Results (International Society of Genetic Genealogy):* *https://isogg.org/wiki/Unexpected_results*
- More on Mitochondrial DNA Testing: https://isogg.org/wiki/Mitochondrial_DNA_tests
- More on Y-DNA Testing: https://isogg.org/wiki/Y_chromosome_DNA_tests

Genetics and DNA Testing Learning Centers:

- AncestryDNA: www.ancestry.com/cs/dna-help/communities
- 23andMe: https://customercare.23andme.com/hc/en-us
- Family Tree DNA: www.familytreedna.com/learn

CHOOSING WHICH TEST TO TAKE

Questions to ask:

- How diverse and large is the reference panel and matching pool?
- Is a subscription fee required to access all the features and services?
- What is the privacy policy?
  - Do they keep my sample and genetic information?
  - Can I have it destroyed?
  - What is the Informed Consent policy?

Things to Consider

- Type of Test
- Test Provider
- Price (and potential sales)
- Size/Diversity of Reference Panel
- Size of Customer Pool (for matching)

Understand the agreement you are entering into:

- It varies by provider
- It is typically a license agreement
  - You retain ownership, but they have license to test
  - If they keep your sample in storage it can enable upgrades in your results and services as they are released
    - ***However, they may retain your genetic information (raw data) even after you request destruction of the original sample***
- *Read the Terms and Conditions, Privacy Policy, and Sample Retention Policy completely*

Types of DNA Test

- Autosomal
- Chromosomal
  - mtDNA
  - YDNA
- Health

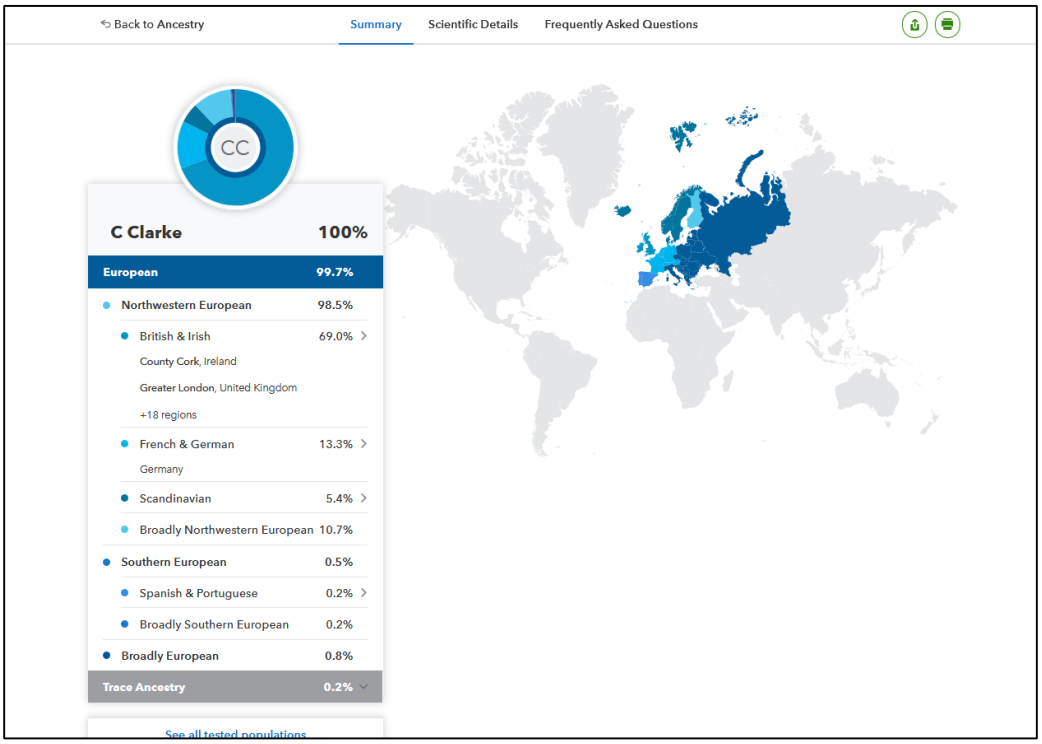
Autosomal Testing

- This will provide an ethnicity estimate
  - Usually broken down into percentages in a pie chart
- Your results depend on the diversity and accuracy of the *reference panel* used by the provider
  - This varies between providers, each has their own unique panel and analysis algorithms
- It can be beneficial to have your other immediate family members tested
  - Unless you are identical twins, your results will be different from your siblings' results
  - They may have inherited DNA that you did not

