

# Guide to DNA Testing

How to Identify Ancestors,  
Confirm Relationships, and Measure  
Ethnic Ancestry through DNA Testing

**Version 3.1**



**RICHARD HILL**

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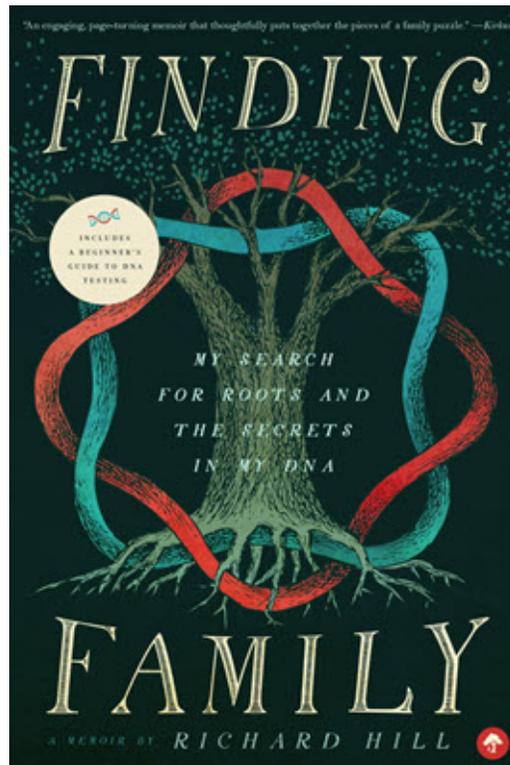
Richard Hill



## WHO AM I?

My name is Richard Hill. I was the first adoptee known to identify my birth family through genetic genealogy DNA tests. I told my story in my book, "*Finding Family: My Search for Roots and the Secrets in My DNA*."

That book is available in print, Kindle and audiobook formats on [Amazon](#), [Audible](#), and elsewhere.



Since 2008 I have been educating adoptees and genealogists on this subject through my [DNA Testing Adviser](#) web site. Several years ago, I launched my "*Guide to DNA Testing*" as a low-priced Kindle Book on Amazon.com.

As the DNA testing market evolved, I have periodically updated this guide. You are reading the latest Version 3.1, which is an update of the prior version 3.0.

Thousands of people have now read my *Guide to DNA Testing* and reviewers have praised it as an easy-to-understand introduction to the basics. In addition, this new version contains many useful links to recommended DNA tests, books, third-party tools, and other resources for further learning.

## WHAT DNA TESTING CAN DO FOR YOU

Everyone has DNA. While your DNA is different than mine, it is much like that of your parents and other people in your family tree. That makes DNA ideal for relationship testing of two presumed relatives.

The classic relationship test is the DNA paternity test. Comparing a child's DNA with a suspected father can determine—without any doubt—if that man fathered the child.

Today, DNA can also confirm other relationships, like siblings, half siblings, grandparent and grandchild, and aunt/uncle with nephew/niece. The more distant the relationship the less DNA you have in common. But you can detect many distant cousins.

### **You can learn a lot from just testing yourself.**

There are large and growing databases of people who have already taken the most popular tests. By testing yourself, you will learn who you match. Over time, you will see additional matches as more people get tested.

Combining family tree information from your matches with what the DNA says about your relationship is what leads to new discoveries in YOUR family tree. For example:

- Genealogists are using DNA tests to get around their “brick walls” where the paper trail ends.
- Adoptees are overcoming family secrets, sealed records and even outright lies to discover and reunite with their biological families.
- People curious about their ethnic ancestry are learning what parts of the world their ancestors came from.
- Adults who discover or suspect that the man who raised them was not their biological father are identifying previously unknown fathers.
- Children of sperm and egg donors are testing their DNA to find biological parents and siblings.

Testing additional family members from different branches of your family tree can provide even more information when you see which matches you have in common or not in common.

## HOW DO I GET TESTED?

It's easy. You order a test from the company's website. They ship a home test kit to your address. You collect a sample of your DNA and send it back.

They analyze your DNA and compare it to every other person who has taken the same test. They notify you by email when your results are ready. Then you log into your private, password protected account to see your results.

Collecting your DNA sample is easy and painless. [AncestryDNA](#) and [23andMe](#) use a "spit kit" where you simply collect some saliva in a tube.

[Family Tree DNA](#), [MyHeritage DNA](#), and [Living DNA](#) use test kits that include swabs for lightly scraping cells from inside your cheeks. Either method is generally effective.

Subjects who are very young or very old may have difficulty producing a lot of saliva or spitting into a tube. For them the cheek swabs will be easier to use.

*NOTE: A mortician can use these cheek swabs to collect DNA from the recently deceased, though I recommend you don't wait that long.*

# WHY PEOPLE ARE CONFUSED ABOUT DNA TESTING

There are four factors that confuse people about DNA testing. Read on to see how this guide deals with each of them. After completing this overview, you will be able to make test decisions with confidence.

## 1. The Boring Science Lesson

Try searching “DNA” online. You will see a lot about the structure of DNA, the replication process, and many other things that make your eyes glaze over. While some people find the technical details interesting, you do not need a biology class to use DNA tests effectively.

*I keep the science talk to an absolute minimum, noting key principles where necessary.*

## 2. Many Test Types

There are many different types of DNA testing. Pick the wrong test for your situation and you won't get the results you seek. Even worse, you will waste your time and money.

*I describe and compare the major test types, explaining their purposes, strengths and limitations.*

## 3. Many Competing Test Labs

Many labs offer similar sounding products. Yet ordering your test from the wrong lab can severely limit the usefulness of your results.

