Food As Medicine

Kathy Tsapos Parmele, MD, IFMCP, FACEP

“Let food be thy medicine, and medicine be thy food”
Educational Objectives

• Participants will be able to identify the different types of diets/food patterns currently available.

• Participants will understand and learn to recommend to their patients which food patterns are associated with improved health span and decreased disease risk.

• Participants will learn how to easily prepare a meal that meets the guidelines of a healthy dietary pattern.
About Me

• Greek immigrant -> grew up on whole food, Mediterranean diet
• Undergraduate: Harvard magna cum laude in biochemistry
• Medical School: University of Pennsylvania
• Residency: University of Pittsburgh Emergency Medicine
• Physician for 26 years (CalvertHealth ED)
• IFM Certified physician and Health & Wellness Coach - private practice since 2019
• 14-time marathon finisher and 10-time Ironman finisher
• No conflicts of interest
My Story- 1992

- 19 year old college student
- Ran 5-6 miles 3-4 times a week
- College meal plan: ate everything, and lots of it
- 30 pound weight gain in 4 years
Winter 1993
Start of med school
Med school

Pasta
+
Veggies/olive oil
+
Home cooking
=
Affordable & Easy
Clinicals and Residency
Keto Diet and Resistance Training
Why are athletes dying of heart attacks?

Annals of Internal Medicine

Death and Cardiac Arrest in U.S. Triathlon Participants, 1985 to 2016: A Case Series

Kevin M. Harris, MD; Lawrence L. Creswell, MD; Tammy S. Haas, RN; Taylor Thomas, BS; Monica Tung, BA; Erin Isaacs, BS; Ross F. Garberich, MS; Barry J. Maron, MD

Cardiac Death During Triathlon 'Not Rare'

Conclusion: Deaths and cardiac arrests during the triathlon are not rare; most have occurred in middle-aged and older men. Most sudden deaths in triathletes happened during the swim segment, and clinically silent cardiovascular disease was present in an unexpected proportion of decedents.
Was I Next?
How do I balance a healthy weight, athletic performance and long-term health?
Most medical students receive an average of 24 hours of nutrition training, some as little as two hours.
Gluten Free
Dairy Free
Soy Free
Mono Diet
Clean Eating
Vegan
Blood Group Diet
I Quit Sugar!

Paleo?
Organic
Low Carb
Fat Burning
High Protein
Juice Detox
Metabolism Boosting
Intermittent Fasting
When did eating get so complicated?
98% OF WATER CAN KILL YOU!!!

Paid for by TPWDLBPSA
Who can you trust?

Neighbor?

Facebook friend?

Social Media?

Trainer at the gym?

Celebrity?

Doctor?
Nibble on a cookie about an hour before lunch.

Sugar keeps your energy up—and your appetite down.

Willpower fascinates the world is over! And guess where it’s at! In sugar! Sugar works faster than any other food to turn your appetite down, turn energy up.

Spoil your appetite with sugar, and you could come up with willpower—the willpower you need to eat less, and maybe even weigh less.

Sugar... only 15 calories per teaspoon... and it’s all energy.
For a better start in life
start **COLA** earlier!

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**How soon is too soon?**

Not soon enough. Laboratory tests over the last few years have proven that babies who start drinking soda during their early formative period have a much higher chance of gaining acceptance and "fitting in" during those awkward pre-teen and teen years. So, do yourself a favor. Do your child a favor. Start them on a strict regimen of sodas and other sugary carbonated beverages right now, for a lifetime of guaranteed happiness.

The Soda Pop Board of America
1515 W. Hart Ave. - Chicago, ILL.
20,679* Physicians say "LUCKIES are less irritating"

"It's toasted"
Your Throat Protection against irritation against cough
CONFLICT OF INTERESTS?
We’re Number 1!

90% of Americans think they’re eating healthy

Diagnosed Diabetes and Obesity estimates are percentage: natural breaks were used to create categories using all data from 2004-2019. Diagnosed Diabetes (%) - <7.1, 7.1-8.6, 8.6-10.5, >10.5; Obesity (%) - <21.2, 21.2-23.9, 25.0-30.5, >30.5.
Diabetes Prevention Program

Food and Exercise

58% Reduction

Diabetes Prevention Program Research Group 346 (6): 393, Figure 2, February 7, 2002, NEJM
ORIGINAL RESEARCH

A way to reverse CAD?

