Genetic testing shows Neanderthals less diverse than modern humans

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Homo neanderthalensis, adult male. Credit: John Gurche, artist / Chip Clark, photographer

(Phys.org) —A large team of researchers with members from Europe, the U.S. and China has found evidence that suggests modern humans are more genetically diverse than were Neanderthals. In their paper published in *Proceedings of the National Academy of Sciences*, the team describes genetic studies they did on Neanderthal specimens from three separate locations and compared them against one another to highlight differences. They report that Neanderthals were much less diverse than modern humans suggesting they lived more isolated lives.

Neanderthals, once one of our closet living relatives, split off on the family tree approximately 550,000 to 765,000 years ago, though recent evidence suggests there was intermingling before Neanderthals, for

whatever reason, disappeared. They are considered to be an extinct species of human beings, of the genus *Homo*. They lived throughout Eurasia, from Western Europe to Central and Northern Asia, and may have died out as recently as 45,000 years ago (the date is still in dispute.) They have been in the news of late as scientists have discovered that Neanderthals and modern humans interbred— approximately 1.5 to 2.1 percent of the genomes of modern non-African people today is Neanderthal. In this new effort the research team sought to learn more about the Neanderthal people by examining their DNA and comparing it with groups living in different regions and with modern humans.

The team collected Neanderthal genome samples from specimens discovered in Spain, Croatia and southern Siberia focusing on 17,367 specific genes that are responsible for generating proteins, and in particular, mutations in those genes that create changes in amino acids.

Under analysis, the DNA revealed a less diverse gene pool suggesting that Neanderthals lived in small groups and didn't tend to interact with other groups. It also showed that Neanderthals underwent more skeletal changes than modern humans, though modern humans underwent more pigmentation and apparent behavioral changes than did Neanderthals. The team also identified amino acid substitutions in Neanderthals and modern humans that may underlie phenotypic (composites of an organism's physical traits and behaviors) differences between the two groups.

Nothing in the DNA analysis led to any discoveries regarding the demise of Neanderthals, though the researchers suggest more study could offer more information on the their history.

More information: Patterns of coding variation in the complete exomes of three Neandertals, Sergi Castellano, *PNAS*, 2014. DOI: 10.1073/pnas.1405138111

Abstract

We present the DNA sequence of 17,367 protein-coding genes in two Neandertals from Spain and Croatia and analyze them together with the genome sequence recently determined from a Neandertal from southern Siberia. Comparisons with present-day humans from Africa, Europe, and Asia reveal that genetic diversity among Neandertals was remarkably low, and that they carried a higher proportion of amino acid-changing (nonsynonymous) alleles inferred to alter protein structure or function than present-day humans. Thus, Neandertals across Eurasia had a smaller long-term effective population than present-day humans. We also identify amino acid substitutions in Neandertals and present-day humans that may underlie phenotypic differences between the two groups. We find that genes involved in skeletal morphology have changed more in the lineage leading to Neandertals than in the ancestral lineage common to archaic and modern humans, whereas genes involved in behavior and pigmentation have changed more on the modern human lineage.