*I tell you which companies I use when spending my own money and provide links to their websites.*

## 4. Different Testing Levels

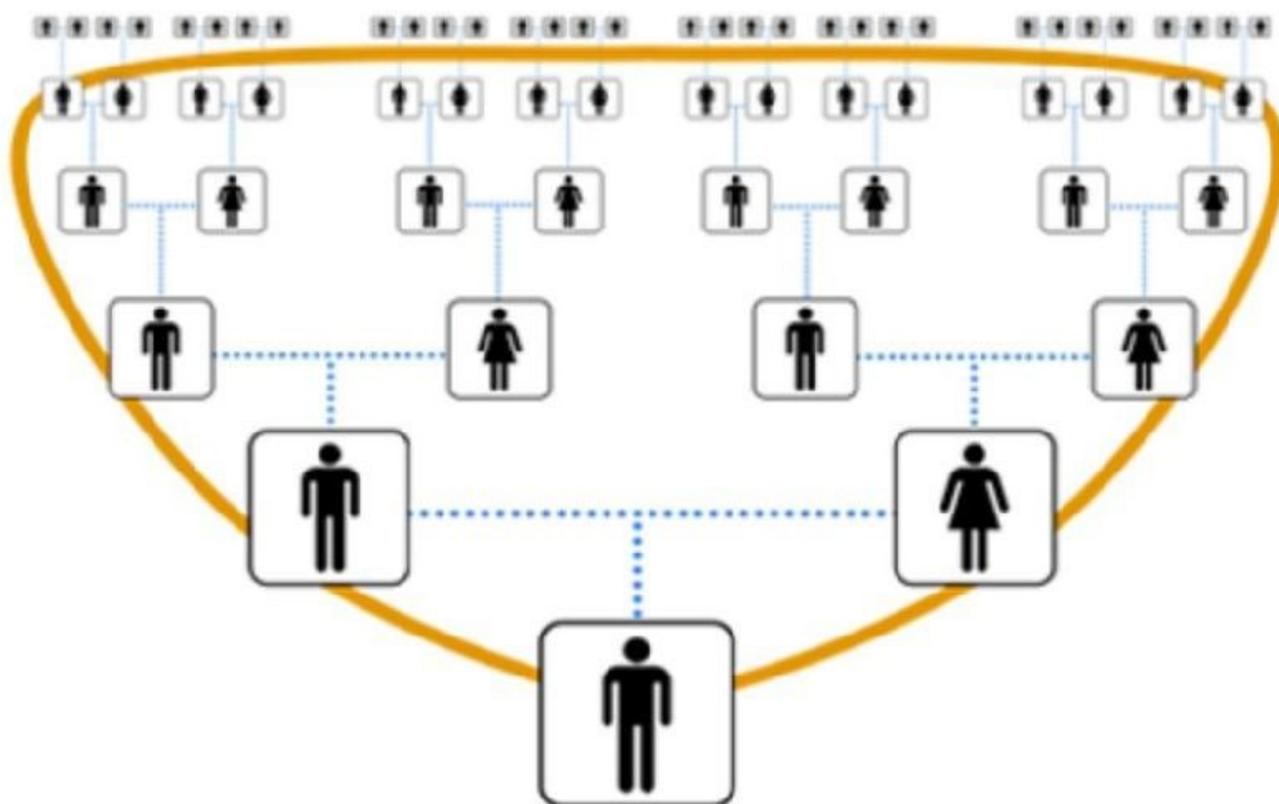
For some tests, there are different testing levels at successively higher prices. Information from the least expensive test may be useless for genealogical purposes. Yet the highest level may be unnecessary.

*For these tests, I note the current “sweet spots” where you get the most value.*

## HOW DNA PASSES DOWN THE FAMILY TREE

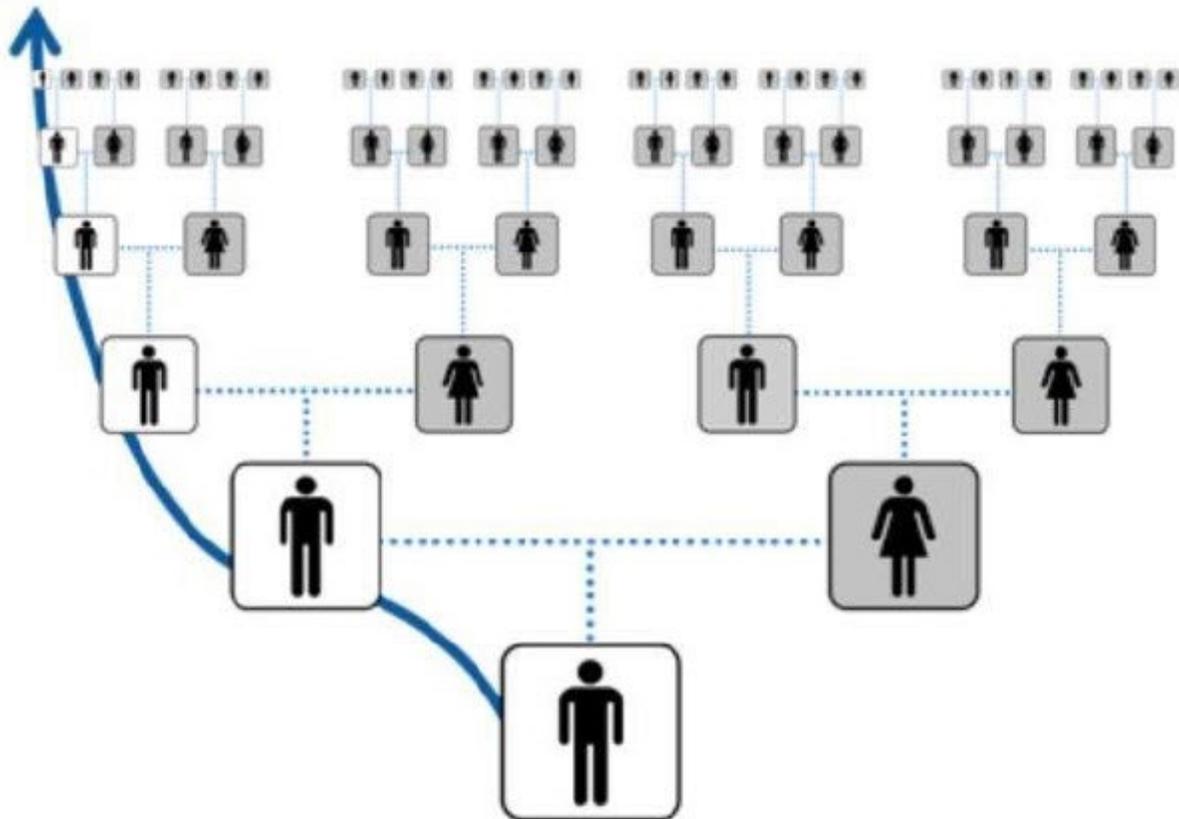
Everyone has a biological family tree, even if you're unaware of anyone but yourself. You have two parents, four grandparents, eight great-grandparents etc. You need to understand three major types of DNA and how each type passes down the family tree.

