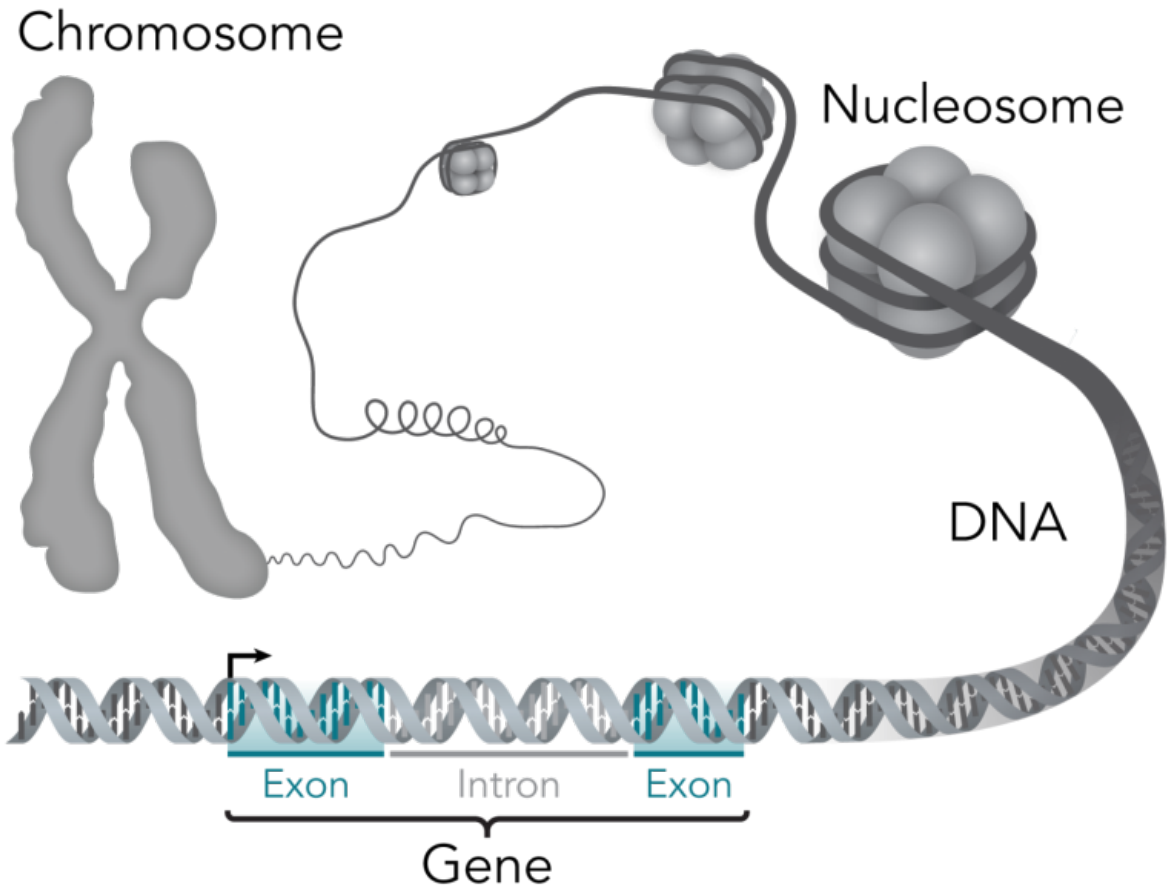
New genes associated with extreme longevity identified

December 17 2015



This stylistic diagram shows a gene in relation to the double helix structure of DNA and to a chromosome (right). The chromosome is X-shaped because it is dividing. Introns are regions often found in eukaryote genes that are removed in the splicing process (after the DNA is transcribed into RNA): Only the exons encode the protein. The diagram labels a region of only 55 or so bases as a gene. In reality, most genes are hundreds of times longer. Credit: Thomas

Centenarians show successful aging as they remain active and alert at very old ages. Scientists at Stanford University and the University of Bologna have begun to unravel the basis for longevity by finding genetic loci associated with extreme longevity.

Previous work indicated that centenarians have health and diet habits similar to the average person, suggesting that factors in their genetic make-up could contribute to successful aging. However, prior genetic studies have identified only a single gene (APOE, known to be involved in Alzheimer's disease) that was different in centenarians versus normal agers. The results from the current study indicate that several disease variants may be absent in centenarians versus the general population.

The report by Kristen Fortney and colleagues, published in *PLOS Genetics*, is an example of using Big Data to glean information about an extremely complicated trait such as longevity. To find the longevity genes, the authors first derived a new statistical method (termed 'informed GWAS') that takes advantage of knowledge from fourteen diseases to narrow the search genes associated with longevity. Using iGWAS, the scientists found five longevity loci that provide clues about physiological mechanisms for successful aging. These loci are known to be involved in various processes including cell senescence, autoimmunity and cell signaling, and also with Alzheimer's disease.

The incidence of nearly all diseases increases with age, so understanding genetic factors for successful aging could have a large impact on health. Future work may lead to a better understanding of how these genes promote successful aging. Also, future studies could identify additional longevity genes by recruiting more centenarians for analysis.

More information: *PLOS Genetics*, dx.doi.org/10.1371/journal.pgen.1005728