Extending the human life-span will have far-reaching political and sociological implications and presents countless ethical conundrums. In an economy based on scarcity, who will receive life-extension treatment? Will treatments be considered therapeutic necessities or mere enhancements for those who can pay? Is life extension a social good or a luxury? Will it be acceptable for an individual to refuse life extension, or would that be akin to suicide? Some experts say we would be wise to consider these questions now, before life-extending therapies become a reality.

A Quandary of the Ages

In Simone de Beauvoir’s 1955 novel, *All Men Are Mortal*, Raymond Fosca, the leader of a 14th century Italian city-state, impulsively swallows an immortality-inducing potion, thinking of the good he could do for his people if he were immune to death. But by the time poor old Fosca reaches the 20th century, he is plagued by a fate he had not foreseen: debilitating emptiness and ennui. With the specter of death removed, the flavor of life is lost. “Sixty years ... sixty seconds,” Fosca proclaims in a moment of despair. “What’s the difference? Year after endless year, I’ll always be here.”

De Beauvoir is just one of the authors and philosophers who have suggested that what makes our time on Earth so precious is the inevitability that we will grow old and die. Although the premise of de Beauvoir’s novel—a potion that could abolish death—remains a fantasy, many of the researchers who study aging believe that their work may soon make a more modest version of this dream into a 21st century reality. Perhaps, for example, they’ll add many more healthy decades to the human life-span. “We will eventually understand aging,” says Edward Schneider, director of the Andrus Gerontology Center at the University of Southern California in Los Angeles. “We probably will be able to modify it. Will we be able to arrest it? Possibly.”

Extending the natural human life-span would profoundly affect society in ways that are hard to imagine. “It is very tough to ... judge the impact of a hypothetical intervention,” says biogerontologist Richard Miller of the University of Michigan, Ann Arbor, “because nothing is known about its expense, side effects, or applicability. If 500 years ago you had asked, ‘What will life be like when we don’t have infection?’ speculation would have been fun, but it wouldn’t have been very accurate. They wouldn’t have been able to predict people playing golf in Florida or the power of the [American Association of Retired Persons].”

Nevertheless, many scientists, bioethicists, and philosophers believe it is important to consider the potential impacts—positive and negative—of new forms of life extension. “If we are not careful, it will go the way of cloning, which is that we will have the technology before we’ve thought about it,” says John Davis, a bioethicist who studies life-extension ethics at the Brody School of Medicine at East Carolina University in Greenville, North Carolina.
Indeed, life-extension research is where cloning was just a few years ago: Scientists have dramatically lengthened the life-spans of experimental animals, including fruit flies, nematode worms, and rodents, but many in the field still see the technology’s application to humans as science fiction. Whether it will move from pipe dream to plausibility as fast as human cloning did remains a matter of debate. “I don’t think it’s going to happen any time soon,” says S. Jay Olshansky, a demographer who studies aging at the University of Chicago. Others make bolder predictions: “I am absolutely convinced that there are going to be interventions in humans that will allow the same sort of longevity extension that we now have in nematodes,” says geneticist Tom Johnson of the University of Colorado, Boulder. “I could easily see maximum life-span being doubled. What I don’t know is when we are going to be able to do that.”

**Should We Do It?**

Faced with at least the possibility that we will someday be able to slow down aging, many have begun to ask whether this is something we as a society should do. It is hard to imagine anyone refusing such a treatment if it did not involve a major reduction in quality of life. “Life has to be pretty horrendous before it is rational to prefer nonexistence,” says Davis. “There are those who think that [life extension] isn’t doing a good at all, that it would be a disaster,” adds philosopher and bioethicist John Harris of the University of Manchester, U.K., “but I don’t think that’s true. I would certainly like a much longer life, and I dare say you would as well.”

But what we want isn’t necessarily good for us, argues University of Chicago bioethicist Leon Kass. Kass posits, as de Beauvoir did in her novel, that the limits to life are what provide its depth and meaning. “To know and feel that one goes around only once, and that the deadline is not out of sight, is for many people the necessary spur to the pursuit of something worthwhile,” Kass wrote in a recent article in the religion journal *First Things*.

