



mtDNA Regions and Common Ancestor Matches				
Segment name	HVR1	HVR2 and HVR1	HVR3 and HVR2 and HVR1	Full mtDNA Sequence (FMS)
Resolution	Low resolution	Medium resolution	Medium resolution	High resolution
Locations tested	350 to 570 individual locations between positions 15,841 to 16,569	267 to 580 individual locations between positions 1 and 579	About 200 individual locations between positions 340 to 720  Some companies include this in HVR2	Entire mitochondrial molecule, locations 1 to 16,569
Common ancestor computations	50% chance there is a common ancestor within 52 generations for two people with exact matches  (1300 years at 25-year generations)	50% chance have a common ancestor within 28 generations for two people with exact matches  (700 years at 25-year generations)		95% chance you have a common ancestor within 22 generations or a 50% chance you have a common ancestor within 5 generations for two people with exact matches <sup>a</sup>
a. See table below for definitions of regions. "How do I tell how closely I am related to a mitochondrial DNA (mtDNA) match?," Learning Center, <i>Family Tree DNA</i> ( <a href="https://www.familytreedna.com/learn/mtdna-testing/tell-closeness-relationship/">https://www.familytreedna.com/learn/mtdna-testing/tell-closeness-relationship/</a> ); (used to state 90% chance common ancestor within 16 generations).				

Family Tree DNA mtDNA Match List Thresholds		
mtDNA (HVR1)	Exact matches in the same haplogroup	Exactly the same results for all markers compared ( <a href="https://www.familytreedna.com/learn/faq-items/exact-match/">https://www.familytreedna.com/learn/faq-items/exact-match/</a> – see also the “What is SmartMatching?” section.)
mtDNAPlus (HVR1 & HVR2)	Exact matches excluding 309 and 315	( <a href="https://www.familytreedna.com/learn/faq-items/exact-match/">https://www.familytreedna.com/learn/faq-items/exact-match/</a> – see also the “On the mtDNA – Matches page, are only exact matches shown?” section.)
mtFull (Full mtDNA sequence)	0–3 step matches including heteroplasmy, but excluding 309 and 315	Locations 309 and 315 are excluded as these frequently exhibit insertions / deletions.

Native American mtDNA Haplogroups – Some, but not all, subgroups of ABCDX <sup>1</sup>			
A – Many A1 – Mexican A2 [many subgroups] A4, A4a, A4b, A4c	B – Many B1 – Mexican B2 [many subgroups] B4 [many subgroups]	C – Many including Turkey, Poland C1 – Native, Mexican [many subgroups] C2, C2b C4 [many subgroups]	D – Choctaw, Mexico, Venezuela, Korea, Japan D1 [many subgroups] D2 [many subgroups] D3, D3a2a – Inuit, Canada, Greenland D4 [many subgroups]
Under investigation M [many subgroups] M, M1a, M1a1e, M1b1, M23, M3, M30c, M51, Mrb3e, M7b1'2, M9a3a	X X2 [many subgroups] X6 - Mexico		

## HETEROPLASMY

- Many mitochondria exist in each cell. When some mitochondria have a different allele (GCAT) at the same location as other mitochondria (or is in the process of mutating), it is possible the lab process may detect multiple values. This is called a heteroplasmy. A child may inherit only unmutated mtDNA, only mutated mtDNA thereby passing the mutation to all descendants, or both mutated and unmutated mtDNA. Heteroplasmies can be seen across many generations. Family Tree DNA now reports heteroplasmies at the 20% detection level; prior to April 2013 heteroplasmies at the 25% detection level were reported.<sup>2</sup>
- Family Tree DNA uses this nomenclature to indicate the state of a heteroplasmy:

Symbol	Meaning	Symbol	Meaning
U	U (Uracil)	S	C or G
M	A or C	Y	C or T
R	A or G	K	G or T
W	A or T	V	A or C or G
H	A or C or T	B	C or G or T
D	A or G or T	X	G or A or T or C
N	G or A or T or C <sup>a</sup>		

a. "How do I know if I have an mtDNA (Mitochondrial DNA) heteroplasmy? What is the nomenclature?" Learning Center, *Family Tree DNA* (<https://www.familytreedna.com/learn/mtdna-testing/heteroplasmy-nomenclature/>).

<sup>1</sup> Roberta Estes, "Native American Mitochondrial Haplogroups," *DNA-eXplained* blog, posted 18 September 2013 (<http://dna-explained.com/2013/09/18/native-american-mitochondrial-haplogroups/>). and "New Native Mitochondrial DNA Haplogroups Extrapolated from Anzick Match Results," posted 24 September 2014 (<http://dna-explained.com/2014/09/24/new-mitochondrial-dna-haplogroups-extrapolated-from-anzick-match-results/>).

<sup>2</sup> Ann Turner, "Now You See It, Now You Don't: Heteroplasmy in Mitochondrial DNA," Satiabile Curiosity column. *Journal of Genetic Genealogy* 2(2006) (<http://www.jogg.info/21/SatiabileCuriosity.pdf>): iv-v. "Heteroplasmy," *ISOGG Wiki* (<http://www.isogg.org/wiki/Heteroplasmy>). "What percentage or amount of mitochondrial DNA (mtDNA) heteroplasmy is needed in order to be detected and reported by Family Tree DNA?" Learning Center, *Family Tree DNA* (<https://www.familytreedna.com/learn/mtdna-testing/percentage-amount-mitochondrial-dna-mtdna-heteroplasmy-needed-order-detected-reported-family-tree-dna/>).