How to Survive to 100

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Outline

- **What is aging**
- **Should you try to live to 100?**
- **Genetic Factors**
- **Environmental Factors**
- **Lifestyle Factors**
- **Interventions**

Theories of Aging

- **Stochastic-aging is accumulated damage, oxidative stress (free radicals), glycation**
- **Developmental-Genetic-aging is pre-programmed, telomere length**
- **Maximum Lifespan Potential vs. Life Expectancy**

Is it reasonable to live to 100?

- **Societally**
- **Individually**

Societally

- Inferno (Dan Brown)
- Logan's Run
- Soylent Green
- Star Trek – Episode # 72

Individually

- Ezekiel Emanuel
- Uwe Reinhardt
- Anecdotal evidence
- Hawaiian Lifespan study

Hawaiian Lifespan Study

- 1292 Hawaiian men of Japanese ancestry, start age 71-82 with 21 year follow-up
- 77% survived to age 85 (34% healthy)
- 24% survived to age 95 (<1% healthy)

»Bell et. Al. JAGS 62:880, 2014

Correlates with Survival and Health

- ABI, BP, inflammatory markers,
- Education, cognitive score, marital status
- BMI, smoking, activity level, alcohol use

Probability

	Risk factor -0	Risk factor 5 +
Survive to 95	27%	7%
Survive to 100	4%	0.1%
Healthy survival to 90	4%	0.01%
Healthy survival to 100	0.002%	

Early Hawaii Heart Program

Survival/ health predictors 45-68 yo

- **High grip strength,**
- **normal weight, no smoking, modest alcohol**
- **normal glucose, normal TG, normal BP,**
- **high education, marriage**

»Wilcox et al. JAMA 296:2343, 2006

General Influences in Aging

(Successful or not)

- ***Genetics***
- **Environment**
- **Lifestyle choices**
- **Medical Interventions**

Genetic Effects on Aging

- **Longevity genes**
- **Shortgevity genes**

Danish Twin study

- Evaluated 2872 pairs of same sex Danish twins
- Estimated 25% longevity (23-26) explained by genetics
  - »Herskind et. al. Human Genetics 97:319 March 1996

Longevity Genes

- FOX03A3
  - Hawaii, Italy, Germany, Dutch
- Apo E
- X Chromosome

Genetics

Long lived populations develop:
CV disease, DM, dementia 10+ years after average groups

Shortgevity genes

- Li-Fraumeni
- LPA gene
- Down's
- Progeria

Genetics – Other Factors

- Attractive people live longer
- Tall people die sooner

General Influences in Aging

(Successful or not)

- Genetics
- ***Environment***
- Lifestyle choices
- Medical Interventions

Environmental

- May explain 25-30% of variation in longevity
- Common predictors of successful aging:
  - Female gender
  - High SE status, married
  - being happy, good cognitive function
  - not smoking, exercise

British Civil Service (Whitehall) Study

- People in lowest levels of British Civil Service: have double the morbidity, triple the CV death of those in highest grades.

»Marmot el. al. Lancet 337:1387, 1991

Environmental Factors- Minimally Modifiable

- **Richest 1 %**
- **Win Oscar, Nobel, Olympic medal**
- **Marry someone younger**
- **Breast-feed**
- **If male, have a daughter**

Sleep and Longevity

- **85+ yo compared with 20-30, 60-70 yo**
- **Have more WASO, shorter sleep, less efficiency, better standardized sleep and wake times, awaken earlier**
- **Have better lipid profiles**

»D. Mazotti et. al., Front Aging Neuroscience 6:134 June 2014

Metabolic Rate

- **IDEAL aging in BLSA associated with significantly lower resting metabolic rate**

Schrack, et. Al, JAGS 62:667, 2014

General Influence in Aging

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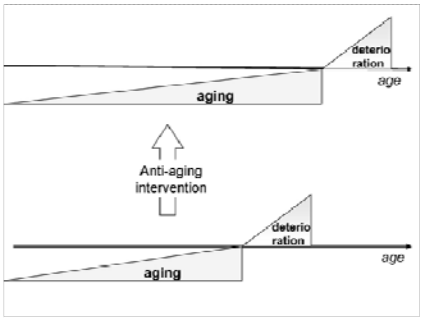
Aging – Slowing the Process



Mikhail V Blagosklonny - Why human lifespan is rapidly increasing: solving "longevity riddle" with "revealed-slow-aging hypothesis" Aging April 2010

Lifestyle Choices

- Tobacco Use
- Weight/Obesity
- Diet
- Exercise/Activity
- Alcohol Use
- Vitamins & Supplements
- Cognitive/Psychological Strategies

Tobacco Use

- It's just bad for you
- Life may be shortened by 11-28 minutes per cigarette.
- May impact longevity by as much as 10 years
- Quitting smoking appears to help at any age
- Not starting helps the most.

