

“Attacking the Driver of Increased Stroke, Heart Disease, and Diabetes”

Invited Talk

**Right Care Rotating University of Best Practices
UCSD**

November 5, 2012

Dr. Larry Smarr

Director, California Institute for Telecommunications and Information Technology

Harry E. Gruber Professor,

Dept. of Computer Science and Engineering

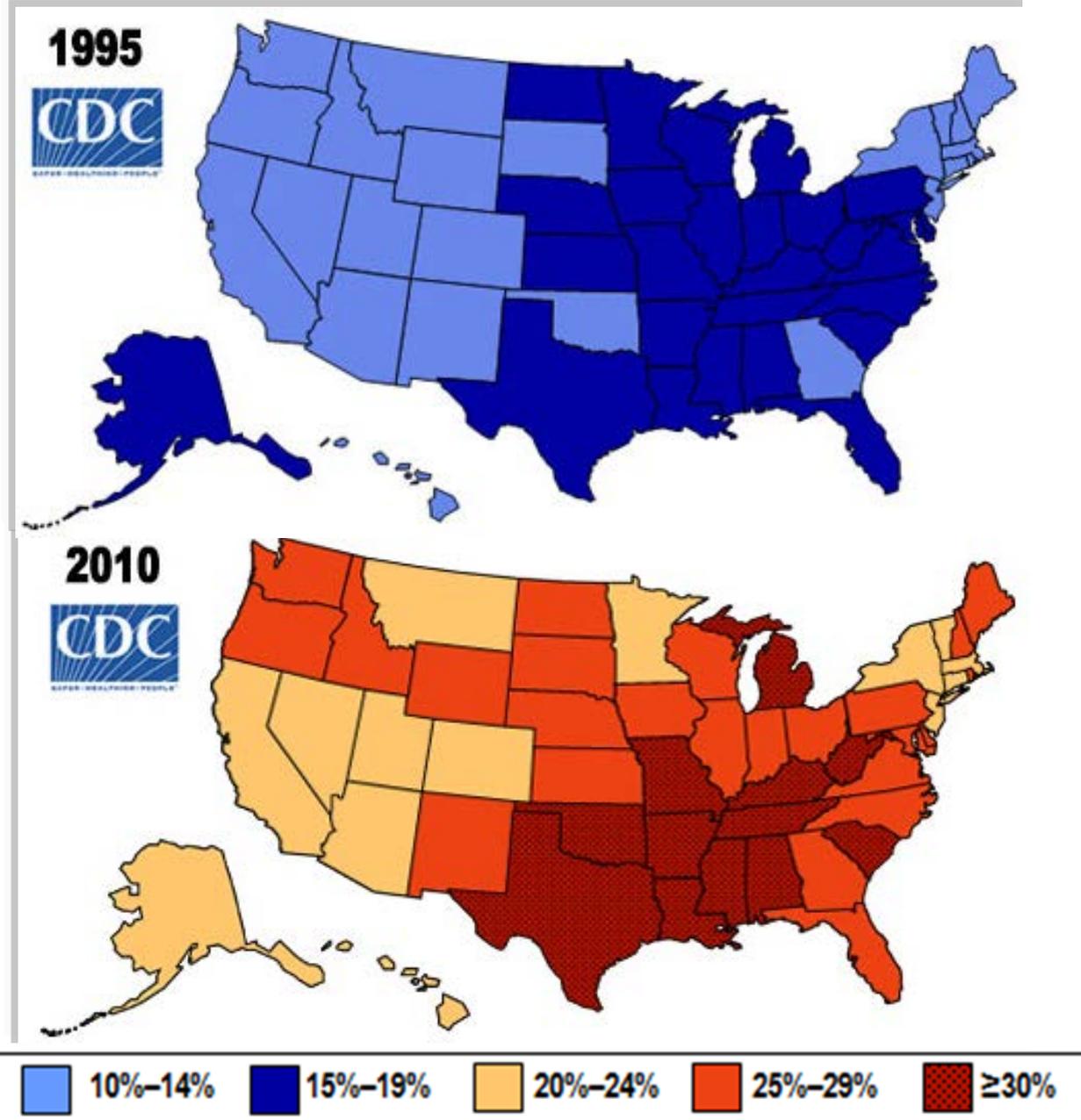
Jacobs School of Engineering, UCSD

<http://lsmarr.calit2.net>

During the Last 15 Years, the Fraction of the Population That is Obese Has Greatly Increased

Source: Behavioral Risk Factor Surveillance System, CDC

(Obese is BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Over 1/3 of American Adults are Obese: This is the Driver of Increased Disease

Obesity-related conditions include heart disease, stroke, type 2 diabetes and certain types of cancer, some of the leading causes of preventable death.

--CDC

I Arrived in La Jolla in 2000 After 20 Years in the Midwest and Decided to Move Against the Obesity Trend

Age
51



2010



Age
61

I Reversed My Body's Decline By
Altering Nutrition and Exercise

The Body's Glucose-Insulin Cycle Is at the Heart of Why We Get Fat

"Gary Taubes is a brave and bold science journalist who does not accept conventional wisdom." —THE NEW YORK TIMES

