Optimal Aging: Strategies for Life

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Reflection

• What if someone could predict with 90% accuracy how long you will live?
• Would you want to know?
• How would it affect the way you live?
• What if you planned to live to 100?
• Would it change the way you…
  • work and play?
  • manage your money?
  • spend time with your family?

When Does “Late Life” Begin?

• Studies have defined older populations in different ways: some as 65 and older, others at 60, and some at 50.
• Consensus seems to be growing:
  • Young-old: 65-80 years
  • Old-old: 80-99 years
  • Oldest-old: centenarians

Life Span and Expectancy

• Life Span: the maximum number of years an individual can live; has remained between 120-125 years
• Life Expectancy: the number of years that the average person born in a particular year will probably live
  • Between 1975 and 2015, life expectancy at birth increased from 72.6 to 78.8 years for the total U.S. population.
    • Men - 76.3 years
    • Women - 81.2 years

www.cdc.gov/nchs/data/hus/hus16.pdf#015
The Oldest of the Old

- In 1997, the oldest person to have ever lived died at age 122 years and 164 days. Jeanne Louise Calment lived in France, took up fencing at age 85, and still rode a bicycle at 100.
- She was from a family of long-lived persons: her father died at age 93, her mother at 86, and her brother at age 97.
- She quit smoking when she was 117, reportedly because she was nearly blind and felt embarrassed asking for a light.

What is “Optimal” Aging?

The capacity to function across many domains—physical, functional, cognitive, emotional, social and spiritual—to one’s satisfaction and in spite of one’s medical conditions.
To live a life that is meaningful, fulfilling, and relatively independent.

Inflammaging

- Obesity superimposed on aging drastically increases chronic low-grade inflammation: a key link between obesity, insulin resistance, elevated blood sugar, insulin-growth factors (IGF), and age-associated diseases.
- Elevated insulin increases tumor growth and aggressiveness.
- IGF-1 and IGF-2 have been identified as tumor promoters in multiple studies.

Caloric Restriction?

- 25 year study University of Wisconsin Madison: 76 rhesus monkeys who between ages 7-14 years, began eating a diet reduced in calories by 30%.
- Disease was 3 fold greater in control group. No evidence of diabetes in any caloric-restricted animal.
- National Institutes of Aging reported one monkey on 30% CR diet at age 16 years lived to be 43 years old, a longevity record for the species, and equivalent of a human living to 130.

Canto is 27 year old monkey on CR diet, Owen is 29 year old on unrestricted diet.

caloriereport/calorie restriction study.jpg

CALERIE (Comprehensive Assessment of the Long-term Effects of Reducing Intake of Energy)

- National Institute of Aging sponsored study: 218 non-obese individuals, randomized to maintain current diet or 25% caloric restriction for 2 years. (11.7% caloric restriction was actually maintained on average).
- Study found statistically significant reduction in cardiometabolic risk factors and inflammatory markers; weight loss, improved mood, sleep duration.


CALERIE 2

- 2-year follow-up study of 39 nonobese adults who went through the CALERIE trial (12 and 24 months post trial completion).
- After the CR intervention, a mean weight loss of 9.0 ± 0.6 kg was observed in the CR group, in which only 54% of the weight was regained 2 y later.
- Despite the regain, weight, percentage of body fat, and fat mass remained significantly reduced from baseline throughout follow-up and remained significantly less than in the control group (P < 0.05).
- After a 2-y intensive CR intervention, ~50% of CR-induced weight loss was maintained 2 y later, which was probably the result of lasting effects on acquired behaviors and dietary restraint.


Fasting-Mimicking Diets (FMD)?

- USC study of 100 healthy participants randomized into 2 study arms and tested the effects of FMD done 5 consecutive days each month for 3 months.
- 1100 calorie first day, 700 calories for 4 days (plant based, multivitamin). Ate whatever they wanted rest of the month.
- Three FMD cycles reduced body weight and total body fat; lowered blood pressure, cholesterol, triglycerides and IGF-1. Lean muscle mass remained unchanged. Note: 25% drop-out rate
- Effects still noted 3 months AFTER study ended.

Promising and…..

