

## 10 Substantial Life Extension and Meanings of Life

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### Introduction

Substantial extension of the human lifespan has become a subject of lively debate. One reason for this is the completion of the Human Genome Project in 2001 and the experimental avenues for biogerontological research the project enables. Another is recent theoretical progress in biogerontology (Austad 1997; Hayflick 1994; Holliday 1995; Kirkwood 1999; Ricklefs & Finch 1995). The character of modern culture is at least as important a factor in explaining why life extension intervention is currently debated. Three existential factors that play a role here are fear of death (fear of no longer existing), fear of the suffering involved in the process of dying, and the sometimes obsessive desire to preserve good health in order to pursue personal life projects and goals (Turner 2004). The historical background of this motivational pattern is 'the decline since the Renaissance of faith in supernatural salvation from death; concern with the worth of individual identity and experience shifted from an otherworldly realm to the "here and now", with intensification of earthly expectations' (G.J. Gruman quoted in Post 2004a, 82, see also Baumeister 1991, 77-115).

There is a lot of interest in substantial life extension, but would it really be a good thing? Experience with other revolutionary technologies shows us that once they exist, they can no longer be stopped. Too much has been invested in them: once research has produced an effective technology catering to all-too-human desires, there is seldom a way back. So we had better investigate the worldview aspects of considerable human lifespan extension now, before this extension has become genuinely practicable, or, before large sums of money have been spent on it.

In this article I will first consider what 'substantial life extension' and a 'meaningful life' means. After that I will deal with some arguments and considerations concerning the relationship between the two.

### **Substantial Extension of Human Lifespan: What Are We Talking About?**

Before embarking on a discussion about the meaning of 'substantial extension of human lifespan', it has to be clear what we mean by it. We can distinguish between four possible outcomes of a biotechnological enhancement of the human lifespan. Drawing on work by Harry Moody (1995) and Eric Juengst and others (Juengst et al. 2003) we can name these extended morbidity, compressed morbidity, decelerated senescence, and arrested senescence.

*Extended morbidity* means that the average human life becomes longer because the period of (co)morbidity at the end is lengthened. Through good hygiene, nutrition, education, housing, medical care, welfare arrangements, and social services, old people with one or more chronic diseases stay alive longer. This means that average life expectancy increases, but this need not be an increase in human flourishing or a cause for joy. Extended or prolonged morbidity does not imply an increase in maximum human life expectancy. A typical time structure for a human life with extended morbidity could be: growing up from 0 to 20, adult health span 20 to 55, period of growing morbidity up to 95 as the average age at death and with an unchanged maximum of around 120. Some scientists (Baltes 2003) fear extended morbidity as the most likely scenario, with Alzheimer's disease as one of the main threats. Since nobody wishes it to become reality, we shall not discuss the desirability of this type of life extension here.

*Compressed morbidity* is a scenario in which the onset of serious age-associated maladies, the infirmities at the end of life, is delayed as long as possible and thus these are compressed into a shorter period. The maximum human lifespan of around 120 is accepted as fixed. The focus of compressed morbidity is that the average human health-span is extended to a much longer period from 20 up to 'the ideal average lifespan, approximately 85 years' (Fries 1980, 130), followed by a relatively short period of decline before death, a period of one or two years at the most. The feasibility of compression of morbidity for the life stage between 55 and 85 was first argued for by James Fries in 1980 and it has been embraced by many, for example the biogerontologist Robert Arking (Arking 2004).

Not long ago three officials of the World Health Organization wrote that Fries's tenets and vision 'now lie at the heart of today's approach to NCDs [non-communicable diseases], ageing and health with its focus on the life course, health promotion, and "active ageing" [use it or lose it]' (Kalache, Aboderin & Hoskins 2002). Because its original assumption is that the maximum human lifespan is biologically predetermined at around 120 and that death at an average age of 85 is 'natural' and even 'ideal', compression of morbidity is not a form of substantial life extension. It has to be noted, however, that several gerontologists think that compression of morbidity is actually impossible. They think it is highly unlikely that we will be able to increase the health-span without simultaneously increasing the lifespan and the period of morbidity at the end (Neugarten 1996). Compression of morbidity would then be practically the same as delayed or decelerated senescence.