GOOD CALORIES,

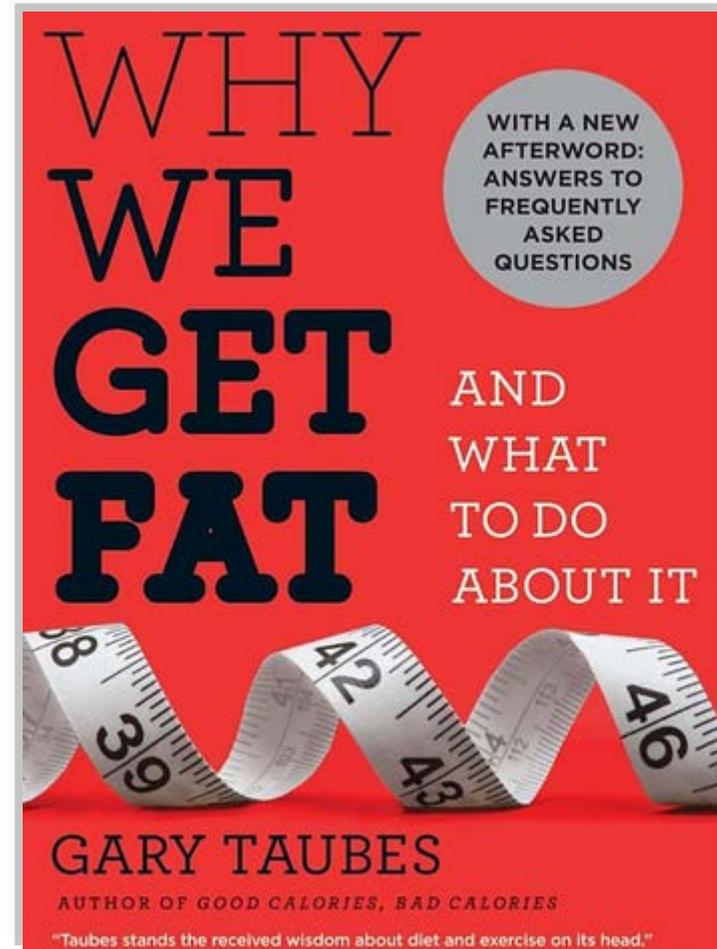


BAD CALORIES

FATS, CARBS, AND THE CONTROVERSIAL SCIENCE OF DIET AND HEALTH

GARY TAUBES

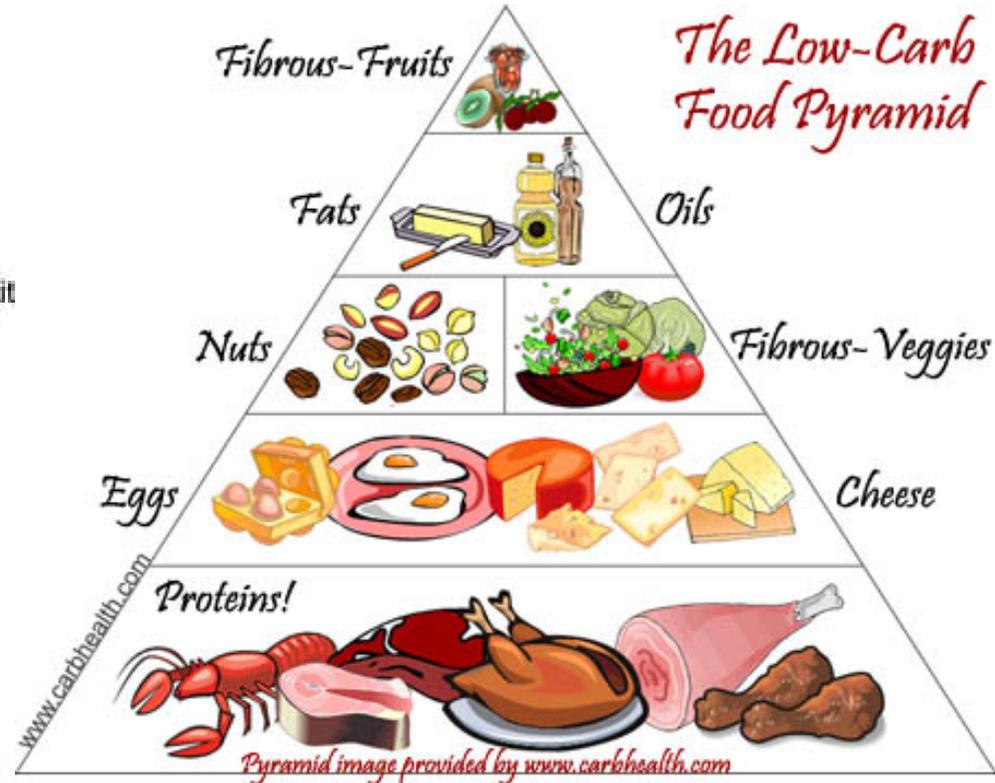
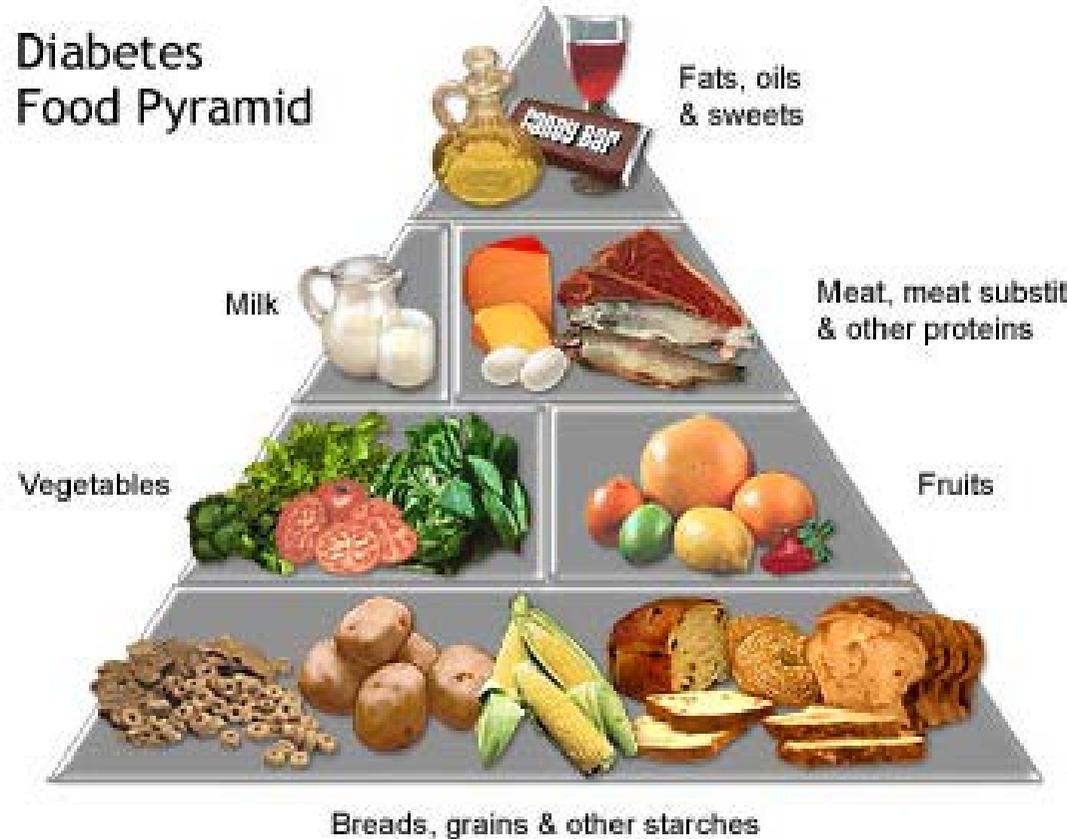
"Carbohydrate is driving insulin is driving fat," the late George Cahill, formerly at Harvard Medical School.