- Much of initial research on yeast and rodent models. Research in rhesus monkeys impressive.
- CALERIE study showed that even 11% reduction in calories can improve weight loss and certain biomarkers associated with aging. Most people could not sustain 25% reduction in cal.
- What is unclear: do these diets extend longevity in humans? The data suggest that they have a favorable impact on many metabolic parameters associated with better health.

Resolution Biology

- Research shows that resolution of self-limited acute inflammation is an active, programmed response.
- **Omega 3 fatty acids** produce specialized *pro-resolving mediators* (SPM) – resolvins, protectins and maresins.
- A lifetime of consuming fish or seafood may keep inflammation in check, reducing risk of certain chronic diseases.

Omega 3 Fatty Acids from Plants and Animals

- Dark green vegetables, walnuts, freshly ground flax seeds and other plant foods.
- Cold water fish, fish oil, fresh seaweed, clean animal foods like free range chicken, eggs, and grass fed beef.

American Heart Association

- “**Omega-3 fish oil** supplements prescribed by a healthcare provider may help prevent death from heart disease in patients who recently had a heart attack and may prevent death and hospitalizations in patients with heart failure.”
No Fish Story

- Omega-3 Index test is the gold standard for omega-3 biostatus testing. It is used as a compliance marker for randomized controlled trials with fish oil supplements, and in epidemiological research.
- In 2008 Dr. Bernadine Healy said, “Before long, your personal Omega-3 Index just could be the new cholesterol—the number you want to brag about.”
- Canadian government found that mean Omega-3 Index level of Canadians aged 20-79 was 4.3%.
- Fewer than 3% of adults had levels associated with low CHD risk; 43% had levels associated with high risk.


Omega 3 Fatty Acids – Healthy Muscles

- Chronic low-grade inflammation also contributes to the loss of muscle mass, strength and functionality, referred to as sarcopenia, as it affects both muscle protein breakdown and synthesis through several signaling pathways.
- Omega-3 fatty acids stimulate muscle protein synthesis in older adults and may be useful for the prevention and treatment of sarcopenia.

Dalle S, et al. Front Physiol 2017; Dec 12;8:1045

Choose Your Seafood Wisely

https://www.seafoodwatch.org/seafood-recommendations/our-app

Nutrient Needs Change with Aging

- The need for certain micronutrients increases with age. These are current recommendations but they may not be sufficient…..
  - Vitamin D increases from 600 to 800 IU (20 mcg) per day
  - Calcium increases from 1000 to 1200 mg/day for women over the age of 50 and for men over the age of 70
- Due to decreased ability to absorb food bound vitamin B12, the Institute of Medicine recommends adults over the age of 50 get their B12 from fortified foods or supplements.
Fragility Fractures

- **Fragility fractures** associated with decreased quality of life, increased disability, more frequent hospital admission and increased risk of mortality.
- While a multimodal approach is important, vitamin D supplementation alone, or in combination with calcium, has been shown to significantly reduce the risk of falling in elders.

Vitamin D: Bones, Balance, and Infection

- Low vitamin D increases risk of falls and gait instability. Exercise, calcium and vitamin D supplementation all decrease falling in elders.
- Meta-analysis by National Osteoporosis Foundation: eight studies (n=30,970 participants) showed calcium plus vitamin D supplementation produced a significant 15% reduced risk total fractures and 30% reduced risk hip fracture.

Vitamin D

- Vitamin D deficiency can cause osteomalacia (lower bone mineralization), leading to musculoskeletal pain, usually in the pelvis, shoulders, low back, and proximal muscles.
- Deficiency is common worldwide but often more severe in elders due to environmental and biological factors.
- Impaired mobility can limit time spent outdoors and decreased synthesis of vitamin D in skin makes it difficult to maintain adequate levels even with sun exposure.
- As aging advances, intestinal resistance to 1,25(OH)2D impairs the uptake of calcium and a decline in renal function reduces activation of vitamin D.

