Is life extension an enhancement?

Yes and no and why that's useful

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Is AdG a transhumanist?

It depends what you mean by transhumanism...

"man remaining man, but transcending himself, by realizing new possibilities of and for his human nature" (Huxley 1957)

"a class of philosophies that seek to guide us towards a posthuman condition" (More 1990)

Structure of this talk

1) Stuff that most of you know by heart

2) How I feel LE relates to transhumanism

3) The remarkable utility of egalitarianism

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Aging in a nutshell

Metabolism (the *hugely messy* network of homeostatic processes that keep us alive)

causes

Pathology (the *hugely messy* network of anti-homeostatic processes that kill us)

This is not controversial -- indeed, it is why most biogerontologists think there's little hope of curing aging for ages

Aging in slightly less of a nutshell

Metabolism *ongoingly* causes "damage" whereas

Damage only *eventually* causes pathology

This turns out to be very useful

Paradigms for intervention



Problem 1: this is the pathology

- Cancer
- Heart Disease
- Diabetes
- Incontinence
- Osteoporosis
- Macular Degeneration

- Alzheimer's
- Stroke
- Sarcopenia
- Osteoarthritis
- Hormonal Imbalance
- Kidney Failure



- Parkinson's
- Pneumonia
- Emphysema
- Sex Drive

... and LOTS more

Problem 2: this is metabolism



Paradigms for intervention



Claim: only the "engineering" approach can achieve substantial extension of human healthspan any time soon

Metabolism → *Damage* → Pathology: **The seven deadly things**

Respiration	Cell loss/atrophy	Neurodegeneration
(oxidation)		
Carbohydrate	Protein crosslinks	Atherosclerosis
metabolism	Extracollular junk	Cancer
(glycation)		
Cell turnover	Death-resistant cells	Diabetes
(mutations,		· · · ·
telomere	Mitochondrial mutations	Hormone decline
shortening,	Lysosomal junk	Blindness
dysregulation,	Lysosoniai junn	
stem cell	Nuclear [epi]mutations	Immune decline
depletion)		
Etc, etc, etc	Er that's it!	Etc, etc, etc

We know how to fix all of them (in mice, in principle!)

	Damage rising with age	It or its effects reversible by
	Cell loss, cell atrophy	Exercise, cell therapy, growth factors
	Extracellular junk	Phagocytosis by immune stimulation
	Extracellular crosslinks	AGE-breaking molecules/enzymes
	Death-resistant cells	Ablation of unwanted cells
*	mtDNA mutations	Allotopic expression of 13 proteins
*	Lysosomal junk	Transgenic microbial hydrolases
*	Nuclear [epi]mutations	Telomerase/ALT gene deletion plus
	(only cancer matters)	periodic stem cell reseeding

See <u>www.sens.org/</u> for detail (lots of it, including all my publications)

Reversal vs. retardation: two key points

- 1) Reversal is not necessarily harder (consider bailing vs. plugging a hole in a dinghy)
- 2) Partial reversal can be as effective as complete reversal; partial retardation can't

How can we do better than this?



How can we do better than this? Option 1: start sooner. Hm...



How can we do better than this? Option 2: better therapy. Hm...







Conclusion: The first 1000-year-old is probably only ~10 years younger than the first 150-year-old

How fast are breakthroughs refined?

prehistoric

1903

1949

- Goal of powered flight:
- First powered flight:
- First transatlantic flight:1927
- First commercial jetliner:
- First supersonic airliner: 1969

Implication: Treatments that extend healthy life by ~30 years will be the cusp: recipients will mostly survive to receive treatments giving a further 30 years, etc.

Conclusion: the first 1000-year-old is probably only ~10 years younger than the first 150-year-old

Well, even if so, how old are they today?

A timeline I will defend (various versions of which you may have read...) Milestone: Robust Mouse Rejuvenation (RMR) make normal two-year-old mice, expected to live one more year, actually live three more years

- 1) With \$100m/year we have a 90% chance of achieving RMR within 10 years
- 2) We have a 50% chance of "robust human rejuvenation" (doubling remaining life of 55-year-olds) within 15 years after RMR

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"I'm about as un-transhumanist as can be: I don't even want my nipples pierced. I wouldn't mind living longer though"

Chris Gray at HETHR

When change is "natural", is resisting it transhumanist?

- Luddites are the quintessential opponents of technology
- Luddites resist change
- Aging is a type of change

An intriguing religious paradox

- God made us age, so we shouldn't fix it
- Up there we won't age, so fixing it isn't important

BUT...

- Up there we won't age, so aging must be bad
- Aging reduces our ability to do good down here
- We're supposed to combat suffering; aging causes suffering

Why life extension *is* an enhancement

- it's life *extension*, dummy

 being older/smarter/stronger than one naturally can be are all *unnatural*, and they're all *extensions of our abilities*, so they must be enhancements

Is this actually just an argument from terminology?

What do these two cars honestly have in common?





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Discrimination is unelectable Old people are people too ... and yet:

"a politician who was rash enough to campaign on a pledge to slow the ageing process would be judged as lunatic"

Warner HR et al., EMBO Reports 2005;6:1006-1008

What gives?

The rational refinement of repugnance (or: why analogies are persuasive)

Reflective equilibrium (Rawls):

a state of balance or coherence among a set of beliefs arrived at by a process of deliberative mutual adjustment among **general principles** and **particular judgements**

How it works

- General principle X: discrimination is bad
 General principle Y: letting people die is bad
 Particular judgement Z: aging is OK
 Conflict: aging kills a certain type of person
 Options:
- modify X: support slavery, etc.
- modify Y: oppose humantarian aid, etc.
- modify Z: support work to defeat aging

A challenge for the audience

Q: Are there corresponding arguments for "real" enhancements?

A: Probably ... but maybe not nearly such strong ones.

An alternative approach

- 1) Win the argument on aging
- 2) Proceed as follows:*
- You used to think aging was OK
- We showed you it was barbaric
- Therefore we're clearly right about this too

*Your mileage may vary...

female people are people

too

black people are people

too

poor people are people too



Let's roll

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