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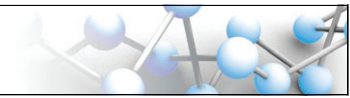

Bioethics ISSN 0269-9702 (print); 1467-8519 (online)
Volume 24 Number 8 2010 pp 384–394
doi:10.1111/j.1467-8519.2008.00712.x

ARTICLES

EQUALITY AND THE DUTY TO RETARD HUMAN AGEING

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Keywords
ageing,
equality,
justice,
disease

ABSTRACT
Where does the aspiration to retard human ageing fit in the 'big picture' of medical necessities and the requirements of just healthcare? Is there a duty to retard human ageing? And if so, how much should we invest in the basic science that studies the biology of ageing and could lead to interventions that modify the biological processes of human ageing? I consider two prominent accounts of equality and just healthcare – Norman Daniels's application of the principle of fair equality of opportunity and Ronald Dworkin's account of equality of resources – and conclude that, once suitably amended and revised, both actually support the conclusion that anti-ageing research is important and could lead to interventions that ought to be considered 'medical necessities'.

I. INTRODUCTION

Our attitude towards which medical services should be publicly provided will no doubt influence our attitude towards how much public funding we are inclined to invest in the basic scientific research that could lead to these proposed services. For example, if we believe that treatments for cancer and Alzheimer's disease (AD) are important medical necessities, then we are more likely to take the view that we should invest a sizable portion of public funds into cancer and AD research. The more important we take one particular medical necessity to be, the bigger the piece of the pie we will be inclined to allocate to the scientific research that could make such medical benefits a reality.

Where does the aspiration to retard human ageing fit in the 'big picture' of medical necessities and the requirements of just healthcare? Is there a duty to retard human ageing? And if so, how much should we invest in the basic science that studies the biology of ageing and could lead to interventions that modify the biological processes of human ageing? Ageing increases an individual's risk of disease (e.g. cancer, AD), frailty, cognitive decline and death. An aged population faces challenges such as increased healthcare costs, a declining and changing labour force, increased strain on pensions, etc.

Not all species age the same way. The maximal lifespan of mice, for example, is only a fraction of the maximal lifespan of monkeys and turtles. And even within a species there is some variation among the rate of ageing. 'The tiny chihuahua can live 12–15 years compared to six or seven for its larger cousin, the Irish Wolfhound'.[1] And while it is true that every human being celebrates a new birthday each year, the lifelong accumulation of molecular and cellular damage we experience with the passage of time can vary dramatically. It is possible for some humans to reach the age of 100 years old free from the diseases (e.g. cancer, heart disease, diabetes) that kill most of their contemporaries decades earlier.

[1] S.J. Olshansky et al. In Pursuit of the Longevity Dividend. *The Scientist* 2006; 20: 28–36: 30.

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Approximately 1 in 10 000 Americans are centenarians.[2] And recent studies of centenarians and the impact of 'longevity genes' suggests that there is a significant genetic component at play. Having a centenarian sibling increases one's chances of survival to very old age.[3] Furthermore, one recent study found that the offspring of long-lived parents had significantly lower prevalence of hypertension (by 23%), diabetes mellitus (by 50%), heart attacks (by 60%), and strokes (no events reported) than several age-matched control groups.[4]

A number of biogerontologists, philosophers and policy advocates have begun to engage in a spirited debate concerning the priority of tackling human ageing itself.[5] And this paper seeks to add a new dimension to these debates by placing the duty to retard human ageing within the framework of a theory of just healthcare. In particular, I consider two prominent theories which emphasis a principle of equality. Norman Daniels invokes the principle of fair equality of opportunity to outline an account of just healthcare that places great emphasis on the notion of 'normal species functioning' and the treatment/enhancement distinction.[6] Ronald Dworkin's account of equality of resources emphasizes the importance of mitigating brute luck inequalities; that is, inequalities that people are not responsible for.[7] Dworkin invokes the idea of a hypothetical insurance scheme to determine the range of medical provisions that should be provided by the publicly funded healthcare system.

I consider what both of these accounts of equality would say about the duty to retard human ageing and conclude that both accounts of equality, once suitably amended and revised, actually support the conclusion that anti-ageing research is important and could lead to interventions that ought to be considered 'medical necessities'. Examining the relation between equality and anti-ageing research should help enhance the interdisciplinary debate and engagement that is needed to ensure that philosophers, bioethicists, gerontologists and policy makers address the duty to retard human ageing in a fair and proportionate manner.

II. THE FASCINATING FIELD OF BIOGERONTOLOGY

While humanity has always been preoccupied with discovering the 'fountain of youth', recent advances in the field of biogerontology suggest that the aspiration to modify the biological processes of ageing in humans – and thus delay the onset of all age-related disadvantages, as well as compress morbidity and mortality – may actually be achievable. Since the seminal paper of McCay et al.,[8] in which the life-extending effect of restricting food intake in rats was described, caloric restriction (CR) has been and continues to be a major research area in biological gerontology.[9] The impact calorie restriction has on our susceptibility to age-related disease and frailty is important, but not because we should prescribe humans to pursue such a burdensome means for promoting their health. Rather it gives us hope that we may better understand the causal biological mechanisms underlying ageing and the onset of prevalent diseases and thus, ultimately, develop safe and effective ways of modulating the ageing process to extend the human healthspan and compress morbidity and mortality.

