

Finding the fountain of youth, a modern take on an ancient obsession

One universal truth that cuts across all cultures, races, genders and species is the fact that once we are born, we are all subject to aging. Since early recorded history and likely beyond, we humans have been intoxicated with life and have sought to extend it, hopefully forever. As far back as the 5th century B.C.E., we can find tales of mystical fountains of youth, whose waters promised to bestow eternal youth on anyone who drank or bathed in them. Such fountains, it was said, could be found in Ethiopia where longevity appeared to be common, at the foot of a mountain near Polombe, India, in Asia and the Americas where in 1513, Ponce de Léon reportedly searched for a famous Fountain of Youth, inspired by stories told to him by the Arawaks inhabiting the Caribbean. We find elixirs of immortality described in ancient Hindu scriptures and read about Chinese emperors who traveled far and wide in search of magical youthful potions ¹.

So our modern obsession with youth is nothing new. What is new is that, for some of us at least, our focus has changed. Instead of looking for a magical cure all, we have turned our attention to trying to understand how aging comes about, in the hopes of developing a targeted approach to slowing and perhaps even reversing the process. In the first known thesis on aging written in 1582 ², the Persian physician Muhammad idn Yusuf al-Harawi described how diet, the environment and drugs affected the aging process. This multifactorial approach is still with us today as modern science is finding that aging is the result of a combination of physiologic, behavioral, social and psychological factors that propel us along a continuum of progressive decay. Here are a few theories about the physiologic mechanisms that underlie this process.

Isn't aging normal?

Some of you may be asking this very question. Well, some scientists would agree with you. There are many theories, some with compelling facts to back them up. For instance, the Aging-Clock Theory suggests that we are born with some type of internal programming built into our nervous and endocrine system that pretty much determines

how long our cells, and therefore we, will live. Here is one explanation of how this might work. In 2009, the Nobel prize in Physiology and Medicine was awarded to Elizabeth Blackburn and colleagues who made several important observations about the role that telomeres may be playing in controlling this internal clock ³. Telomeres are structures that act like caps at the end of our chromosomes, those strands of DNA that carry all of our genetic information. One function of a telomere is to prevent the loss of genetic information when the cell divides. You can think of it as an aglet, the stiff part that protects the end of a shoelace. As the cells divide, these telomeres become shorter and shorter (the aglet starts to unravel) and this, it turns out, limits the number of times the cell can divide, referred to as the Hayflick limit. When the cell can no longer divide, it dies. So, if we can keep telomeres from unraveling and shortening, we might be able to keep cells alive longer. Maybe.

Or is aging a disease?

Other scientists believe that aging is not a normal process, but is the result of something gone awry. There are many theories about what could be going wrong. The DNA may be directly damaged due to a number of factors such as the accumulation of waste, mutations, viruses ⁴ or there may be defects in how the DNA repairs itself after being damaged; these defects accumulate over time and the result- a dysfunctional and eventually dead cell ⁵. Some authors have suggested that our reproductive hormones that control many important cellular functions as we grow and reproduce, become dysregulated later in life as reproductive function declines, thereby driving the aging process ⁶. Free-radicals or reactive oxygen species may also play an important role in aging, above and beyond their contribution to age-related diseases such as arthritis and cardiovascular disease ⁷. When it was noted that a restricted caloric intake prolonged the lifespan in laboratory animals, scientists discovered what this was likely mediated through an increase in our antioxidant defense mechanism ⁸.

The aging process is not simply a biological phenomenon. There are many psychological, social and behavioral factors that may also directly impact the biological changes that contribute to aging ⁹.

Whether you consider aging to be a normal or abnormal process, most of us would agree that slowing it down a bit might be a good thing. Today, scientific research may be showing us how to do this by giving us insights into specific mechanisms linked to aging that could be targets for intervention. As we bathe ourselves in these fountains of new knowledge, we may be finding that we have a variety of elixirs to choose from.

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