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viewpoint

The search for Methuselah

Should we endeavour to increase the maximum human lifespan?

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One of the oldest dreams of humankind has been to find a way to evade death for as long as possible—or even entirely. Molecular biologists, geneticists and biogerontologists are actively exploring ways to extend the maximum human lifespan by slowing or stopping the ageing process. This so-called 'strong' form of life extension differs from 'weak' forms, which focus only on the better prevention and treatment of common diseases, without seeking to alter the upper lifespan limit of about 120 years (Lucke & Hall, 2006).

There is no consensus at present on whether anti-ageing interventions will prove possible or, if such methods are developed, when they will be available and to whom. Nevertheless, the idea of expanding the maximum human lifespan has fascinated philosophers, scientists and writers for millennia—from the biblical Methuselah to the medieval Fountain of Life, and from the Philosopher's Stone to contemporary debates about increasing longevity using scientific methods. Also, given the unwavering media interest in research into slowing or preventing ageing, it is not surprising that ethicists have begun to debate whether we should attempt to increase human longevity—and whether society should finance research focused on this goal. In this article, we briefly summarize the ethical arguments raised in this debate, with a focus on the issues surrounding the more controversial form of life-extension research that would extend the human life span beyond the current maximum of 120 years.

The most fundamental opponents of increasing the maximum human lifespan in this way are conservative critics of biotechnology, who argue that this would be contrary to the 'natural' order of things or that it would be against 'divine' law. These conservatives have taken 'pro-life' stances in abortion and stem-cell debates, and are generally wary of human intervention in natural processes, such as reproduction and ageing (Horrobin, 2006). In this way, some prominent ethicists, such as Leon Kass and Francis Fukuyama, have advocated an adherence to a traditional human life expectancy, claiming that interfering with the ageing process amounts to 'playing God'.

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Adherents to the natural-law argument maintain that our current lifespan, the various stages of the human life cycle—birth, infancy, puberty, adulthood, old age and death—and the process of ageing itself are all inseparable facts of human nature that help to define what it is to be human. The US President's Council on Bioethics claims that the human life cycle has an inherent worth and that, consequently, age-extension technologies distort or pervert the 'natural' or 'proper' human lifespan (President's Council on Bioethics, 2003). A more secular version of the natural-law line of reasoning attempts to appeal to evolutionary biology, arguing that the current human lifespan is a product of evolution that endows us with qualities that are integral to our humanity.

One obvious rejoinder to divine-law and natural-law objections to life extension and other medical technologies is that humans have been interfering with natural processes, albeit unscientifically, for the entire course of their evolution. It is often only when these interventions are labelled as 'science-based' that they become the subject of ethical debate. For generations, plant and animal breeders have been interfering in 'God's plan' without criticism, and many medical inventions have greatly reduced human mortality without extensive religious or pro-nature scrutiny. Statins, for example, lower blood cholesterol and therefore increase life expectancy; surgery and drugs improve the survival rates of cancer, heart attack and stroke patients. As such, it is not clear why technologies that aim to directly extend life expectancy are profoundly abhorrent to proponents of natural or divine law, when other technologies that achieve the same goal indirectly are not.

The conservatives respond that—unlike smallpox, cancer or atherosclerosis—ageing is not a disease or the result of an accident. Interfering with the basic molecular biology of ageing, according to this view, is therefore not a medical treatment or a preventive therapy, but rather a form of human enhancement that lies outside the realm of medicine. The more one uses technology to change the natural form and function of a human being, the argument goes, the more one compromises human dignity and identity, and claims to human rights (Kass, 2002). Proponents of the growing 'transhumanist' movement see anti-ageing technologies as an essential part of their quest to create 'post-humans'—individuals so radically enhanced by technology that they can no longer be considered human. However, Fukuyama (2002) has claimed that attempting to improve human nature in this manner amounts to extinguishing it, thereby undermining the basis of human rights.

Natural-law proponents who oppose human life extension need to explain why

the current human lifespan should stay as it is, and why the ageing process should be considered an integral and unchangeable part of human nature. Their claims that we should not 'pervert' nature cannot be convincingly defended in the light of medical and technological advances that have already enhanced humans, and have improved life expectancy without compromising our humanity. Although human nature and natural law remain highly contentious issues, natural-law proponents have not yet presented sufficiently persuasive arguments based on appeals to human nature or dignity to warrant a ban on this type of research.