Trace Regions

- Your ethnicity estimate may also include "low confidence" or "trace" results
  - These are results that appeared inconsistently or in a small amount during testing
  - May or may not be accurate, consider how they might fit into your research
  - These can be used to inform research, but take them with a grain of salt until proven

Example: *23andMe Ancestry Report*



Chromosomal Testing

- Provides a *haplogroup*, not an ethnicity estimate
- Two options: Y-DNA and mtDNA *(see below)*
- Traces one line based on your sex chromosomes (X, Y)
- Not all DNA providers offer this test *[see chart on page 12]*
    - Some providers include it with basic test (23andMe) and others offer it as a separate add-on package (Family Tree DNA)

Chromosomal Familial Matching

- Separate from autosomal relative matching
- Can determine if two individuals are maternally/paternally descended from the same line
    - *But does not provide a specific degree of relation*

Y-DNA Test

- Follows the paternal line based on the Y-chromosome
- Can only be taken by men (or those with a Y chromosome)
- Uses mutations to estimate the most recent shared ancestor in matching with relatives
- Tends to be more expensive than mtDNA testing

*A chart of **Y-DNA population distribution** can be viewed here: https://bit.ly/2Kw3l8Z*

mtDNA Test

- Follows the maternal line based on the X-chromosome
- Can be taken by both women and men
- Haplogroup results vary between Y-DNA and mtDNA tests:
    - *Y-DNA Group H*: India, Sri Lanka, Nepal, Pakistan, Iran, Central Asia, and Arabia
    - *mtDNA Group H*: Europe

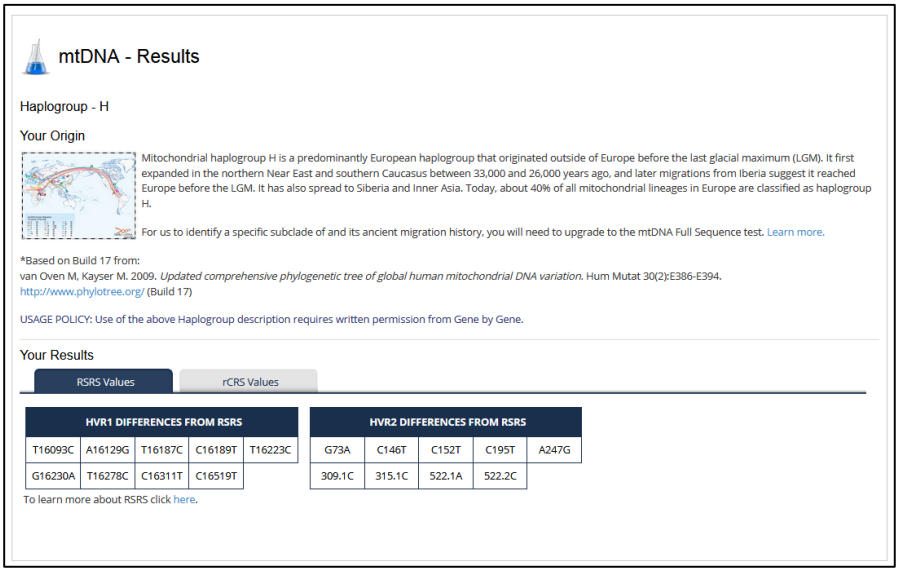
*A chart and map of **mtDNA population distribution** can be viewed here*: https://bit.ly/2WRiecu

Example: *Family Tree DNA mtDNA Haplogroup Results*

Haplogroup: *H*

(predominantly European – "40% of all mitochondrial lineages in Europe are classified as haplogroup H.")

Your genetic variances (SNPs) possessed by this haplogroup



mtDNA - Results

Haplogroup - H

Your Origin

Mitochondrial haplogroup H is a predominantly European haplogroup that originated outside of Europe before the last glacial maximum (LGM). It first expanded in the northern Near East and southern Caucasus between 33,000 and 26,000 years ago, and later migrations from Iberia suggest it reached Europe before the LGM. It has also spread to Siberia and Inner Asia. Today, about 40% of all mitochondrial lineages in Europe are classified as haplogroup H.

For us to identify a specific subclade of and its ancient migration history, you will need to upgrade to the mtDNA Full Sequence test. Learn more.

*Based on Build 17 from:
van Oven M, Kayser M. 2009. *Updated comprehensive phylogenetic tree of global human mitochondrial DNA variation.* Hum Mutat 30(2):E386-E394.
http://www.phylotree.org/ (Build 17)

USAGE POLICY: Use of the above Haplogroup description requires written permission from Gene by Gene.