Success in increasing longevity in labouratory organisms has demonstrated that ageing is not an immutable process. In yeast, the *SIR2* gene determines the lifespan of mother cells, and adding an extra copy of *SIR2* extends

[2] For a summary of the prevalence of centenarians in the United States visit Boston University's *The New England Centenarian Study* at: http://www.bumc.bu.edu/Dept/Content.aspx?DepartmentID=361&PageID=5749 [Accessed 5 Nov 2008].

[3] T. Perls. 1998. Siblings of Centenarians Live Longer. *The Lancet* 1998; 351.

[4] G. Atzmon. Clinical Phenotype of Families with Longevity. *JAGS* 2004; 52: 274–277.

[5] See N. Bostrom. The Fable of the Dragon-Tyrant. *J Med Ethics* 2005; 31(5): 273–277; R. Butler et al. New Model of Health Promotion and Disease Prevention for the 21st Century. *BMJ* 2008; 337: 149–150; A. Caplan. Death as an Unnatural Process. *EMBO Rep*. 2005; 6(2): S72–S75; A. De Grey. Life Extension, Human Rights, and the Rational Refinement of Repugnance. *J Med Ethics* 2005; 31: 659–663; C. Farrelly. A Tale of Two Strategies: The Moral Imperative to Tackle Ageing. *EMBO Rep* 2008; (7): 592–595; C. Farrelly. Sufficiency, Justice and the Pursuit of Health-Extension. *Rejuv Res* 2007; 10(4): 513–520; R. Miller. Extending Life: Scientific Prospects and Political Obstacles. *The Millbank Quarterly* 2002, 80(1): 155–174; S.J. Olshansky et al. In Pursuit of the Longevity Dividend. *The Scientist* 2006; 20: 28–36; C. Overall. 2005. *Ageing, Death and Human Longevity*. Berkeley & Los Angeles: University of California Press; and the Alliance for Ageing Research website at: http://www.ageingresearch.org/ [Accessed 5 Nov 2008].

[6] N. Daniels. 1985. *Just Health Care*. Cambridge: Cambridge University Press; N. Daniels. Normal Functioning and the Treatment-Enhancement Distinction. *Camb Q Healthc Ethics* 2000b; 9: 309–322; & A. Buchanan et al. 2000a. *From Chance to Choice: Genetics and Justice*. Cambridge: Cambridge University Press.

[7] R. Dworkin. 2000. *Sovereign Virtue*. Cambridge, Mass.: Harvard University Press; R. Dworkin. What is Equality? Part 1: Equality of Welfare. *Philos Public Aff* 1981a; 10(3): 185–246; R. Dworkin. What is Equality? Part 2: Equality of Resources. *Philos Public Aff* 1981b; 10(4): 283–345.

[8] C. McCay et al. The Effect of Retarded Growth Upon the Length of Life and Upon Ultimate Size. *J Nutr* 1935; 10: 63–79.

[9] E. Masoro. Caloric Restriction and Ageing: An Update. *Exp Gerontol* 2000; 35: 299–305.

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lifespan.[10] Resveratrol, an anti-ageing molecule present in red wine, has been shown to shift the physiology of middle-aged mice on a high-calorie diet towards that of mice on a standard diet and significantly increases their survival.[11] Human clinical trials are now under way for sirtuin activating compounds, to see if they are safe and effective treatments for diseases of ageing like type 2 diabetes.[12]

Incredible scientific advances have been made in recent years in the biology of ageing. In his recent Horizon's *Nature* article, entitled 'A Systematic Look at an Old Problem', Thomas Kirkwood argues that there is good reason to be optimistic that real, tangible health benefits could be reaped from the study of ageing. He claims:

> Clear consensus now exists that ageing is caused by the gradual, lifelong accumulation of a wide variety of molecular and cellular damage . . . But if ageing is a matter of things falling apart, can research realistically hope to achieve anything useful? The answer is emphatically yes – there is plenty of evidence that it is possible to intervene in the underlying causative mechanisms. Indeed, the malleability of the ageing process, as revealed by demography, derives precisely from the fact that it seems to be possible to slow the rate at which damage accumulates.[13]

While the science of biological gerontology may still be in its infancy, the importance of achieving even modest success in retarding human ageing could have significant individual and societal benefits. According to the authors of 'In Pursuit of the Longevity Dividend', slowing human ageing by just seven years would yield health and longevity benefits greater than those which would be achieved with the elimination of cancer or heart disease.[14] To help inspire greater public support for tackling ageing itself (rather than continue down the current path of tackling one disease at a time), proponents of pursuing anti-ageing research ought to frame their aspirations in a moral discourse that goes beyond emphasizing just the importance of the likely benefits that retarding human ageing would have on individuals and society. In other words, if the duty to retard human ageing is framed only in the confines of a consequentialist cost-benefit analysis, its potential to win over some skeptics or critics will be more limited than it need be. In this paper I provide a more robust normative analysis which reveals the importance of anti-ageing research for a theory of just healthcare. This analysis begins with the core value that opponents of giving priority to retarding ageing are most likely to invoke – the value of *equality*.

Is the aspiration to retard human ageing, and to do so by investing a greater portion of public funding into tackling ageing itself (rather than tackling a particular disease), a violation or requirement of equality? That is the question this paper seeks to answer. I examine two prominent accounts of equality – Norman Daniels's application of the principle of fair equality of opportunity to just healthcare, and Ronald Dworkin's account of equality of resources- and conclude that each of these accounts, when properly amended and revised, actually support the conclusion that anti-ageing research is important and could lead to interventions that ought to be considered 'medical necessities'. Showing how the aspiration to retard human ageing promotes the value of equality should help go some way towards winning over the critics and skeptics that believe tackling ageing itself is not an important priority.