More pragmatic critics are not opposed to strong life extension in principle, but argue that it will have serious adverse consequences for individuals, society and the environment. Critics who adopt such a consequentialist or utilitarian approach question whether the benefits of life extension will outweigh its costs. One key ethical question for such utilitarians is whether increasing life expectancy will also prolong healthy physical and mental functioning. Some indirect forms of life extension already increase the average healthy lifespan, but it is not clear whether they end in a swift death after a fulfilled, active and extended life, or lead to a prolonged period of disability preceding death. A prolonged period of dying is not the aim of anti-ageing forms of life extension, but critics fear that it might be its unintended consequence. Some therefore question whether we should attempt to extend longevity if the extra years are likely to be spent in a mentally or physically disabled state. Another related argument is that the rising cost of providing health care in developed countries would be exacerbated by life extension if it simply postponed death and led to a 'global nursing home' (Fukuyama, 2002). Eric Juengst comments that this outcome would represent a "failure for the anti-aging research enterprise" (Juengst *et al*, 2003).

Other critics are concerned that extended lives might not bring more productive years, but rather increased boredom, ennui and a loss of aspiration and sense of urgency (President's Council on Bioethics, 2003). If lifespans could be extended for several centuries in good physical health, would we simply run out of things to do? This seems unlikely to be true for everyone: many people could happily and usefully live for another 50 or possibly 100 years. The social consequences of a lifespan of 500 years are more difficult to envisage; yet, if this became a reality, one could argue that we would need to become much more considerate of one another and our environment. Our goals and desires would also have to move beyond immediate gratification, because we would be around long enough to both suffer the consequences of our mistakes and reap the rewards of our hard work. John Harris (2004) noted that "only the terminally boring are in danger of becoming terminally bored," and David Gems (2003) observed that many people already have life plans that are more open-ended than 'traditional' discrete goals such as going to university or having children. For example, the ambition to become 'ever wiser' and the desire to learn more would both be facilitated by extending human longevity.

Indeed, one of the most appealing arguments in favour of pursuing research into strong anti-ageing technologies is that they might produce better overall health and more healthy years towards the end of life—allowing the fulfilment of long-term life goals. If, for example, intervening in the ageing process reduced the incidence of cardiovascular disease, cancer and Alzheimer disease—as increasing age is a major risk factor for the development of all of these diseases (DePinho, 2000)—it would be a convincing reason to pursue life extension by means of anti-ageing interventions. In fact, just like the critics who appeal to natural law, opponents who appeal to utilitarian arguments also face a major challenge: they need to demonstrate that anti-ageing interventions will bring greater harm than benefits to individuals and society.

Consequentialist critics argue that strong forms of life extension will create large-scale disruptions to society—even one of the most fervent advocates of life extension, Aubrey de Grey, acknowledges that "it's going to be absolute pandemonium" (de Grey, 2005a). If this kind of social unrest is a possible result of increasing the human lifespan, it is natural for some critics to ask whether it would be worth allowing a 'selfish' few to pursue a potentially dangerous goal. Indeed, the kind of frightening social upheaval that might result has been explored in John Wyndham's science-fiction novel *The Trouble with Lichen* (1960).

> **How could we justify […] advancing the "selfish desires of relatively affluent people to live to 150 while millions of poor people die before 50"**

If life expectancy were to be increased without a general improvement in health—as pessimistic critics imagine—then the economic implications for health services, retirement funds and care provision could be even worse than the current predictions about the impact of an ageing population (Fukuyama, 2002). Other adverse consequences of widespread life extension could be overpopulation, an unsustainable drain on societal resources, and civil strife between those with and without access to the technologies (Davis, 2005)—probably the rich and poor, respectively. Increasing the average age of a population might also trigger other public-health issues, particularly in already overpopulated nations. If more people were to live substantially longer lives and require a greater proportion of scarce resources, it could lead to increased poverty and depletion of resources in a world that is already straining to support its current population (Louria, 2005).

Proponents of life extension respond that—if anti-ageing interventions delay the onset of disease—a longer healthy life will allow more people to make social contributions that will potentially benefit others (Stock & Callahan, 2004). Jay Olshansky and co-workers describe this as the 'longevity dividend' (Olshansky *et al*, 2006). They predict that social and economic standards will increase, because people will be able to work for more years and accumulate personal wealth to support their extended lives. Critics suggest that this scenario is too rosy, arguing that if people live longer and healthier lives, they will stifle the opportunities of younger generations who are competing for the same jobs and resources. A 'glut of the able' and the relative 'youth' of older generations would make them less inclined to make way for their younger replacements (President's Council on Bioethics, 2003). These arguments imply that the development of strong life-extension technologies might prove to be a mixed blessing. Any individual and social benefits could come at a price—both to the individuals who use them and to the societies in which they live. In the absence of any relevant social experience, it is a challenge to predict whether the costs will be greater than the benefits.

New health technologies are usually expensive when they are introduced to the market, and this is likely to be true of effective anti-ageing and life-extension technologies. This raises the egalitarian concern that, at least in the beginning, only the wealthy will be able to afford these technologies, thereby amplifying existing socio-economic inequities in life expectancy and life chances. Would it be fair to further increase these differences by allocating resources to extending longevity? How could we justify advancing the, as Tom Mackey puts it, "selfish desires of relatively affluent people to live to 150 while millions of poor people die before 50" (Mackey, 2003)?