In *decelerated senescence* the processes of biological ageing are slowed down, resulting in a higher average life expectancy and probably a higher maximum life expectancy. Decelerated senescence means that the period of good health in a human life is extended (as in the scenario of compressed morbidity), but the period of morbidity remains the same or is lengthened as well (as in extended morbidity). The average pattern of a human life in this case could be: growing up 0-20, adult health-span 20-90, and period of decline after that with death at an age of about 110. Maximum life expectancy at birth might be 140 years. Richard Miller is a respected biogerontologist who thinks that such a decelerated senescence is the most likely development. 'Nature can slow down aging, and so, it turns out, can we. There are so far two approaches that work for sure: diminished total caloric intake and changes in genes that regulate the rate of early-life growth' (Miller 2004, 233). A recent and clear manifestation of the idea of decelerated senescence can be found in an article by Jay Olshansky and others, including Miller. They can be regarded as representatives of a growing chorus of scientists calling themselves 'moderate', 'modest', and 'realistic'. They firmly believe that a current investment of 3 billion US dollars annually will make it possible to decelerate ageing and to delay the onset of ageing-related diseases and disorders among the baby boom cohorts by seven years.

People who reach the age of 50 in the future would have the health profile and disease risk of today's 43-year old; those aged 60 would resemble current 53-year-olds, and so on. Equally important, once achieved, this seven-year delay would yield equal health and longevity benefits for

all subsequent generations, much the same way children born in most nations today benefit from the discovery and development of immunizations (Olshansky et al. 2006, 32).

*Arrested senescence* refers to relatively complete control of the biological processes of senescence. In this scenario, ageing in the sense of senescence or physical and mental deterioration does not occur anymore, or the human organism is cared for very well (maintenance) and the senescence that occurs is periodically repaired by a rejuvenation cure. For decades, or centuries, the chance (probability) of dying does not increase with age anymore, but stays rather constant. People still die, but they no longer die from the slow accumulation of damage and chronic deterioration. Instead they die from accidents, murder, or war. In this scenario people can become very old. Average life expectancies of 150, 500 or even 5000 years are thought to be possible. Talking about engineering arrested senescence may sound as if we have entered the field of quackery, pseudoscience, or science fiction. However, one of the strongest defenders of the scientific credibility of Strategies for Engineering Negligible Senescence (SENS), Aubrey de Grey (De Grey 2003; 2005; De Grey et al. 2002), forcefully argues that humanity needs to set aside massive sums of money for a War on Aging. He has also, together with relevant specialists, outlined and embarked on detailing a set of biotechnological measures we could use to beat the 'seven deadly things' that accumulate with age as side effects of metabolism. According to De Grey these seven problems together constitute the core of aging. The seven categories of damage to be solved are: 1. cell death without matching replacement (especially important in the heart and the brain); 2. unwanted cells, e.g. visceral fat and senescent cells (important in arthritis and diabetes); 3. nuclear (epi)mutations causing cancer; 4. mitochondrial mutations; 5. extracellular protein/protein cross-links (e.g. leading to high blood pressure); 6. extracellular aggregates (e.g. resulting in amyloid involved in Alzheimer's disease); and 7. intracellular aggregates (e.g. resulting in hardening of the arteries). De Grey proposes to remove and repair the damage that has accumulated every ten years or so. He does not believe in prevention of damage. His type of arrested senescence is rejuvenation. He expects that in the period between 2025 and 2040 we will be able to fix the seven problems of senescence (to a large extent through genetic interventions and stem cell therapies) and that around 2050 'robust human rejuvenation' will be generally accessible. He realizes that the first fixes will not be perfect, but they will give us time to develop better repair methods. Highly respected biogerontolo-

gists have attacked De Grey's ideas forcefully (Estep et al. 2006; Warner et al. 2005). It is important to note, however, that the difference of opinion is mainly political, ethical, and related to funding and estimates about the speed of future developments, not about the possibility of substantial life extension in itself. A last remark to conclude this preliminary section: the [US] President's Council on Bioethics has taken 'the possibility of extended youth and substantially prolonged lives' very seriously. In its 2003 report *Beyond Therapy* (President's Council on Bioethics 2003, 159-204) the Council warns against substantial life extension as a threat to the meaning of human lives.