Your Results

RSRS Values | rCRS Values

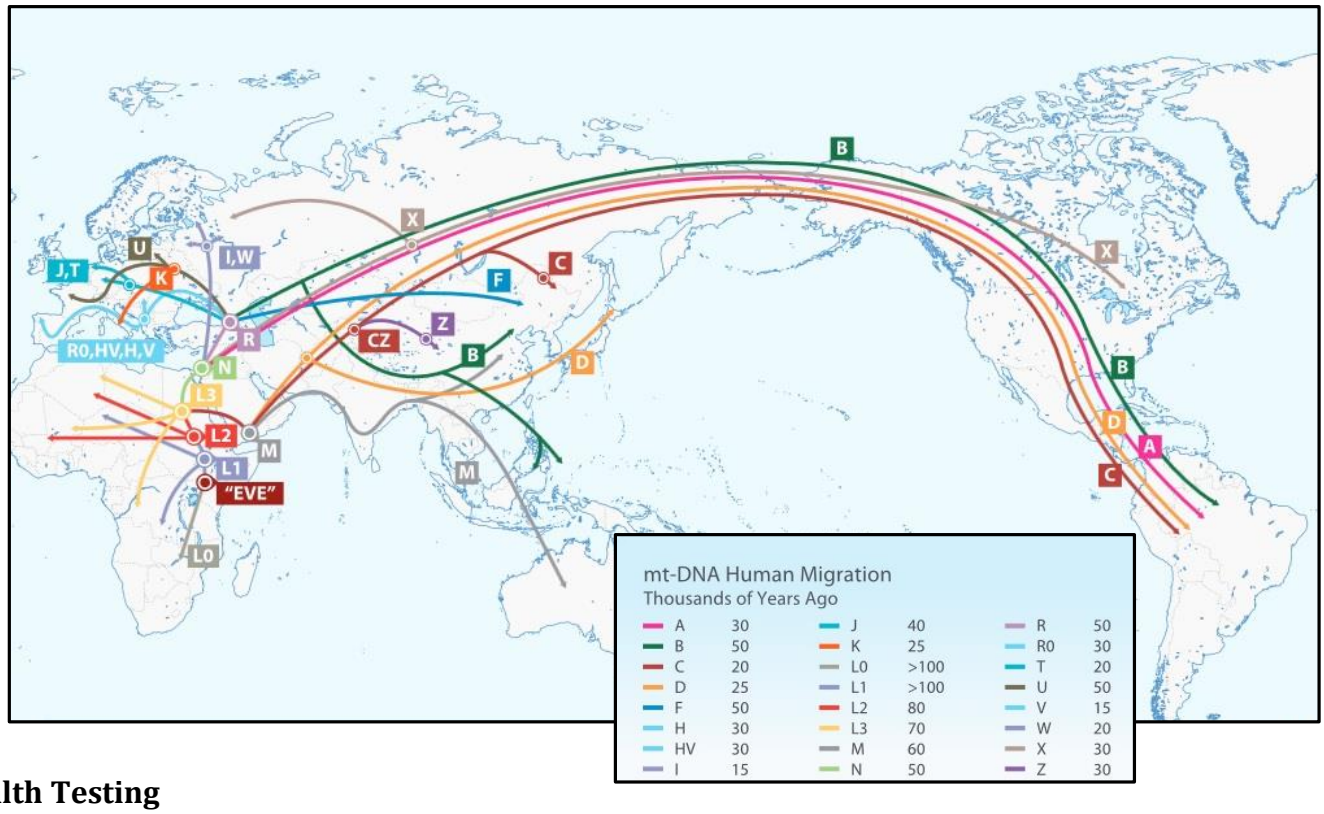
HVR1 DIFFERENCES FROM RSRS				
T16093C	A16129G	T16187C	C16189T	T16223C
G16230A	T16278C	C16311T	C16519T	

HVR2 DIFFERENCES FROM RSRS				
G73A	C146T	C152T	C195T	A247G
309.1C	315.1C	522.1A	522.2C	

To learn more about RSRS click here.