Vitamin D and Respiratory Infection

- Acute respiratory infection kills ~2.65 million people/year.
- 25 eligible randomized controlled trials (n=10,933, aged 0-95 years).
- Vitamin D supplementation reduced risk of acute respiratory infection among all participants and those who were vitamin D deficient experienced the most benefit (NNT=4).
Endocrine Society Guidelines

• Serum 25(OH)D level is used to determine vitamin D status
  • Sufficiency is 30 ng/mL (75 nmol/L) and above
  • Insufficiency defined as 21-29 ng/mL
  • Deficiency defined as <20 ng/mL

• 66.8 million Americans 1 year and older had levels between 12-20 ng/ml
• 23 million Americans 1 year and older had levels less than 12 ng/ml

CDC 2nd National Report on Biochemical Indicators of Diet and Nutrition in the U.S. Population

Calcium: Not too Much and Not Alone

• Calcium and vitamin D crucially important for healthy bone, however, vitamin K2 is necessary for ensuring calcium is taken up by bone and not in the kidney or blood vessels. A multivitamin or supplement that contains K1 and/or K2 is important when taking calcium supplements.

Endocrine Society Guidelines for Treating Deficiency

• All adults who are vitamin D deficient should be treated with 50,000 IU of vitamin D2/D3 once per week for 8 weeks or 6000 IU of vitamin D2/D3 daily to achieve a blood level of 25(OH)D above 30 ng/mL, followed by maintenance therapy of 1500–2000 IU/d.


A Note on Protein

• Framingham Osteoporosis Study found higher protein intakes (60-83g/d versus 46g/d) in elderly men and women (mean 75 years) associated with a 37% decreased risk of hip fracture.
• Women's Health Initiative found 20% increase in protein intake improved bone mineral density maintenance and marginally lowered forearm fracture risk.
• European guidelines recommend 20-25 grams high quality protein with each meal for women over age 50 with regular physical activity/exercise 3-5 times/week.
• Current recommendations are 0.8 grams protein per kg of body weight.

Case 41-year old Female

- Strict vegan for 2.5 years. Disturbance of taste (unable to sense flavor of variety of fruits and vegetables), fatigue after simple daily activities, paresthesia of the anatomic structures innervated by the mandibular division of the trigeminal nerve on her left side, disturbance of memory and slowing mental faculty. No meds. No significant medical or dental history.


Laboratory Tests

<table>
<thead>
<tr>
<th>Test</th>
<th>Normal range (female)</th>
<th>Patient's values</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBC count (cells/µL)</td>
<td>3.90–5.03</td>
<td>1.63</td>
</tr>
<tr>
<td>Hemoglobin (g/dL)</td>
<td>12.0–15.5</td>
<td>7.2</td>
</tr>
<tr>
<td>MCV (fL)</td>
<td>79–100</td>
<td>104</td>
</tr>
<tr>
<td>Hematocrit (%)</td>
<td>36–45</td>
<td>23.4</td>
</tr>
<tr>
<td>RDW (%)</td>
<td>13±1.5</td>
<td>25</td>
</tr>
<tr>
<td>Serum folate (ng/mL)</td>
<td>3–16</td>
<td>7.73</td>
</tr>
<tr>
<td>Serum cobalamin (pmol/L)</td>
<td>118–716</td>
<td>71.8</td>
</tr>
</tbody>
</table>

MCV = mean corpuscular volume; RBC = red blood cell; RDW = red cell distribution width.

Patient treated with 1000 mcg B12 IM per week for 4 weeks and 1 mg folate daily. Symptoms disappeared after 14 days of treatment.
Vitamin B12

- Found in animal and fortified foods. Key role in DNA synthesis, hematopoiesis and neurological function.
- Deficiency: megaloblastic anemia, neurological disorders (numbness/tingling feet, difficulty walking, memory loss, dementia) tongue soreness, constipation).
- Risk for deficiency: inadequate intake, impaired absorption, vegan, meds (metformin, PPIs), obesity, elders, alcoholism
- With increasing prevalence of type-2 diabetes, we will continue to see increase in metformin use, a drug known to deplete vitamin B12.
- Recommend 20-100 mcg/d for those over age 50

Prescription Meds and Nutrients: Just a Glimpse

- Widespread use of prescription drugs for management of chronic health conditions can make it difficult to maintain adequate levels of specific nutrients.
- PPI drugs are one of the most commonly prescribed medications and are also available over-the-counter in the United States. Long-term use can increase the risk of fracture, cause magnesium levels to plummet, and interfere with B12 absorption, as well as increasing the risk of C. difficile infection.