What’s more, Kass suggests that the human desire to live longer is a misdirection of a deeper spiritual yearning and cannot be fulfilled simply by adding more years to our lives: “Man longs not so much for deathlessness as for wholeness, wisdom, goodness, and godliness.” And these, Kass writes, are “longings that cannot be satisfied fully in our embodied earthly life.” Indeed, from the perspective of most religions, extending our life on Earth past its natural length may not be a bonus, notes Davis: “If you believe in divine reward [after death], how long do you want to wait to receive it?”

But considering our culture’s fascination with youth, and the billion-dollar market for products that claim to extend it, it seems clear that, should life extension become technically possible, it would be embraced by many who could afford it. Those who foresee negative consequences on society might still want to benefit from life extension themselves, Miller observes: “People are very good at refusing to pay attention to that kind of internal contradiction.” And so, says Davis, “I don’t think the real question is whether to do it but how to handle the consequences.”

**Redefining “Old”**

Perhaps the greatest concern that arises when people first consider the concept of life extension is that it would add to the years of infirmity at the end of life. Miller says that when he lectures on aging research to potential donors to the medical school, or even just brings up the topic at a dinner party, “90% of the time, someone says they don’t want the world to fill up with old people.” The same people who object to aging research generally support cancer research, Miller notes, although both focus on helping people live to a healthy old age: “It doesn’t make any sense, but it is a very common, deeply rooted feeling.”

Some types of life extension, such as treatments to replace or rejuvenate failing organ systems, would share something with cancer treatments: They may eliminate a lot of suffering, but because they do nothing to slow the aging process itself, they would not alter the general decline into old age. By contrast, a means of truly slowing the aging process would carry little risk of filling up the world with “old, sick folks,” says Miller. He notes that researchers have already created long-lived laboratory animals, including mice, rats, worms, and flies, using genetics, calorie restriction, and other treatments. Rather than extending the time of frailty, he says, these interventions “actually postpone the debilities and diseases of late life. What is being extended is ... active, healthy, productive life, and so it is a societal benefit.”

However, some people might not view even extra healthy years as a bonus. “Life has a narrative structure, ... with a beginning, a middle, and an end, if you construct it well,” says Davis. Some, he says, might feel that, “if it goes on too long, it can be like a movie that goes on for an extra hour after it should have ended.” James Carey, a researcher on aging at the University of California (UC), Davis, suggests that those concerns come from viewing the extra years as tacked onto the end of a life lived in the currently familiar pattern, which begins with education, followed by years of work and raising a family, and capped by retirement and old age. The question to ask, says Carey, is not “whether you would like to live to 100, [but] if you would like to have a second lifetime.” With an additional 25 or 30 years, he says, “you can begin to put whole new chapters and biographies together.”

Indeed, slowing the aging process and extending the average life-span by decades might spell the end of retirement, suggests gerontologist Robert Butler, president and CEO of the International Longevity Center, a nonprofit research and education organization in New York City. “Retirement is basically a 20th century aberration,” he says. “It probably isn’t even good for people.” It may be much healthier to take breaks throughout life, he suggests, to enjoy leisure time or to train for a new career. As a result, he speculates, people “may be more engaged, more creative, more likely to be helpful to society as a whole.”

Others worry about individuals who are less inclined to help society. “The first people who will have access to this will be the rich and powerful,” notes biogerontologist Leonard Hayflick of UC San Francisco. “I don’t want the world full of 200-year-old Hitlers or Saddam Husseins.” Olshansky suggests that new technologies could be used to create a long-lived superrace—a notion that conjures up images of eugenics and Nazi Germany. But Manchester’s Harris doesn’t feel that such concerns should halt the pursuit of life extension. “Fortunately, the Hitlers and Saddam Husseins are relatively thin on the ground,” he says. “I have an optimistic view of human beings.”

Butler adds that a society of longer lived individuals may benefit from the accumulated wisdom of a generation of superelders. An aging population may also lead to more “societal maturity,” he muses. “Hanging lived longer, people may lean toward resolving conflicts elsewhere than the battlefield.” Davis agrees, noting that “people tend to commit fewer crimes as they get older, so the crime rate may go down.”
But even the optimists agree that life extension would present countless ethical conundrums and profoundly transform society. “So much of our moral framework is based on time,” Davis says. If society decided it was appropriate to offer life extension to those in prison, what about those with life sentences? “Should you then keep them in prison for hundreds of years? ... Should Bill Gates pay an inheritance tax every 100 years? What about contractual obligations? Statutes of limitations might change.”

