





Disaster awaits.

“If some real disaster impends in the city, it is not because parking spaces are hard to find, because architecture is bad, because department store sales are declining, or even because taxes are rising. **If there is a genuine crisis, it has to do with the essential welfare of individuals or with the good health of the society, not merely with comfort, convenience, amenity, and business advantage, important as these are.**”

from *The Unheavenly City*, Edward C. Banfield, 1968, 1970

Theses for this presentation:

- What we eat is important.
 - Micronutrient adequacy
 - Macronutrient reasonableness
- Weight issues are related to type, amount, and quantity consumed, as well as micronutrient adequacy, physical exercise and hormonal stability.
- Our functioning as we age and our freedom from disease and depression is a function of our diet and behavior.

Human nutritional physiology in one slide

- Macronutrients – provide calories:
 - **Carbs** (can be made from proteins by gluconeogenesis)
 - C,H, O atoms
 - **fat** – some are essential and cannot be synthesized
 - (large amounts of processed vegetable oils skew Omega 6:3 ratio)
 - **protein** – (C, H, O, and N – nitrogen containing essential & non-essential amino acids)
 - **fiber, water**
- Micronutrients:
 - **Minerals** – both essential and trace
 - **Vitamins**
- Less well established: **antioxidants /phytochemicals**

Physiology of micronutrients and deficiency syndromes

% Mineral depletion from the soil during the past 100 years, by continent

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General information

Programme for the Further Implementation of Agenda 21	North America	85%
Earth Summit+5 coverage including statements by delegates	South America	76%
Reports for Earth Summit+5	Asia	76%
Country profiles	Africa	74%
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	Australia	55%

Source: UN Earth Summit Report 1992

% of US Resident \geq 2 years of age who are deficient

- Vitamin A 34% deficient
- Vitamin C 25% deficient
- Vitamin D 70% deficient
- Vitamin E 60% deficient
- Calcium 38% deficient
- Magnesium 45% deficient

"Without enrichment and/or fortification and supplementation, many Americans did not achieve the recommended [bare minimum] micronutrient intake levels..."

[Fulgoni, V, et al. J Nutr. 2011 Oct]

JAMA
The Journal of the American Medical Association — To Promote the Science and Art of Medicine and the Betterment of the Public Health

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Vol. 287, No. 23, June 8, 2002
Scientific Review and Clinical Applications

Vitamins for Chronic Disease Prevention in Adults
Clinical Applications

Robert H. Fletcher, MD, MSc; Kathleen M. Fairfield, MD, DrPH
JAMA. 2002;287:3127-3129.

Vitamin deficiency syndromes such as scurvy and beriberi are uncommon in Western societies. However, suboptimal intake of some vitamins, above levels causing classic vitamin deficiency, is a risk factor for chronic diseases and common in the general population, especially the elderly. Suboptimal folic acid levels, along with suboptimal levels of vitamins B₆ and B₁₂, are a risk factor for cardiovascular disease, neural tube defects, and colon and breast cancer; low levels of vitamin D contribute to osteopenia and fractures; and low levels of the antioxidant vitamins (vitamins A, E, and C) may increase risk for several chronic diseases. Most people do not consume an optimal amount of all vitamins by diet alone. Pending strong evidence of effectiveness from randomized trials, it appears prudent for all adults to take vitamin supplements. The evidence base for tailoring the contents of multivitamins to specific characteristics of patients such as age, sex, and physical activity and for

“Pending strong evidence ... from randomized trials, it appears prudent for all adults to take vitamin supplements.” Fletcher & Fairfield, JAMA 2002



Bruce Ames, Ph.D.

395 citations in PubMed, May 1952-June 2014.

Most recent is “Enough is Enough” Ann Intern Med 2014 Jun 3, with Frei, Blumberg and Willett

November 2, 2012



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PNAS
Proceedings of the National Academy of Sciences of the United States of America

Performing your original search, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1693790/>, in PMC will retrieve **284896** records.