III. DANIELS ON EQUALITY AND JUST HEALTHCARE

The value of equality preoccupies a great deal of the energies of moral and political philosophers, and informs a good deal of public debates on a range of applied topics. From the civil rights movement to feminism and global justice, equality is often invoked to raise greater awareness of the deficiencies of the status quos. Does equality entail a moral duty to retard human ageing? And if so, is this duty stringent enough to justify investing a greater share of scarce public funding into the science of biological gerontology? I believe it is. As Olshansky et al. note, the National Institutes of Health was funded at $28 billion in 2006, but less than 0.1% of that amount goes to understanding the biology of ageing and how it predisposes us to a suite of costly diseases and disorders expressed at later ages.[15] Such a meagre investment in the science that could lead to interventions that retard human ageing is, I shall argue, a violation of equality.

There are of course different accounts of equality. And thus when the critic declares 'To suggest that we should

[10] See H.A. Tissenbaum & L. Guarente. Increased Dosage of a Sir-2 Gene Extends Lifespan in Caenorhabditis Elegans. *Nature* 2001; 410: 227–230.

[11] See J.A. Baur et al. Resveratrol Improves Health and Survival of Mice on a High-Calorie Diet *Nature* 2006; 444: 337–342.

[12] See, for example, http://www.sirtrispharma.com/pipeline.html. [Accessed 5 Nov 2008].

[13] T. Kirkwood. A Systematic Look at an Old Problem. *Nature* 2008; 451: 644–647: 645.

[14] Olshansky et al., *op. cit.* note 5. Also see S.J. Olshansky. Simultaneous/Multiple Cause Delay: An Epidemiological Approach to Projecting Mortality *J Gerontol* 1987; 42: 358–365.

[15] Olshansky et al., *op. cit.* note 5.

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make retarding human ageing a priority is unfair because it violates equality' one needs to spend some time bringing precision to the concern at hand. This involves unpacking the theoretical commitments and assumptions of the egalitarian. In this paper I examine two conceptions of equality – fair equality of opportunity and equality of resources. I conclude that neither account of equality undermines the claim that we ought to be investing a greater portion of public funds into the biology of ageing and anti-ageing research. Indeed, once suitably revised, both accounts of equality actually support the aspiration to retard human ageing.

One of the most influential accounts of just healthcare is Norman Daniels's *Just Health Care*. Daniels extends John Rawls's[16] principle of fair equality of opportunity to the provision of medical services. According to Daniels, a theory of healthcare needs 'should illuminate the sense in which many of us think health care is *special* and should be treated differently from other social goods'.[17] This idea that healthcare is special, so special that it should be provided by the state, helps explain why some might believe the aspiration to retard human ageing runs counter to equality or, at a minimum, why equality does not require us to retard ageing. 'Surely retarding ageing is not "special" ', the critic will contend. And this attitude is no doubt part of the reason why anti-ageing research is a hard sell to the general public and policy makers.

Echoing Daniels, the critic will contend that 'the primary rationale for claiming that we are obligated to provide people with medical service is that it meets an important need for treatment of disease or disability'.[18] If anti-ageing interventions were possible, our critic will continue, they would not be viewed as part of the provisions that fall under 'medical necessity' because ageing itself is not a disease. Ageing is simply part of normal species functioning. And medical obligations are ultimately premised on the 'normal functioning' interpretation of fair equality of opportunity. Equality requires us to restore people to normal species functioning, but there is no obligation to provide anti-ageing interventions that would slow down the molecular and cellular damage caused by the passage of time itself.

How adequate is this line of argument? Daniels himself admits that the treatment/enhancement distinction does not map unqualifiedly onto the moral boundary between obligatory and nonobligatory services.[19] So he concedes that if a new genetic technology that could enhance immune capabilities became available, and it enhanced our capabilities beyond normal functioning, it could be considered something that ought to be provided through healthcare services. But yet, surprisingly, Daniels claims that the treatment/enhancement distinction is a 'reasonable distinction for use within our primary rationale for including medical services in a healthcare benefit package'.[20] Furthermore, he believes that dropping this view has 'distinct disadvantages from a public policy perspective and no compelling arguments for it from a moral perspective'.[21] While Daniels might be correct about the former,[22] it is odd that he should say that there are no compelling moral arguments for dropping the distinction. The most obvious and compelling moral argument would be that the distinction unnecessarily constrains the potential avenues we could pursue to promote the health prospects of a population. So if the treatment/enhancement distinction impedes our ability to improve the opportunities for pursuing a rational plan of life then the distinction contravenes the very underlying rationale upon which Daniels's account of just healthcare is premised. For ageing has a profound impact on an individual's risk of disease and frailty. For example, nearly half the population over the age of 85 has Alzheimer's disease.[23] And nearly half (45.1%) of the current population over 75 years of age fall into the category of people considered to have a limitation of activity caused by chronic conditions.[24]

To remain faithful to the idea that normal species functioning provides a natural baseline for medical services, and yet to also spend billions trying to treat all of the various age-related disadvantages that we are susceptible to, is to be pulled in two contradictory directions. And the result is a sub-optimal and unfair response to our biological vulnerabilities. The current mindset will have dire consequences for societies (like the United States) that are set to have unprecedented numbers of senior citizens in the decades to come. To help us respond, in a fair and proportionate manner, to age-related disadvantage we must transcend the narrow limitations imposed