**1. Autosomal DNA** (abbreviated atDNA) passes down from ALL your ancestors. At each conception, a child receives approximately 50% of this DNA from each parent. But which 50% you get is random. You will probably not inherit equal amounts from each grandparent and your siblings will likely get a different mix.



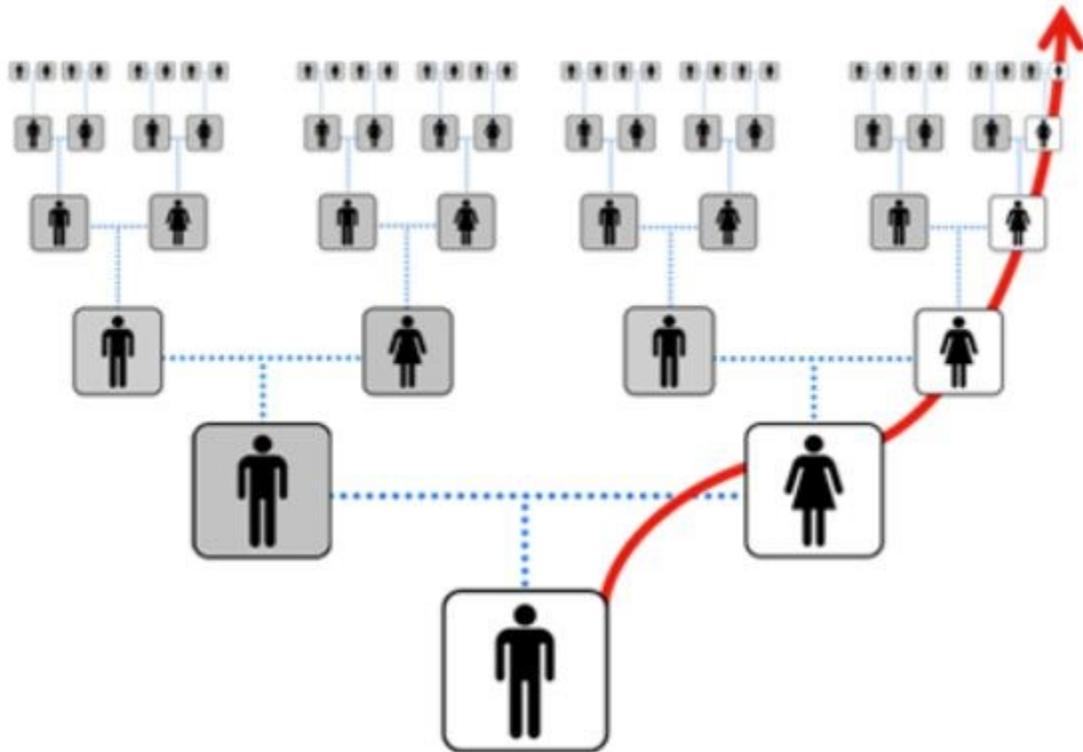
Your matches can reflect common ancestors from *any* branch of your family tree. Yet after five generations or so, the amount of DNA you have from any one ancestor may or may not be detectable. In terms of your family tree, think of autosomal DNA testing as having a *broad* but relatively *shallow* reach.

**2. Y-DNA** focuses on the Y chromosome, which men inherit from their father, who got it from his father etc. Y-DNA testing covers the direct paternal line and only men can be tested. Since the Y chromosome passes on mostly unchanged—and surnames usually pass down the same paternal line—[Y-DNA testing](#) can help trace your PATERNAL ancestry.



Your direct paternal line is just a tiny part of your overall ancestry. Yet Y-DNA testing can uncover matches from common ancestors who lived hundreds of years ago. Think of Y-DNA testing as a *narrow* but *deep* test of your family tree.

**3. Mitochondrial DNA** (abbreviated mtDNA) is a type of DNA that mothers pass on to all their children. Both men and women have mtDNA but only women pass it on.



An [mtDNA test](#) can help trace your MATERNAL ancestry back hundreds of years. Like Y-DNA testing, it's a *narrow* but *deep* test of your family tree.

# AUTOSOMAL DNA TESTING

## Powerful, Inexpensive Tests for Everyone

Today the most cost-effective testing investments in genetic genealogy are the autosomal DNA tests. Each checks a half million or more locations on your chromosomes. Both men and women can take these tests and your matches can be from any branch of your family tree.