Proc Natl Acad Sci U S A. 2006 November 21; 103(47): 17589–17594. PMID: PMC1693790
Published online 2006 November 13; doi: 10.1073/pnas.0608757103

Low micronutrient intake may accelerate the degenerative diseases of aging through allocation of scarce micronutrients by triage

Bruce N Ames*

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This article has been cited by other articles in PMC.

ABSTRACT Go to:

Inadequate dietary intakes of vitamins and minerals are widespread, most likely due to excessive consumption of energy-rich, micronutrient-poor, refined food. Inadequate intakes may result in chronic metabolic disruption, including mitochondrial decay. Deficiencies in many micronutrients cause DNA damage, such as chromosome breaks, in cultured human cells or *in vivo*. Some of these deficiencies also cause mitochondrial decay with oxidant leakage and cellular aging and are associated with late onset diseases such as cancer. I propose DNA damage and late onset disease are consequences of a triage



Ames & Micronutrient Triage - deconstructed

1. Inadequate dietary intakes of vitamins/minerals are widespread.
 - Excessive consumption of energy-rich, micronutrient-poor, refined food
2. Deficiencies in many micronutrients cause DNA damage in cultured or living human cells.
3. Proposal: DNA damage and late onset disease are consequences of a triage allocation based on micronutrient scarcity.
 - Natural selection favors short-term survival at expense of long-term health.

Ames B. *Proc Natl Acad Sci U S A*. 2006 Nov 21;103(47):17589-94. Epub 2006 Nov 13.

Ames & Micronutrient Triage - deconstructed

4. If proposal is correct, “micronutrient deficiencies that trigger the triage response would **accelerate cancer, aging, and neural decay** but **would leave critical metabolic functions**, such as ATP production, **intact.**”
5. “A multivitamin-mineral supplement is one low-cost way to ensure intake of the Recommended Dietary Allowance of micronutrients throughout life.”

Ames B. *Proc Natl Acad Sci U S A*. 2006 Nov 21;103(47):17589-94. Epub 2006 Nov 13.

Impact of Oral Nutritional Supplementation on Hospital Outcomes

44 million inpatients, 460 sites, 2000-2010 = 20% of all US inpatient episodes (1.6% were on ONS during the inpatient episode.)

>= 18 years. No terminal patients, tube feedings.

RESULTS for “ONS”:

- 2.3 day shorter length of stay
- Decreased cost of \$4,734 / episode
- 2.3% reduced probability of early readmission.

CONCLUSIONS: “Use of ONS decreases length of stay, episode cost, and 30 day readmission risk in the inpatient population.”

Tomas J, et al. *Am J Manag Care*. 2013;19(2):121-128



Magnesium mementos

- One of the first minerals to disappear with:
 - Processed food
 - Stress
- Decreased by EtOH, caffeine, sodas, meds
- Considered “anti-stress” mineral
 - Decreases cortisol (rel to sleep disruption)
 - Relaxes muscles, prevents cramps (sleep disruption)
 - Decreases anxiety; improves sleep



Symptoms of Magnesium Deficiency

- PSYCHIATRIC ISSUES: Health Conditions Associated with Magnesium Deficiency
- Difficulty with memory and concentration
 - Depression, apathy
 - Emotional lability
 - Irritability, nervousness, anxiety
 - Insomnia
 - Autism
 - ADHD
 - Migraine headaches
 - PMS
 - Dysmenorrhea
 - Fibromyalgia
 - Fatigue
 - CONSTIPATION

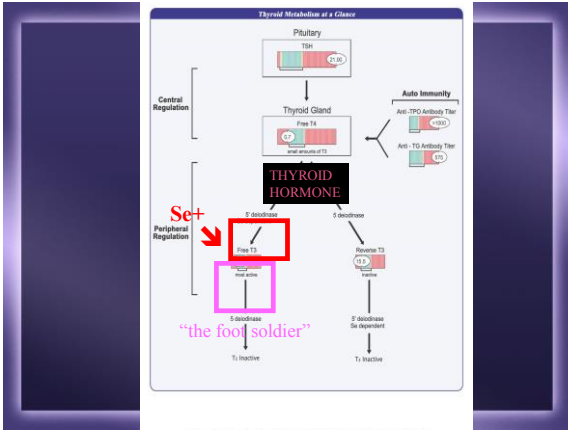
SELENIUM DEFICIENCY in FASEB:



- “Adaptive dysfunction of selenoproteins from the perspective of the ‘triage’ theory: why modest selenium deficiency may increase risk of diseases of aging.”