[16] J. Rawls. 1971. *A Theory of Justice*. Cambridge, MA: Harvard University Press.
[17] Daniels 1985, *op. cit.* note 6, p. 19.
[18] Daniels 200b, *op. cit.* note 6, p. 314.
[19] Ibid.
[20] Ibid: 319.
[21] Ibid: 319.
[22] Which simply reinforces the importance of the present theoretical exercise – namely, to reveal the failings of the current attitude towards health extension (i.e. that equality requires us to tackle one disease at a time because that strategy will restore people to normal functioning).
[23] National Institute of Ageing. *Alzheimer's Disease Fact Sheet*. Available at: http://www.nia.nih.gov/Alzheimers/Publications/adfact.htm [Accessed 5 Nov 2008].
[24] US Department of Health and Human Services, Centers for Disease Control and Prevention. *Health, United States. 2004*. 234. Available at: http://www.cdc.gov/nchs/data/hus/hus04.pdf. [Accessed 5 Nov 2008].

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by the notion of 'normal species functioning' and the treatment/enhancement distinction.

A revisionist reading of Daniels's account of fair equality of opportunity and just healthcare is one that will give primary importance to the impact ageing has on the range of opportunities open to us. According to Daniels, 'the relative importance of treating different diseases and disabilities can in part be judged by reference to their impact on the range of opportunities open to us'.[25] But there is no justifiable reason to constrain our deliberations about the importance of medical services in the way Daniels suggests. Retarding ageing by just seven years would have a much more profound impact on the health opportunities open to us than the opportunities created by eliminating cancer or heart disease.[26] This is hard for many people to internalize because they tend to think that curing someone of cancer means that this patient's life has been *saved*. But a more accurate description is that such a treatment *extends* a patient's life. Curing someone of a disease means you have eliminated one particular disease and thus conferred upon them the benefit of extra 'disease-free' life. But the *magnitude* of that benefit will depend on many factors (e.g. the likelihood that they will be afflicted with another disease). And the age of the person in question is thus a very important factor in this respect.

The molecular and cellular damage we accrue over time means that eliminating cancer would only add a few years of disease-free life to most people's health prospects. And this is because another disease or ailment will probably strike next – like diabetes, a stroke, AD, infection, bone fracture, etc. The reality is that adults are much more susceptible to disease and frailty the older they get. This is simply part of our normal species functioning. Historically ageing itself did not represent a major threat to the survival of human beings. We were much more likely to die from starvation, infection or conflict. And thus our current biological limitations are a product of our evolutionary legacies. To treat these legacies, which also include cancer risk itself,[27] as part of a 'natural baseline' is, at best, arbitrary and irrational.

The authors of 'In Pursuit of the Longevity Dividend' explain how even a modest deceleration in the rate of ageing, for example by seven years, would confer significant health benefits:

> If we succeed in slowing ageing by seven years, the age-specific risk of death, frailty, and disability will be reduced by approximately half at every age. 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.[28]

In order to buttress more support for the importance of tackling ageing, and thus postponing the onset of the most prevalent diseases, we must transcend the mindset that premises equality of opportunity on unhelpful notions of 'normal functioning' and the treatment/enhancement distinction. The decisions we make concerning the provision of medical services should not be driven by narrow etiology-based reasoning. Such reasoning is likely to ignore the important role ageing plays in the development of disease, or it will be premised on the mistaken assumption that ageing is immutable and ought to remain part of our normal species functioning. Ageing is of course part of our normal functioning, but so to is the development of disease. We are biological creatures that are *intrinsically vulnerable*. And to fixate on just one part of our evolutionary legacy (our susceptibility to a particular disease like cancer) without acknowledging the importance of other parts of our evolutionary design (i.e. the damage ageing does to our range of opportunities) is irrational. If equality of opportunity requires us, as I believe it does, to take seriously those things that impede our range of opportunities then the current neglect of biological gerontology is a violation of equality. Far from contravening the demands of equality, investing in anti-ageing research could result in one of the most significant medical interventions of this century. And thus we cannot afford to continue down the narrow road of tackling one disease at a time.

The revisionist reading of Daniels I have advanced actually complements his most recent position, as

[25] Daniels 200b, *op. cit.* note 6, p. 315.

[26] Olshansky et al., *op. cit.* note 5.

[27] This point is nicely captured in the following passage from M. Greaves. Darwinian Medicine: A Case For Cancer. *Nat Rev Cancer* 2007; 7: 213–221: 219:

> The blind process through which we and other species have emerged carries with it inevitable limitations, compromises and trade-offs. The reality is that for accidental or biologically sound, adaptive reasons, we have historically programmed fallibility. Covert tumours arise constantly, reflecting our intrinsic vulnerability, and each and every one of us harbours mutant clones with malignant potential.

[28] Olshansky et al., *op. cit.* note 5, p. 32.

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articulated in his new book *Just Health*.[29] Daniels dedicates a whole chapter of this book to the issue of 'Global Ageing and Intergenerational Equity'. He now defends what he calls the general Prudential Lifespan Account to health. This scheme involves treating people equally over their whole lives. Daniels argues that this account imposes two requirements that ensure our decisions concerning distributive allocations of healthcare resources and services are fair and impartial.[30] Firstly, we must function behind a form of 'veil of ignorance', and thus should pretend we do not know how old we actually are. And secondly, we accept a distribution only if we are willing to live with the results at each stage of our lives.