Haplogroups

- A haplogroup result pertains to a single line of descent
  - Unlike other DNA, mitochondrial DNA doesn't recombine (change) each generation
  - Most of Y chromosome does not change and the amount of change can determine shared ancestors
- Traces lineage back *tens of thousands of years*
  - Each haplogroup is assigned an uppercase letter, *i.e. H*
    - Sub-groups that are offshoots within each haplogroup have results with additional numbers and lowercase letters, *i.e. U5a1*
  - Follows migration patterns of unique populations that share specific genetic mutations
  - These mutations occurred tens of thousands of years ago
  - *Shared mutations by haplogroup list:* www.familytreedna.com/mtDNA-Haplogroup-Mutations.aspx



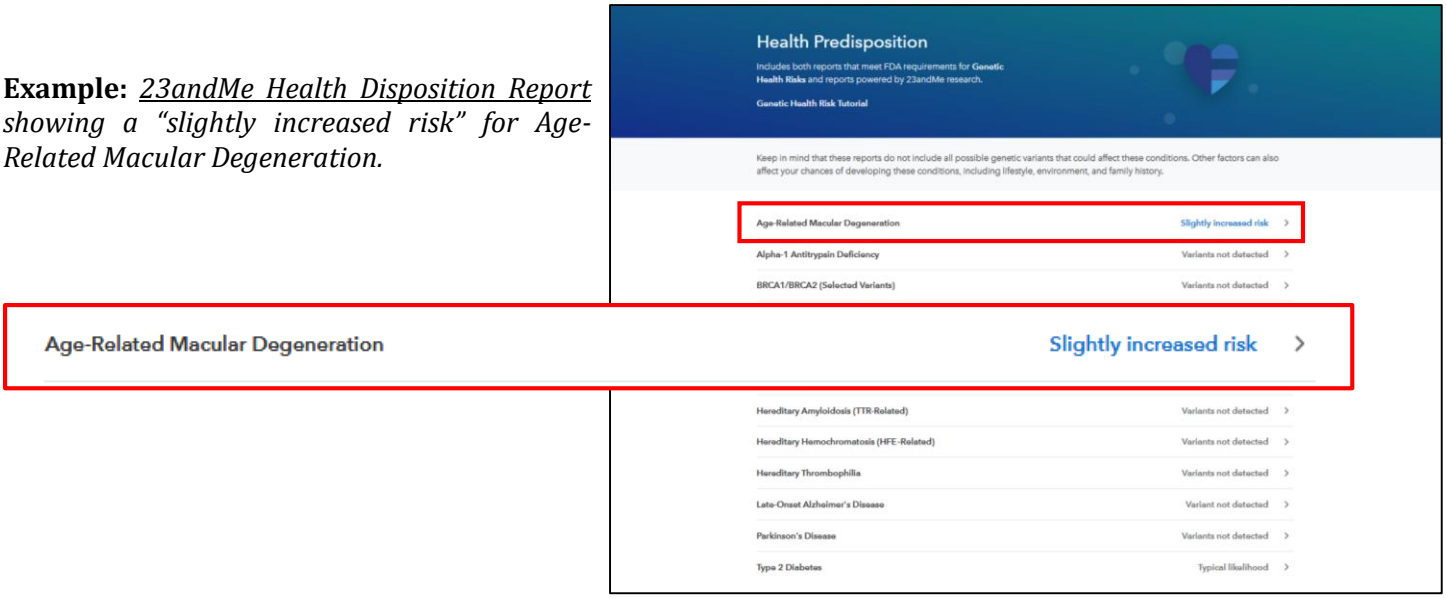
Health Testing

Health testing will typically use your genetic information to provide insight into:

- *Health Predisposition*

    - Due to your DNA, are you at increased risk of developing a particular condition, *i.e. the BRCA variant*
- *Carrier Status*
    - Do you carry any known genetic variants for a condition that may be passed on to your children and affect their health
- *Wellness*
    - How do your genes affect your body's response to diet, exercise, and sleep
- *Traits*
    - How do your genes affect your appearance and senses

Example: *23andMe Health Disposition Report showing a "slightly increased risk" for Age-Related Macular Degeneration.*



Lists of Genetic Risk and Carrier Status Tests by Provider:

- MyHeritageDNA: https://bit.ly/2WkWL7k
- AncestryDNA: https://ancstry.me/2QS9ixW
- 23andMe: https://bit.ly/31gfFzW

A review of DNA Health Test Providers, including 23andMe, published in Science News: https://bit.ly/2GVDJgh
What to Know Before Taking a DNA Health Test: https://bit.ly/2KBVt5V

NOTE: These genetic health tests are NOT a doctor and are not individually reviewed by a doctor. If you have health concerns, please consult your physician.