Foundation of American Societies for Experimental Biology

McCann, J, Ames BM. FASEB J. 2011 Jun;25(6):1793-814.



BioFactors, 2012 Mar-Apr;38(2):139-44. doi: 10.1002/bf.1003. Epub 2012 Mar 15.

Selenium and cognitive impairment: a brief-review based on results from the EVA study.

Berr C, Arnaud J, Akbaraly TN.
Inserm, U1061, Montpellier, France. claudine.berr@inserm.fr

Abstract
Preventing cognitive impairment and dementia in the elderly is a major public health challenge for our century and all hypotheses should be explored. Selenium (Se) is one of the factors that may affect the risk of cognitive decline. Its importance in the health and aging process has been documented. Because of the potential of selenoproteins to protect against oxidative stress, Se raises significant expectations for the prevention of cognitive decline.

“The concomitant evolution between **plasma Se decrease** over a 9-year period and **cognitive decline** suggested that **optimal Se status is potentially important to maintain neuropsychological functions in aging people.**”

Copyright © 2012 International Union of Biochemistry and Molecular Biology, Inc.

Negative downstream effects from selenium deficiency:

“...cancer, heart disease, and immune dysfunction are prospectively associated with modest selenium deficiency.... suggesting that **Se deficiency could be a CAUSATIVE factor.**”

McCann, J, Ames BM. FASEB J. 2011 Jun;25(6):1793-814.

STUDIES SUGGEST THAT TESTOSTERONE LEVELS HAVE DECLINED EVERY YEAR FOR THE PAST 4-5 DECADES. ISN'T IT TIME SOCIETY AND THE ENVIRONMENT STOPPED EMASCULATING THE MALE SPECIES?

- ◆ Observational study of randomly selected men – Boston
- ◆ 3 cohorts of men: 1987-1989; 1995-1997; 2002 - 2004.
- ◆ 1374, 906, and 489 men, respectively.
- ◆ “Age independent decline in T that does not appear to be attributable to observed changes in explanatory factors, including lifestyle characteristics such as smoking and obesity.”
- ◆ “Recent years have seen a ***SUBSTANTIAL***, and as yet ***UNRECOGNIZED*** age-independent population-level ***decrease in T*** in American men.”

Travisson, Arango, et al. Jnl of Clin. Endocrinol & Metabol 92:1: 196-202.

Fast food (low Zn) is bad for you.

J Pharm Pharmacol, 2008 Sep;60(9):1237-42.

Frequent inadequate supply of micronutrients in fast food induces oxidative stress and inflammation in testicular tissues of weanling rats.

El-Sewady MM, Hashem RM, Abb-El-matty DM, Mohamed RH.
Department of Biochemistry, Faculty of Pharmacy, Zagazig University, Egypt.

- Fast food = high energy density = low essential micronutrient density, ESPECIALLY ZINC
- Antioxidant processes are dependent on **Zinc**
- Fast food = *severe decrease in antioxidant vitamins and zinc, correlating with inflammation in testicular tissue* – with *underdevelopment of testicular tissue and decreased testosterone levels*

Special needs - Zinc

- Low Zinc- associated with low testosterone
 - Found in meat, seafood, oysters & dairy
 - Vegetarians at highest risk for zinc deficiency
 - Per USDA, **60% of US men between 20 – 49 years of age do not get enough.**
 - (N.B.: Do not supplement with > 50 mg daily - can interfere with Cu+ metabolism)
 - Tsai, E.C., Boyko, E.J., Leonetti, D.L., & Fujimoto, W.Y. (2000). Low serum testosterone level as a predictor of increased visceral fat in Japanese-American men. *International Journal of Obesity and Related Metabolic Disorders*, 24, 485-491

T vs. Cognitive Function

- 400 independently living men, 40-80yo
 - 100 in each age decade
 - TT: 208-1141ng/dL; Bio-avail T 78-470ng/dL
- HIGHER T = better cognitive performance in OLDEST AGE category
- Men with lowest 1/5 T = worse than men with highest 1/5 T
- Highest Bio-available T more significant than TT, age, intelligence level, mood, smoking, and alcohol.

