

For Healthy Aging, We Need To Fight The Dark Side of Evolution

By ACSH Staff — May 21, 2018



Science, technology, engineering, and medicine have brought wonderful improvements in our lives. We have greater longevity and lower infant mortality thanks to plentiful food, clean water, affordable energy, antibiotics, vaccines, and more.

We've beaten back numerous infectious diseases. But in doing so we have created an environment much different than that which we evolved to survive. Genes that helped us survive in our evolutionary past, when lifespans were much shorter, may predispose us to chronic disease in old age. But it can go both ways, natural selection linked to modernization might also reduce the burden of some chronic diseases, [according to a new paper](#) [1].

We are programmed to live and then die and some aspects of aging are caused by the combined effect of many genes that are beneficial when young, but have adverse effects at older ages. Genes can influence a variety of traits and can also express themselves differently as we age (pleiotropy). The term antagonistic pleiotropy describes genes that can carry both beneficial and detrimental effects. Somewhat counter-intuitively evolution by natural selection can lead to antagonistic pleiotropy spreading in populations: The benefits received when young can outweigh the evolutionary disadvantages in old age. Some variants of the gene BRCA1 are, for example, beneficial to fertility. However, women who carry one of such variants of BRCA1 will – more likely than not – develop breast cancer by the age of 90.

“It is clear that some mutations that benefit fertility have been favored by natural selection despite heavy costs in old age. It seems likely that these genes have contributed to the rise in chronic disease in modern societies, but it’s still uncertain if these genes are the main cause of that increase or just a minor contributing factor,” [says Jacob Moorad, from the University of Edinburgh](#)

In contrast, the evolutionary impact of contemporary life on human health is difficult to establish: evolutionary change often requires many generations to leave an unambiguous trace in our genome. The review found “suggestive but not yet overwhelming” evidence that natural selection, the engine of evolution, is changing course in our modern times. Several studies in pre- and post-industrial populations point, for example, to a selection toward an extended fertility period in women.

So while bad nutrition in childhood can cause, for example, stunted growth, the environment also shapes natural selection. Natural selection can make some genes more – and others less – frequent in the population over time: Lactose-intolerance in adults, for example. It’s tempting to point to natural selection when we observe a particular change. However, particularly when the changes occurred recently, it is more likely that gene expression has changed, rather than that the genes themselves have adapted to a new environment.

Citation: Corbett S, Courtiol A, Lummaa V, Moorad J, Stearns S (2018), 'The transition to modernity and chronic disease: mismatch and natural selection', *Nature Reviews Genetics*, doi: [10.1038/s41576-018-0012-3](https://doi.org/10.1038/s41576-018-0012-3) [1].

COPYRIGHT © 1978-2016 BY THE AMERICAN COUNCIL ON SCIENCE AND HEALTH

Source URL: <https://www.acsh.org/news/2018/05/21/healthy-aging-we-need-fight-dark-side-evolution-12991>

Links

[1] <https://www.nature.com/articles/s41576-018-0012-3>

[2] <http://www.sciencecodex.com/dark-side-our-genes-healthy-aging-modern-times>