Is Government and Medical Advice Driving the Obesity Epidemic?



The Low-Carb Alternative



Intermediate Moments On the Path to Public Health

2012



Glycemic Index:

- Potato 126
- Table Sugar 97

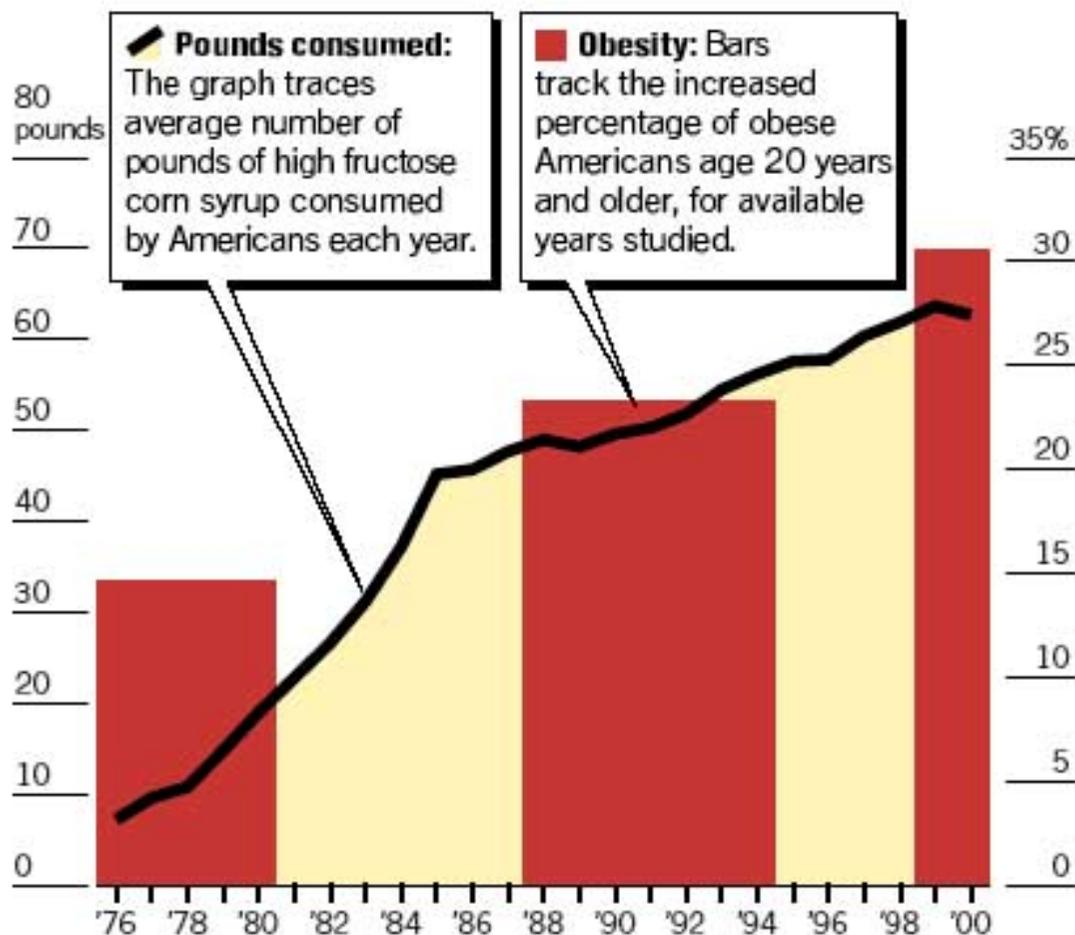
1982



Reversing the Consumption of High Glycemic Sweeteners is Key to Reducing Public Health Risks

Obesity and high fructose corn syrup

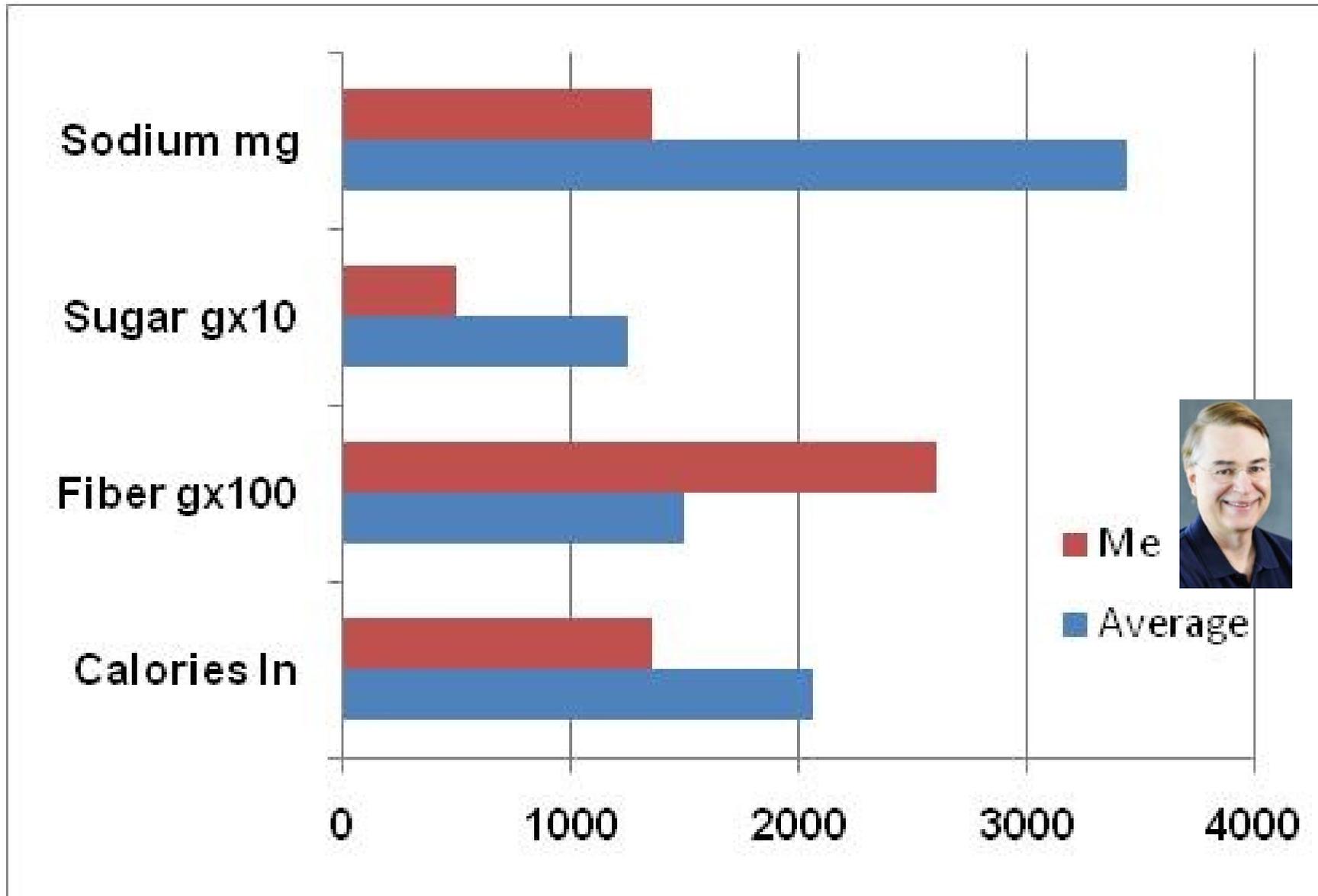
The number of Americans who are obese has quadrupled in recent years, a study shows. At the same time, high fructose corn syrup consumption has risen at parallel rates.



