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Y-DNA Testing Strategies by Research Question: Using Targeted Testing

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COURSE DESCRIPTION

Attendees receive a brief introduction to the two types of Y-DNA tests – Y37 through Y111 (STR) and Big Y-700 (STR and SNP) – and how each test can be used separately or together to provide insight into a variety of genealogical research questions beyond the deep ancestral roots of paternal surnames. Using targeted DNA testing, several brief case studies highlight the variety of research questions for which Y-DNA can be used, including:

- **Ancestral Origins**: Where are the modern and ancient origins for my paternal line?
- **Genetic Networks:** Within a group of shared autosomal DNA matches, which of my great grandparent line is the match related?
- **Unknown Parentage:** What is the biological surname of my father or grandfather?
- **Relatedness:** Are two men with the same surname related?

INSTRUCTOR BIOGRAPHY

Dr. Rick T. Wilson is the founder and blogger for My Family Pattern, which is a website and blog utilizing a case study approach to present research tips and strategies for solving genealogical problems. Dr. Wilson has been working with Y-DNA since 2006 and genealogical research more broadly for 33 years. As a marketing professor by trade, he is trained in content delivery and the scientific research method. Dr. Wilson has published more than 30 academic papers enabling him to design, research, and articulate complex genealogical problems. Dr. Wilson's genealogical research has been featured in the *Research Like A Pro* podcast and webinars as well as on his blog and YouTube Channel.

Y-DNA TESTS

Y-DNA is the portion of your DNA passed down from father to son on the Y chromosome and therefore permits the tracing of a man's paternal ancestry. Mutations in Y-DNA from generation to generation permit the tracing of paternal ancestry. Mutations occur in the basic DNA building blocks of A (adenine), C (cytosine), G (guanine) and T (thymine).

FamilyTreeDNA offers two types of Y-DNA tests.

1. **STR Tests.** The **Y-37** and **Y-111** tests read the sequences the basic DNA building blocks of A, C, G, and T, which are referred to as short tandem repeats (STR). While FamilyTreeDNA currently offers Y-37 and Y-111 tests, Y-DNA testers may see matches who have previously tested with Y-11 and Y-67 tests, which are no longer sold.

2. **SNP & STR Tests.** The **Big Y-700** test reads 700+ STR markers plus 500,000+ other markers called single nucleotide polymorphisms (SNPs). FamilyTreeDNA's Big Y-700 test offers the greatest value because of the number of STR and SNP markers tested enabling greater reporting ability and genetic matches to all relatives within a genealogical time frame.

An advantage of SNP testing (i.e., Big Y-700) is that SNP markers mutate less frequently and do not mutate back to its "original" value. These latter mutations can mask a change in a marker (A, C, G, or T) making it difficult to compare genetic relationships. Tracing mutations backwards through time permits testers to determine when and where their paternal branch (called a haplogroup) separated from the overall Y-DNA family tree. A summary of the differences in Y-DNA tests is provided below.

	Short Tandem Repeat (STR)	Single Nucleotide Polymorphisms (SNP)
Y-DNA Test	Y-37, Y-111, Big Y-700	Big Y-700
Y Chromosome Area	Repeated Sequence	Specific Nucleotide
Mutation Rate	More Frequently	Less Frequently
Future Inheritance	Yes	Yes
Backwards Mutation	Yes	No
Genetic Genealogy	General Relatedness	All relatives within genealogical time frame

THE SCIENTIFIC METHOD FOR Y-DNA

To efficiently resolve genealogical questions, whether using Y-DNA or other data analysis methods, it's important to understand the difference between a research question and hypothesis.

A **research question** refers to what you want to learn about your ancestor, such as where are they from or who is their father? It is a focused inquiry, but it cannot be tested. A **hypothesis** is an educated guess potentially answering the research question. It is a testable prediction informed from collected data collected prior to testing. A hypothesis might be, for example, my ancestor is from Ireland, or this person is my ancestor's father.