Weight - Calorie Restriction

- Studies in the 1930's on rats
  - 20-40% increase in life expectancy.
- Primate models
  - Improved cholesterol levels, blood pressure, insulin levels.
- Biosphere 2 participants
  - 2 years in a controlled environment.
  - Biomarker findings similar to rats and primates

» Walford et al, J Gerontol A biol Sci Med Sci 2002 Jun 57(6):B211-24

Weight - Calorie Restriction

- Minnesota Starvation Experiment - 1940's
  - Explore the effects of famine, 40-50% calorie deficit
  - Improvement in some biomarkers, but also depression, preoccupation with food, social isolation, poor concentration.

Weight - "Obesity Paradox"

- Multiple studies over the past decade have shown that there may be a survival benefit to a higher weight.

- Diabetes Care August 2013 vol. 36 no. Supplement 2 S276-S281

- Systematic review that appeared in JAMA in 2013 concluded that all-cause mortality was not higher in overweight (BMI 25 to <30) and grade I obesity (BMI 30 to <35)

- Flegal, et al. JAMA.309(1):71-82, 2013

- Lowest risk around BMI of 25, and highest risk at either extreme of BMI.

Weight - Conclusions

- Calorie restriction without malnutrition may have some survival benefit in humans.
- Obesity at higher levels (BMI 35+) consistently associated with higher mortality
- "IDEAL" patients – Insight into Determinants of Exceptional Aging and Longevity patients in the Baltimore Longitudinal Study on Aging.
  - IDEAL patients had lower resting metabolic rate (RMR)
  - Lower RMR correlates with longevity.
  - Being fully functional and free of disease (except controlled HTN) correlates better with RMR than body composition

» Schrack, et. Al, JAGS 62:667, 2014

Exercise

- Does not have to be daily
- 150 minutes or more each week is optimal
  - Aerobic activity
    - moderate intensity (enough to raise heart rate)
    - 50% of total time (75 minutes/week)
  - Muscle strengthening activity
    - working all major muscle groups
    - 2 more days a week

Exercise

- Correlates with lower resting heart rate
- Improves cholesterol profiles
- Maintains muscle mass
- Reduces risk of some cancers (colon cancer, breast cancer, possibly others).
- Improves mental health/mood
- Improves sleep
- Independent of above effects may extend life by 6 months

» Wright et al. NEJM 339(6): 380-386, 1998

Diet/Nutrition

- Few studies that examine diet over prolonged period of time, especially in isolation from other lifestyle interventions.
- Most conclusions based on observations of populations and analysis of dietary habits of groups with known longevity (Sardinia - Italy, Okinawa - Japan, Loma Linda - California)
- Mediterranean Diet
  - One of the better researched
  - Appears to reduce risk of heart disease
  - Difficult to exclude effects of other lifestyle interventions

Diet/Nutrition - Conclusions

- Portion size matters
- More vegetables/fruits
- Less meats, especially processed meats
- Legumes/Nuts
- Whole grains/fiber
- Fish
- Low added sugar/salt
- High anti-oxidant foods – coffee
- Alcohol

Alcohol

- "Moderation"
  - Up to 1 drink/day for women and men > 65 years of age
  - Up to 2 drinks/day for all other men
  - Heavier use appears to tip scale toward more harm/less benefit (head & neck cancer, breast cancer)
- Benefits of "moderation"
  - Raises HDL level
  - Improves sensitivity to insulin
  - Decreases blood clotting (in a beneficial way)

Vitamin & Supplements

- Lots of claims, little data.
- Iowa Women's Health Study published 2011 in JAMA suggested increased mortality risk of some common supplements, most notably iron.
  - » *Arch Intern Med.* 2011;171(18):1625-1633. doi:10.1001/archinternmed.2011.445
- 2012 Cochrane review of common antioxidants found no benefit in prevention, and likely increased mortality with beta carotene, vitamin E and possibly vitamin A supplementation.
  - » Cochrane Database of Systematic Reviews 2012, Issue 3. Art. No.: CD007176. DOI:

Vitamins/Supplements - Conclusions

- Malnutrition is harmful - correction of deficiencies is important.
- Optimization of vitamins/micronutrients likely beneficial. Still working on determining optimal levels of some vitamins.
- Excess supplements/Mega doses offer no clear benefit and might cause harm

Tobacco, Exercise, Diet, Alcohol

- Those who are unfavorable in all categories
  - At age 40:
    - May reduce life by 17 years (man) or 14 year (woman).
  - At age 75:
    - the 10 year mortality rate is nearly double
- Tobacco use appear to be dominant risk factor
- Other appear to be more equal in effect

Cognitive/Psychological Strategies

- Educate yourself
  - Strong benefit through at least high school
  - Additional benefit to college or beyond
- Continue to learn new skills
- Stay informed
- Continue intellectual stimulation into retirement

"100 Ways to Live to 100" www.huffingtonpost.com 09/23/2013

Cognitive and Psychological Strategies

Positive Affect

Adults who scored highest for a positive affect had a death rate 50% lower than those who scored lowest over 5 years. Steptoe et al, PNAS 108(45) 18244-8, 2011

Smile

Bigger smiles, longer life?

"100 Ways to Live to 100" www.huffingtonpost.com 09/23/2013

Cognitive and Psychological Strategies

Laugh

Found to be a key indicator of well being in older adults

Think well of yourself

People who rate their health as good have lower risk of death.