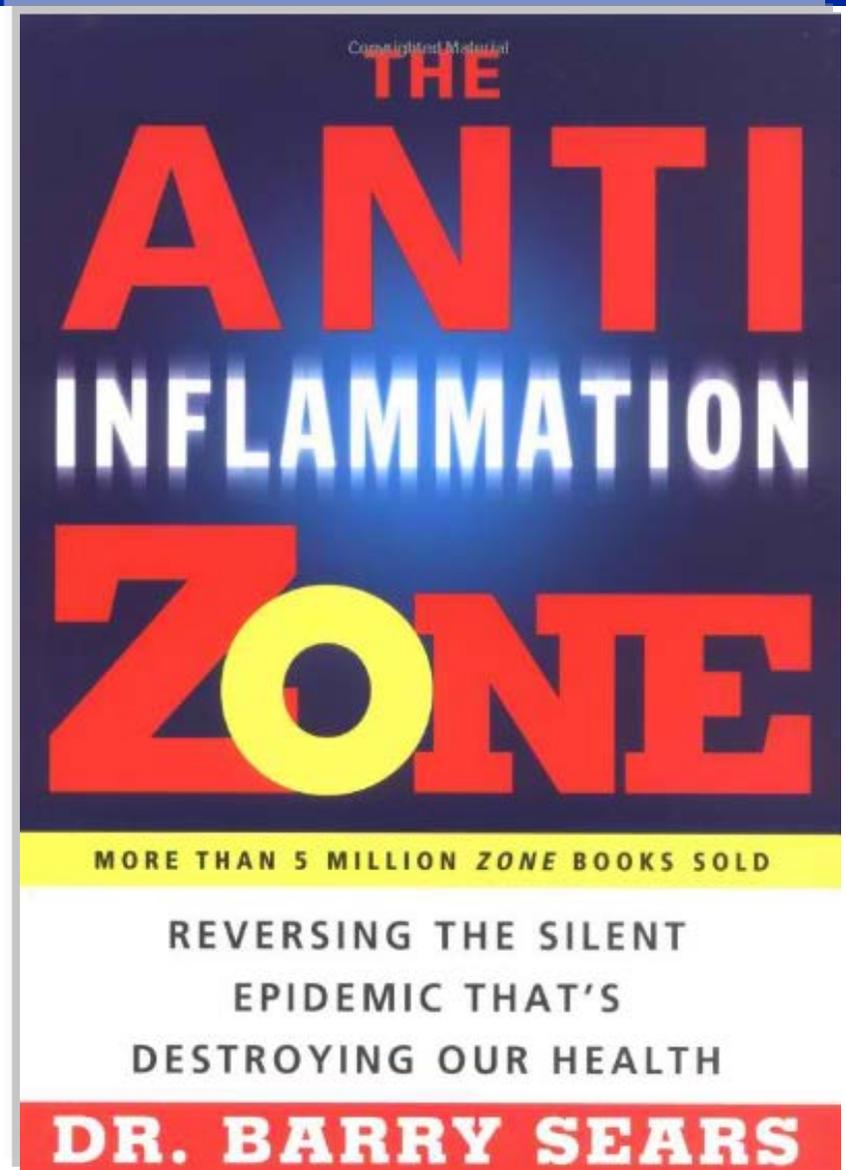
Source: Centers for Disease Control, American Obesity Association, Chronicle research

Chronicle Graphic

I Modified My Diet to Reduce Calories, Sugar, and Sodium, While Increasing Fiber



But What About Fat? Inflammation Is Driven By Omega-6 Fats



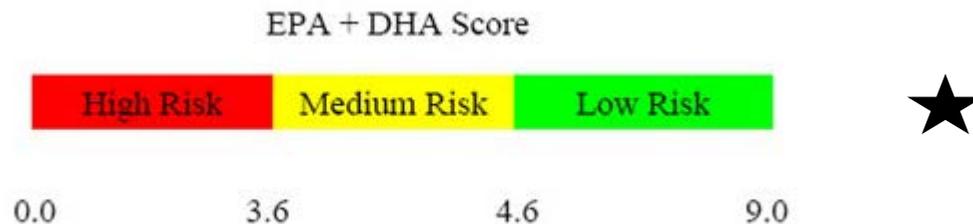
Goal: Improve My Omega-3 Scores To Protect Against Future Heart Disease

Graphics from www.anne-marie.ca/ratiokits/

If your Omega-3 Score is at least 7.2 and your DHA Score is **at least 4.5**, you are 32% less likely to develop heart disease

