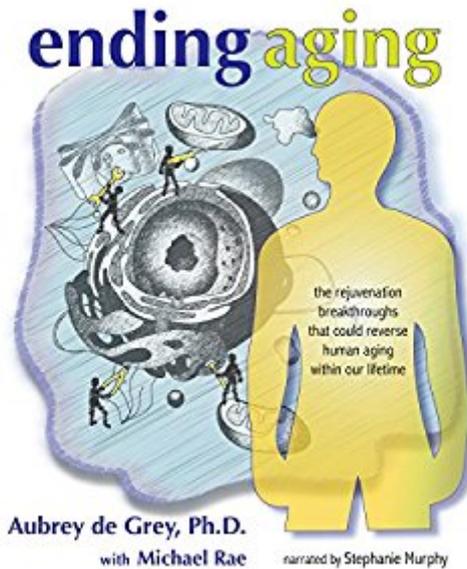


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# Ending Aging: The Rejuvenation Breakthroughs That Could Reverse Human Aging In Our Lifetime



## Synopsis

Must we age? A long life in a healthy, vigorous, youthful body has always been one of humanity's greatest dreams. Recent progress in genetic manipulations and calorie-restricted diets in laboratory animals hold forth the promise that someday science will enable us to exert total control over our own biological aging. Nearly all scientists who study the biology of aging agree that we will someday be able to substantially slow down the aging process, extending our productive, youthful lives. Dr. Aubrey de Grey is perhaps the most bullish of all such researchers. As has been reported in media outlets ranging from 60 Minutes to The New York Times, Dr. de Grey believes that the key biomedical technology required to eliminate aging-derived debilitation and death entirely - technology that would not only slow but periodically reverse age-related physiological decay, leaving us biologically young into an indefinite future - is now within reach. In *Ending Aging*, Dr. de Grey and his research assistant Michael Rae describe the details of this biotechnology. They explain that the aging of the human body, just like the aging of man-made machines, results from an accumulation of various types of damage. As with man-made machines, this damage can periodically be repaired, leading to indefinite extension of the machine's fully functional lifetime, just as is routinely done with classic cars. We already know what types of damage accumulate in the human body, and we are moving rapidly toward the comprehensive development of technologies to remove that damage. By demystifying aging and its postponement for the non-specialist listener, de Grey and Rae systematically dismantle the fatalist presumption that aging will forever defeat the efforts of medical science.

## Book Information

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## Customer Reviews

This book might be a steep read for most lay-people who aren't all that interested in cell biology or molecular chemistry, even as a passing fancy. But, the flipside of the author's depth of detail is that it allows you a glimpse into the kinds of complexities and even paradoxes that occur in the human metabolism (and how different those reactions can be even from those taking place in mice and monkeys). DeGrey's major beef, in a nutshell, with the R&D community is that they are spending waaay too much time and energy trying to "understand" the complexities of why aging, cell damage, dysfunction, and diseases arise over time as bi-products of simply living life. He argues that we need a more targeted engineering approach -- simply FIND the damage after it has occurred, define what that damage is, and then GO FIX IT. These are much simpler problems to solve. As an analogy, look at what we do to preserve any machine or system. You can see a 100-year old house has holes in the roof; go patch them. While you're at it some new caulking around the windows, maybe some more insulation in the attic, some anti-termite spray, and there you go, good for another 100 years. DeGrey envisions periodic therapies, say once per decade or so (similar to immunization schedules, for example) where individuals would receive viral injections and/or gene therapy to kill cancer cells, untangle proteins that cause alzheimers and the like, and remove calcification and stiffening from arteries and veins, generally restoring the body to a state of youthful vitality. It is not nearly as "crazy as it sounds", but the fact remains that the large amounts of govt.

So many good reviews. And being positive about this subject is great. But the book does not warrant such high reviews. Before I get into my opinion of this, let me summarize what this book is about: De Grey and Rae tackle the problem of aging. They view aging, primarily, as a product of junk that accumulates in the body. The junk happens because of many things: diet, our environment, mutations in our DNA, etc. But primarily because of free radical damage: oxidation. The junk deforms our tissues, both inter and intra-cellularly. It's the hostile environment of oxidation that causes the twisting of proteins in our cells, and makes them deformed and non-functional. Through the process of oxidation, like a log burning up, we basically become less and less functional as time goes on because of free radical damage. Like the log burning, we don't really have a choice if we want to keep living. Just like the log takes in oxygen to fuel its fire, so too do we take in oxygen to fuel our mitochondria that provides energy to our cells. It's that energy that keeps the cell alive, and keeps us alive. But in the process we are burning up, and dying, just like the log. Mitochondria is the

culprit: the energy furnaces which exist in every cell. In order to thwart aging, we need to clear our bodies of this junk, and reduce mutations in our mitochondria that cause them to malfunction, as well as stop hydrogen peroxide - a free radical - from being systemically released to the rest of the body. Hydrogen peroxide is a byproduct spit out by mitochondria. That is the main cause of systemic oxidation. The solution to stopping mitochondria from oxidizing the rest of the body is to transplant it into the nucleus of the cell, shielding it.

The basic strategy is to bootstrap: figure out how to repair the age-related damage that we know about today, and use the extra lifetime this gives us to learn how to repair the damage that will develop as we live longer and longer lives. So if you reach the age of 200, say, the damage that has to be repaired is the damage that occurs to get to 100, plus whatever becomes an additional problem between 100 and 200, and so on. I think the basic strategy is quite sound, given the exponential progress in technology and especially bio-tech that we are seeing today. It is pretty common to hear researchers say that they can do more in a year today than they could do in 10 years previously, because the tools and our knowledge are both so much better. So once we can get to a point where we can extend current lives by 20+ years, there is a good chance that no one will die of old age ever again (except by choice). When I talk about this, one of the immediate concerns I hear is for the planet and running out of resources. Personally, I am convinced that when this problem arrives we will solve it, and that there are a variety of ways that this could be done (much lower birth rates, higher density on this planet, moving into space and/or to other planets), so I am much more concerned with curing aging. I don't want to see any more of my friends or family die, and I would like to enjoy life as long as I want. So I am all in favor of this program! The book is divided into three sections. One that talks about the problem of aging and treating it as an engineering problem to be solved; one that talks about the known issues that have to be solved and possible solutions; and one that talks about what each of us can do to contribute to solving the problem.

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