When autosomal DNA tests first came out, the price was several hundred dollars. Thanks to improved technology and much greater volume, prices have dropped dramatically. Now such tests cost less than \$100 each.

As of now, four of these tests yield large numbers of genetic matches from huge user databases. Click each of the following links to learn more and see current pricing.

[AncestryDNA](#)

from Ancestry

[Family Finder](#)

from Family Tree DNA

[23andMe](#)

from 23andMe

[MyHeritage DNA](#)

from MyHeritage

While each test has different features and strengths, I recommend that adoptees and serious genealogists eventually do all of them.

## Why Do Them All?

Since so many people take only one of these tests, the databases are quite different. There is no way to tell in advance which test will produce your closest or most useful matches. Now that you can get into all four databases for less than the cost of one test a few years ago, I encourage you to do so.

Adoptees should absolutely heed the advice of search angels to “fish in all the ponds.” While it is possible to identify your birth family from 3<sup>rd</sup> or even 4<sup>th</sup> cousin matches, it is *much* easier and faster if you can get a match that’s a 1<sup>st</sup> or 2<sup>nd</sup> cousin or even closer. You need to exhaust every possibility of finding such a close match before you begin to work with more distant matches.

## Uncovering Previously Unknown Relatives

Whether you’re a genealogist or an adoptee, the first function of genetic genealogy is to find previously unknown relatives.

The testing company will compare your DNA with that of everyone else who has already taken the same test and will continue to compare you with new people who take the test for years to come.

If you and another person have several long segments of DNA in common, that outcome cannot be coincidental. You must both have inherited those segments from common ancestors.

The more segments you share and the longer the length of those segments, the more common ancestors you have...and the more closely related you are.

If your family has been in the U.S. for many generations, you are likely to discover hundreds or even thousands of matches in all but the newest database.

Contacting cousins and/or reviewing their online family trees can get you beyond a genealogical brick wall or provide new information about shared ancestors.

## **Powerful Tools for Adoptees**

These key autosomal tests are helping adoptees overcome sealed records to discover and reunite with birth families.

The process can be remarkably easy or require quite a bit of work. It all depends on how close your matches turn out to be.

**That's why adoptees really need to get into every autosomal DNA database to exhaust every possibility of finding a close match.**

If you're lucky, you will get a direct match to a parent, aunt, uncle, sibling, or half sibling. This doesn't happen for everyone; but it is becoming much more common as the databases get bigger.

Nearly as good is a match to a first or second cousin. By contacting that match and/or researching the person's family tree, you can usually find a branch of your match's family that lived in the time and place of your birth.

Even if your closest matches are third or fourth cousins, there is still a methodology that can uncover the truth of your origins.

Basically, you find two or more people who are genetically in common with you and each other...plus you all have overlapping segments on the same chromosome. Adoptees don't yet have a family tree, but your matches probably do. And there's a good chance that *their* common ancestor is *your* ancestor too.

You can use reverse genealogy to follow that common ancestor's descendants forward in time to discover probable close relatives.

The complete methodology and information about tools to implement it more easily can be found at [DNAAdoption.com](http://DNAAdoption.com). This site, staffed by volunteer search angels and supported by

donations, is the place to go for help after you get your autosomal DNA results.

## Confirming Relationships

The second function of genetic genealogy is to confirm that two people have ancestors in common and identify the relationship.

By measuring how much DNA two people share, autosomal DNA tests can confirm or disprove any suspected relationship out to the second cousin level.

Even though the amount of shared DNA gets cut roughly in half with each generation, these autosomal tests are a great way for adoptees and others to confirm suspected relationships.

Autosomal DNA tests can even serve as a cheap but powerful paternity test. Besides confirming a parent-child relationship, these tests can identify full siblings, half siblings, aunt/uncle and nephew/niece, grandparent and grandchild, first cousin and second cousin.

Shared DNA on an autosomal test is measured in a unit called centiMorgans (cM). To see how much DNA is typically shared for various relationships, check the following table.

### [The Shared cM Project](#)

If you have a specific match to evaluate, enter the number of shared centiMorgans in the box to see the possible relationships and the probabilities for each.

You can do as I did and confirm a child's father when that man is deceased (or unwilling to test). Just test someone who would only be a close relative to the child IF the suspected man is the father.

*NOTE: DNA testing from home test kits is not admissible in a court of law. That's because there is no way to prove who provided the sample. If you have a legal situation such as child support, custody or immigration, you need to be tested in person at a certified laboratory such as [EasyDNA](#).*

*Labs like this have nationwide collection sites. Test subjects can be in different locations and a chain of custody process ensures valid comparisons. Just be sure to order the LEGAL test and not the Home test.*

I did all my testing of close relatives through [23andMe](#) and [Family Finder](#). Each has proven to be excellent for this purpose. This can also be done with [AncestryDNA](#) and [MyHeritage DNA](#).

The AncestryDNA test lacks a chromosome browser, which may be useful in some cases. Therefore, AncestryDNA is not my first choice for confirming close relationships if that is your only objective.

## Measuring Ethnic Ancestry

The third function of genetic genealogy is to identify your ethnic ancestry. Autosomal DNA tests provide a detailed ethnic and geographic breakdown of where your ancestors lived

maybe 500 or even a thousand years ago.

Certain groups like Ashkenazi Jews and Native Americans have distinct genetic signatures.

To create this “admixture” report each company uses different population data for reference and follows different processes for reporting a percentage breakdown of your mix. As a result, your reports will be somewhat different from one company to another.