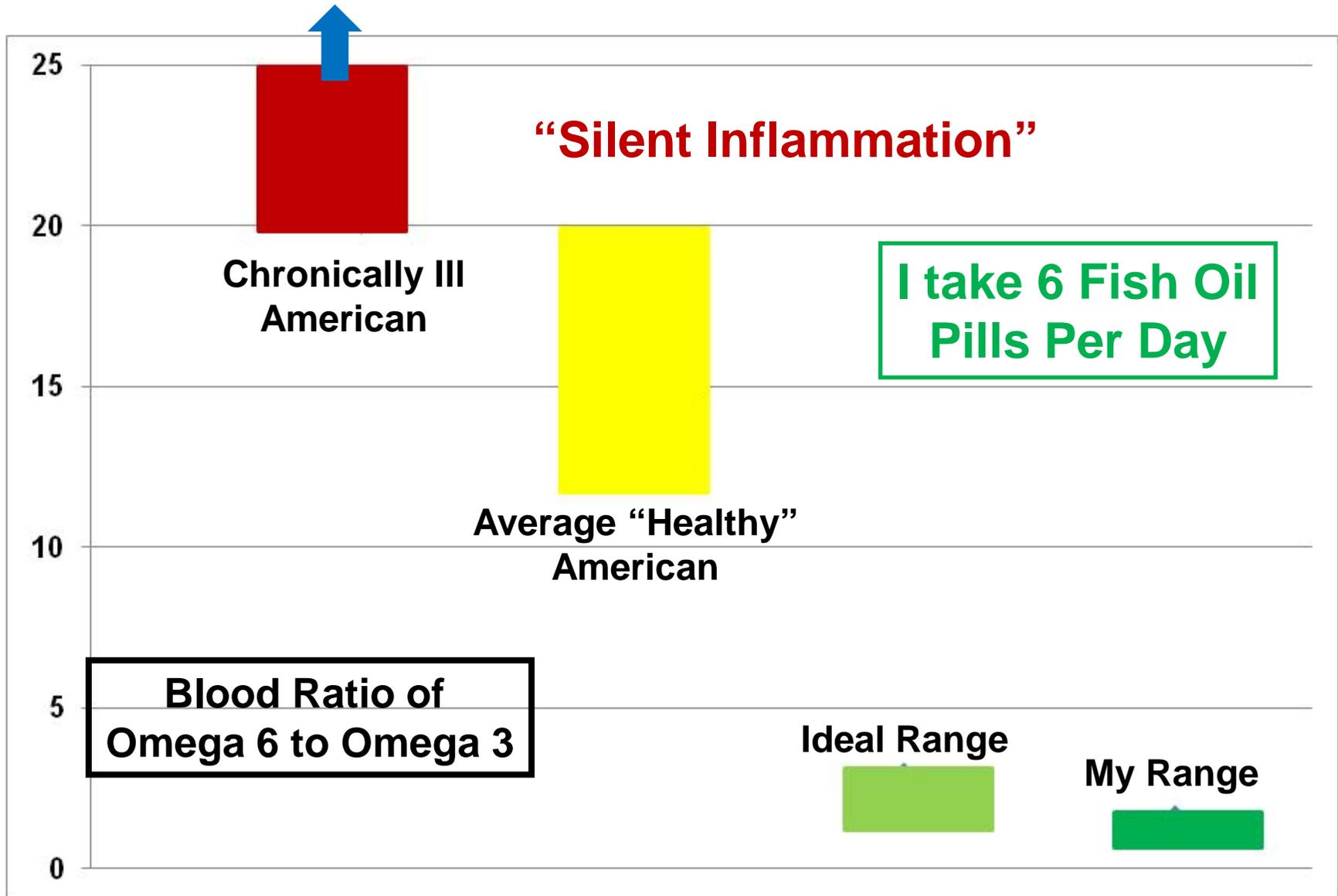


If your EPA+DHA Score is **at least 4.6**, you are 70% less likely of dying from a heart attack.



★ = My Values Tested by yourfuturehealth.com

I Lowered My Body's Inflammation From Food By Increasing Omega-3s and Reducing Omega-6s



Lower Triglycerides by Increasing Omega-3 Intake and by Reducing Foods High in Refined Carbs

- **TG**

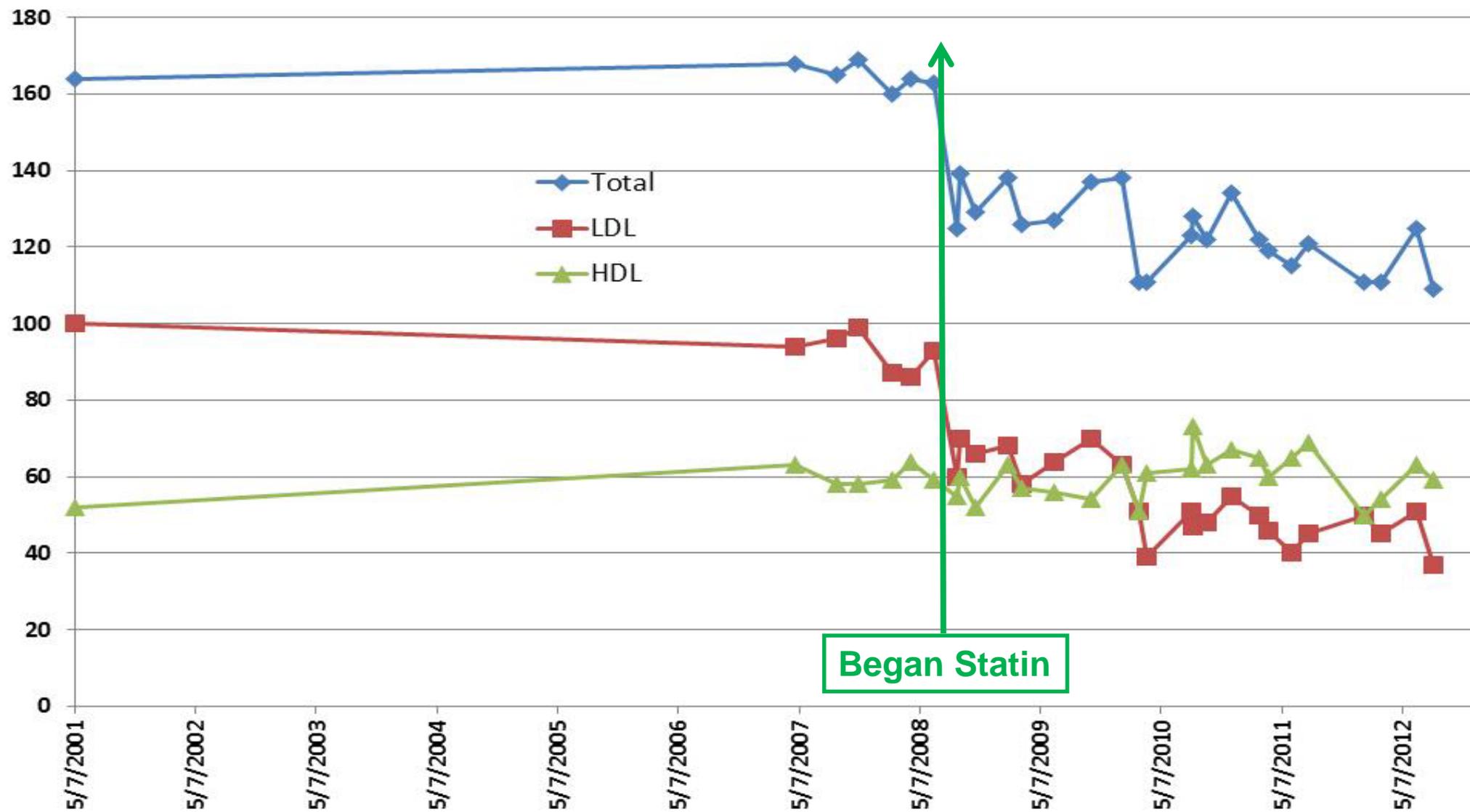
- High Risk 200-500
- Best <150
- My TG Dropped from 62 (2001) to 37 (2012)