"100 Ways to Live to 100" www.huffingtonpost.com 09/23/2013

Cognitive and Psychological Strategies

- Be Conscientious
  - Think about death
  - Choose healthy habits,
  - Prioritize own health
  - "Pessimistic enough to care"

"100 Ways to Live to 100" www.huffingtonpost.com 09/23/2013

Cognitive and Psychological Strategies

- Deal with Stress
  - Be resilient
  - Meditate
  - Exercise
  - Take Vacations
  - Have a pet

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Find a Purpose

- Have a reason to live
- Have a spiritual life
- Volunteer
- Mentor younger individuals
- Turn off the TV

"100 Ways to Live to 100" www.huffingtonpost.com 09/23/2013

Fun Family Facts

- Get married
- But don't argue
- And don't stay in bad marriage
- Have kids
- But stop at 2
- Dads - have a daughter
- Moms - have twins

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Other "Fun" ways to live longer

- Shop a bit more
  - People who shop frequently live longer
- Move to Hawaii
  - Or North Dakota
  - Or to the mountains
- Take a siesta
- Live in a blue state
- Get Busy
  - Men who have sex more often have a lower rate of CAD
  - Women who enjoy sex may live up to 8 years longer

"100 Ways to Live to 100" www.huffingtonpost.com 09/23/2013

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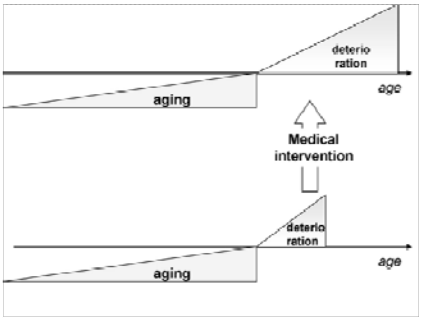
Aging – Medical Intervention



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Primary Care Considerations

- Counseling and education on Lifestyle measure previously discussed (Tobacco, Exercise, etc)
- Immunizations
- Screening Tests
  - Extensive guidelines from US Preventive Services Task Force
  - Aimed at preventing or detecting conditions early

Managing Conditions

- Conditions easy to detect through physical exam or lab screening
- HTN, Hyperlipidemia, Diabetes management
- Clear guidelines based on studies/data and calculated overall risk
- Studies support reduction in mortality when managed well

Medical Procedures

- **Cardiac Interventions – angioplasty, stents, bypass grafts, valve replacement surgery.**
- **Dialysis for end stage renal disease, kidney transplants**
- **Cancer Treatments**
- **Surgery – appendectomies, gall bladder removal.**

Effects on Life Expectancy

Intervention	Target Population	Gain in Life Expectancy
Vaccines	Infant/Child/Adolescent	0.7 months
Moderate Exercise	Adults	6.2 months
Quitting Smoking	Adults	28-34 months
Pap Smears	Adult Women	3.2 months
Mammograms	Adult Women	0.8-3.1 months
Colon Cancer Screening	Adults > age 50	2.5 months

Wright et al. NEJM: 339(6) 380-386, 1998

Effects on Life Expectancy

Intervention	Target Population	Gain in Life Expectancy
Treat HTN	DBP > 105	66 months
Treat high cholesterol	Total cholesterol > 300	50-76 months
Cardiac stent placement	Diagnosed CAD	1-14 months
Defibrillator placement	Recurrent ventricular arrhythmias	28-34 months
Prophylactic Mastectomy	BRCA -1 or 2 positive	36-46 months
Appendectomy	Suspected appendicitis	9-31 months

Wright et al. NEJM: 339(6) 380-386, 1998

Negative Impacts of Medical Care

- **Adverse outcomes that shorten life**
- **Medical Errors**
- **Adverse drug reactions**
- **Nosocomial infections**
- **Surgical Complications**

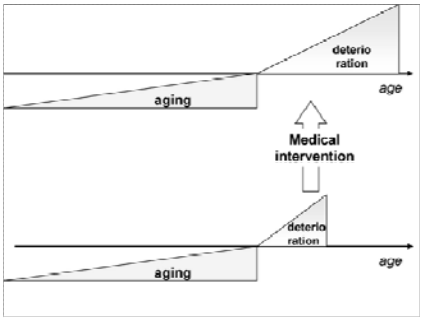
Summary of Impact on Life Expectancy

- **Difficult to determine precise impact of medical care.**
- **Gain of 23 years in life expectancy in first half of 20th century largely attributed to 'mastery of infection'**
  - » **J Lederberg. International Herald Tribune, 1996**

Summary of Impact on Life Expectancy

- **Gain of 7.5 years in life expectancy in second half of 20th century. Estimated that about 50% of that due to improved medical care, such as gains from better management of chronic disease that is amenable to treatment**
  - » **JP Bunker. J Roy Coll Physicians 1995; 29:105-12**
- **Some of the most significant gains are in quality of life (e.g. treatment of cataracts)**

Aging – Medical Intervention



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"We have to age, but we can, to some extent, add years to life, and to a far greater extent, add life to years"

- David Katz, M.D.