

Genetic Genealogy: Strategies For Analysis

Research First

1. Identify your research goal.
2. Gather all of your paper research and analyze.
3. Cluster matches with the “shared” or “in common with” tool.
4. View the public trees of your matches.
5. Ask relevant family members to test.
6. Come to a conclusion.

DNA First

1. Choose a close match with a public tree.
2. Cluster matches with the “shared” or “in common with” tool.
3. Study family trees of clustered matches to identify the most recent common ancestor (MRCA).
4. Research the MRCA and all of their descendants.
5. Evaluate the evidence.

Analyze Your atDNA

- **centiMorgan (cM)** – a measurement showing how much DNA two people share.
- **Percentage** – sometimes results are given as a percentage of DNA shared. Use DNA Painter’s shared cM Project to convert percentage to cM.

DNA Painter

- <https://dnainter.com/>
- DNA Painter offers tool to create a family tree, the shared cM tool, chromosome mapping, and What are the Odds? (WATO).
 - We will focus on the shared cM tool. To learn more about what DNA Painter has to offer, see the free webinars on the website.

Shared cM Project

- The Shared cM Project by Blaine Bettinger is a crowd sourcing of information, used to determine acceptable ranges of shared DNA for determining DNA relationships.
- Look at the chart or enter your match information to receive a list of possible relationships. <https://dnainter.com/tools/sharedcmv4>

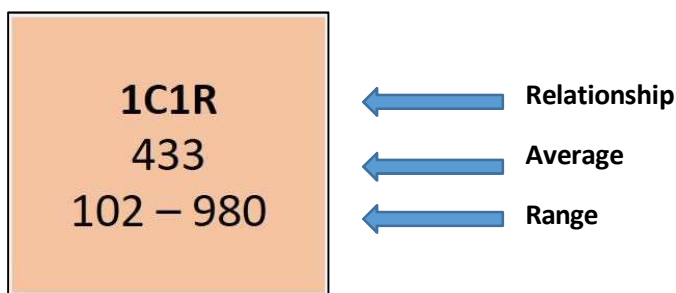


Figure 1: Example from the Shared cM Project

Clustering Matches

1. Select a close match that is a known relationship.
2. Select “Shared Matches”. This is **triangulation**, when three or more people share a segment of DNA.
3. Used shared matches to determine the most recent common ancestor (MRCA). The **MRCA** is the most recent ancestor shared by two or more persons.

Organize with the Leed’s Method

- The Leed’s Method is a way to organize your DNA matches in a way that is easy to visualize.
- With the Leed’s Method you can view all DNA results in one place.
- Put your data into a spread sheet so that it is easy to adapt to your needs.
- Learn more at <https://www.danaleeds.com/the-leeds-method/>

Strategy

- Color code your matches.
- Sort your matches between 400 and 90 cM.
- Add four grandparents to your chart.
- Make notes about what you know.
 - Known relationship?
 - Account managed by

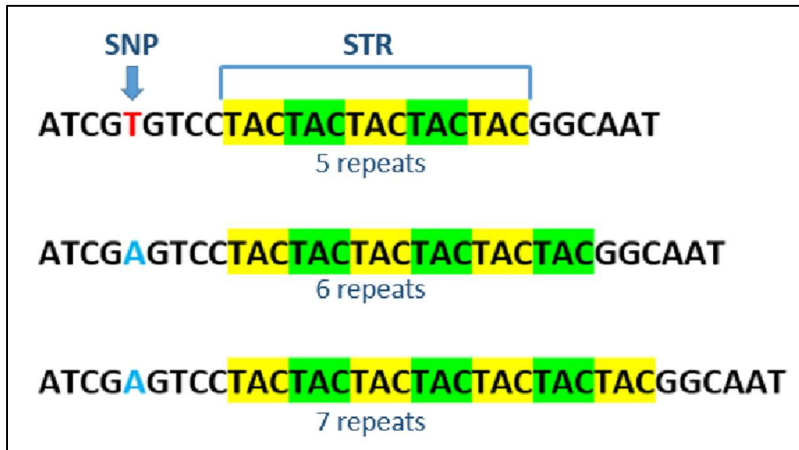
Name	shared cM	Notes	GP1	GP2	GP3	GP4
Ringo Starr	700	Great Uncle				
k457x	523	1C1R				
T.T.	458	1C1R				
Elvis Presley	456	1C1R				
A.M.	441	1C1R				
D_Smith	421	1C1R				
<hr/>						
Jason Bourne	400					
Smith.Jane	345					
David Jones	294					
D.P.	267					
Edward FP	265					
Iron Man	231					
John	218	2C1R				
4ever fishing	197	3C				
mikeyb43	175					
bballgirl	153	2C1R				
Jean-Luc Picard	144					
M.C.	136	managed by 4ever fishing				
W.C.	131	managed by d2002c				
E_Smith	124					

Specialized Testing

- These tests include mtDNA and Y-DNA. X-DNA is often tested with atDNA, and is not a stand-alone test.
- These tests require more complex analysis techniques.