CHOOSING A TEST PROVIDER

Major Providers

- Ancestry DNA
- 23andMe
- Family Tree DNA
- MyHeritage DNA

If you only want to take the test once, or you are shopping for a provider on a budget, this chart may help you choose:

OVERALL DNA TEST PROVIDER COMPARISON			
Ancestry DNA	**23andMe**	**Family Tree DNA**	**MyHeritage DNA**
$99 Autosomal (*seasonal/holiday sale prices as low as $69*) **$20** (*add-on*) Traits	**$99** Autosomal & Mitochondrial **$199** +Health	**$69** Autosomal **$79-$199** mtDNA **$169-$359** Y-DNA **$536** Full Package	**$69** Autosomal **$199** +Health
Saliva Sample	Saliva Sample	Cheek Swab Sample	Cheek Swab Sample
Relative Matching	Relative Matching	Relative Matching	Relative Matching
15 Million Users	10 Million Users	~ 1 Million Users	2.5 Million Users
Family Tree Integration	No Family Trees	Family Tree Integration	Family Tree Integration
Some Privacy Concerns	Some Privacy Concerns	No Known Concerns	New, Unknown
No Additional Tests	Chromosomal and Health Testing	Chromosomal Tests	Health Testing
Sample kept indefinitely (*can be destroyed, consent revocable*)	Sample kept indefinitely (*can be destroyed, consent revocable*)	Sample kept 25 years (can be destroyed, consent revocable)	Sample kept indefinitely (*can be destroyed, consent revocable*)
No Raw Data Upload	No Raw Data Upload	Raw Data Upload (for a fee or as part of a package upgrade)	Raw Data Upload (free)
43 Regions in Panel	+1,000 Regions in Panel	24 Population Clusters in Panel	42 Ethnic Groups in Panel
6-8 weeks for results	6-8 weeks for results	6-8 weeks for results	3-4 weeks for results
Further fees required for some genealogy features	No Ongoing Fees	No Ongoing Fees	Further fees required for some genealogy features

International Society of Genetic Genealogy DNA Provider Comparison Chart: https://bit.ly/2KDcJaG

Other Providers and DNA Resources

- National Geographic Geno 2.0
  https://genographic.nationalgeographic.com
  - Based on genomic testing and research, ethnicity results are more general, but look further back in scope to your deep ancestry; connected to the Helix genome platform
- LivingDNA
  www.livingdna.com/en-us
  - Focused intensively on genetic ancestry of the British Isles

Third Party Databases

Uploading your raw data from DNA test providers to these databases may offer new insights into your health, wellness, and ethnicity, often for free – ***again, be sure to read the terms and conditions of each before using!***

- Promethease
  https://promethease.com
  - Upload raw data here for a $12 fee to receive a report of scientific studies and findings related to your unique genetic mutations
  - Reports provide information on genetic risk and carrier status
- GEDMatch, *free* (new resources, $10/month)
  www.gedmatch.com

    - Known for its use in catching the Golden State Killer and identifying unidentified bodies
    - Recent privacy changes – you now have to opt-in to have your DNA profile included in police searches
- GenomeLink, *free*
  https://genomelink.io
    - Provides reports on physical traits, personality, intelligence, nutrition, and sports based on your genetic information

USING YOUR RESULTS

Unexpected Results

Reasons you results may not match your research:

- Your ancestor was from an area but not ethnically of the population; or assimilation
- The area had a highly diverse population
- Due to recombination of DNA over generations, you did not inherit that distant ancestor's DNA
- You inherited so little it wasn't traceable

Getting the Most Out of Your Results

- Take advantage of relative matching features
    - Reach out to matches
- Find relatives, collaborate on research
- Connect your family tree when applicable
    - Comparing family trees can help your matches figure out how you are related with less frustration

Etiquette for Contacting Matches

- *Fill Out Your Profile*
    - Say who you are and which families you are researching
    - Add a photo to your profile
    - Appear welcoming and engaged
- *Be Concise and Specific*
    - Send an introductory message that is clear and gets right to the point
    - Don't dump all of your research on them at once
    - If you have a specific research question, make it clear
- *Offer to Team Up*
    - Nothing brings two genealogists together like a DNA match
    - Offer to share information
    - Join relevant groups, projects, or message forums
- *Don't be Pushy*
    - If they don't respond, don't be aggressive
    - People get busy and have to step away from their research
    - You aren't entitled to anything simply because you share DNA

Okay, Now What?