Though current medical and surgical treatments manage coronary artery disease, they do little to prevent or stop it. Nutritional intervention, as shown in our study and others, has halted and even reversed CAD.

198 patients, 3.7 years follow up
Figure 1

Restoration of myocardial perfusion

Positron emission tomography performed on a patient with coronary artery disease shows an area of myocardium with insufficient blood flow (top). Following only 3 weeks of plant-based nutritional intervention, normal blood flow was restored (bottom).

Figure 2

Reversal of coronary artery disease

Coronary angiography reveals a diseased distal left anterior descending artery (A). Following 32 months of a plant-based nutritional intervention without cholesterol-lowering medication, the artery regained its normal configuration (B).
Micronutrients and Macronutrients

- Antioxidants
- Phytonutrients
- Vitamins
- Minerals

- Carbohydrates
- Fats
- Proteins

What everyone always focuses on
MACROS!
Myth: A calorie is a calorie
... Oh My!

- Polyphenols
- Phytonutrients
- Antioxidants
- Phytosterols
- Carotenoids
- Glucosinolates
- Organosulfurs
- Flavonoids
- Curcuminoids
- Lignans
- Xanthophylls
- Tannins

Etc., etc.
“The important take-home message from today’s research is that we need a wide variety of plant foods in our diet to get the full spectrum of phytochemicals available to protect our health. Loading up on any one phytochemical or antioxidant just isn’t the same.”
Rainbows are good for you
Not These Rainbows
Macronutrients

CARBS!    PROTEIN!

FATS!
Fats

- Body’s energy stores
- Vital component to every cell membrane
- Thermoregulation
- Transport and absorb Vitamins A, D, E, and K
- Precursors of hormones and enzymes
- Essential for brain development
- Important components of cell membranes
- Essential Omega-3 fatty acids
Types of Fats

Monounsaturated
• Most vegetable oils

Polyunsaturated
• Fatty fish, seeds, nuts, legumes, olive oil, avocado oil

Saturated
• Animal fats (beef, chicken, pork), dairy, and palm and coconut oil

Trans Fats
• Partially hydrogenated vegetable oil (processed foods)
Omega 3 fatty acids

- Essential amino acids
- Anti-inflammatory
- Cell membrane fluidity
- ALA (walnuts, flax seeds, soybeans)
- EPA/DHA (marine sources like algae and fish)
- Genetic SNPs determine ALA -> EPA/DHA
Effects of red meat, white meat, and nonmeat protein sources on atherogenic lipoprotein measures in the context of low compared with high saturated fat intake: a randomized controlled trial

Nathalie Bergeron,¹,² Sally Chiu,¹ Paul T Williams,³ Sarah M King,¹ and Ronald M Krauss¹

¹Children’s Hospital Oakland Research Institute, Oakland, CA; ²Department of Biological and Pharmaceutical Sciences, College of Pharmacy, Touro University California, Vallejo, CA; and ³Department of Genome Sciences, Life Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA
Diet protein source and atherogenic lipoproteins

Randomized Diet Order

TABLE 3  Plasma lipid concentrations after 4 wk of diets varying in dietary protein source and saturated fat content

<table>
<thead>
<tr>
<th></th>
<th>High-SFA</th>
<th>Low-SFA</th>
<th>Protein</th>
<th>SFA</th>
<th>Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Red meat</td>
<td>White meat</td>
<td>Nonmeat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total cholesterol, mmol/L</td>
<td>4.42 ± 0.93</td>
<td>4.39 ± 0.83</td>
<td>4.22 ± 0.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LDL cholesterol, mmol/L</td>
<td>2.64 ± 0.80</td>
<td>2.61 ± 0.72</td>
<td>2.46 ± 0.70</td>
<td></td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>HDL cholesterol, mmol/L</td>
<td>1.34 ± 0.31</td>
<td>1.34 ± 0.31</td>
<td>1.29 ± 0.31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-HDL cholesterol, mmol/L</td>
<td>3.08 ± 0.93</td>
<td>3.05 ± 0.85</td>
<td>2.92 ± 0.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triglycerides, mmol/L</td>
<td>0.95 ± 0.47</td>
<td>0.96 ± 0.49</td>
<td>0.99 ± 0.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>apoA-I, g/L</td>
<td>1.31 ± 0.18</td>
<td>1.30 ± 0.18</td>
<td>1.28 ± 0.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>apoB, g/L</td>
<td>0.73 ± 0.23</td>
<td>0.74 ± 0.22</td>
<td>0.70 ± 0.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total/HDL cholesterol</td>
<td>3.41 ± 0.97</td>
<td>3.41 ± 0.96</td>
<td>3.41 ± 1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LDL cholesterol/apoB</td>
<td>3.61 ± 0.39</td>
<td>3.57 ± 0.41</td>
<td>3.51 ± 0.38</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Values are means ± SD, n = 113. Data were analyzed by ANOVA for a 3-treatment crossover design, adjusted for dietary period. apoA-I, apolipoprotein A-I; apoB, apolipoprotein B.
“Pairwise comparisons across dietary protein sources showed that concentrations of total cholesterol (P<0.0001), LDL cholesterol (P<0.0001), and non-HDL cholesterol (P <0.001) were significantly higher after either the red meat or white meat diet than after the nonmeat diet.”