### Meanings of Life: A Theory

Before going into arguments on life extension and meanings of life we also have to explicate the concept of meanings of life. A useful point of departure is social psychologist Roy Baumeister's book *Meanings of Life* (Baumeister 1991) in which he develops a theory which gives us some grip on the elusive concept of a meaningful life. According to Baumeister, meaning is about connection. People have a need to put things, actions, and projects in a broader context and this need can be subdivided into a number of needs for meaning. An important one is the need for *purpose*. The vital thing here is to interpret one's current activities in relation to future or possible goals or fulfillments. A second need for meaning is the need for *moral worth*. People want their life to be of positive value and their choices to be right and good and morally justifiable. A third need is for *efficacy*, competence or control. People do not only want to have purpose in a life of moral value, they also want a certain capability or power to achieve these goals and realize these values. They want to feel free and competent and able to make a difference. They do not want life to happen to them, they want to direct it at least to some extent, and often people prefer the illusion of control over a more realistic sense of powerlessness. The last need for meaning mentioned by Baumeister is the need for self-respect, self-esteem, or *self-worth*. Humans not only want a life of positive moral value, they also want to have worth themselves. They want to find some basis for positive self-worth, they want to have some claim on respect, both self-respect and the respect of others. Usually this need takes the form of finding an aspect in which one is better than others, a reason to be respected by others. But this reason need not always be moral. Although self-worth is often related to a combination of moral worth and

efficacy, it is not the same as this combination. Someone who has left his or her partner, may feel greater self-worth because of this tough decision (it feels better than being rejected and abandoned by the other), but he or she may feel guilty at the same time, in doubt about the moral value of the act.

Baumeister's theory has been improved by others. Jan Hein Mooren (1998) has argued that a meaningful human life is a life that is sufficiently understood as part of a world with a certain structure and causality. People have a need for *comprehension*. They want to be able to understand and explain the world they live in, what happens to them and why they act as they do. They want to be able to create a coherent life narrative, to tell an intelligible story about their life. They want their new experiences to fit their past and to conform to what they know about their environment, their world. Through 'interpretive control' the need for comprehension can be linked to the need for efficacy. Adri Smaling (unpublished) adds a last need for meaning; the need for (*comm*)unity, which to some extent can be seen as the flip side of the need for efficacy. People not only have a need for controlling things, but also a need for release, for abandonment, they want to let go. They do not want everything to depend on themselves, but they also want to be part of something bigger, to feel connected and as one with others or the other. Altruism is related to the need for moral worth and the need for (*comm*)unity.

Baumeister has argued that it is very implausible to think of *the* meaning of life as one single overarching good thing everything in life connects with, completely and eternally. This is what he calls the myth of higher meaning. Life is bound to have several meanings and to have trivial, meaningless, and unruly fragments as well. Moreover, it often happens that meanings of life conflict with each other (Berlin 1991). Life is inescapably characterized by absurdity, conflict, and change. However, human beings keep searching for meaning, which is often woven together into *a connecting narrative, a story to live by* (Dresden 1990; McAdams 1997). Living your story turns out to be important, even though your life story is not your whole life and even though your story has more than one important plot. Meaning is one of life's principal tools for stability, continuity, and identity.

This theory of a meaningful life is partly based on findings of empirical psychology, but it is obvious that a fully fledged theory needs historical, sociological and ethical input. Baumeister's conviction that in modern Western society the self has become the major base of values (not needing further justification itself) shows this clearly. Baumeister thinks that

seeking, knowing, or finding yourself (personal identity), creating yourself (self-actualization), and self-worth have become more important than religion, morality and tradition. He also indicates (1991, 127) that in modern society it is more difficult to satisfy the needs for moral worth and purpose than those for efficacy and self-worth. In this context, Charles Taylor's *Sources of the Self* (1992), Anthony Giddens's *Modernity and Self-Identity* (Giddens 1991), and Joep Dohmen's *Het leven als kunstwerk (Life As a Work of Art)* (2008) raise important philosophical issues about autonomy, authenticity, life politics, the art of living, hypergoods, and transcendence. Moreover, a meaningful life is not equally within everybody's reach, and some social circumstances are more favourable for achieving it than others. '[I]n many societies that we call advanced, such as the United States, whole segments of the population grow up with so much chaos and so little order that "planning" is a foreign word' (Hagestad 1996, 208). Given all these issues, it is clear that the theory of meanings of life is still in its infancy, and that much more empirical, theoretical, and philosophical research needs to be done.