- **TG/HDL**

- Ratio >4 Are Pre-Diabetic or Have Type 2 Diabetes
- Average American Has a Ratio of ~3.3
- My Ratio 0.6 Is Half What it Was in 2001

“The Ratio of Triglycerides to HDL Cholesterol (TG/HDL-C) is the Single Most Powerful Lipid Predictor of Extensive Coronary Disease.”
[*Clinics* 63, 427-432 (2008)]

Statins Do Change Your Cholesterol Levels By Lowering LDL, Thus Lowering Total Cholesterol



New Meta-Analysis Shows Why Low-Carb Diets Lower Heart Disease Risk

Effects of Low-Carbohydrate Diets Versus Low-Fat Diets on Metabolic Risk Factors: A Meta-Analysis of Randomized Controlled Clinical Trials

Tian Hu, et al., Tulane University School of Public Health and Tropical Medicine
Am J Epidemiol. 2012;176(Suppl):S44–S54

“Compared with participants on low-fat diets, persons on low-carbohydrate diets experienced a slightly but statistically significantly lower reduction in total cholesterol, and LDL, but a greater increase in HDL and a greater decrease in triglycerides.”

TG Down, HDL Up → TG/HDL Much Lower

Exercise Lowers Risk of Heart Disease and Diabetes

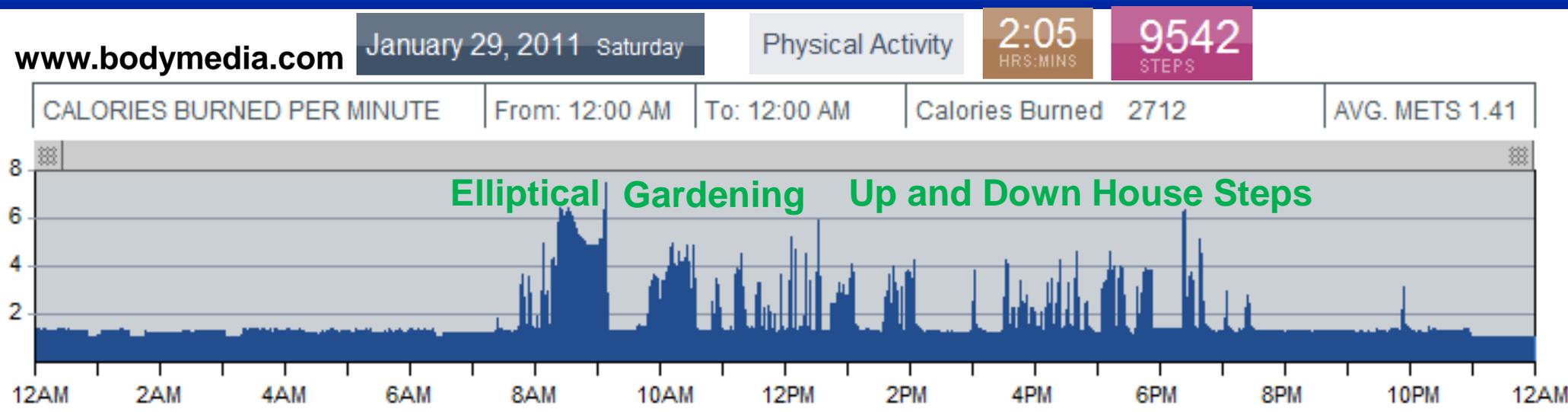
“Weight training was associated with a significantly lower risk of Type 2 Diabetes, independent of aerobic exercise. Combined weight training and aerobic exercise conferred a greater benefit.”

A Prospective Study of Weight Training and Risk of Type 2 Diabetes Mellitus in Men

Anders Grøntved, MPH, MSc; Eric B. Rimm, ScD; Walter C. Willett, MD, DrPH; Lars B. Andersen, PhD, DrMED;
Frank B. Hu, MD, PhD