“Independent of dietary protein source, diets high in SFA resulted in higher plasma total cholesterol, LDL cholesterol and non-HDL cholesterol concentrations than diets low in SFA (all P<0.001)”
Specific Dietary Fats in Relation to Total and Cause-Specific Mortality

Dong D. Wang, MD, MSc, Yanping Li, PhD, Stephanie E. Chiuve, ScD, Meir J. Stampfer, MD, DrPH, JoAnn E. Manson, MD, DrPH, Eric B. Rimm, ScD, Walter C. Willett, MD, DrPH, and Frank B. Hu, MD, PhD

Departments of Nutrition (DDW, YL, SEC, MJS, EBR, WCW and FBH), and Epidemiology (MJS, JEM, EBR, WCW and FBH), Harvard T. H. Chan School of Public Health, Boston, MA; The Channing Division for Network Medicine (MJS, JEM, EBR, WCW and FBH), and the Division of Preventive Medicine (MJS, SEC and JEM), Department of Medicine, Brigham and Women’s Hospital and Harvard Medical School, Boston, MA

126,233 patients followed 26 years
Total Fat Intake (vs Carbohydrate) and Total Mortality in Men and Women

\( n = 126,233; 33,304 \) deaths

\( P_{trend} = <.001 \)

Types of Fat and Total Mortality

- MV-adjusted results, isocaloric comparison is CHO

### Fats: Take-Home Points

**CHOOSE** heart healthy fats (Monounsaturated, Polyunsaturated)

- Olive oil, nuts, seeds, avocados, fatty fish

**AVOID** Saturated and Trans fats

- Margarines, ultra-processed foods, fatty meat
CARBOHYDRATES

SUGAR AND CARBS
ARE THE DEBIL
Why Are Carbs Important?

- Main source of fuel for your brain and your muscles
- Fiber (found in complex carbs) feeds your gut microbes
All carbs are not created equal

**COMPLEX CARBS**
- Whole grains, fruits and vegetables
  - Low glycemic index
  - Low insulin release
  - High fiber
  - Slow-acting
- Examples: quinoa, whole wheat pasta, whole wheat bread, whole wheat tortilla

**SIMPLE CARBS**
- Refined, simple sugars
  - High glycemic index
  - High insulin release
  - Low fiber
  - Quick-acting
- Examples: white bread, white pasta, white rice, sugar, honey, agave, white potatoes, maple syrup
Whole Grain vs. "White" Grain

Bran
The fiber-rich outer layer that protects the seed and contains B vitamins and trace minerals.

Endosperm
The middle layer that contains carbohydrates along with proteins.

Germ
The small nutrient-rich core that contains antioxidants, including vitamin E, B vitamins and healthy fats.
Dietary Fiber, Glycemic Load, and Risk of Non–insulin-dependent Diabetes Mellitus in Women

Jorge Salmerón, MD; JoAnn E. Manson, MD; Meir J. Stampfer, MD; et al


65,173 women, 6 years of follow up
Relative Risk of Type 2 Diabetes by Different Levels of Cereal Fiber and Glycemic Load

(Salmeron et al, 1997)
Speaking of Fiber...
You are 1/10\textsuperscript{th} of what you eat...