An important issue is how a meaningful life relates to the quality of life, to happiness, life satisfaction, or *subjective well-being* (Diener 1984; George 2000; 2006; Pavot & Diener 2004; Ryff 1989; Ryff & Singer 1998; Veenhoven 1996), and to the more objective concept of *human dignity* as proposed in human rights theories or human capabilities theories (Buitengeweg 2007; Nussbaum 2001; 2006; Nussbaum & Sen 1993; Pogge 2002). In this context, Baumeister's analysis of the parenthood paradox, described in the following paragraph, is relevant (1991, 160-166).

A large amount of evidence supports the conclusion that having children produces worries and reduces happiness, but in spite of this many people want children. The difference between a happy or satisfactory and a meaningful life may largely explain the parenthood paradox. However, much here depends on the meaning given to the concepts 'happy' and 'meaningful'. Baumeister's parenthood paradox seems to presuppose a hedonic interpretation of happiness, life satisfaction, and subjective well-being, as argued for by Ed Diener (1984) and Ruut Veenhoven (1996). Life satisfaction, positive affect, and absence of negative affect are central here. If, following Carol Ryff (1989), subjective well-being is interpreted eudaimonically, emphasizing purpose in life and thus 'clearly imposing a definition of life quality on individuals who may or may not evaluate their own lives on those criteria' (George 2000, 7), the difference between 'well-being' and 'meaningfulness' becomes smaller. Ryff's eudaimonic subjective well-being originally had six dimensions: self-acceptance, purpose in life,

personal growth, positive relations with others, environmental mastery, and autonomy. After some more empirical work she reduced the relevant dimensions to four, of which the first two are primary: purpose in life and quality connections to others, and the other two are secondary: positive self-regard and mastery (Ryff & Singer 1998).

To my knowledge little theoretical and empirical research has been done to improve Baumeister's theory of 'meanings of life'. The alternative theory of 'eudaimonic subjective well-being' has turned out to be much more fruitful, up to now. Starting from this theory a considerable amount of research has been and will be published (see [www.midus.wisc.edu](http://www.midus.wisc.edu)). However, as indicated above, Ryff's concept of subjective well-being shows much overlap with Baumeister's and our theory of a meaningful life. The most important remaining difference appears to be our emphasis on the need for moral worth. And because in my considered opinion morality and ethics posit objective or at least intersubjective norms for relations with others, moral worth makes a meaningful life – in the same way as human dignity – a more than purely subjective concept. To achieve progress in the theory of meanings of life interdisciplinary research, which combines psychology, philosophy (especially ethics), and other academic disciplines such as sociology, history, cultural anthropology, and evolutionary biology, is necessary.

In the remainder of this article I will indicate a few important considerations around the meanings of life that regard effective substantial extension of the human lifespan; a detailed examination of all of these considerations is not my purpose here, nor is it even possible. By substantial extension I mean decelerated senescence and arrested senescence as outlined earlier on in this chapter. Decelerated senescence is much more probable as the scenario for decades to come, but arrested aging certainly is an interesting scenario. It cannot be completely ruled out for the long run and it is interesting because it forces us to think in new ways about what we think most important in our lives and societies. This is important even if arrested aging will never happen.

### **Life Extension and Sense of Purpose**

A very 'natural' argument in favour of substantial life-extension is that in a very long life we will be able to complete important projects we have planned and embarked upon (Hagestad 1996). For example, at conferences I have met quite a few biogerontologists and philosophers who argued

that it is unfortunate that when we finally start to understand the topic we study, our cognitive abilities begin to dwindle and our death comes near. However, a sense of purpose does not depend on finishing our projects. When we complete a project or see a long-standing desire fulfilled, this will bring a sense of satisfaction and sometimes efficacy, but to experience a sense of purpose in life it is necessary that we keep striving for something in the future, for something that is unachieved but imagined to be possible. As every scientist and scholar knows, achieving better knowledge of a subject is possible, but it always opens up new questions we had not yet thought of before. Complete knowledge always has the character of a receding target. This means that a much longer life will make it possible to finish larger projects, to plan longer careers, to not only see our children and grandchildren grow up but also our great grandchildren. Essentially, however, the situation will not change as far as sense of purpose is concerned.

