

Angela Hughes <Angela.Hughes@mss.effem.com>
Summary of Tony's Wisdom Panel re-analysis
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Dear Howard,

Per your request I am summarizing the re-analysis of Tony's Wisdom Panel results and our discussion. As we discussed, the original analysis for Tony reported German Shepherd as the grandparent level on one side and German Shepherd and Rottweiler at the great-grandparent level on the other side of his ancestry. For the re-analysis the computer spends about an hour and analyzes Tony's DNA data from scratch again and gives me the output in two forms. The first is each of the best possible pedigrees starting with what would Tony most likely be if he was a single breed, then if he were two breeds, three breeds, etc. For each of these pedigrees the computer gives a statistical score for how well it matches to Tony's DNA data and the pedigree with the best match is the one reported overall. This analysis also gives a breakdown by chromosome which breeds match Tony the best. Using all of this information, I can evaluate the data and confirm the breeds reported.

The re-analysis also picked the same pedigree tree as before with the German Shepherd as his best breed match overall followed by Rottweiler and these two breeds are consistently included in the different ancestry trees built. Beyond these breeds, Tony has smaller matches to a number of breeds. When this is the case, it can be more difficult to decide which breeds are really in Tony's lineage, however looking at all the trees built by the computer as well as the chromosomal analysis, I think that the other breeds that are more likely to be in his ancestry include the hounds like the Dachshund and Beagle and terriers, particularly the Scottish Terrier. These breeds would likely be 3 to 4 generations back in his ancestry if they are involved. Also as we talked about, there are some small matches to the Catahoula Leopard Dog, so while I cannot rule it out in Tony's more distant ancestry, it certainly does not appear to be a recent contributor to Tony and we are not seeing any matches to the Australian Cattle Dog (aka Heeler).

I like to look at mixed breed dogs by the genes involved in their traits. Tony has the gene for yellow which is a recessive trait (need two copies of the gene to show it) and could be coming from the any of the breeds called. He also has the gene for black since his nose, eye rims, and likely the pads on his feet are black, which is a dominant trait (only need one copy of the gene to show it) and could be coming from all the breeds called. On top of the yellow coat, Tony has two dominant traits: the saddle and brindle. The saddle gene is found in the German Shepherd and many of the hounds like the Beagle while the brindle gene is rarely seen in the German Shepherd but more commonly found in hounds (Beagles and Dachshunds can carry it) and terriers including the Scottish Terrier. He also has short hair which again is a dominant trait and has been recently associated with the FGF5 gene for most breeds. When the FGF5 gene is working normally, the FGF5 protein tells the hair to stop growing and shed which results in a short haired dog, however, when a dog has two "broken" or mutated copies of FGF5 it can't tell the hair to stop growing at the right time and so the hair continues to grow until other genes take over and tell it to stop. So while Tony may have a longer haired ancestors (longhaired German Shepherd, Scottish Terrier) he has obviously received at least one normal copy of the FGF5 gene from his shorter haired ancestors (shorthaired German Shepherd, Rottweiler, hounds). Also as we discussed, there appear to be a number of genes involved in head and ear shape/size that are still being identified (I predict that we will find at least a few of them in the next year or two as a couple of researchers are very close). Needless to say, the genes generally appear to act co-dominantly (meaning they act together rather than having one dominant over another). For example, when you breed a long nosed dog to a short nosed dog, you get puppies with an intermediate length muzzle. So what I do is picture the head shapes of all the breeds and picture the intermediate head shape and size. Thus, Tony's head will be intermediate to the breeds that contributed with a muzzle that longer due to the influence of the German Shepherds but likely a little shorter than the typical German Shepherd due to the shorter muzzle of the Rottweiler and other breeds involved.

Obviously Tony is a very unique and special dog (and so adorable!). I hope my explanation is clear and provides some insights into his traits. If you have any further questions about him, please let me know. I can be reached by email at Angela.Hughes@marsveterinary.com or by phone at 530.416.2211.

Best regards,

Angela Hughes DVM PhD

Angela Hughes DVM PhD
Veterinary Genetics Research Manager
Mars Veterinary
T: 530-416-2211 | F: 301-444-7901