- We are made up of only 10\% of our own DNA (90\% bacterial)
- We live in a symbiotic relationship as hosts
- Gut bacterial diversity plays a powerful role. We are only starting to realize its importance.
  - Inflammation
  - Mood
  - Weight gain/loss
  - Food cravings

https://static01.nyt.com/images/2017/01/03/science/03-SCI-GUTBACTERIA/03-SCI-GUTBACTERIA-master768.jpg
Simple Carbs Starve Your Microbiota

High Fiber Diet

Microbiota lives here

Circulation

Colon

SCFA

Small intestine

High Simple Carbohydrate Diet

Sonnenburg, HKHL 2018
A starving microbiota eats you

MAC=
Microbiota
Accessible
Carbohydrate

MAC-rich

MAC-deficient

Host (DAPI)
Bacteria (DAPI)
Mucus (anti-Muc2)
Debris
Carbohydrate Take-Home Points

• Eat “GOOD” carbs— **Note to patients:** MORE FIBER!
  • **Whole** grains
  • **Whole** fruits (EAT your fruit, don’t drink it, unless in a smoothie)
  • **Whole** vegetables
• Minimize “BAD” carbs: refined carbohydrates and simple sugars- **LESS SUGAR!**
Protein

• Building block of all organs, muscles, enzymes. Important for healthy and healthy aging.

• Composed of 20 amino acids
  • 9 essential amino acids (must be consumed in diet, cannot be made in body)
    • histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine
Branched Chain Amino Acids

• Why are they important?
  • Unique in that they are principally metabolized in the skeletal muscle (Not in the liver)
  • Trigger Muscle Protein Synthesis
Leucine Trigger for Muscle Protein Synthesis

• ? Evolutionary adaptation?
  • Liver protein synthesis (all the time) versus muscle protein synthesis (periodic)
  • 2.5 grams of leucine stimulates mTOR which triggers MPS
  • There are about 2.5 grams of leucine in 20-30 gm of protein
  • Leucine triggers synthesis, but if there aren’t enough amino acids around you get increased muscle protein BREAKDOWN
  • NOT helpful to supplement only with BCAA

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4848650/
How Much Protein Do We Need (RDA)?

- RDA is 0.8 gm/kg of body weight; to avoid deficiency
- 1.2-1.6 gm/kg of body weight (higher end for athletes and >65 yo)

- 100 kg = 220 lbs (between 120-160 grams per day) 40 gm 3-4 x/day
- 50 kg = 110 lbs (between 60-80 grams per day) 20-30 grams 3 x/day
How Much Protein Do We Get?

2005-2006 National Health and Nutrition Examination Survey (NHANES) data for US:

Average woman: 70.1 grams
Average man: 101.9 grams

MORE THAN THE RDA
True or False:

You have to eat animal products to get protein
True or False:

You have to eat animal products to get protein

FALSE!

If it has DNA, it has protein
Which has the most protein?

• 100 calories of beef
• 100 calories of broccoli
• 100 calories of spinach
• 100 calories of beans
Which has the most protein?

• 100 calories of beef= 10 grams of protein
• 100 calories of broccoli= 8 grams of protein
• **100 calories of spinach= 12 grams of protein**
• 100 calories of beans= 7 grams of protein

https://i.pinimg.com/originals/6a/d2/2f/6ad22fbe580772ce46d033c37f77859c.jpg
True or False:

• Some plant sources of protein do not contain all essential amino acids
True or False:

• Some plant sources of protein do not contain all essential amino acids

FALSE!

Everything has everything
Proportions of amino acids in selected foods across food groups
(Source: Nutrition Database System for Research, University of Minnesota)
HOWEVER: Protein can NOT be stored
I repeat: Protein can NOT be stored
What Happens to Excess Protein?

- Converted to carbohydrate and stored as fat
Grass Fed Beef MAN v FOOD Steak

Be the first to review this product

Size ➤ Choose an Option...

Qty 1

From £10.03 £8.78 RepBox Members

Add
For Protein...

**TIMING IS EVERYTHING**

https://cdn.shopify.com/s/files/1/0783/3649/articles/Timing_is_Everything.png?v=1449180252
Space Out Protein Intake

• 3-4 x a day based on size
• Maintains an anabolic phase (muscle buildup)
• There is a cap to maximal effectiveness
  • Eating more doesn’t give you more benefits (maxes out around 30-40 gm/meal)
• Circulates for up to 6 hours, then you get catabolism (muscle breakdown)
20 grams of Protein Looks Like...