Authors criticizing substantial life extension often point to loss of meaning. Thus, Hans Jonas wrote: 'Perhaps a non-negotiable limit to our expected time is necessary for each of us as the incentive to number our days and make them count' (Jonas 1985, 19). The objection to life extension seems to be that, when we have a lot of time to reach our goals, reaching these goals becomes meaningless, because we have known all along that we would reach them, this year or another. Yet much can be said in response to this. What does 'making our days count' exactly mean? Horrobin (2005, 14) points out that it is an odd argument to assert that people enjoy playing football today and experience no ennui in doing so only because they are aware that they cannot do it three centuries hence. Perhaps the most fundamental criticism of Jonas's argument is expressed by Christine Overall (2004). She states that we should not argue against increasing human longevity by reference to the limited parameters set by current life expectancies. According to her, this is the fallacy of begging the question. When the context changes and life expectancies become much longer, our judgment of life's possibilities and meanings will also change. Not only will childhood and age be redefined, but concepts like schooling, education, marriage, partnership, friendship, sexuality, gender, father, mother, parent, grandparent, family, career, retirement, nationality, and citizenship will also take on other meanings. Together these changes will constitute new moral systems, purposes, and contexts for meaning. But I think Overall exaggerates. The way we think about human fulfillment now, of course, is relevant to our well-considered present-day judgments on prolongation of life. I would agree with her, however, if she

argued that we ought not to evaluate substantial life extension *only* by reference to the kind of life that we know now. Certainly, a comprehensive evaluation of future possibilities requires not just norms, values, facts and extrapolations, but also imagination.

It is a fact, of course, that lives with less than the average life expectancy can be experienced as meaningful. But even if life extension would not increase the possibility to lead a meaningful life, it might result in new (better?) ways of having a meaningful life, as has happened in the past:

[T]he increase in life expectancy [since 1900] means that individuals now have a greater chance of growing old. In a sense, the course of people's lives has become more predictable. People expect to reach a respectable age and they live their lives accordingly. The growing certainties in life have been accompanied by a shift in norms and values. In the early twentieth century, people had a more fatalistic approach to life: things simply happened, and changes in life unavoidably befell people (...). This fatalistic approach to life has been replaced by a more proactive attitude, or 'choice biography', the notion that people can shape their own lives (Dykstra 2002, 10; see also Hagestad 1996, 208).

Another round of substantial life extension might cause people to take on an even stronger managerial attitude towards life. However, that human lives can be planned towards chosen purposes in the future will remain a matter of degree. Human vulnerability remains. A society with more (expensive) health care technology for its members creates the conditions for more instead of fewer insurance policies and other risk-averting strategies. New risks (among them corporate and state uncertainties transferred to individual citizens, see Dannefer 2000, 270) and the old risks that remain, might even become more oppressive and threatening because there is more to lose. That is why Aubrey de Grey does not want to lecture in dangerous countries and why he thinks that the prevention of traffic accidents will be given absolute priority in societies with greatly extended life expectancies.

### Life Extension and Efficacy

Research shows that having a fair amount of control over life's circumstances and having a relatively high degree of self-esteem are factors in determining a more than average life expectancy (Marmot 2005). So hav-

ing (a sense of) control is good for longevity. But do control, life extension and a much longer life contribute to a more meaningful life? The desire for control can go so far as to be self-defeating and counterproductive. Furthering longevity might involve such hard and manifold efforts that life becomes meaningless rather than meaningful. A body repair every ten years, as envisaged by De Grey, is not too big a price to pay for a long and healthy life, but when a substantially extended lifespan and health-span demands constant attention every day, the gain in years might be offset by a loss in quality of life. Medicalization could turn out to be a serious problem connected with life extension (Porter 1999; Verweij 1999). A good balance would have to be sought, as otherwise the controlling efforts needed for a longer life might start to make human life meaningless (and lives experienced as meaningless might tend to become shorter again).

### Life Extension and Moral Worth: Distributive Justice

An important aspect of a meaningful life is that it can be justified morally, and one of the most important moral problems concerning the engineering of substantial life extension relates to justice. Justice is about the distribution of (the lack of) things we value. At the beginning of this article I distinguished between different kinds of life extension, but I left out one very important factor: the 'social gradient' of longevity. Life expectancies differ according to social status. Michael Marmot's recent summary starts with an illustration from the United States capital:

If you take the Metro from the southeast of downtown Washington to Montgomery County, Maryland, in the suburbs – a distance of about 14 miles – for each mile traveled life expectancy rises about a year and a half. This is the most life-enhancing journey in the world. There's a twenty-year gap between poor blacks at one end of the journey (male life expectancy fifty-seven), and rich whites at the other (Marmot 2005).