Muller M, et al. *Neurology*. 2005 Mar;64(5): 866-71

T vs. Mood in men

- Study: 278 men, ≥ 45 yo, followed 2 years
- Compared to eugonadal patients, hypogonadal men w/TT ≤ 200 ng/dL had
 - 4-fold increase risk of depression
 - Significantly shorter time to depression diagnosis
- Depression risk inversely related to TT w/statistical significance ≤ 280 ng/dL

Shores MM, *Arch Gen Psychiatry*. 61(2004):162-7

Balanced presentation inclusive of women...

- Oral zinc raises testosterone levels in women.
 - Vecchio M, et al. *Cochrane Database Syst Rev*. 2010 Dec 8;(12):CD007747. doi: 10.1002/14651858.CD007747.pub2.
- Transdermal testosterone improves:
 - Sexual desire, arousal, orgasm frequency, and sexual satisfaction in premenopausal and post-menopausal women.
 - Also associated with favorable effects on body composition, bone, cardiovascular fxn, and COGNITION
 - Davis SR. Androgen therapy in women, beyond libido. *Climacteric*. 2013 Aug;16 Suppl 1:18-24. doi: 10.3109/13697137.2013.801736. Epub 2013 May 27.

SHIFT: Vitamins

- They are essential nutrients (except Vit D)
- Deficiencies result in classic/obvious diseases:
 - Goiter, scurvy, osteoporosis, pernicious anemia, impaired immune function, disorders of cell metabolism, some forms of cancer, premature aging, poor psychological health (including eating disorders)

• Shils et al. (2005). *Modern Nutrition in Health and Disease*. Lippincott Williams and Wilkins. ISBN 0-7817-4133-5.

Symptoms of B₁₂ Deficiency

Mental

- Irritability
- Apathy
- Personality changes
- Depression
- Memory loss
- Dementia
- Hallucinations
- Violent behavior
- Anxiety

Physical

- Diminished sense of touch and pain
- Clumsiness
- Weakness
- Pernicious anemia
- Chronic fatigue
- Tremors
- GI problems

The Effects of high dose B vitamins on stress at work

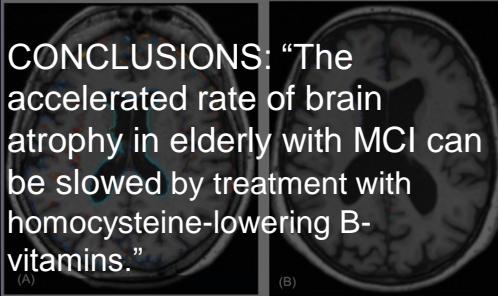
- "Occupational stress is increasing in Western societies."
- 3 month, double blind, placebo control, randomized study
- Measured: Personality, work demands, mood, anxiety, and strain
- After variances in personality and work demands were controlled, **the vitamin B complex treated group reported significantly lower personal strain and a reduction in confusion and depressed/dejected mood after 12 weeks.**

Strough C et al. The effect of 90 day administration of a high dose vitamin B-complex on work stress. *Hum Psychopharmacol*. 2011 Sept 8. doi 10.1002/hup.1229 (Swinburne University of Technology – Hawthorn, Victoria, Australia.)

Vitamin/mineral supplementation & cancer, cardiovascular, and all-cause mortality (EPIC-Heidelberg) Li K, Kaaks R., et al. Eur J Nutri July 2011

- Purpose: evaluate vitamin/mineral supplementation with CA, CV dz, and mortality
- Methods:
 - 23,943 healthy participants, followed x 11 years
 - Baseline and “new-use” supplementation noted
- Results: 513 CA deaths, 264 CV deaths
 - “No MVI supplement had any significant effect”
 - **Baseline users of antioxidant supplements had significantly reduced risk of cancer [HR 0.52] and all cause mortality [0.58]**
- “sick user” phenomenon discussed.