Such inequities might have other undesirable consequences. If only the 'rich and powerful' have access to life-extension technology, then they will have even more opportunities to consolidate their wealth and power. The result might be 'parallel populations' of rich and poor (Harris, 2004), and, more speculatively, separate human species of 'mortals' and 'immortals' (Kass, 2002). Walter Glannon (2002) argues that the unfairness of allowing only wealthy people to extend their lives provides a moral justification for banning research into life extension.

> **Prohibiting research into life extension altogether would […] preclude the possibility that it could ever be made available to everyone**

Proponents of life-extension research respond that anti-ageing research does not preclude studies also being done into preventing premature deaths among the socially disadvantaged (Mackey, 2003). These goals, they argue, can be pursued concurrently without necessarily detracting from each other. In any case, existing inequities in health status and access to health care do not automatically warrant a ban on scientific research into better prevention and treatment of diseases of the affluent. Moreover, we do not demand a guarantee of equal access to new technologies before they are developed (Post, 2004). If we did, no technological progress could be made.

If life-extension and anti-ageing interventions work and confer health benefits, will it be fair to deny access to everyone because some will not be able to afford them? Achieving a more equitable society this way would arguably be a hollow victory. The benefits of life-extension technologies could, with time, become available to the many—even if at the outset they were only available to the rich. As with other healthcare technologies, they might benefit a minority at first, but would eventually spread as demand and technological improvements reduced costs. Prohibiting research into life extension altogether would therefore preclude the possibility that it could ever be made available to everyone.

John Davis (2004) argues that the "collective suttee" that would result from prohibiting research into life extension could only be justified if the burdens incurred by those who could not access interventions were likely to be greater than the potential benefits for

those who could. He claims that this would not be the case. Yet, even if significant life extension was available to only a minority, Harris (2004) argues that we are not morally obliged to deny access to all in order to avoid denying access to some. A better strategy, according to Harris, is to make life-extension interventions available as "justly and widely" as possible. Alex Mauron (2005) has argued for a similar policy.

Given the respect and priority afforded to personal autonomy in modern bioethics and contemporary culture (Fukuyama, 2002), it is difficult to envisage bans on any life-extension technologies that have demonstrable health benefits. Do we in fact have a duty to develop such interventions? de Grey (2005b) has argued that we do. First, he asserts that there is a basic right for a healthy human to live, even indefinitely: "Human rights do not get any more fundamental than the right to carry on living" (de Grey, 2005b). Second, given this, he argues that we have a duty to pursue research into anti-ageing and life-extension technologies to realize this right. de Grey reasons that when it comes to life-threatening illnesses, we demand that the medical community apply all existing treatments, and develop new and better ones to save the lives of those who are afflicted. The moral obligation to 'save' life, he claims, is no different from the moral obligation to 'extend' it (de Grey, 2005b).

Libertarian ethicists might argue that though people have a negative right not to have their freedom to pursue life extension infringed, there is no positive right to have their lives extended, as de Grey argues. Positive rights entail obligations on others—in this case, the obligation on researchers to develop life-extension interventions—whereas negative rights entail the right to be left alone. From the libertarian perspective, there is no duty for individuals or society to fund research into developing life-extension interventions, but individuals should be free to do so if they wish.

An impartial observer might also question whether the use of medical treatment to prevent premature death is the moral equivalent of using new technologies to extend the human lifespan beyond the current maximum limit. The idea of an obligation to develop life-extension technologies to benefit an individual seems to imply that this should be done regardless of any negative consequences for society. It is challenging enough to convince people to accept burdens in return for expected benefits—look at the climate-change debate, for example. It seems unlikely that one could persuade the general public to suffer burdens for research that might only benefit a few, while having negative consequences for society as a whole.

Views about whether research into human life extension is ethically sound clearly differ markedly along theoretical and ideological lines (Macklin, 2006). Arguments about the moral acceptability of life extension made within one ethical framework are often unconvincing to proponents of others. Arthur Caplan (2004; 2005), Stephen Post (2004) and Gregory Stock (Stock & Callahan, 2004), for example, have appealed to a utilitarian ethic to justify research into life extension, whereas opponents, notably Kass (2002) and Daniel Callahan (Stock & Callahan, 2004), appeal to natural law and human nature.

Proponents of pursuing life-extension technologies refer to the potential benefits of a longer life and, most importantly, the possibility of more years of healthy life. Conversely, those who are wary of creating a society of Methuselahs argue that extended lives will not necessarily increase the quality of life, and that life-extension technologies will have potentially adverse consequences—such as overpopulation and social strife—that outweigh any benefits to individuals. Other ethicists see crucial problems of equity and justice in access to life-extension technologies. A consensus on the ethics of human life extension might prove elusive; yet, none of the arguments against life extension seem strong enough to warrant a ban on research into the possibility—assuming that such a ban could be enforced.

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