Such inequalities in life expectancy at birth exist all over the world (Mackenbach & Bakker 2003; Marmot 2004). How do we understand these inequalities? Marmot's analysis comes down to this. An important determinant of an individual life's longevity is (1) a favourable genetic endowment and early life history, but, though important, this is only a small part of the story. Other important elements are: (2) living in a country above the absolute poverty level – a GDP of about USD \$5,000 – above this, level

differences in GDP between countries do not matter very much; (3) high relative social position (as regards status, employment grade, relative wealth and extent of social participation); and (4) high relative freedom, autonomy, or control over life's circumstances – in many Western countries this still means for men especially at work, for women at home. The third and fourth factors are connected with the fact that a more equal distribution of household income in a country seems to be related to a higher average life expectancy. The second factor indicates a similar thing, but then with reference to a threshold kind of equality between countries. In some countries infant and child mortality is still terribly high, while the means to do something about it have been known to humanity for a long time, which shows that we live in a world full of injustice. What counts as injustice depends on the theory of justice that is used. However, whether one refers to human rights (Buitengeweg 2007), Rawls's theory of justice as fairness (Rawls 1999a; 1999b), Dworkin's equality of welfare and resources (Dworkin 2000), or Nussbaum's capabilities theory (Nussbaum 2001; 2006), differences in average life expectancy at birth of forty years between countries (Japan and Zimbabwe) and more than twenty years for socio-economic groups within countries – differences which can be removed and prevented by collective social action – are hard to defend as morally acceptable. Now imagine what would happen if in such a world substantial life extension became possible through initially very expensive biotechnology such as longevity pharmaceuticals or gene therapy. The demand, backed by purchasing power, certainly in the beginning, would mainly come from young adults, the better educated, wealthier and higher-income individuals and those with higher initial endowments of health. Socioeconomic and health inequalities would be amplified. A small group of people with an already high life expectancy would have access to lifespan and health-span extension, but many less-privileged people would not. Surely this is ethically undesirable, is it not? 'The need-based claims of the worse off to have reasonably long lives have more moral weight than the preference-based claims of the better off to have longer lives' (Glannon 2001, 167, see also McConnell & Turner 2005, 61 and Mauron 2005).

The existence of social injustice can never be a valid reason for morally objecting to any improvement in the fate of human beings who do not belong to the most underprivileged ones. 'If we were to insist that technological developments of all sorts wait until the world becomes perfectly just, there would be absolutely no scientific progress' (Post 2004b, 537, see also Harris 2003 and Davis 2004). This is true, but I think one should not

stop there. Demanding equality and perfect justice within and between countries as a prerequisite to the development of life-extension technology is asking too much. Here, as often, 'perfection' would be the enemy of the good. The remedy for injustice is not denial of benefits to some with no corresponding gain to others, but redistribution (Dworkin 2000, 440). Not being able to do everything, or enough, should be no excuse for doing nothing. Efforts like the UN Millennium Development Goals are very important. It is important before 2015 to try to reduce the proportion of people living on less than a dollar a day by half, to reduce the mortality rate among children under five by two-thirds, to try to reduce the maternal mortality ratio by three-quarters and to halt and begin to reverse the spread of HIV/AIDS and the incidence of malaria and other major diseases (Garrett 2007, 32). These are challenging goals, but they are technically feasible and mainly depend on political will. In the same vein, ambitious but feasible goals could be formulated to do something about the shocking disparities in longevity between and also within countries. Christine Overall proposes a qualified prolongevityism (expanding the 'natural' maximal lifespan) within countries, one that will genuinely be for all, a kind of affirmative action in the field of life extension. She writes that increased research into conditions and diseases that affect groups of people with low life expectancy, like people of colour and poor people, is morally indicated (Overall 2003, 200). However, note that for longer life expectancies of less-privileged people more equality of income is more important than new achievements in high-tech biomedicine. As highlighted by Marmot, only three of the thirty-nine recommendations in the Acheson Report to the British government – *Inequalities in Health: Report of an Independent Inquiry* (1998) – are related to health care. 'The others covered the tax and benefit system; education; employment; housing and environment; mobility, transportation, and pollution; and nutrition' (Marmot 2004, 251). Reducing health inequalities might both be the ethically indicated and the most effective way to substantially extend the (remaining) life expectancies of many people; it will be more effective than biotechnological approaches aimed at decelerating or arresting senescence of human beings as a species. Many healthy human years can be gained by this heavily neglected form of life extension: *more equal longevity*.