Remember, Protein is in EVERYTHING!
Protein Source and Mortality

Association of Animal and Plant Protein Intake With All-Cause and Cause-Specific Mortality

Mingyang Song, MD, ScD; Teresa T. Fung, ScD; Frank B. Hu, MD, PhD; Walter C. Willett, MD, DrPH; Valter D. Longo, PhD; Andrew T. Chan, MD, MPH; Edward L. Giovannucci, MD, ScD

131,342 patients followed 32 years
Risk for mortality associated with replacement of 3% energy from various animal protein sources with plant protein (131,342 men and women, 36,115 deaths)

<table>
<thead>
<tr>
<th>Animal Protein Source by Cause of Death</th>
<th>HR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All cause</td>
<td></td>
</tr>
<tr>
<td>Processed red meat</td>
<td>0.66 (0.59-0.75)</td>
</tr>
<tr>
<td>Unprocessed red meat</td>
<td>0.88 (0.84-0.92)</td>
</tr>
<tr>
<td>Poultry</td>
<td>0.94 (0.90-0.99)</td>
</tr>
<tr>
<td>Fish</td>
<td>0.94 (0.89-0.99)</td>
</tr>
<tr>
<td>Egg</td>
<td>0.81 (0.75-0.88)</td>
</tr>
<tr>
<td>Dairy</td>
<td>0.92 (0.87-0.96)</td>
</tr>
</tbody>
</table>

(Song M et al., JAMA Intern Med 2016)
Red and Processed Meat and Colorectal Cancer Incidence: Meta-Analysis of Prospective Studies

Doris S. M. Chan¹, Rosa Lau¹, Dagfinn Aune¹, Rui Vieira¹, Darren C. Greenwood², Ellen Kampman³, Teresa Norat¹*

¹ Department of Epidemiology and Biostatistics, School of Public Health, Imperial College London, London, United Kingdom, ² Biostatistics Unit, Centre for Epidemiology and Biostatistics, University of Leeds, Leeds, United Kingdom, ³ Division of Human Nutrition, Wageningen University, Wageningen, The Netherlands
Major Dietary Protein Sources and the Risk of Coronary Heart Disease in Women

Adam M. Bernstein, MD ScD, Qi Sun, MD ScD, Frank B. Hu, MD PhD, Meir J. Stampfer, MD DrPH, JoAnn E. Manson, MD DrPH, and Walter C. Willett, MD DrPH

Departments of Nutrition (AB, QS, FH, WW) and Epidemiology (FH, MS, JM, WW), Harvard School of Public Health; Channing Laboratory, Department of Medicine, Brigham and Women’s Hospital and Harvard Medical School (JM); Division of Preventive Medicine (MS, JM), Harvard Medical School

84,136 women followed 26 years
Poultry for red meat
Fish for red meat
Nuts for red meat
Beans for red meat
Macronutrient Composition of the Diet and Prospective Weight Change in Participants of the EPIC-PANACEA Study

Anne-Claire Vergnaud¹, Teresa Norat¹, Traci Mouw¹, Dora Romaguera¹, Anne M. May²,³, H. Bas Bueno-de-Mesquita³,⁴, Daphne van der A³, Antonio Agudo⁵, Nicholas Wareham⁶, Kay-Tee Khaw⁷, Isabelle Romieu⁸, Heinz Freising⁸, Nadia Slimani⁸, Florence Perquier⁹,¹⁰, Marie-Christine Boutron-Ruault⁹,¹⁰, Françoise Clavel-Chapelon⁹,¹⁰, Domenico Palli¹¹, Franco Berrino¹², Amalia Mattiello¹³, Rosario Tumino¹⁴, Fulvio Ricceri¹⁵, Laudina Rodríguez¹⁶, Esther Molina-Montes¹⁷,²⁰, Pilar Amiano¹⁸,²⁰, Aurelio Barricarte¹⁹,²⁰, Maria-Dolores Chirlaque²⁰,²¹, Francesca L. Crowe²², Philippos Orfanos²³,²⁴, Androniki Naska²³,²⁴, Antonia Trichopoulou²³,²⁴, Birgit Teucher²⁵, Rudolf Kaaks²⁵, Heiner Boeing²⁶, Brian Buijsse²⁶, Ingegerd Johansson²⁷, Göran Hallmans²⁸, Isabel Drake²⁹, Emily Sonestedt²⁹, Marianne Uhre Jakobsen³⁰, Kim Overvad³⁰,³¹, Anne Tjønneland³², Jytte Halkjær³², Guri Skeie³³, Tonje Braaten³³, Eiliv Lund³³, Elio Riboli¹, Petra H. M. Peeters¹,²

