Genetic "Markers" – Not a Valid Test of Native Identity

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Across the country, there is currently a lot of interest in the prospects of using genetics to determine whether somebody is really Native American. This interest has arisen in many contexts—from determining whether ancient remains are Native American for purposes of repatriation to groups of people who are seeking recognition as an Indian tribe by the United States government, to individuals who think they might have American Indian ancestry and would like to find a way to "prove" it. There are even several companies that claim to be able to help people determine their Native American heritage with genetic analysis. In the notorious case of "Kennewick Man", geneticists were charged with the impossible task of identifying him racially and tribally, and were of course unsuccessful, in spite of having destroyed some of the remains to do the tests.

But there are problems with using genetics to determine whether or not one has Native American ancestry, and/or alternatively to determine tribal membership. The most obvious problem is that being Native American is a question of politics and culture, not biology—one is Native American if one is recognized by a tribe as being a member. And one is not necessarily a member of a tribe simply because one has Native American ancestors. Another problem is that genetic analysis, and some of the processes involved, can be problematic for indigenous people in terms of their own cultural knowledge. Put simply, there are things involved in genetic analysis that some indigenous cultures consider violations of their principles or values.

But the point that is frequently lost in the debate about using genetic analysis to determine whether one is Native American is that the genetic analysis itself is not conclusive, even on strictly scientific terms. This article will explain the scientific shortcomings of trying to use genetic analysis to prove native identity. It is limited to the scientific shortcomings, but the real legal, political, social, and moral issues should also not be ignored.

The Theory: Native American Genetic Markers

First, an explanation of the theory behind using genetics to determine Native American identity is in order. Scientists have found certain variations, or "markers" in human genes that they call Native American markers because they believe all "original" Native Americans had these genetic traits. The theory is that, if a person has one of these markers, certain ancestors of the person must have been Native American.

The markers are principally analyzed in two locations in people's genes— in their mitochondrial DNA and on the Y-chromosome. On the mitochondrial DNA, there are a total of five different "haplotypes", called A, B, C, D, and X, which are

increasingly called “Native American markers,” and are believed to be a genetic signature of the founding ancestors. As for the Y-chromosome, there are two primary lineages or “haplogroups” that are seen in modern Native American groups, called M3 and M45. Some scientists maintain that up to 95% of all Native American Y-chromosomes are from these two groups (with the rest being from either Asian lineages or non-native haplogroups). It must be pointed out that none of these markers is exclusive to Native American populations—all can be found in other populations around the world. They simply occur with more frequency in Native American populations.

Y-chromosome and mtDNA markers are the most commonly used genetic markers used for analysis of Native American ancestry. But how does testing for these genes work?

Mitochondrial Analysis for Native American Marker Genes

Both females and males inherit their mitochondrial DNA (mtDNA) only from their mother. This line of biological inheritance, therefore, stops with each male. That means that, if you think of your 4 great-grandmothers, you and all your brothers and sisters have inherited your mtDNA only from your maternal grandmother’s mother. Your other 3 great-grandmothers and your 4 great-grandfathers have contributed none of your mtDNA. If you are female, you and your sisters will, in turn, transmit that great-grandmother’s mtDNA to all your children, but your brothers won’t transmit it to their children. In other words, your mtDNA is identical to that of your mother’s mother’s mother, but does not constitute a biological line of descent from your other 7 great-grandparents. If that great-grandmother happened to have the genetic variations that have been labeled as either A, B, C, D, or X, then by having the same mtDNA yourself, you will have inherited a “Native American” mtDNA marker.

Of course, if all your other great grandparents were Native American, and your mother’s mother’s mother was non-Indian, then you will not likely have one of the “Native American” mtDNA haplotypes. So, 7 of your 8 great-grandparents may be Indian, and yet you would not be identified as Indian from this test. Moreover, it really goes farther than that, since the mtDNA only comes from the purely maternal line. If you go back two more generations, 31 of your 32 great-great-great grandparents could be Indian. Yet you could not be identified as Native American using this test if that one of your 16 (great-great-great) grandmothers who is part of your female lineage was not Native American (or more specifically if her mother did not have one of the five haplotypes called “Native American.”) Keep going back further, and still only a single one of your female ancestors is detectable, while the number of ancestors invisible to this test increases enormously.