One should realize, however, that priorities do not have to be absolute and generally allow for compromise. Serious and strenuous attempts to tackle the national and global social gradient of longevity certainly do not require that biogerontological research into the diseases of the oldest old and into the general underlying processes of senescence is stopped

completely. As far as international injustice is concerned, one should not forget that the numbers of the old and oldest old in developing countries will also increase rapidly. Already the remaining life expectancy of a woman who has managed to reach the age of sixty in Brazil (21 more years), India (18 years) and Nigeria (17 years) is not so different from the number of years an average sixty-year-old female inhabitant of the United States can expect to add to her life (24 years). The WHO anticipates that the percentage of people over sixty living in developing countries between now and 2050 will rise from 60 to 85 per cent of the total global number (Kalache, Barreto & Keller 2005, 36, see also Aboderin 2006 and Kirkwood 1999, 8). In China and India the elderly will outnumber the total current population of the US by mid-century (Olshansky et al. 2006, 31). It is possible that understanding the fundamental processes of biological ageing is the most effective way of fighting age-related diseases such as Alzheimer's (Post 2004b). Because of this, because we do not really know how to make the distinction between biological processes of 'normal' ageing and age-associated diseases, and because this distinction continues to change, it would be short-sighted to stop fundamental biogerontological research (Derckx 2006; Izaks & Westendorp 2003; Juengst 2004).

This whole section about justice relates to the sense of moral worth, an important component of a life which is experienced as meaningful. All things considered it should be very difficult for human beings to enjoy a substantially extended and at the same time meaningful life without contributing anything to the fight against ethically unacceptable longevity inequalities in the world.

### **Life Extension, Subjective Well-Being, and Meanings of Life**

I have already made some remarks about the relation between life-extension and sense of purpose, but more has to be said. A longitudinal survey done in the US showed that people over 64 reported significantly lower levels of life purpose than younger adults. In addition, physical and emotional health were perceived as decreasing with age, and people over 74, especially women, rated themselves substantially lower on sense of control than younger age groups. At the same time, however, women over 54 and men over 64 rated their relationships with others more positively than younger adults did, and overall life satisfaction of men and women over 54 was more positive than that of younger people (Ryff 2006). De-

spite a decline in many areas, overall subjective well-being is as good, if not better, for older people as for their younger counterparts. This has been regarded as strange, but socio-emotional selectivity theory shows that there need not be a contradiction here:

The theory maintains that two broad categories of goals shift in importance as a function of perceived time: those concerning the acquisition of knowledge and those concerning the regulation of feeling states. When time is perceived as open-ended, as it typically is in youth, people are strongly motivated to pursue information. ... In the face of a long and nebulous future, even information that is not immediately relevant may become so somewhere down the line. In contrast, when time is perceived as constrained, as it typically is in later life, people are motivated to pursue emotional satisfaction. They are more likely to invest in sure things, deepen existing relationships, and savor life (Carstensen 2007, 45).

Not so much a preoccupation with the past but with the present may be a sign that a person's life is felt to be coming to an end (see Hagestad 1996, 207). The decisive factor in socio-emotional selectivity theory is not chronological age but perceived remaining life expectancy. When conditions create a sense of the fragility of life, for example after the September 11 attacks in the US, or during the SARS epidemic in Hong Kong, younger as well as older people prefer to pursue emotionally meaningful experiences and goals in the short term (Fung & Carstensen 2006). So, what does this mean for substantial life extension? It is plausible that with a substantially higher life expectancy people will keep making plans and for a longer time will have a sense of purpose in life, but they will also pay the price of having to wait longer before they reach the state of more positive relations with others and higher overall satisfaction with life. When the expectations of the longevity of life increase, people will be more inclined to keep gathering information that might be useful some time in the future and to postpone gratification of emotional needs. However, it is not immediately clear what is the better situation. Is it more important to have a meaningful life or a happy life? Will later life be more emotionally gratifying if one has had a longer period of (successful?) striving for goals and fulfillments? Will 'old age' be happier if one has had a longer 'youth'? Will it be possible to live longer and at the same time to learn to be 'older and wiser' at a relatively early stage? Part of the answers will depend on the socially expected life course. 'The life course has become a princi-

pal cultural connection between individual lives and the larger society through an image not only of the good life, but of the timetable according to which it should be achieved' (J. Keith and others quoted in Hagestad 1996, 209).

