Virus DNA first found in Neanderthal genome identified in modern humans

19 November 2013, by Bob Yirka

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

(Phys.org) —An ancient retrovirus that altered the DNA of Neanderthals and Denisovans has now been found to have left alterations in modern human DNA as well—in some cancer patients. The team of researchers from the U.K. that made this startling discovery has written about what they've uncovered in a paper published in the journal *Current Biology*.

Scientists have known for many years that some viruses can impact not just the general biology of animals (and humans) but can make their way into their genome, causing changes to strands of DNA. Those changes can then be passed on to offspring. To date, no such strands have ever been found to cause ailments in humans, however.

In June of 2012, another team of researchers discovered changes that had come about in Neanderthal and Denisovan DNA due to an ancient retrovirus. The virus left evidence of its existence in a parts of the genome known as "junk" sequences—so named because they don't hold any information related to creating proteins—they don't appear to do anything. That team found 14 unique instances of such virus evidence. Intrigued, the team then looked to see if any of the 14 existed in modern human DNA. Their cursory inspection didn't find any matches.

In this new research, the team in Britain took a much closer look, and in doing so, found 7 matches—but only in cancer patients. More specifically, they took DNA samples from 67 people, all of whom had some form of cancer. In studying the samples, the researchers found that every single one of the cancer patients had seven of the virus sequences that matched those found in Neanderthal and Denisovan DNA last year.

The findings by the team suggest that there might be a link between people with the ancient virus information stored in their junk sequences and a tendency to get cancer. The researchers suggest that because of what they've found, it seems likely that the other seven retroviruses found by the team last year in Neanderthal and Denisovan DNA exist in the genomes of other people alive today. That could mean that such people have a higher incidence of other unknown medical problems. More research will have to be conducted, though the team acknowledges it could take a lot of time as the process could potentially involve examining the genomes of groups of people afflicted with any number of ailments.

More information: Neanderthal and Denisovan retroviruses in modern humans, *Current Biology*, Volume 23, Issue 22, R994-R995, 18 November 2013. DOI: 10.1016/j.cub.2013.10.028

Abstract

In the June 5th 2012 issue of *Current Biology*, Agoni et al. reported finding 14 endogenous retrovirus (ERV) loci in the genome sequences of Neanderthal and/or Denisovan fossils (both ?40,000 years old) that are not found in the human reference genome sequence. The authors [1] concluded that these retroviruses were infecting the germline of these archaic hominins at or subsequent to their divergence from modern

humans (?400,000 years ago). However, in our search for unfixed ERVs in the modern human population, we have found most of these loci. We explain this apparent contradiction using population genetic theory and suggest that it illustrates an important phenomenon for the study of transposable elements such as ERVs.

Press release