Sep 24, 2012,

The Biofeedback of Monitoring Enables Me To Increase My Daily Caloric Burn



25 Week Average:
2473 Calories Burned/Day
1:19 hr Physical Activity/Day (>3 METs)
6887 Steps/Day (~3.4 Miles)



Now Using Fitbit
Average 8000 Steps/Day



FitBit Compares Your Steps to Population of Your Age and Sex

Typical You



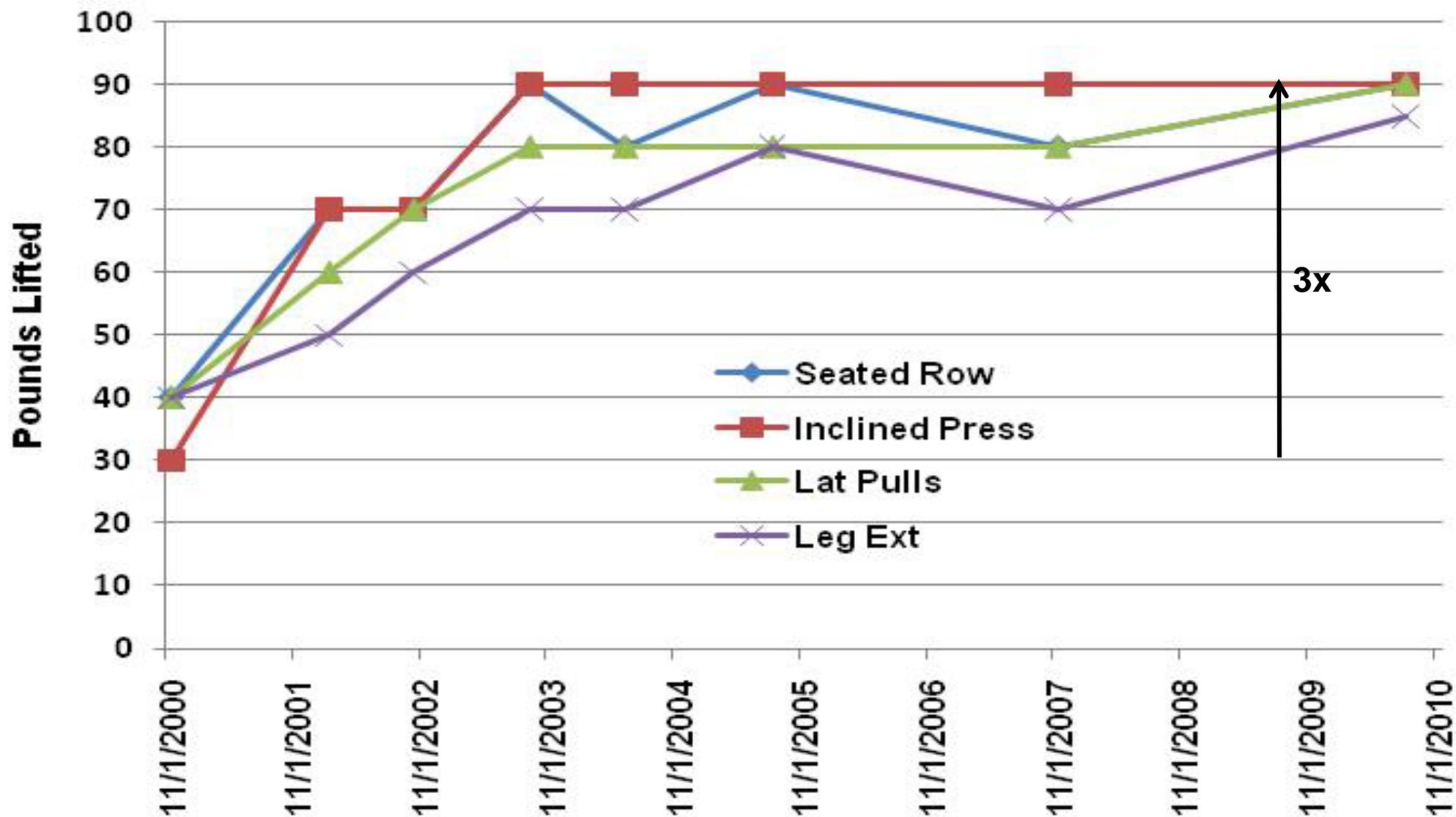
This week you walked
8028 steps

15% more than the median for men 55 to 64 yrs who are normal or underweight

You are in the
60 percentile

of all men 55 to 64 yrs who are normal or underweight

Goal: Use Strength Training to Raise My Rest Metabolic Rate



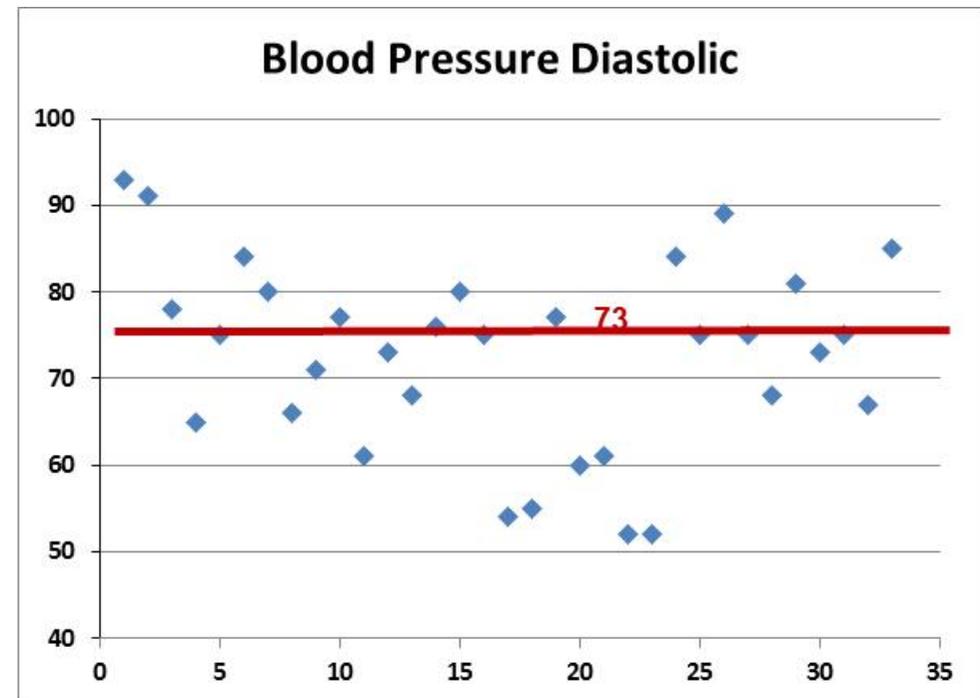
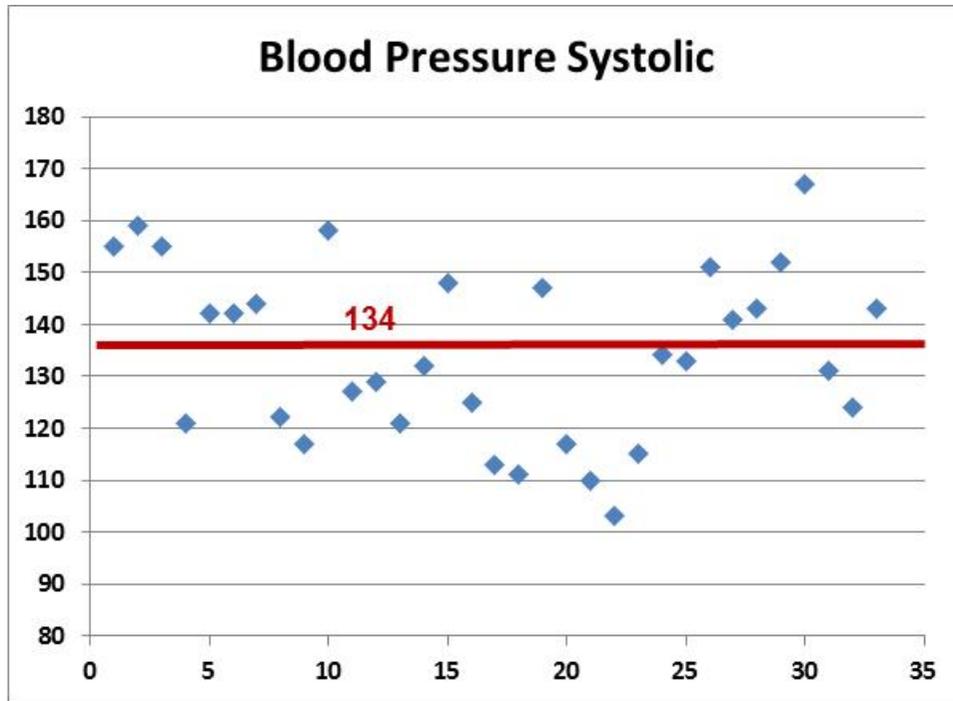
LS Resting Heart Rate