Terms to Know

- **Genetic distance** – genetic differences or mutations between two individuals.
- **Haplotype** – your individual test results.
- **Haplogroup** – a group of people who share several genetic mutations and a common ancestor (usually ancient).
- **Haplotree** – a tree tracing all of humankind back to one common ancestor.
 - Mitochondrial Eve or Y Adam
- **Marker** – a tested region of DNA. There are three types.
 - **STR (short tandem repeat)** – a short repeating pattern of DNA.
 - **SNP (single nucleotide polymorphism)** – a variation of DNA at one specific position.
 - **Sequencing** – determining the order of all DNA bases.



Y-DNA Testing and Results

- Depending on the level of test purchased, STRs and SNPs will be analyzed.
 - More markers = more possible matches
- If you chose a test that analyzes SNPs, a haplogroup will be assigned to you.
- This test is limited to those who were born with a Y chromosome.
- Use this test to find genetic cousins and ancestral origins.
- The Y chromosome has about 59 million base pairs.
- Visit https://isogg.org/wiki/Y-DNA_STR_testing_comparison_chart for more information on choosing a test.

Results

- **DYS (DNA Y-Chromosome Segment)** – each marker is named with a number.

Name	DYS#	393	390	19	391	385	426	388	439
John Smith	Results	14	21	15	12	11	11	14	10
Jacob Smith	Results	14	22	15	12	11	11	13	10

- The numbers on the chart show us the number of STR repeats.
- The **genetic distance** between John and Jacob is 2.

mtDNA Testing and Results

- Depending on the test you purchase, SNPs or full sequencing will be utilized.
 - Full sequencing = more possible matches
- You will receive a haplogroup designation.
- Everyone can take this test, though it follows the maternal line.
- Use this test to find ancestral origins.
- mtDNA is very small, containing only 16,569 base pairs.
- Visit https://isogg.org/wiki/MtDNA_testing_comparison_chart for more information on choosing a test.

Results

- All mtDNA is compared to a reference sequence
 - **rCRS** – revised Cambridge Reference Sequence
 - **RSRS** – Reconstructed Sapiens Reference Sequence

Mutation	What does it mean?
C152T	There is a T at position 152 (reference sequence has a C)
152T	There is a T at position 152 (different than reference sequence)
573.1C	There is an extra C at position 573
573.2C	There is a second extra C at position 573
7123-	There is a missing DNA base at position 7123

Third Party Websites

- Review tests from multiple companies in one place.
- Identify and map shared segments of DNA.
- Evaluate X-DNA results.

Source Citations

- Record all of the important information.
 - Database and website
 - Date accessed
 - User names
 - Specific and relevant information

Online Resources

- <https://isogg.org/>
- <https://dnainter.com/tools/sharedcmv4>
- <https://thegeneticgenealogist.com/>
- <https://thednageek.com/>
- <https://dna-explained.com/>
- <https://www.yourdnaguide.com/>
- <https://dnaadoption.org/>
- <https://www.gedmatch.com/>
- <https://www.banyandna.com/>

MGC Resources

<i>Advanced Genetic Genealogy: Techniques and Case Studies</i>	929.1072 AD95
<i>An Introduction to Genetics for Kids</i>	599.935 Z19
<i>DNA for Native American Genealogy</i>	929.1072073 ES85
<i>Finding You Roots: The Official Companion to the PBS Series</i>	929.1 G2232
<i>Genetic Genealogy in Practice</i>	929.1072 B4662G
<i>Research Like a Pro With DNA: A Genealogist's Guide to Finding and Confirming Ancestors with DNA Evidence</i>	929.1072 EL22R
<i>The Adoptee's Guide to DNA Testing: How to Use Genetic Genealogy to Discover Your Long-lost Family</i>	929.1 W43
<i>The Family Tree Guide to DNA Testing and Genetic Genealogy</i>	929.1072 B4662
<i>Your DNA Guide the Book: Step-by-Step Plans to Connect You With Your Family Using Your DNA</i>	929.1072 SO87
<i>Evidence Explained: Citing History Sources from Artifacts to Cyberspace</i>	907.2 M625
Ready Reference Guides	
<i>Citing Genetic Sources for History Research</i>	929.1072 M625CG
<i>Genetic Genealogy Basics</i>	929.1072 B963G 2nd
<i>Mitochondrial DNA for the Genealogist</i>	929.1072 SO87
<i>Next Steps: Working With Your Autosomal DNA Matches</i>	929.1072 SO87N
<i>Organizing Your DNA Matches: A Companion Guide</i>	929.1072 SO87O
<i>Understanding 23andMe: A Companion Guide to "Autosomal DNA for the Genealogist"</i>	929.1072 SO87AT
<i>Understanding Family Tree DNA: A Companion Guide to "Autosomal DNA for the Genealogist"</i>	929.1072 SO87AF
<i>Using DNA in Genealogy</i>	929.1072 C436U
<i>Y Chromosome DNA for the Genealogist</i>	929.1072 Y