The Prudential Lifespan Account reveals why tackling ageing itself should be more of a priority. The last years of most people's lives are the ones where they are most vulnerable to frailty, morbidity and mortality. Given the severity of the dangers of senescence, it makes little sense not to invest aggressively in longevity science. Furthermore, slowing ageing does not just benefit people when they are very old (say over the age of 85). It benefits them *throughout* their entire adult lifespan. Recall the point made by Olshansky et al., that slowing ageing by seven years reduces the age-specific risk of death, frailty, and disability by approximately half *at every age*. This fact reveals why retarding ageing is more important, from the Prudential Lifespan Account, than a cure for one specific disease of ageing: the benefits of the former would be realized throughout the whole stage of our adult lives.

Consider, for example, the case of AD. According to the Centre For Disease Control,[31] in the year 2003 AD was among the top ten leading causes of death only for Americans ages 75 and over. Among those aged 75–84, AD accounted for 3% of total deaths. This rate is actually lower than the rate of deaths caused by cerebrovascular diseases (3.5%) among adults aged 45–54. Furthermore, cerebrovascular diseases also account for more than twice (7.5%) the number of AD deaths among Americans aged 75–84. My point being that a cure for AD would mostly benefit people in the most advanced stages of life, whereas slowing ageing by just seven years would not only reduce the risk of AD at all stages of our adult lives but would also do the same for stroke, cancer, heart disease, diabetes and all the other afflictions of senescence. And these facts should impact our attitudes towards how much we invest in research for AD versus ageing itself. Thus we should re-think whether spending, as we currently do,[32] more than half of the National Institute of Ageing budget on AD is a wise and fair investment.

The aspiration to retard human ageing satisfies the two requirements of Daniels's account of the Prudential Lifespan Account. Not knowing one's real age, we would want to reduce the age-specific risk of death, frailty, and disability throughout our adult lives, which retarding ageing would accomplish. Secondly, these benefits to our health prospects are ones we would be willing to live with at each stage of our lives (given the first point).

One might object to this last point and protest that, if slowing ageing merely *delays* the onset of the diseases of ageing, are people really any better off if they still suffer morbidity and mortality in their 90s, rather than their 70s and 80s? There are two ways to respond to this objection. The first is to say that even if retarding ageing just delays the afflictions of senescence (say by a few years), it is still a laudable benefit. All else being equal, it is better to suffer morbidity and mortality later in life rather than earlier in life. A cure for cancer, for example, would not eliminate the possibility that a person might suffer a stroke or heart attack a year or two later. So every medical intervention merely *delays*, rather than eliminates, morbidity and mortality. And the real value of the intervention depends on its impact on our health prospects: that is, how many extra disease-free years it will permit us to enjoy.

Secondly, in addition to extending the number of years we can expect to enjoy health and vigour, there is also good reason to believe that retarding ageing would compress morbidity and mortality. Longevity scientist David Sinclear recently summarized the goals of this science this way:

> My stated goal is to keep people out of nursing homes for as long as possible. It is known that the longer a person lives, the shorter the period of his or her chronic disability or illness. People who live a very long time die relatively quickly. Thus, the goal would be to reach 90 years of age, feel well, still be a productive member of society, be able to play tennis, and see your grandchildren graduate from college. Then, in a matter of weeks, go through the final stages of life and die. In that way we would suffer less and be less of a burden on our families and society.[33]

Tackling ageing also complements Daniels's comments on justice and preventative health. He argues that the

[29] N. Daniels. 2008. *Just Health*. Cambridge: Cambridge University Press.
[30] Ibid.
[31] http://www.cdc.gov/nchs/data/nvsr/nvsr55/nvsr55_10.pdf [Accessed 5 Nov 2008].
[32] Olshansky et al., *op. cit.* note 5.
[33] D. Sinclear. 2008. Interview. *Rejuvenation Research* Vol 11(1): 265–268: 267.

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latter requires (1) reducing the risks of disease and disability and (2) seeking an equitable distribution of those risks. Given the 'natural lottery' of life, the risks of late onset disease and death are not currently equitably distributed. Centenarians can enjoy decades more of disease-free life than most people. Slowing down ageing would permit all of us to age more like centenarians do. Thus retarding ageing is perhaps best viewed as a requirement of justice in *preventative health*. It reduces our risks of disease and disability, and it helps ensure there is a more equitable distribution of those risks. Why should those 1 in 10 000 Americans who are centenarians be the only ones to enjoy a century of disease-free life?

IV. DWORKIN AND EQUALITY OF RESOURCES

Another prominent account of equality is provided by the political and legal philosopher Ronald Dworkin. Like Daniels and his account of just healthcare, Dworkin's account of 'equality of resources' evolved as a response to what he took to be deficiencies in John Rawls's influential account of 'justice as fairness'. In particular, Dworkin attempted to improve upon Rawls's theory by taking more seriously the issue of personal responsibility and natural inequalities. And Dworkin's view is perhaps the most prominent account of what has been labeled 'luck egalitarianism'.[34] Luck egalitarians maintain:

> **Luck Egalitarianism**: Inequalities in the advantages that people enjoy are just if they derive from the choices people have voluntarily made; however, inequalities deriving from unchosen features of people's circumstances are unjust.