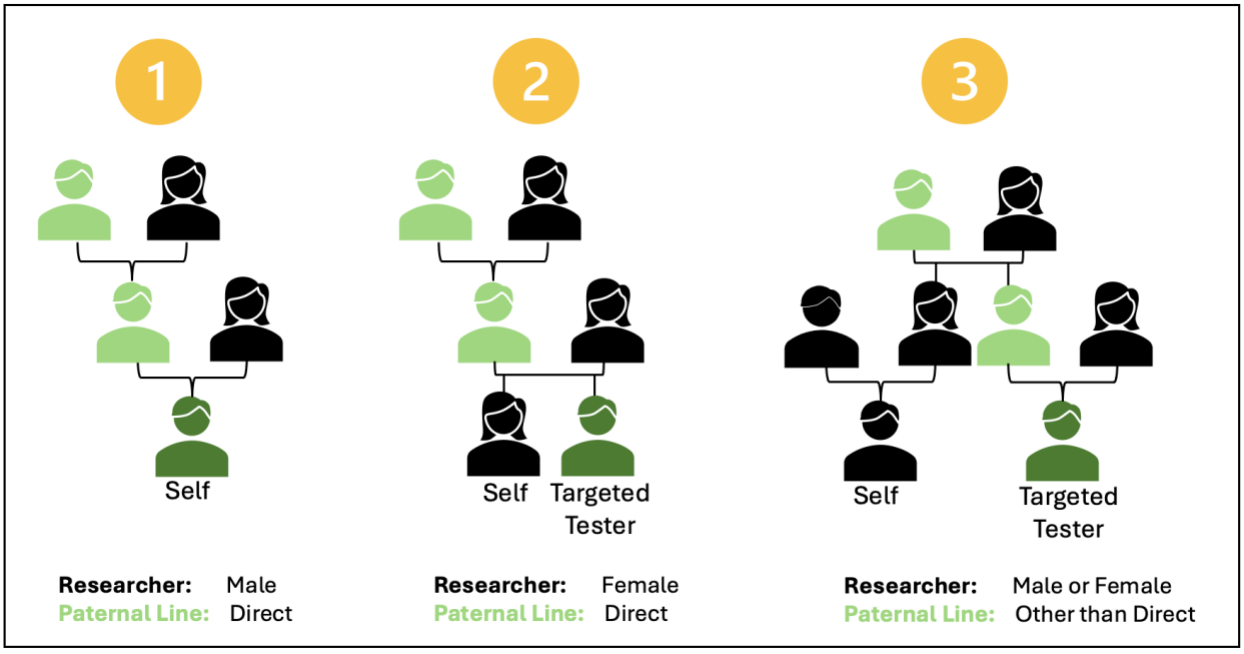
Logistically, one starts with a research question and initially collects reasonably accessible data to inform the hypothesis. Data are indirect evidence illuminating potentially realistic theories for what might be the answer to the research question. Data could be census information or vital records suggesting but not confirming the answer.

Typically, several hypotheses might be developed. For example, research for where a paternal ancestor is from may suggest the British Isles with stronger evidence for Northern Ireland as opposed to Scotland. A Y-DNA test can indicate whether one's ancestor is likely from Northern Ireland (hypothesis 1) versus Scotland (hypothesis 2). Targeted DNA testing can help answer this question.

TARGETED DNA TESTING

You may or may not be the appropriate person to test using Y-DNA testing, especially if you are female. You may also not be the appropriate person to test using Y-DNA even if you are a male if the ancestry of interest is not associated with your father's paternal line. You may need to find some other male who descends from a paternal line of interest.

For example, if you are a woman (example #2 below), you may need a brother, uncle, or male cousin to test for you. Whether you are a man or woman and are interested in your maternal grandmother's ancestral line (example #3 below), you will need a male cousin whose has an uninterrupted paternal line back to your maternal grandmother's father. The image below illustrates when a targeted tester is needed.



When testing someone other than yourself, you may not know their paternal ancestry as well as your own. Perhaps unbeknownst to you and your targeted tester, they may have been adopted or associated with an unknown paternal event where they are unaware that the father who raised them is not their biological father. The concern is that unexpected paternal events can be found

between any generation be it the tester's father or six-times great grandfather. In recognition of this, caution should be taken.