Year	Resting Heart Rate
2000	60
2005	50
2010	45
2012	40

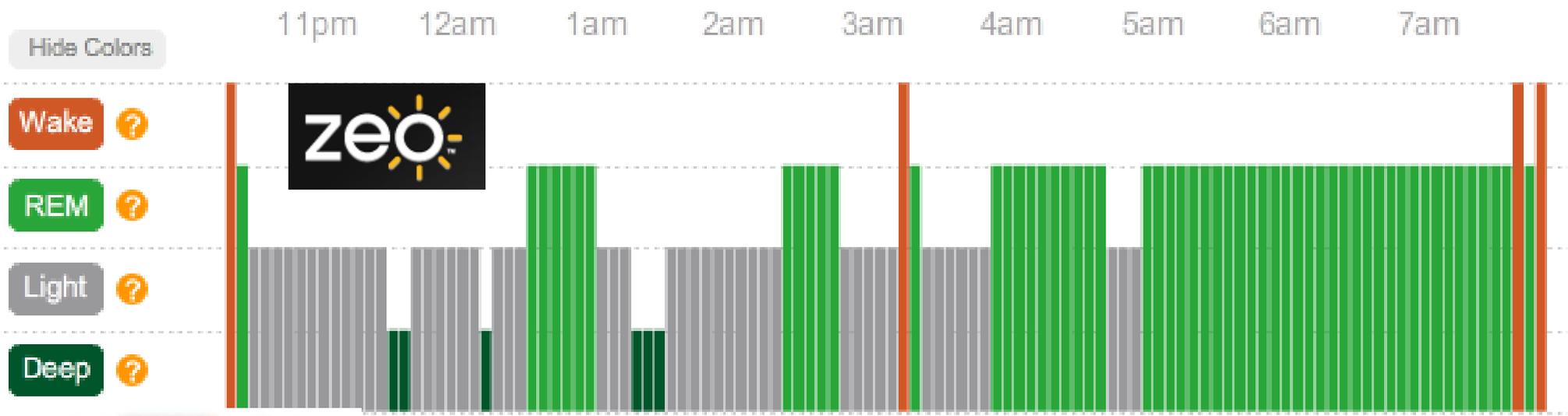
Change in LS Blood Pressure Under Different Blood Pressure Medication

Year	Blood Pressure Drug	Average Systolic	Average Diastolic
2010	Benecar 20mg	134	73
2012	Losartan 100mg	143	82
2012	Lotrel 5/10mg combo	125	70

Blood Pressure Home Monitoring Problem: Wide Scatter in Results Over Time



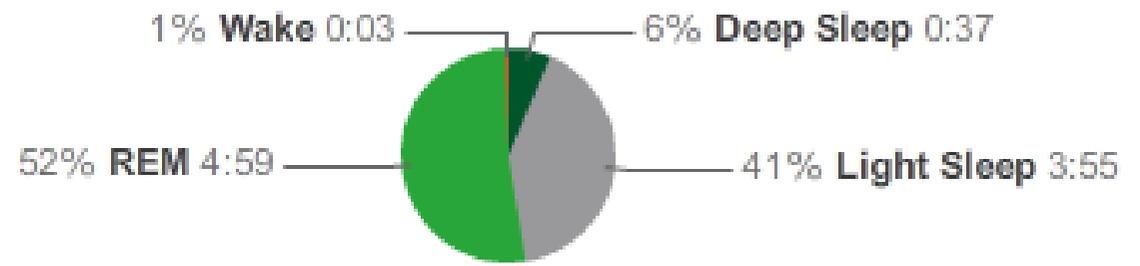
Quantifying My Sleep Pattern Using a Zeo - Increased My Average to 8 Hours/Night



Total Z: 9 hr 31 min

Time to Z: 0 hr 2 min

Stroke risk increased by sleeping less than six hours a night
 -M. Ruiters, *Sleep* 2012



Why are these numbers different from the sleep graph above?

Challenge-Develop Standards to Enable MashUps of Personal Sensor Data Across Private Clouds



**Lose It-
Calories Ingested**



**Body Media-
Calories Burned**



**Withings/iPhone-
Blood Pressure**



**EM Wave PC-
Stress**



Zeo-Sleep



Azumio-Heart Rate

Invited Paper for Focus Issue of Biotechnology Journal, Edited by Profs. Leroy Hood and Charles Auffray.

Perspective

Quantifying your body: A how-to guide from a systems biology perspective

Larry Smarr

University of California, San Diego, CA, USA

Download Pdfs from my Portal:

http://lsmarr.calit2.net/repository/Biotech_J._LS_published_article.pdf

http://lsmarr.calit2.net/repository/Biotech_J._Supporting_Info_published.pdf



Biotechnol. J. 2012, 7, 980–991



Work Group Questions

Attacking the driver of increased stroke, heart disease and diabetes:

What tools did you take away from Dr. Smarr's presentation?

Does your medical group/practice have the discussion tools in place to activate or energize your patients to change their behaviors.

- A.** If so, what are they?
- B.** If not, what would or could they be?
- C.** What are the barriers?