*NOTE: Siblings who do the same test are likely to see differences in ethnic ancestry. That's because you each inherited a random mix of DNA from each parent. You may have a lot more or a lot less DNA from a certain ancestor than your siblings.*

Estimating ethnic ancestry from autosomal DNA is a very new science and the labs have been periodically refining their reports. When that happens again, you will simply see revised results at no additional cost.

These reports may be especially useful for those with an unknown father. Anything in your ethnicity report that does not match your mother's family background may provide a clue to your father's ethnicity.

## **Genetic Communities**

AncestryDNA has a feature called Genetic Communities. It combines DNA results with geographic information from your genetic matches to trace relatively recent migrations.

This may place a few specific parts of your family tree into more recent subgroups, i.e. a few hundred years ago instead of a thousand years ago. Results vary, but the technology has a sound, published methodology.

## **Ancient Ancestry**

Some of the autosomal DNA tests provide additional information about your deep ancestry from tens of thousands of years ago. Such reports are fascinating. But they have no bearing on genealogy or what most of us think of as ethnic ancestry.

The [Family Finder](#) test includes an Ancient Origins report that breaks European ancestry into three groups of ancient people: Hunter-Gatherers, Early Farmers, and Metal Age Invaders.

For each group, they provide overview information and details from specific archeological dig sites.

[23andMe](#) includes a report on Neanderthal Ancestry. It shows you how much of your ancestry can be traced back to Neanderthals, an extinct population of ancient humans. It even compares your Neanderthal ancestry to others in the database.

## **Haplogroups**

Y-DNA and mitochondrial DNA testing each confirm another type of ancient ancestry—your

haplogroup.

A man's Y-DNA haplogroup locates him on the tree of all human males. A mix of letters and numbers, it tells you where in the world your direct paternal line came from thousands of years ago.

Likewise, the mtDNA haplogroup tells everyone (male or female) where in the world your direct maternal line came from thousands of years ago.

Haplogroups can provide genealogical clues. If two people have different haplogroups, they cannot share the same direct paternal or maternal line in the era of genealogical record keeping. They can, however, share common ancestors somewhere else in the family tree.

*NOTE: Paternal and maternal haplogroups use many of the same letters. So always confirm which one you or someone else is referring to.*

# COMPARING THE AUTOSOMAL DNA TESTS

Not everyone has the need or the budget to do every test. The following summary briefly notes the major strengths and limitations of each test.

## **Ancestry DNA**

Thanks to massive amounts of TV advertising, [AncestryDNA](#) has the largest DNA database (over 15 million people). They also have the most users with posted family trees, which can be nicely integrated with DNA results. Genetic Communities is an exciting new feature.

They also have an innovative tool called ThruLines that uses Ancestry trees to suggest how you may be related to your DNA matches through these common ancestors.

This test lacks advanced analysis features such as segment data and a chromosome browser. To benefit from all the tree integration features you need to pay extra for a subscription. Yet many genealogists already have a subscription for the records.

## **Family Finder**

[Family Finder](#) includes many useful tools for analyzing your genetic matches. Plus, nearly all your genetic matches will be identified by their real name instead of a username. You also get email addresses for direct correspondence. Their Family Matching System provides real advantages when you have multiple family members in this database. I make sure to include every tested relative.

Family Finder has a smaller database than the other tests. But a generous program offering free uploads of raw data from other tests is expanding the database. If you take advantage of the free upload, you just need to pay small optional fee to access the full set of tools.

## **23andMe**

[23andMe](#) offers both genetic genealogy features and health reports in their Health+Ancestry service. Yet their Ancestry-Only option is competitively priced. Their Ancestry Composition report (included with either option) offers the most detailed breakdown of European ethnic ancestry. It also reports your maternal haplogroup and (for males) your paternal haplogroup.

Since many 23andMe users only tested for the health reports, you may see a lower response rate when attempting to contact your matches for genealogy purposes. Yet with a database of ten million users some degree of success is virtually certain.

## **MyHeritage DNA**

Unlike the first three autosomal DNA tests, [MyHeritage DNA](#) is based outside the United States. It is the most popular DNA test and records service in Europe, making it an excellent choice for tracing ancestry outside the U.S.

Innovative tools include Auto Clusters and the Theory of Family Relativity that suggests

how you and many your matches are connected. They also accept uploads for free with a small optional fee for access to their tools. Furthermore, they now offer a Health+Ancestry option with some innovative health reports.

## LivingDNA

I did not mention [LivingDNA](#) earlier, because it does not (at the time of this writing) report on your genetic matches. For now, you should think of it as an expanded ethnic ancestry test for people with significant British ancestry. It breaks down your DNA mix across 80 world regions, including 21 in Britain and Ireland.

The British breakdown is based on the Peoples of the British Isles Project of the University of Oxford. That study collected blood samples from 4,500 people in rural populations all over the UK. They focused on people whose parents and grandparents were all born in the same locality. A regional breakdown of Ireland is in the works and a similar study has been announced for Germany.

LivingDNA also reports your maternal haplogroup and (for males) your paternal haplogroup.

### Autosomal DNA Summary Table

	Autosomal DNA Test
<b>WHAT IS CHECKED</b>	A half million or more DNA locations in the DNA inherited from both parents
<b>PRINCIPAL USES</b>	<p>Find relatives that share a common ancestor in any branch of your family tree within five generations or sometimes more</p> <p>Confirm close relationships out to second cousin and often beyond</p> <p>Measure percentages of ethnic ancestry from different regions of the world</p>
<b>STRENGTHS</b>	<p>Huge databases growing fast with millions of people already tested.</p> <p>More conclusive than old technology “sibling” or “kinship” tests for confirming close relationships</p>
<b>LIMITATIONS</b>	<p>Some relatives at third cousin level and beyond may not share enough DNA to show up as matches</p> <p>Those born outside the U.S. and children of recent immigrants may find few matches</p> <p>If ancestors married cousins or were part of close-knit ethnic groups, your matches may appear to be more closely related than</p>

	they really are
<b>RECOMMENDED TESTS</b>	<a href="#">23andMe</a> , <a href="#">Family Finder</a> , <a href="#">AncestryDNA</a> , <a href="#">MyHeritage DNA</a> , <a href="#">LivingDNA</a>

# THREE COMMON QUESTIONS ABOUT AUTOSOMAL DNA TESTING

## 1. Who Should I Test?

Usually, you will want to test yourself. But if one or both of your biological parents are living, you should test them on at least one of the autosomal tests. Testing your parents has two important advantages:

First, your parents are one step closer to your family's distant relatives. So, they will get some DNA matches that are too weak to show up in your results.