### **A Final Issue: Is Life Extension Unnatural?**

Important authors on life extension such as Hans Jonas (1992), Leon Kass (2004), Francis Fukuyama (2002), Daniel Callahan (1995), and Bill McKibben (2003) have exhorted us

to live more or less according to nature, and warn that our efforts to depart from what we are will result in new evils that are more perilous than old ones. (...) Our focus (...) should be on the acceptance of aging rather than on its scientific modification. The intergenerational thrust of evolution, by which we are inclined toward parental and social investment in the hope, energy, and vitality of youth, provides the basis for a natural law ethic that requires us all to relinquish youthfulness (Post 2004b, 536-537).

It is very easy to dismiss these 'natural law positions' as an untenable deontological stance by pointing out that if substantial life-extension starts to occur in nature it begins to be 'natural', or by emphasizing that humans have always changed nature (including their own natural features) in the course of civilization. More or less the same goes for the religious versions of these arguments, referring to a God who has established the natural law. That humans should respect the will of God or that they should not attempt to play God, runs into similar intellectual difficulties as the exhortation to respect nature, and into additional difficulties as well. Referring to the will of God is not a very strong argument in a pluralistic democratic society that includes atheists and agnostics.

However, it is possible to discover something important behind these arguments from nature or God, even if one rejects the absolute deontological positions and is more inclined towards consequentialist ethics. Human nature is not blank, nor completely and always easily malleable. It is the result of millions of years of natural selection. Human beings are the result of evolution and as such they are very complex organisms with many trade-offs involved, referring back to environments of the past. We cannot design humans from scratch. Stressing that we ought to be wary

of bad unintended consequences is not the same as claiming that nothing should be changed. It is possible for a society to opt for a less-than-one-child-per-family policy to counteract undesirable effects of population-growth due to increasing old age survival, but will its individual citizens accept this policy and live up to it? Human nature is very flexible, but it is possible to ask too much of human beings. It seems relevant, for example, to consider the emotional implications of a population scenario with 9 billion people in 2300 with an average life expectancy at birth of about 100 years, few children and a high proportion of very old people (Basu 2004, 93). And we should not only be talking about what is possible for human beings, individually and as a group. We should also consider what is good for them and what makes their lives meaningful. To ask what desires and emotions are humanly 'natural' can be translated into a question about what desires and emotions are good and proper for human beings to have and deserve the opportunity to be acted upon.

More discussion about meanings of life is needed. But in individualistic secular societies people have many different ideas about what constitutes a meaningful life, so it will be difficult to reach consensus or even understanding about the value of life extension. Part of the difficulty is that in modern Western societies it is rather generally accepted that meanings of life are a private matter, not something about which to engage in public debate.

The variety of ideas about meanings of life will be very difficult to handle in a democracy, because the differences can be wide and not a matter of degree. 'Transhumanists' like Ray Kurzweil (Kurzweil & Grossmann 2004), Nick Bostrom (2003; 2005), Gregory Stock (2002), and Aubrey de Grey (De Grey & Rae 2007) feel that we should not accept biological ageing as inevitable. They argue that the fundamental biology of human beings should be changed in order to get rid of death caused by senescence. Other thinkers, not only of the natural-law variety, see this as a dangerous illusion, holding that the propagation and cultivation of ideas like this are very detrimental to the meanings of human lives. This difference in worldview is a crucial aspect of the debate on substantial extension of human life expectancy. Much of what is involved is expressed in these words of Michael Lerner:

[We] need to do the spiritual work as we grow older to accept the inevitability of death rather than acting as though aging and death could be avoided if only we had a better technology. The enormous emotional, spiritual, and financial cost of trying to hang on to life as long as pos-

sible (and to look as though we were not aging) is fostered by a marketplace that tries to sell us endless youth. It is also fostered by our cultural failure to honor our elders, provide them with real opportunities to share their wisdom, and combat the pervasive ageism with its willingness to discard people long before their creative juices have dried up, to stigmatize the sexuality of the elderly (...), and to provide little in the way of adequately funded and beautifully conceived long-term care facilities (Lerner 2006, 308-309).

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# Technology, Trust, and Religion

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