Y-Chromosome Analysis for Native American Markers

Males inherit a close copy of their Y-chromosome from their fathers. Females do not have a Y-chromosome. So males could also be tested for "Native American markers" on their Y-chromosome, but the analysis has similar limitations as testing mtDNA. Here again, the test only traces one line of ancestry, and misses most of the subjects' ancestry because the vast majority of the ancestors are invisible to the test. If a man has 15 Native American great-great-grandparents, but his father's father's father's father was non-Indian, that person will not appear to be Native American under this test. So, almost 94% of that person's genetic inheritance may be from Native Americans, but under this test he may be identified as "non-Indian". And, like mtDNA analysis using the purely maternal line, using Y-chromosome analysis to determine Native American ancestry ignores a greatly increasing percentage of a person's ancestry as you go more generations into the past with the analysis.

The Tests Yield False Negatives

The discussions of mitochondrial and Y-chromosome testing for Native ancestry have already indicated that it is very easy to get a false negative using these tests-- there is a very high chance of someone having a significant amount of their ancestry being Native American, and yet appearing to be non-Native according to the test. All it takes is one non-Native person located in the proper position in a person's ancestry. A woman's mother's grandmother could be non-Indian, and all her 7 other great grandparents Indian, and the test will still show the woman as non-Indian.

There is another possibility of false negatives from these types of tests as well. This other type of false negative would arise if some Native American people simply do not have one or more of the "Native American" markers. Scientists have not tested all native people, so they do not know for sure that Native Americans only have the markers they have identified, if their maternal or paternal bloodline does not include a non-Indian. Real peoples are not bound by the geneticist's ideal of purity. The scientists already admit to some of this uncertainty when they estimate that, for example, 95% of Native American men without a known non-Native in their purely paternal line (father's father's father, and so on) have one of the two "Native American" variations they have identified. This implies that at least 5% of the men can have other genetic markers.

The Tests Also Yield False Positives

Some of the haplotypes attributed to Native Americans are also found in people from other parts of the world. A, B, C, and D are found in North Asia, and X is found in southern Europe and Turkey. In fact, the principal marker of haplotype B

is called the "9 base pair deletion," and is found in some Japanese and almost all Samoans. Could they then be classified as genetically Native American? These tests cannot even establish with certainty that, for example, someone's mother's mother's mother was Native American—they can at best establish a certain probability that this was the case.

Tribes Do Not Differ From One Another In Ways That Geneticists Can Detect

Another issue is the widespread belief that genetics can help determine specific tribal affinities of either living or ancient people. This is quite simply false. Neighboring tribes have long-standing complex relationships involving intermarriage, raiding, adoption, splitting, and joining. These social historical forces insure that there cannot be any clear-cut genetic variants differentiating all the members of one tribe from those of nearby tribes. At most, one can identify slight differences in the proportions of certain genetic variations in each group, but those do not permit specific individuals to be assigned to particular groups.

CONCLUSION

The concept of genetic testing to prove Native American ancestry is one that is discussed more frequently in recent times, but there are many problems with the idea. Perhaps foremost of these problems is that to make a genetic test the arbiter of whether someone is Native American or not is to give up tribal sovereign ability to determine membership and relations. But even taken on their own scientific terms, the tests cannot do much to identify who is and who is not Native American. This is because they yield many false negatives and false positives (they readily misidentify non-Native people as Native, and misidentify Native people as non-Native), and the positive results they do yield at best are only probabilities, not certainties. If these were medical diagnostic tests, they would never be approved or adopted.

But the most important argument against this type of testing to establish tribal affiliations is that biology (and genetics) track just part of our tribal inheritance. These DNA tests treat "Native American biology" as though all Indians were essentially the same. But in reality, our traditions make us who we are, not just our biology.