Secondly, matches to your mother are clearly through your mother's side of your family and matches to your father are clearly through your father's side. If you only test yourself, it's not easy to determine whether a match is from your paternal or maternal side.

Even if your parents are not available, testing additional known relatives can help you sort your matches based on which testers have the match in common. So, the more family members you can test, the better.

*NOTE: If your family is part of an endogamous population, e.g. Ashkenazi Jews or Mennonites, where people tend to marry within a close-knit society, some of your matches will be related to your mother AND your father. This means that the projected closeness of the match may be overstated, i.e. a projected 3<sup>rd</sup> cousin may just be a 4<sup>th</sup> or 5<sup>th</sup> cousin with a lot of distant ancestry in common.*

## 2. Can DNA Testing Confirm Native American Ancestry?

It seems like nearly every family in America has rumors of Native American ancestors. Autosomal DNA tests can detect Native American ancestry in their ethnicity reports. But you may not see that on your report for three reasons:

1. It isn't real. Many stories of a Native American ancestor in the family tree are myths.
2. The Native American ancestor is so far back that you don't have enough of his or her DNA to be detectable.
3. The Native American ancestor may have had a lot of European ancestors. This is especially true for Eastern tribes, such as Cherokee, which have been mixing with Europeans for 400 years.

These tests will not identify a specific tribe. Any tests that claim to do that are based on tiny samples and should be avoided.

*NOTE: Certain haplogroups will confirm that your direct maternal or paternal line is Native American.*

A DNA test alone does not guarantee automatic membership in a tribe. But if you really do

have recent Native American ancestry, some of your DNA matches may already be tribe members with knowledge of where your family fits in.

To learn more about tracing Native American ancestry see [this page](#) on the website of the U.S. Department of the Interior.

### **3. What About Health Testing?**

You may wish to see what your autosomal DNA says about your inherited risk for genetic disorders or your carrier status for diseases that could pass on to your children.

Just knowing your genetic risk can get you to assert more control over your health. Lifestyle changes may offset inherited tendencies. Plus, the added genetic information can also let you and your physician schedule appropriate screening tests.

Of the autosomal DNA tests noted here, [23andMe](#) and [MyHeritage DNA](#) are the only ones to directly offer health testing information. To get this you need to order the Health+Ancestry version of either test. Or you can do the Ancestry-Only version and pay an upgrade fee later.

Since health testing is regulated, the collection of health reports you get is determined by your country of residence. Depending on the test, you may see your genetic risk for condition like Parkinson's, Alzheimer's, heart disease or certain cancers.

Carrier Status reports check for things you could pass on to your children. This can be critical for couples planning to have children. If one of you proves to be a carrier for a certain harmful condition, the other one should be tested to make sure he or she is not also a carrier.

Another option is to download your raw data from any one of the autosomal DNA tests recommended here and upload it for a fee to a third-party site that analyzes the data for health implications. One such site is [Promethease](#).

Such sites typically lack clear laymen's explanations and do not include all the health reports in the Health+Ancestry tests.

If DNA analysis indicates a greater risk for a disease, do not panic. Genetics only accounts for a portion of the risk. Factors such as diet, exercise, obesity and smoking also come into play.

## OTHER DNA TESTS WORTH CONSIDERING

[Family Tree DNA](#) (FTDNA) offers several tests in addition to the Family Finder autosomal test. I have done them all and can recommend them for the purposes described here.

Since this company offers multiple tests, they will attempt to save the DNA from your first test for up to 25 years. When you order additional tests, you won't have to provide a new sample.

**Be sure to test your older relatives NOW on one of the FTDNA tests.** Have them name a beneficiary in their account. When even better DNA tests become available in the future, someone in the family can have the stored DNA tested.

*NOTE: A transfer of autosomal data from another test only gets you into Family Finder. They need an actual DNA sample to do any other test.*

### Y-DNA Testing

The Y chromosome passes from father to son with only an occasional mutation. [Y-DNA testing](#) can identify or confirm men in your **paternal** line.

Since surnames usually don't change along paternal lines, a man's closest matches in a Y-DNA database will often share his surname. That characteristic of a Y-DNA test will provide male adoptees with the surname of their biological father about 40% of the time.

Matches on a Y-DNA test will be labelled with a Genetic Distance number. The smaller the number (zero is best) the more likely that your common ancestor lived within a genealogical timeframe.

### Who Should You Test?

Only men have the Y chromosome necessary for this test. Yet females can often participate in Y-DNA testing by sampling a living male in their paternal line. This could be a father, a brother, a father's brother, or a son of a father's brother.

This test will also determine your Y-DNA haplogroup, which identifies the ancient origins of your direct paternal line.

*Note that haplogroups from direct Y-DNA testing are usually more precise than those included with some of the autosomal DNA tests.*

### How Many Markers to Order?

[Family Tree DNA](#) will test 37, 67, or 111 markers. 37 markers are adequate much of the time, though many men are now testing 67 markers. That means 67 is becoming the sweet spot for testing.