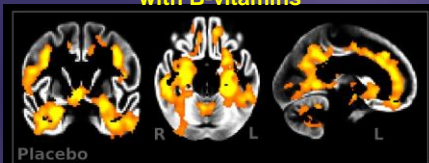
“Homocysteine lowering by B-Vitamins slows the rate of accelerated brain atrophy in MCI” ...



Smith DJ, Smith PM, de Jager CA, Whitmer CA, et al. (2012) Homocysteine-Lowering by B-Vitamins Slows the Rate of Accelerated Brain Atrophy in Mild Cognitive Impairment: A Randomized Controlled Trial. PLoS ONE 5(9): e12244. doi:10.1371/journal.pone.0012244
<http://www.plosone.org/article/info:doi/10.1371/journal.pone.0012244>

PLoS one

Regional loss of grey matter volume reduced with B-vitamins



Douad G, et al. preventing Alzheimer’s disease-related gray matter atrophy by B-vitamin treatment. Proc Natl Acad Sci U S A. Jun 4, 2013; 110(23): 9523–9528.

What causes oxidative stress?

- **Environmental Toxins**

- Heavy metals
- Pesticides/herbicides
- Preservatives
- PCB's, Dioxins, Phthalates



- **Toxins produced in (or injected into) the body**

- Yeast and bacteria
- Products of cellular metabolism
- Dental amalgams/vaccines (Hb)



- **Emotional Stress**

- Anxiety/Tension
- Fear
- Anger



Carotenoids – the first
line of defense

WILL an apple a day keep the doctor away?

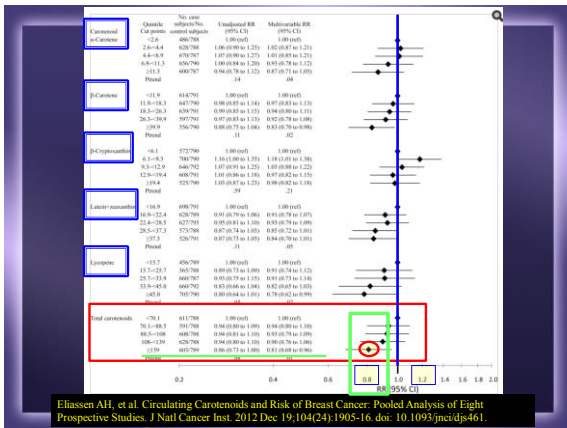
- Liu S, et al. Intake of vegetables rich in carotenoids and risk of coronary heart disease in men: The Physician's Health Study. *Int. J Epidemiol.* 2001 Feb;30(1):130-5.
- Findings adjusted for *age, randomized treatment, BMI, smoking, alcohol intake, physical activity, DM history, HTN history, high cholesterol, use of (conventional) MVI's..*
- **2.5 servings/day of vegetables had a "RR (relative risk) of 0.77"** for CAD vs. men in lowest category
 - (<1 serving per day)

(c) 2013 Louis B. Cady, M.D. - all rights reserved

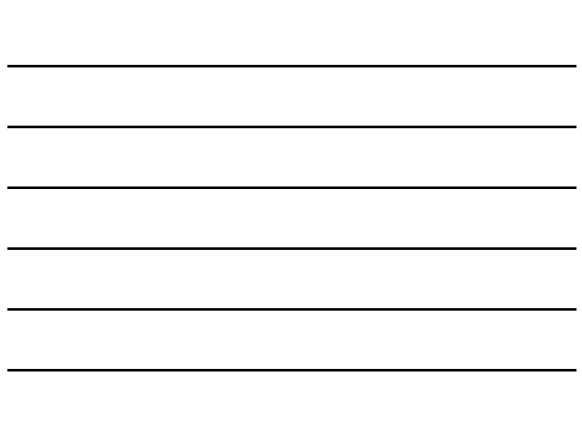
Circulating Carotenoids and Risk of Breast Cancer

- STUDY: pooled analysis of 8 cohort studies
 - 80% of the world's published prospective data on plasma/serum carotenoids and breast cancer
 - 3055 case subjects
 - 3,956 matched controls.
- CONCLUSIONS: This comprehensive prospective analysis suggests women with higher circulating levels of **α-carotene**, **β-carotene**, **lutein+zeaxanthin**, **lycopene**, and **total carotenoids** may be at **reduced risk of breast cancer**.