- Let the results inform your research, not dictate it
    - Revisit your previous work to see how the results fit in with or redirect your research
- Try another provider, compare results – get a "second opinion"
- Have your parents and siblings tested

PRIVACY CONCERNS

Privacy Concerns with DNA Testing and Test Providers

The information provided here is <u>not</u> intended to constitute legal advice. All information and resources provided are for general informational purposes only.

*It cannot be stressed enough how important it is to **<u>read the legal statements in their entirety</u>***

- Check their ***Terms and Condition*** *(sometimes called the Terms of Service)*, ***Privacy Policy***, and ***Informed Consent*** statements
    - Don't just scroll to the bottom and click accept
- The legal obligations of DNA companies are still largely uncharted terrain, make sure you know what protections you do — and do not — have in these contracts
    - These legal statements are often not easy to locate or get to on their websites, it helps to do a Google search for it instead, i.e. "*AncestryDNA Privacy Policy*"
- *You can agree to the first part (the Terms and Conditions of the DNA testing process) and not agree to the Informed Consent for research and still get your results*
    - ***You do not have to opt-in to research in order to get your results***
    - In the kit activation process, the Informed Consent is usually asked immediately after the general Terms and Condition and can be confusing – *<u>pay attention to what you are agreeing to</u>!*

Who is involved?

- Testing Providers
    - Privacy Policies
    - 3rd Party Research Opportunities
- 3rd Party Testing Databases
    - Public Databases (user-contribution)
        - i.e. GEDMatch

Privacy Concerns to Check for in DNA Agreements

- Who **owns** my genetic information?
- Who can **see** my genetic information?
- Who can **use** it?
    - **And how**?
- How much **control** do I have?

Things to Consider

- Privacy Risks
    - *What are the risks to my privacy?*
    - Common risks include: potential security breaches, lost or stolen samples, and learning information that may make you or your family uncomfortable
- Sample Retention
    - *How long do they keep it? What is their destruction policy?*
    - Common retention policy is: Contact customer service to request that your sample to be destroyed, but they are vague on whether or not they still keep your genetic information (particularly 23andMe).
- Research Consent
    - *How do I give consent? What does that entail? How do I revoke consent? What does that entail?*
    - Common issues here: If you initially consented, but later revoked consent for your genetic information to be included in research projects (or request that your sample be destroyed), your information cannot be removed from any studies that used your information prior to 30 days after your revocation or sample destruction request.

Research Projects

- Typically, agreeing to the Provider's Terms of Service is separate from consenting to participation in Research Projects
- You have to opt-in to Research Projects
    - Look for "Informed Consent" in account settings or kit activation agreements

AncestryDNA *Terms & Conditions: https://ancstry.me/2HZ8STK*
Privacy Policy: https://ancstry.me/2K180jV
Informed Consent: https://ancstry.me/2EUFg80

23andMe *Terms & Conditions: www.23andme.com/about/tos*
Privacy Policy: www.23andme.com/about/privacy
Informed Consent: www.23andme.com/about/consent

Family Tree DNA *Terms & Conditions: https://bit.ly/2MMzFaz*
Privacy Policy: https://bit.ly/2Wqvpla
Informed Consent: https://bit.ly/2Z6nq9K

MyHeritageDNA *Terms & Conditions: www.myheritage.com/terms-and-conditions*
Privacy Policy: www.myheritage.com/privacy-policy
Informed Consent: www.myheritage.com/dna-informed-consent-agreement

ADDITIONAL RESOURCES

Additional Resources

Why DNA Results Aren't The Same: www.legalgenealogist.com/2017/07/30/whence-the-dna-differences
Help for Adoptees: www.legalgenealogist.com/2017/08/27/help-with-dna-for-adoptees
Choosing a DNA Test Provider: https://isogg.org/wiki/Choosing_a_DNA_testing_company
The Basics of Genetic Genealogy: https://isogg.org/wiki/Genetic_genealogy
FamilySearch Wiki – Choosing a Provider: www.familysearch.org/wiki/en/Hiring_a_DNA_Testing_Company
Basic Genetics: http://learn.genetics.utah.edu/content/basics

Visit the library's locations page (www.casscolibrary.org/locations) for CCPL Genealogy's location, contact information, and hours of operation.

Information regarding our digital collections, access to online databases, submitting inquiries, and more, can be found on Cass County Public Library's Genealogy Resources page, located here: www.casscolibrary.org/genealogy

Send Research Inquiries to:
askgenealogy@casscolibrary.org

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