An upgrade to 111 markers is only useful if you have too many close matches on the first 67 markers. You can upgrade to more markers later without submitting a new sample.

## Y-DNA Summary Table

	Y Chromosome (Y-DNA) Test
<b>WHAT IS CHECKED</b>	A man's Y Chromosome inherited from father
<b>PRINCIPAL USES</b>	Find male relatives that share a common ancestor in your direct paternal line Confirm that a given man is in your paternal line Determine paternal line haplogroup for ancient ancestry
<b>STRENGTHS</b>	Your matches must share a common paternal line ancestor with you Matches can often reveal birth father's surname
<b>LIMITATIONS</b>	Only males can be tested. Only checks the paternal line Common ancestors may have lived hundreds of years ago The time to your most recent common ancestor can only be estimated
<b>RECOMMENDED TESTS</b>	Y-DNA 37 OR Y-DNA 67 at <a href="#">Family Tree DNA</a>

## Y-DNA SNP Testing

The traditional Y-DNA testing mentioned above looks at markers called STRs. Using a tree analogy to represent the paternal lineage of all human males, Y-STRs help you identify your family's leaf.

Y-SNPs, on the other hand, define branches on the male tree. The larger branches split thousands of years ago and have continued to split into smaller branches. We describe all this branching with haplogroups and subclades.

While SNPs have been always tied to our ancient ancestry, they have not been relevant to genealogy. But that is changing.

New tests such as Family Tree DNA's "[Big Y-700](#)" test, are now uncovering thousands of previously unknown SNPs. Many of these define more recent branches and some may even be able to distinguish among different families with the same surname.

## Cutting Edge Research

SNP testing is NOT for beginners. It's on the cutting edge of genetic genealogy. The Big Y-700 test costs several hundred dollars and interpreting your results is an advanced activity.

But if you've already learned as much as you can from Y-STR testing and want to participate in a new science adventure, log into your account at [Family Tree DNA](#) and order the Big Y test.

## **Mitochondrial DNA Testing**

The test that connects people in the **maternal** line is the [mitochondrial DNA](#) (mtDNA) test. Since a mother passes on her mtDNA to ALL her children, both males and females can take this test.

You may discover a lot of matches in a database of mtDNA test results. But mitochondrial DNA mutates more slowly than Y-DNA, which means matches may not be as meaningful.

Plus, a female's surname typically changes every generation. Because of these factors, the common ancestors responsible for mtDNA matches may be more difficult to identify than in the case of YDNA testing.

The best use of mtDNA testing is often to confirm whether or not two people share a specific common ancestor in their direct maternal lines.

### **The Ultimate mtDNA Test**

While the basic mtDNA test will identify your base haplogroup, telling you where in the world your direct maternal line lived tens of thousands of years ago, you need to do the [mtFullSequence test](#) at Family Tree DNA to have any genealogical significance. This is the only mtDNA test that covers 100% of your mitochondrial DNA.

## Mitochondrial DNA Summary Table

	<b>Mitochondrial DNA (mtDNA) Test</b>
<b>WHAT IS CHECKED</b>	Mitochondrial DNA inherited from mother
<b>PRINCIPAL USES</b>	<p>Find relatives that share a common ancestor in your direct maternal line</p> <p>Confirm that a given person is in your maternal line</p> <p>Determine maternal line haplogroup for ancient ancestry</p>
<b>STRENGTHS</b>	Your close matches share a common maternal line ancestor with you
<b>LIMITATIONS</b>	<p>Only checks the maternal line</p> <p>Surname changes increase the difficulty of finding common ancestors</p> <p>Common ancestors may have lived thousands of years ago</p> <p>The time to your most recent common ancestor is uncertain</p>
<b>RECOMMENDED TESTS</b>	<u><a href="#">mtFullSequence at FamilyTreeDNA</a></u>

## YOUR OVERALL TESTING STRATEGY

Invest most of your time and money with the autosomal DNA tests: [AncestryDNA](#), [Family Finder](#), [23andMe](#), and [MyHeritage DNA](#).

If you are interested in a direct paternal line and have a suitable male to test, order the 37-marker or 67-marker Y-DNA test at [Family Tree DNA](#).

For a more detailed breakdown of European ethnic ancestry, consider the [Living DNA](#) test. It's already breaking down British ancestry into subregions. If additional research proceeds as planned, it could become quite useful for measuring continental European ancestry as well.

Treat mtDNA testing as your lowest priority, unless you have a specific goal to prove or disprove that two people share a direct maternal line ancestor.

### Stick with the Top Companies

You can accomplish all your genetic genealogy goals by testing with the companies mentioned in this Guide.

No other companies offer a comparable autosomal test...and those that offer Y-DNA or mitochondrial DNA testing have far smaller databases and less robust comparison tools.

### Don't Waste Your Money

Many companies are still offering old-technology tests that don't live up to their promises. One example is the so-called "sibling" or "kinship" test that can only **estimate** the probability of certain close relationships based on a handful of markers.

Such tests are inconclusive at best and misleading at worst.

Instead, use one of the new autosomal tests described here and you will **measure** the amount of DNA two people have in common.

There is an old-technology test with a name that is quite like AncestryDNA that is often advertised through Groupon. Don't fall for it. Use the links in this Guide to ensure that you are getting to the correct tests.

Avoid any DNA test that claims to place you in a specific tribe, either Native American or African, or promises to trace your ancestry to a specific village. Such tests are based on very small samples and the results are more wishful thinking than science.

Also beware of DNA tests that claim to help with dieting, exercise, skin care etc. There is no sound science behind such claims.

