

Using DNA Testing to Uncover Native Ancestry

Janine Cloud
FamilyTreeDNA

Introduction

One of the most common reasons for people to take a DNA test is to see if their family stories of Native American ancestors is true or just that – stories. Unfortunately, proving descent from indigenous Americans is difficult even with DNA testing, and disproving it is almost impossible. Even when said heritage shows in the test results, it cannot reveal tribal affiliation based on the data alone.

Inheritance patterns

- **Y chromosomal DNA - passed from father to son.**
 - Since women do not typically have Y chromosomes, their children typically cannot inherit Y-DNA from their mothers.
 - If the Native American ancestry was from off the direct paternal line, it won't show.
- **Mitochondrial DNA (mtDNA) - passed from mother to child.**
 - Men have mtDNA but their children typically do not inherit it from them.
 - If the Native American ancestry was from off the direct maternal line, it won't show.
- **Autosomal DNA - passed 50% from each parent. Unless they are identical twins, siblings do not inherit the exact same 50% as each other.**
 - Each parent gives to their children 50% of the randomly recombined DNA they inherited from their parents, who inherited 50% of the randomly recombined DNA of their parents.
 - Children generally share about 25% of their DNA with each of their grandparents, but with each successive generation, the actual inherited percentage varies from the mathematical potential percentage inherited.
 - Ancestry-informative markers (AIMs) are not inherited in exact ratios.
 - For the purposes of population genetics, individual data is compared to reference populations and matched to the references the data most closely resembles.

Limitations of DNA testing in proving Native American ancestry - by the numbers

I am a registered member of the Cherokee Nation. My eligibility for enrollment was proven by birth and death certificates to my paternal grandfather, who was listed on the Dawes Rolls. Blood quantum is not a condition of enrollment, only the ability to prove a direct line descendency from

an enumerated tribal member. To prove my heritage using DNA would be complex in my situation, which is not unique among admixed Native Americans.

- ❖ **My mother** (Maggie Edrie White) was not Native American at all, so **my own mtDNA** would not reveal anything along those lines.
- ❖ **My father's mother** (Gilletha Ethel Griffin) was not known to be Native American at all, so my **father's mtDNA** would not be expected to have a Native haplogroup.
- ❖ **My father's direct paternal great-grandfather** (James Monroe Cloud), testified before the Dawes Commission that he was not Cherokee by Blood, but by marriage, so **my father's Y-DNA** would not reveal a Y-DNA haplogroup.

Y-DNA and mtDNA on my immediate relatives will not work for this. That leaves autosomal DNA. **By blood quantum we've established I should be approximately 9.8% (13/128ths)**, but that's not what the ancestral origins portions of any of the autosomal tests I've taken show.

<u>My Heritage</u>	<u>Ancestry current</u>	<u>FamilyTreeDNA</u>
Mesoamerican and Andean 7.1%	Indigenous Americas-North 5%	Americas 3%
<u>23andMe current</u>	<u>Ancestry previous</u>	<u>LivingDNA</u>
Indigenous American 4.3%	Native American North, Central, South 5%	Mesoamerica 3.2%

Additional illustrations from testers with confirmed Native American ancestry

Several family members on my father's side have tested with only FamilyTreeDNA. Their results further illustrate the random nature of DNA recombination and the ambiguity of Native reference populations. My son and the son of one of my half-siblings, both adults, have each tested but their results include documented Native American ancestry from their respective fathers. However, I have included them in the table below for reference.

My nephew's father is registered with a North American tribe. My son is a registered Cherokee, of course, but his paternal grandmother's family is from Mexico, so he gets some Native admixture from her. His paternal grandfather's family lore includes Cherokee ancestry, but none shows in his admixture (or in the paper trail so far, either), so my son could not have inherited any from him.

Father's generation	Uncle No. 1 Americas 11%	Uncle No. 2 Americas 7%
My generation	Half-sibling No. 1: Americas < 1%	Half-sibling No. 2 Americas 2%
Next generation	Half-sibling No. 1's child Americas 2%	My son Americas 6%

As you can see, random recombination makes a huge difference in the amount of autosomal DNA passed down generation by generation. Had my son and his cousin not gotten Native American markers from their respective fathers, they might not have shown as Native at all. And look at the variation in the regions assigned to each person...there is little consistency in how the markers compare to the reference populations, so assigning tribal affiliation based on such broad associations would be impossible.

Summary

Unless Native American ancestry is along the tester's direct maternal or direct paternal line, Y-DNA and mitochondrial DNA will be of no use in showing it. Autosomal DNA may show it, depending on how many generations back to the full-blood Native American ancestor(s). If that ancestor is at the second-great-grandparent level or closer, chances are good that the ethnicity estimates will show it, though no tribal affiliation can be determined at this point in the development of the science. Finding the right people to test can increase the chances of proving Native ancestry via DNA testing.

Useful Terms

Admixture - Blending of two or more genetically distinguishable groups.

<https://www.well.ox.ac.uk/~gav/admixture/2014-science-final/resources/FAQ.pdf>

Ancestry Informative Markers - Genetic polymorphisms that occur in specific populations.

<https://www.genome.gov/glossary/index.cfm?id=530>

Blood quantum - Numerical designation of amount of Native American ancestry inherited.

Certificate of Degree of Indian Blood (CDIB) document issued by the Bureau of Indian Affairs listing blood quantum from a federally recognized tribe.

https://www.bia.gov/sites/bia.gov/files/assets/public/raca/online_forms/pdf/CDIB_1076-0153_Exp3-31-21.pdf

Recombination - Exchange of genetic material between genes or genetic regions.

<https://www.nature.com/scitable/topicpage/genetic-recombination-514>

Resources

- Native American Y haplogroups are, broadly, C and Q, though not all subclades are Native. Several pieces on C and Q are linked in Roberta Estes' blog DNA-Explained: <https://dna-explained.com/native-american-dna-resources/>
- Native American mtDNA haplogroups are, broadly, A, B, C, D, and X. A comprehensive list can be found in here: <https://dna-explained.com/2013/09/18/native-american-mitochondrial-haplogroups/>
- National Institute of Health Genetics Home Reference <https://ghr.nlm.nih.gov/chromosome/Y>
- National Archives Native American Heritage <https://www.archives.gov/research/native-americans>
- National Archives Dawes Rolls <https://www.archives.gov/research/native-americans/dawes/tutorial/intro.html>
- FamilyTreeDNA Learning Center <https://learn.familytreedna.com/>
- FamilyTreeDNA Blog posts:
 - <https://blog.familytreedna.com/videos-myorigins-3-0-explained/>
 - <https://blog.familytreedna.com/myorigins-3-0-white-paper/>
- Guide to Tracing Your American Indian Ancestry <https://www.bia.gov/sites/bia.gov/files/assets/foia/ois/pdf/idc-002619.pdf>
- Certificate Degree of Indian Blood (CDIB) Application & Instructions https://www.bia.gov/sites/bia.gov/files/assets/public/raca/online_forms/pdf/1076-0153_CDIB%20Form_Expires%2011.30.2024_508.pdf
- Indian Entities Recognized by and Eligible To Receive Services From the United States Bureau of Indian Affairs <https://www.federalregister.gov/d/2020-01707>
- Tribal Leaders Directory <https://www.bia.gov/service/tribal-leaders-directory>