Eliassen AH, et al. Circulating Carotenoids and Risk of Breast Cancer: Pooled Analysis of Eight Prospective Studies. *J Natl Cancer Inst.* 2012 Dec 19;104(24):1905-16. doi: 10.1093/jnci/djs461.



Eliassen AH, et al. Circulating Carotenoids and Risk of Breast Cancer: Pooled Analysis of Eight Prospective Studies. *J Natl Cancer Inst.* 2012 Dec 19;104(24):1905-16. doi: 10.1093/jnci/djs461.



Lipid peroxidation, antioxidant status & survival in institutionalized elderly

- Plasma MDA predicted mortality independently of all other variables.
- B-carotene and alpha tocopherol were independently associated with survival.

Huerta JM et al. *Free Radical Research* 2006, vol 40, no 6, pp 571-578.



Relative Stress

Value	Reference Range
0.76	>> 689 micromol/L
0.29	>> 0.54 mmol/L
	0.46-1.20 mg/dL
	3.0-5.9 mg/dL
	0.12-0.32
	1.60-3.20 mg/dL
	0.17-0.50

Value	Reference Range
32.8	20.0-38.0 U/g Hb
23,464	5,275-16,862 U/g Hb

Value	Reference Range
11.4	<< 10.0 micromol/L

Reference:
www.cadywellness.com/cadywhitepaper2008.pdf

When blue light (at exactly 473 nm) is shined onto carotenoids, the energy of the reflected light is 'shifted' to green (510 nm) due to a molecular characteristic shared among all carotenoids. This is known as 'Raman shift'

Molecular length and an alternating single-double bond structure gives carotenoids the unique ability to shift blue light to green.

Higher Frequency → Lower Frequency

UV 400 500 600 700 IR

Wave Length (nm)

Everett Napier, an unemployed miner, said he pawned various items while he has been looking for work, including rifles, tools, jewelry and two guitars he used to play at church. 'I just swallowed my pride and quit playing. That's all you can do.'

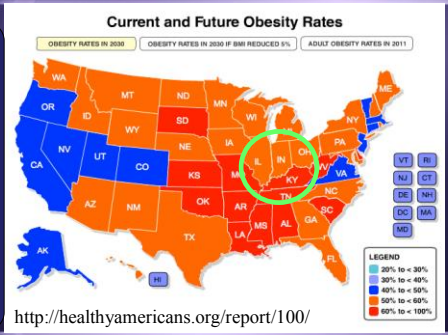
David Stephenson for *The Wall Street Journal*. November 26, 2013

"F as in Fat – How Obesity Threatens America's Future 2012" — Robert Wood Johnson foundation

2030 ...

IN, IL obesity rates: 50-60%

KY: >60%



What Happened?

Year	1900	2010
Sugar	5 lbs/year	200 lbs/year
Oils/fat	4 lbs/year	74.1 lbs/year
Cheese	2 lbs/year	30 lbs/year
Meat	140 lbs/year	210 lbs/year
Fruit/Veget.	131 lbs/year homegrown	11 pounds/year homegrown
Calories	2100	2757
Nutrient Density		40-60%
Soft drinks	0	53 Gallons
TV	0	4 hours/day

Sources: USDA, FoodReview: Major Food Trends a Century in Review 2000

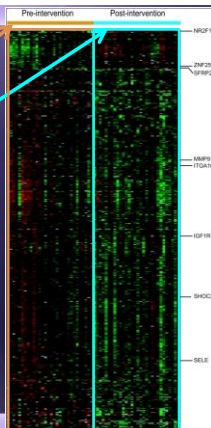
Change your DIET, change your GENES:

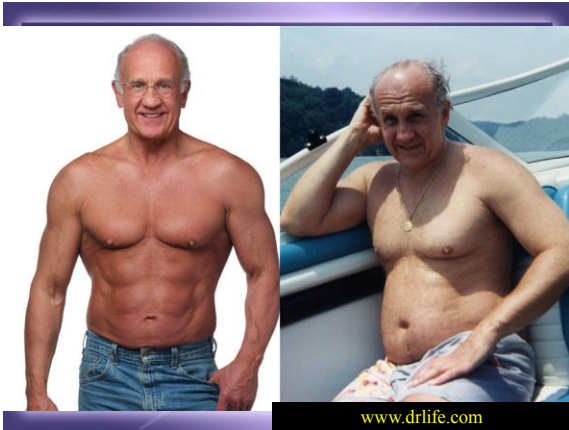
Pre-intervention gene expression

Post-intervention gene expression

TRANSLATION: What you eat talks to your genes and CHANGES THEIR EXPRESSION.

Changes in prostate gene expression in men undergoing an intensive nutrition and lifestyle intervention. Ornish, Dean et al. **Proc Natl Acad Sci USA** 2008 June 17; 105(24):8369-8374









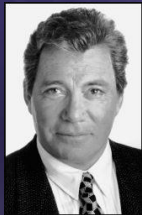


Aging Symptoms



2000

To boldly age where no man has aged before...



*William Shatner as James T. Kirk,
and himself...*

The Seven Secrets of Optimizing Body Composition

1. Control blood sugar.
2. Eat more small meals.
3. Eat more protein.
4. Get hormones (thyroid, etc.) checked.
5. Make it idiot proof.
6. Balanced supplementation, as needed.
7. EXERCISE –it’s the “fountain of youth.”

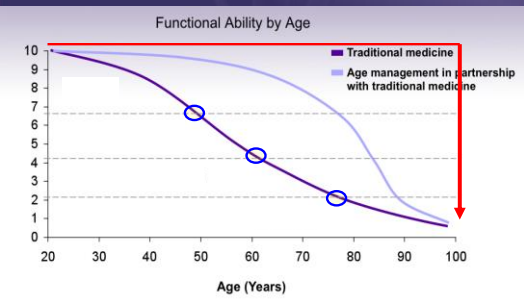
Cady Wellness Institute Synergy: The Five Point Plan




Mind
Body
Actions

- 1) GET ALL THE LABS YOU NEED.
- 2) Rx: Hormones, if needed.
- 3) MONITOR ANTIOXIDANT & vitamins/minerals. SUPPLEMENT AS NEEDED.
- 4) RATIONAL EATING
- 5) RATIONAL EXERCISING.

Wrapping Up: The “Survival Curve” – Where Are You?



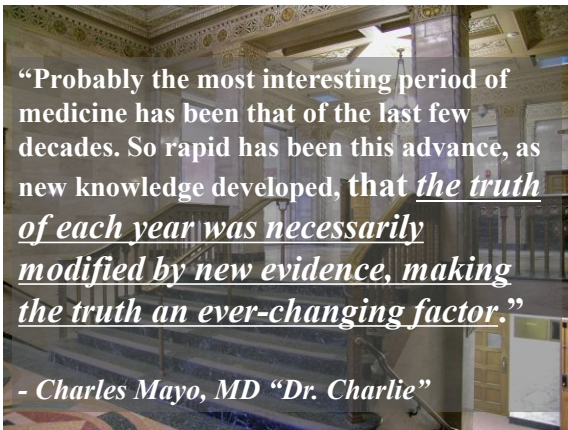
"If I hadn't believed it,
I wouldn't have
seen it."
- Yogi Berra



Personal collection
Louis B. Cady, M.D.

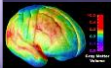
"Probably the most interesting period of medicine has been that of the last few decades. So rapid has been this advance, as new knowledge developed, that *the truth of each year was necessarily modified by new evidence, making the truth an ever-changing factor.*"

- Charles Mayo, MD "Dr. Charlie"



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