### Review Your Account Settings

Each DNA test offers some options through your personal account settings. For example, if you are interested in your ethnicity breakdown but don't want your DNA to be compared

with other users, you can turn off matching.

Some companies share anonymous genetic data with other companies doing medical research. A couple of databases will cooperate with law enforcement to identify murder victims or perpetrators of violent crimes. Such secondary applications are noble causes that help society as a whole and I am happy to participate. But if you don't feel that way, you can opt out through your settings. In some databases you are opted out by default and need to opt in if you wish to help.

## WHERE TO LEARN MORE

Fortunately, there is so much interest today in genetic genealogy testing that many resources have appeared to help genealogists and adoptees understand these tests. Powerful methods and tools have also been developed to help you work more easily and more productively with your test results.

### BOOKS

I recommend the following books. All are available on Amazon and some other booksellers.

#### [\*The Family Tree Guide to DNA Testing and Genetic Genealogy\*](#)

By Blaine Bettinger

This 240-page book is the most complete and up-to-date resource on genetic genealogy. While some material is too advanced for raw beginners, you will want this comprehensive book on hand as you work your way through the DNA testing process. Available in both print and Kindle editions.

#### [\*NextGen Genealogy: The DNA Connection\*](#)

By David Dowell

This is another recent textbook on genetic genealogy. Unfortunately, this great book is priced like a textbook. If it's too costly for you, I suggest you ask your local library to purchase the book. Available in both print and Kindle editions.

#### [\*Genetic Genealogy: The Basics and Beyond\*](#)

By Emily D. Aulicino

This is another recent book on genetic genealogy. Although it's not as tightly written as the above books, it has good information and plenty of examples. Available in both print and Kindle editions. The Kindle edition is a real bargain.

#### [\*Advanced Genetic Genealogy: Techniques and Case Studies\*](#)

Debbie Parker Wayne (Editor)

If you are really into genetic genealogy and have learned all you can from the more basic books, you will want this book. It is not for beginners.

### WEBSITES

If you want to explore specific DNA topics in depth online, there are several websites you can visit.

#### **International Society of Genetic Genealogy**

The [ISOGG](#) website contains a huge amount of information on genetic genealogy. The site includes a great Wiki where you can look up subjects of interest.

## **DNA Testing Companies**

Each testing company includes some educational resources on its website. To learn more or to order one of the DNA tests I've discussed in this guide, visit one of the following testing company websites:

[Ancestry DNA](#)

[Family Tree DNA](#)

[23andMe](#)

[MyHeritage DNA](#)

[Living DNA](#)

## **FACEBOOK GROUPS**

Facebook is today's epicenter of online discussions about genetic genealogy. You can learn a great deal just by joining certain groups and following the discussions. Then jump in with specific questions to get answers and other help. Here are some of the most popular:

### **DNA Newbie**

The [DNA Newbie](#) group is perfect for beginners. Join, follow the discussions, and post your questions.

### **Genetic Genealogy Tips & Techniques**

The [Genetic Genealogy Tips & Techniques](#) group is designed for people who have already tested and want to wring every bit of information out of their DNA test results.

### **International Society of Genealogy (ISOGG)**

You can [Join ISOGG](#) for free. Then you can join their [ISOGG Facebook Group](#). All the genetic genealogy experts are members and the ISOGG discussions tend to be at the intermediate or advanced level.

### **DNA Detectives**

The [DNA Detectives](#) group is where adoptees will find DNA-savvy search angels. Members of this group have solved countless adoption mysteries, usually for free.

## **THIRD-PARTY DNA TOOLS**

Once you start getting DNA matches, these mostly free websites can play an important role in helping you use your data more productively and uncover new connections.

## **GEDmatch**

[GEDmatch](#) accepts raw data uploads from all the autosomal DNA tests. If you have only done some of them, you will uncover additional matches here. Even if you have done them all, this site has many useful tools to analyze your DNA and automatically compare your family tree with those of others. If you have questions, see the [GEDmatch User Group](#) on Facebook.

## **DNA Adoption**

The [DNA Adoption](#) website was created by adoption search angels, genetic genealogists, and IT professionals. You learn a powerful methodology and gain access to custom tools that make it easier to implement. They also offer reasonably priced online classes. The site is popular with genealogists as well as adoptees.

## **DNA GEDCOM**

[DNA GEDCOM](#) is a sister site of DNA Adoption and has more documents and tools to interpret the results of DNA tests.

## **DNA PAINTER**

[DNA Painter](#) provides a user-friendly tool for chromosome mapping. Discover which ancestors gave you specific segments of your DNA.

## **THE LEEDS METHOD**

The [Leeds Method](#), developed by Dana Leeds, lets you easily visualize matches through color clustering.

## **GENETIC AFFAIRS**

[Genetic Affairs](#) offers the AutoCluster tool that groups together your DNA Matches into clusters of matches that most likely descend from common ancestors.

## A FINAL NOTE

I encourage all genealogists to get involved in genetic genealogy. As the primary databases get bigger, all of us benefit by getting more and closer matches. Furthermore, since adoptees have no family trees to start with, we depend on the family trees of our genetic matches to provide critical breakthroughs.

If you are contacted by an adoptee DNA match, I implore you to do all you can to help that person. Someone in their first family may also be searching for that lost child and it is immensely satisfying to help them reunite.

I occasionally share highlights of my story and/or present a DNA workshop to genealogy groups, libraries, conferences and other gatherings. If you would like me to speak to your group—and you have the budget to get me there from Michigan—contact me through the [Contact Form](#) on my website.

To learn more or to sign up for my e-newsletter, visit my [DNA Testing Adviser](#) website. You can also follow current DNA, genealogy and adoptee news on my [Facebook Page](#).

Thank you,

Richard Hill