The youthful and the aged have different life prospects (for example, their risk of disease, frailty and death).[35] This inequality in life prospects is not of course necessarily skewed in one direction. Many people in the later stages of life possess practical wisdom, love, financial security etc. that their younger counterparts lack. But the molecular and cellular damage that occurs over time means that those in the later stages of life will, on balance, face much greater risks of disease and frailty than those in the prime of life. For instance, a twenty year-old male who is cancer-free today has only a 3.07% chance of being diagnosed with cancer in the next thirty years. Contrast this with the 43.87% chance that a sixty year-old who is cancer-free today will develop cancer in the next thirty years of his life.[36] Once one adds the increased risk of infection, heart disease, bone fracture, cognitive decline, etc. it becomes apparent that age is a prime example of a *bad brute luck* inequality. The aged do not deserve the increased risk of disease, frailty and death that they face as a result of the passage of time. It is just part of the natural lottery of life. Our biological design is driven by the shortsighted aim of continuity of the species. And once our reproductive capacities have run their course there is no evolutionary benefit to keeping a particular person in their prime physical and mental capacities. And so our ability to repair the damage to our DNA declines, and with it the range of opportunities open to us.

Can Dworkin's account of equality of resources provide us with an equality-based argument for tackling ageing? I believe it can. To do so we shall have to make some revisions to Dworkin's theory of equality, as we did with Daniels's account. So first let me provide a brief outline of Dworkin's account of equality of resources.

Dworkin's normative theory is premised on the following two important principles:

> **Principle of Equal Importance**: It is important, from an objective point of view, that human lives be successful rather than wasted, and this is equally important, from an objective point of view, for each human life.

> **Principle of Special Responsibility**: though we must all recognize the equal objective importance of the success of a human life, one person has a special and final responsibility for that success – the person whose life it is.[37]

These two principles make different demands on government. The principle of equal importance requires 'government to adopt laws and policies that ensure that its citizens' fates are, so far as government can achieve this, insensitive to who they otherwise are – their economic background, gender, race, [and I shall add *age*] or particular set of skills and handicaps'.[38] The principle of special responsibility 'demands that the government work, again as far as is it can achieve this, to make their fates sensitive to the choices they have made'.[39] The

[34] E. Anderson. What is the Point of Equality? *Ethics* 1999; 109(2): 287–337.

[35] One could say the same thing about centenarians who possess 'longevity genes' and the average population that do not live past 85. But to develop my point in a way that is distinct from my analysis in the previous section, I will contrast the health prospects of the young and aged.

[36] http://seer.cancer.gov/csr/1975_2002/results_merged/topic_lifetime_risk.pdf [Accessed 5 Nov 2008].

[37] Dworkin 2000, *op. cit.* note 7, p. 5.

[38] Ibid: 6.

[39] Ibid.

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requirements of these two principles are most vivid in Dworkin's argument for equality of resources.

Dworkin's argument for equality is developed in his hypothetical tale of shipwrecked survivors who are washed up on a deserted island that has abundant resources. Let us assume for the moment that everyone has the same natural talents. In order to develop a suitably revised version of Dworkin's account of equality, let us add to this initial assumption that individuals also have the same risk of disease, frailty and death. So all our shipwrecked survivors are in the prime of their adult lives. These immigrants agree to divide the resources of the island equally among them. Each person is given 100 clam shells to bid on the various resources. People will obviously have different preferences and this will be reflected in what they spend their clam shells on.

The distribution that would result from such an auction would be 'ambition sensitive'. That is, the bundle of goods people end up with would reflect only the choices they made. No one could complain that someone else received preferential treatment as all started with 100 clam shells and were free to bid on those resources they wanted. Of course some resources will be more expensive than others but these are not grounds for a complaint as this stems from people's preferences. This auction will treat all as equals if it satisfies what Dworkin calls the 'envy test'. The envy test maintains that 'no division of resources is an equal division if, once the distribution is complete, any immigrant would prefer someone else's bundle of resources to his own bundle'.[40]

The first part of Dworkin's hypothetical story captures the concern for the special responsibility principle. The initial bundle of goods the immigrants have are the result of their own ambitions, tastes, etc. But what happens once the auction is completed and the immigrants begin to work and produce things? We now drop the initial assumption that all have equal natural talents. Given the fact that some immigrants will be more skilful, others will fall sick, etc., it will not be long before the conditions of the envy test will fail to be met. These events thus threaten to undermine the principle of equal importance. This principle maintains that it is important that human lives be successful rather than wasted. But a 'starting-gate' theory that holds that justice requires equal initial resources and laissez-faire thereafter will undermine the requirements of this principle. Dworkin argues that we must not allow the distribution of resources to be endowment-sensitive, that is, 'to be affected by differences in ability of the sort that produce income differences in a laissez-faire economy among people with the same ambitions'.[41]

Once we add ageing into Dworkin's tale we see that ageing itself can give rise to complaints that violate the envy test. Those who are more susceptible to infection, disease and frailty – like the aged – will envy the health prospects of the youthful and this inequality is unchosen. Furthermore, the age-related disadvantages that will be visited upon the aged violate the requirements of the principle of equal importance. That principle stipulates that 'human lives be successful rather than wasted, and this is equally important, from an objective point of view, for each human life'. Pathology, pain and suffering, these all compromise the success of a human life by limiting our ability to pursue our conception of the good and, ultimately, by ending our lives completely. The principle of equal importance does not say that human lives should be successful only for a fixed number of years, after which point people's interests in remaining healthy have no ethical significance. And thus one ought, to be consistent with the logic of luck egalitarianism and the principle of equal importance, bring to the fore the importance of redressing age-related disadvantage. And this occurs in Dworkin's second stage of his hypothetical tale.