While the Big Y-700 test is the best and preferred test to order, unknown or unexpected parentage of the targeted DNA tester can render the Y-DNA test unhelpful in testing the hypothesis and thus an unnecessarily expensive proposition. In these uncertain situations, or if limited funds are an issue, I recommend beginning with a Y-37 test to determine if results are helpful in testing the hypothesis and/or determine if any of your matches have tested at the Big Y-700 level where you can receive greater insight into your own ancestry. Once confirmation has been made, a Y-37 (or Y-111) test can be upgraded to the Big Y (see the table below).

Y-DNA TEST	SITUATION
Y-37	• Initial test for **limited funds**; Determine if any matches have Big Y-700 tested. • **Initial test is for someone else**, especially if you cannot confirm paternal generational links.
Y-111	• Upgrade from Y-37 if no Big Y-700 matches but there are Y-111 matches (cost-saving measure).
Big Y-700	• **Test is for yourself** or an individual who is the subject of the research question. • Upgrade from Y-37 or Y-111 for other individuals once paternal match is confirmed and there are Big Y-700 matches (cost-saving measure).

Y-DNA APPROPRIATE RESEARCH QUESTIONS

There are four types of research questions that Y-DNA can appropriately address.

1. **Ancestral Origins.** Depending on the number of matches, Y-DNA can determine where in the world a paternal ancestor is from in the genealogical near term and several thousand years ago.

2. **Genetic Networks.** Among a group of shared autosomal DNA matches, Y-DNA for a targeted tester can indicate whether an unlinked family cluster within the genetic network is from an ancestral line of interest.

3. **Unknown Parentage.** The surnames of close Y-DNA matches hint toward the surname associated with the targeted tester thus confirming or refuting suspected lineage.

4. **Relatedness.** Y-DNA can also be used to determine if two or more men are paternally related. The suspected men may carry the same surname or simply reside within close proximity to one another.

ADDITIONAL RESOURCES

MyFamilyPattern Resources

Video Resources (YouTube)

- Big Y-700 DNA Learning Module Series (six parts, YouTube playlist)
    1. A general introduction to the Big Y-700
    2. Understand ancestral origins and migration of paternal ancestors
    3. Interpret genetic distance between your Y-DNA matches
    4. Evaluate Y-DNA mutations and haplogroups for your place on the Y-DNA family tree
    5. Recruit your matches to upgrade their test to improve haplogroup estimates for the time to most recent common ancestor (TMRCA)
    6. Use targeted testing to further improve haplogroup estimates for the time to most recent common ancestor (TMRCA)

Blogs (MyFamilyPattern.com)

- *Three tips to improve haplogroup estimates for the time to most recent common ancestor (TMRCA).* This blog details how adding additional Y-DNA testers on your branch of the Y-DNA family tree can improve your test results.
- *Calibrating test results: A Big Y-700 DNA Experiment.* This blog lists three tasks you should do to ensure the FamilyTreeDNA testing company can provide you with the most accurate test results.
- *"Y" gift DNA? Unwrapping paternal ancestry.* This blog describes the Y-DNA test and provides three case studies.
- *Targeted Y-DNA Testing: Uniting a Band of Brothers (Part 1 and Part 2).* This blog details how targeted DNA testing can be used to prove relatedness among a probable group of ancestral brothers.
- Identifying John Wilson's Irish Origins, Part 1: Y-DNA Analysis. This blog post details how Y-DNA was used to identify the ancestral origins of an 18th century ancestor. This post was also featured in the *Research Like A Pro® Genealogy Podcast*, episode 198.

Other Resources

- Estes, Roberta (2024). *The Complete Guide to FamilyTreeDNA: Y-DNA, Mitochondrial, Autosomal, and X-DNA.* Baltimore, MD: Genealogical Publishing Company. Available on Amazon.com and on the publisher's website, Genealogical.com, which includes an eBook version.