Equal Access?

Among the issues society would certainly face is one raised by other biomedical advances as well, that of “distributive justice.” If a very expensive treatment were to become feasible, say to replace failing organs with ones that have been cloned or grown from stem cells, would everyone have a right to that treatment? “What seems fair and equitable is to bring everybody up to a certain baseline that we would consider normal health for whatever their age and circumstances may be,” Davis says. If it is normal for a 100-year-old liver to fail, then every 100-year-old may not be automatically entitled to a new liver. At some point, Davis says, treatments would cross the line from medical care to “enhancement”—something, like a face lift, that improves a person’s physical condition beyond the baseline of normal health. “It is going to force us to think more carefully about what is a disease,” Davis says.

Likewise, he adds, societal attitudes may need to shift regarding how we view a person’s right to decline medical treatment. “Turning down [enhancement] is not the same thing as refusing medical treatment. Suppose somebody wants to refuse life extension. Is that suicide?”

“One thing I think we absolutely don’t want to have is a situation like the tragedy of nonavailability of AIDS drugs in Africa,” says Colorado’s Johnson. Such hazards, however, don’t mean research should stop, says Harris. “There are real issues of justice here,” but “they are not conclusive against developing the technology.”

Our society already accepts a good deal of such inequalities, he notes, and although we may believe in working to minimize them, we don’t see them as reasons not to develop technologies. “We don’t refuse to do kidney transplants until every person can get a kidney transplant;” he notes. But, he adds, life extension may be considered fundamentally different, because “the size of the advantage of an extended life is so disproportionate to other advantages that we might gain, that its unfairness is more radical.”

Although life extension may be viewed as a good to be pursued, Michigan’s Miller suggests that from a global perspective it may not deserve top priority. “The vast majority of people these days are dying of tuberculosis and malaria and AIDS and malnutrition and infectious disease of kids,” says Miller, “and the amount of money being spent on those programs is pitifully small in comparison to their public health importance in the world at large.” From that perspective, he says, “the argument that [aging research] is a luxury has a lot of power.”

Miller, basing his scenario on the fact that dwarf mice live 50% longer than normal mice. “People would have to decide for their kids whether they want them to get a pretty good chance at an extra 2 or 3 decades of life but be marked through childhood by their short stature.”

Were life extension to become widely available and used, some worry that it could reduce the quality of life for generations that follow. “[Overpopulation] could be a serious problem,” says Davis. He suggests that governments might require users of life-extension treatments to abstain from having children. Others are less concerned. “Whether the world’s population increases unacceptably depends on what reproductive choices people make rather than improvements in health care,” says Harris. And Butler of the International Longevity Center notes that, in cultures around the world, as life expectancy increases, the birth rate drops.

Such a trend could create a society in which an ever-shrinking proportion of young adults must support a burgeoning elderly population. But Butler suggests that these concerns are also misguided. It’s hard to imagine healthy people “sitting idly by [in retirement] with all their gifts and talent and experience,” he says. “If people are living longer, they are going to have to work longer.”

But that could hurt the young in a different way, by preventing them from advancing into good jobs. “If you and I never retire,” says Harris, “that means there are fewer desirable jobs to go around.” But, he adds, that could be handled by limiting the length of time a person can keep a given job. That would also help prevent a stagnation of ideas, offers Johnson. “Do we want a society where people maintain the status quo for 130 years? Should I have my tenure at the University of Colorado for the next 120 years? We would want to engineer society ... so I couldn’t stay here indefinitely.”

Despite the challenges that life extension presents, many say history suggests that society would adjust. After all, Butler says, there was an unprecedented 30-year gain in life expectancy during the 20th century, from 47 to 77, and “we have adjusted quite remarkably. If you go back to the 1800s, there were no social protections, no retirement systems, no social security, no National Institute on Aging, no geriatrics, no 401Ks, no [Individual Retirement Accounts].” Miller agrees. “Social institutions can not just adapt to, but can actively make use of, accommodate, and create active lifestyles even under very dramatic shifts. It is not a future that is entirely unknown, because in the past 200 years, Western societies have done this.”

Marcia Barinaga is a correspondent for Science. She looks forward to a long life with many more chapters.

Further Reading