Dworkin introduces the *hypothetical insurance scheme* to alleviate the concerns about abandoning the ideal of an endowment-insensitive distribution. He modifies the auction story by declaring that, prior to the auction, the immigrants are denied information about their natural endowments and are given the opportunity to purchase insurance against handicaps and unequal skills. Under these conditions of uncertainty people would be willing to depart with some of their 100 clam shells to guard against having disabilities or lacking skills. Those who fare poorly in these respects will receive compensation in the form of extra resources paid out by these insurance schemes. Such schemes will be funded by those who are fortunate not to have to make an insurance claim but will have to pay an insurance premium (in the form of taxes).

Moving from this hypothetical story to the real world of policy decisions, Dworkin argues that there is a need for taxation and redistribution. Income tax is a device society can use to neutralize the effects of handicaps and differential talents. But a tax system can only roughly approximate the results of the insurance scheme and will not achieve a truly ambition-sensitive/endowment-insensitive distribution. Nor is there one simple solution that will do justice to the demands of the two fundamental principles. Dworkin endorses, for example, a decent minimum of medical care for all citizens and the option

[40] Ibid: 67.

[41] Ibid: 89.

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to buy private health insurance. But his endorsement of universal health coverage is not founded on the rescue principle, which instructs us to spend all we can on health care 'until the next dollar would buy no gain in health and life expectancy at all'.[42] Equal concern for all does not necessarily entail that we spend exorbitant amounts of public funds trying to save the lives of those who have little chance of surviving for long. Society must make difficult decisions regarding which medical tests and procedures should be deemed 'necessary and appropriate' for coverage under the publicly funded healthcare system and also allow individuals to choose for themselves how much more they wish to spend to insure themselves against other possible misfortunes. Such an arrangement is a just compromise between the demands of equal importance and special responsibility.

At this stage one might argue that Dworkin's account of equality of resources cannot be utilized to buttress support for anti-ageing research and interventions. At best, the critic might contend, anti-ageing interventions are something that individuals should be permitted to buy private insurance for. But such interventions are not a 'medical necessity' and thus should not be part of the coverage provided by the publicly funded health care system. So the aspiration to retard human ageing appears to be premised on the principle of rescue which Dworkin explicitly rejects.

This objection is mistaken because it assumes that retarding ageing would require us to spend exorbitant amounts of public funds trying to save the lives of those who have little chance of surviving for long. But the aspiration to retard ageing does not strive to prolong the last stages of the human life cycle. Rather, it aspires to expand the human healthspan – that period of our lives when we enjoy our greatest health opportunities. And thus investing a greater portion of public funds into anti-ageing research is not premised on a principle of rescue. Nor are the advocates of the Longevity Dividend Campaign asking for exorbitant amounts of money. The request that 1% of the current Medicare budget of $309 billion be invested annually in anti-ageing research is a modest request. Indeed, if there is a valid complaint to be raised about the amount requested, it is that 1% is not nearly enough. Let me expand on Dworkin's account of the insurance scheme to show why this is so.

Many proponents of Dworkin's account of equality of resources believe its virtue lies in the fact that it does not get drawn into a debate about what our 'fundamental needs' are. Justine Burley, for example, invokes Dworkin's theory to support state-funding of assisted conception techniques, something which is typically ruled out by a needs-based approach to healthcare.[43] The Dworkinian model only requires us to determine if infertility counts as a deficit in personal resource holding (i.e. a handicap). Burley argues that two conditions must be satisfied in order for fertility to count as a handicap: (1) the infertile person must envy the capacity of others to bear genetically related offspring and (2) the deficit in personal resources at issue must not be traceable to her tastes or choices.[44]

Infertility is an interesting case because one's age has a profound impact on the fertility of both men and women. One does not need to focus simply on the case of infertility to make explicit the disadvantages of ageing. Not only would the aged envy the capacity of the youthful to have children, but also their increased likelihood of having children that do not have chromosomal abnormalities.[45] Furthermore, the aged would envy the youthful's mobility and vigour, their lower risk of disease, frailty, death, etc. And age-related disadvantage satisfies Burley's second condition – it is the result of brute luck rather than something we can trace back to the choices of the aged. No one is responsible for the rate at which the molecular and cellular damage caused by ageing occurs. So ageing would satisfy Burley's two requirements for a handicap.

Considering Burley's application of Dworkin's theory to infertility treatment can further strengthen the revisionist interpretation of equality of resources, so that a strong case can be made in favor of the duty to retard ageing. When making the case for the state provision of fertility treatment Burley remarks:

> Recall that only those handicaps individuals in the aggregate would have insured against will be compensated. In the hypothetical insurance scheme people would have knowledge of the actual incidence of this handicap. They would know that 20 per cent of all couples experience infertility, and that up to 10 per cent of this number will not conceive other than through artificial means . . . I contend that in this situation the average individual would deem having

[42] Ibid: 309.

[43] J. Burley. 2000. The Price of Eggs: Who Should Bear the Cost of Fertility Treatments. In *The Future of Human Reproduction* (paperback edn.). J. Harris & S. Holm, eds. Oxford: Oxford University Press.

[44] Ibid.

[45] See, for example, the *Age and Fertility* booklet provided by the American Society for Reproductive Medicine, available at http://www.asrm.org/Patients/patientbooklets/agefertility.pdf. [Accessed 5 Nov 2008] The total risk of chromosomal abnormalities, for a 20 year-old woman, for example, is approximately 1/526. Compare this with the high probability that a 49 year-old woman would give birth to a child with a chromosomal abnormality: 1/8.