Magnesium

- Low magnesium intakes/serum levels associated with type 2 diabetes, metabolic syndrome, inflammation, high blood pressure, atherosclerotic vascular disease, sudden cardiac death, osteoporosis, migraine headache, asthma, and colon cancer.
- 50% of U.S. population consumes less than the required amount of daily magnesium.
- Deficiency associated with negative effects on calcium and vitamin D homeostasis. Magnesium required for the activation of vitamin D.
- Many medications can deplete magnesium (e.g., diuretics, PPIs, OCPs, gout medication, B2-agonists, steroids, etc)

Magnesium and Diabetes

- Insulin resistance repeatedly shown to decrease magnesium levels and diabetics with low magnesium show a more rapid disease progression and an increased risk for diabetes-related complications.
- A vicious forward cycle is created.
- Magnesium supplementation has been shown to improve glucose metabolism and insulin sensitivity in those with type-2 diabetes.
Magnesium and Heart Disease

- 2013 meta-analysis of 16 studies with more than 313,000 participants found:
  - Higher blood levels associated with a 30% lower risk of cardiovascular disease.
  - Dietary magnesium (per 200 mg/d increment) associated with a 22% lower risk of fatal ischemic heart disease.
  - Magnesium important in maintaining blood pressure and supplementation (365 to 450 mg/d) shown to significantly lower blood pressure in those with insulin resistance, prediabetes, and other chronic diseases.


Lack of Sleep

- 1 in 3 Americans do not get sufficient sleep. Research shows chronic sleep problems can lead to weight gain, obesity, diabetes (33% increased risk type 2 DM), and heart disease.
- Biological clock most important regulator of the sleep wake cycle. Responsible for 24 hour fluctuations in hormone secretion, body temperature and other bodily functions.
- Lack of exposure to sunlight and use of bright lights at night increases the likelihood of disordered circadian clock. Consider dawn simulation device/app, use blue light blocking glasses at night with technology.
- Controlled release melatonin now first line therapy for those older than 60 (3-5 mg)

Cognitive Behavioral Therapy

- CBT has emerged as a recommended first-line therapy for insomnia. Digital CBT has been shown to be effective for improving sleep, as well as mental health and well-being.
- CBT-I typically consists of:
  - Psychoeducation about sleep and insomnia
  - Stimulus control
  - Sleep restriction
  - Sleep hygiene
  - Relaxation training
  - Cognitive therapy


Sleep Evaluation

- There are numerous medications that can impair sleep (e.g., beta blockers, antidepressants, steroids, ADHD meds, possibly statins, etc.) Do some online research and/or talk to your pharmacist. If you are taking medication that disrupts sleep, talk to your health care provider.
- Restless leg syndrome impacts many people. Talk to your provider, it could be due to low iron, vitamin D or meds you are taking – though the cause is really not known.
- Sleep apnea is a condition where breathing is interrupted during the night. A sleep study can be ordered and treatments are available (e.g., CPAP, dental appliances which reposition lower jaw and tongue)
Guided Imagery: Imagine Yourself……..

- An immersive, deeply relaxing intervention that uses calming words, soothing music and positive images to structure a healing experience.
- Like meditation, it focuses attention and calms the mind, working on those parts of the brain where the emotional self dwells.
- Imagery has been shown in clinical trials to reduce stress, anxiety, and depression; help with sleep; lower blood pressure, and help with posttraumatic stress.
- I have found guided imagery a fabulous tool for patients. Very helpful for those with anxiety, depression, pain, insomnia. And often an easier transition to meditation.

Belleruth Naparstek

- Love, love, love her. Something for everyone.
- She has Guided Imagery Meditations for:
  - Anxiety and Panic
  - Anger and Forgiveness
  - Depression
  - Healing Trauma
  - Fears Grief
  - Relieving Stress
  - Undergoing Surgery
  - Chemotherapy and Radiation

Loneliness, Social Isolation & Your Health

- Review found poor social relationships associated with 29% increase in risk of incident CHD and 32% increased risk of stroke.
- 148 studies on the effects of social isolation on health found it is:
  - As bad as smoking 15 cigarettes a day.
  - As dangerous as being an alcoholic.
  - As harmful as never exercising.
  - Twice as dangerous as being obese

Meaning and Purpose


- "Listen, Are you breathing just a little and calling it a life?" - Mary Oliver
“Healing may not so much be about getting better, but about letting go, of all the expectations, all of the beliefs, and becoming who you are.”

— Rachel Naomi Remen, M.D.