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> genetically related offspring a constitutive element of leading a good life . . . It is therefore plausible to insist that individuals in the aggregate would stipulate infertility as one handicap that they were particularly concerned to receive compensation for.[46]

Now consider what would happen to Dworkin's hypothetical insurance scheme if we add age-related disadvantage to the things we should insure against (which is now becoming a real possibility): *I contend that in this situation the average individual would deem delaying the onset of all age-related disadvantage a constitutive element of leading a good life. It is therefore plausible to insist that individuals in the aggregate would stipulate ageing as one handicap that they were particularly concerned to receive compensation for.* And part of that compensation should be anti-ageing interventions.

Behind Dworkin's veil of ignorance the contracting parties know that, no matter what natural endowments they are born with, the chances that they will be afflicted with age-related disadvantage is extremely high. And thus they will have an interest in postponing the onset of age-related afflictions and in compressing morbidity and mortality. Ageing will increase one's risk of cancer, heart disease, diabetes, Alzheimer's etc., not to mention infection, bone fracture, etc. The list goes on and on. Once one points out how prevalent and severe age-related disadvantage is, it becomes evident that insuring against these disadvantages will be among the highest priorities of the participants in Dworkin's insurance scheme. This is so because ageing is linked to many of the diseases and illnesses that afflict most people in the industrial world. It would be irrational to buy insurance against every particular disease and ailment but not invest in a policy that would support anti-ageing interventions (and thus postpone the onset of all age-related disadvantage).

Of course one cannot insure against *all* possible age-related disadvantages. Eventually ageing will kill us if we do not die of some other cause first. But by slowing down the ageing process, even by just seven years, the age-specific risk of death, frailty, and disability would be reduced by approximately half at every age. And thus insuring against ageing itself is more reasonable than trying to insure against every specific age-related disadvantage. For example, more than half of the National Institute on Ageing budget in the United States is devoted to AD.[47] But such a disproportionate response to one particular age-related disadvantage is unjustified. It is much more important to retard ageing itself. For this would reduce the risk not only of AD but of all-age related disadvantage (e.g. cancer, heart disease, frailty, risk of infection, etc.)

Dworkin's rejection of the principle of rescue further reveals how his account of just healthcare coheres with the prescriptions of the Longevity Dividend Campaign. For this campaign, which calls upon the American Congress to invest $3 billion dollars a year into understanding the biology of ageing, takes seriously both the constraints of scarcity and the plurality of age-related disadvantage. No rational individual in Dworkin's hypothetical insurance market would spend all of their initial clam shells buying insurance against every potential disease and handicap. There are over 6 000 known single gene disorders alone, and 200 types of cancer. Dworkin's thought experiment thus transcends the (well-intentioned) tendency to move from the fact that one needs medical intervention to the prescription that such an intervention ought to be publicly provided. Instead, his account of equality focuses on the *prevalence* and *severity* of the disadvantage in question, as well as the cause (choice or brute luck) of the disadvantage. By both measures we cannot justify the current neglect of anti-ageing research. And thus equality of resources requires us to give greater attention, and support, to the aspiration to retard human ageing. Equality requires we invest a greater portion of the current Medicare budget into the biology of ageing.

V. CONCLUSION

In this paper I have examined two prominent interpretations of equality that inform accounts of just healthcare. Far from contravening the requirements of equality, I have argued that the aspiration to retard human ageing is actually a *requirement* of equality. Postponing the onset of age-related disadvantage will increase the range of opportunities for all people. Everyone – rich, poor, young and old – is susceptible to age-related afflictions. And thus Daniels's account of fair equality of opportunity ought to abandon its natural baseline of 'normal species functioning' and the treatment/enhancement distinction. Furthermore, Dworkin's account of equality of resources also reveals the importance of aggressively tackling ageing itself rather than merely tackling each disease, one at a time. Given our intrinsic vulnerabilities, and scarcity of resources, we must approach healthcare in a more sensible manner than that prescribed by a principle of rescue. And that is precisely what the advocates of the Longevity Dividend are proposing. While retarding ageing does not treat a particular disease, it would increase the amount of disease-free years we can expect to

[46] Burley, *op. cit.* note 43, p. 142.
[47] Olshansky et al., *op. cit.* note 5.

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enjoy. And that is a laudable goal that cannot be rationally ignored. Given the current levels of government funding invested in the biology of ageing (less than 0.1% of 2006 NIH budget) we are at present failing our duty to take ageing seriously. And thus we are potentially forfeiting medical interventions that could confer great benefits on the health prospects of the population.

I conclude this paper with one final thought. Egalitarians might be tempted to complain that my analysis misses the mark. It does so, they might argue, because the primary egalitarian concern is that if anti-ageing interventions should one day become possible, this would exacerbate existing inequalities, as only the rich would be able to afford to pay for them. This is a serious concern. However, the arguments I have developed in this paper are an attempt to ensure that we *do not* arrive at this situation. But showing how equality requires us to tackle ageing I have sought to make a compelling case for investing public funds in the science of anti-ageing research. If we do this, and do it now, we are less likely to face the situation the egalitarian is concerned about. For that scenario is much more likely to occur if anti-ageing interventions are not viewed as important medical necessities. In that kind of scenario not only will it take longer for such interventions to come into existence, but such research will be forced to rely very heavily on private funding. And this could have adverse effects on how widely available such interventions are. So the greatest threat anti-ageing research is likely to have on equality would occur when such interventions are viewed as falling *outside* the scope of 'medical necessities'. And thus it is imperative that we begin to have an informed, robust moral discourse on the importance of anti-ageing research and its relation to equality and just healthcare.

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