373,803 patients followed 5 years
<table>
<thead>
<tr>
<th>Percentage energy from protein</th>
<th>BMI &lt;25kg/m² at baseline N = 191,748</th>
<th>25≤ BMI &lt;30kg/m² at baseline N = 132,266</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>N overweight or obese (%)</td>
</tr>
<tr>
<td>≤14%</td>
<td>34,487 (18.0)</td>
<td>6,919 (20.1)</td>
</tr>
<tr>
<td>14.1–16%</td>
<td>48,529 (25.3)</td>
<td>9,877 (20.4)</td>
</tr>
<tr>
<td>16.1–18%</td>
<td>51,379 (26.8)</td>
<td>10,789 (21.0)</td>
</tr>
<tr>
<td>18.1–20%</td>
<td>34,092 (17.8)</td>
<td>7,809 (22.9)</td>
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<tr>
<td>20.1–22%</td>
<td>15,390 (8.0)</td>
<td>4,049 (26.3)</td>
</tr>
<tr>
<td>≥22%</td>
<td>7,871 (4.1)</td>
<td>2,299 (30.5)</td>
</tr>
</tbody>
</table>

P for trend <0.0001 <0.0001

Macronutrient Composition of the Diet and Prospective Weight Change in Participants of the EPIC-PANACEA Study
Protein’s Dream
Protein’s Reality (if sedentary):

BEFORE

AFTER
Protein: What to tell your patients

• Eat a moderate amount of protein (.8- 1.6 grams/kg)
• Spread the protein intake in chunks throughout the day
• Minimize meat
• Choose plant and fish sources
Those were the Macro and Micro basics- now for the Diet Deep Dive
Time and Quantity Restricted Diets

Intermittent Fasting
- Feasting days and Fasting days
- Most popular: 5 off/2 on
- Every other day (alternate day fasting)
- No caloric restriction on “off” days
- 0-500 calories on fasting days

Time Restricted Eating
- Short eating window (example: 10:00 AM - 6:00 PM)

Fasting Mimicking Diet
- Several days in a row with low caloric intake (500 calories)
Benefits of Time and Quantity Restricted Diets

• Improve insulin resistance
• Use up liver glycogen -> fat stores (gluconeogenesis)
• Improve sleep quality
• Promote autophagy
• Result in weight loss
• Increase longevity in animal models (mTOR, cAMP cell signaling)
Early Time-Restricted Feeding Improves Insulin Sensitivity, Blood Pressure, and Oxidative Stress Even Without Weight Loss in Men with Prediabetes

Elizabeth F. Sutton, PhD\textsuperscript{1}, Robbie Beyl, PhD\textsuperscript{1}, Kate S. Early, PhD\textsuperscript{2}, William T. Cefalu, MD\textsuperscript{1,3}, Eric Ravussin, PhD\textsuperscript{1}, and Courtney M. Peterson, PhD\textsuperscript{1,4,5}
\textsuperscript{1}Pennington Biomedical Research Center, Baton Rouge, LA, 70808, USA
\textsuperscript{2}Health, Physical Education, and Exercise Science, Columbus State University, Columbus, GA, 31907, USA
\textsuperscript{3}American Diabetes Association, Arlington, VA 22202, USA
\textsuperscript{4}Department of Nutrition Sciences, University of Alabama at Birmingham, Birmingham, AL, 35294, USA

8 participant, five-week, randomized, crossover, isocaloric and eucaloric controlled feeding trial testing eTRF in men with prediabetes
HIGHLIGHTS

• Early time-restricted feeding (eTRF) increases insulin sensitivity
• eTRF also improves β cell function and lowers blood pressure and oxidative stress
• eTRF lowers the desire to eat in the evening, which may facilitate weight loss
• Intermittent fasting can improve health even in the absence of weight loss
Consumption of Meals Prepared at Home and Risk of Type 2 Diabetes: An Analysis of Two Prospective Cohort Studies

Geng Zong¹, David M. Eisenberg¹, Frank B. Hu¹,²,³, Qi Sun¹,³*

¹ Department of Nutrition, Harvard T.H. Chan School of Public Health, Boston, Massachusetts, United States of America, ² Department of Epidemiology, Harvard T.H. Chan School of Public Health, Boston, Massachusetts, United States of America, ³ Channing Division of Network Medicine, Department of Medicine, Brigham and Women’s Hospital and Harvard Medical School, Boston, Massachusetts, United States of America
Consumption of Meals Prepared at Home

Hazard Ratio of Obesity

Meals prepared at home = Non-processed

Note to patients: more home cooked meals
Overall **food quality** is super important

- Nutrient-dense
- Minimally processed
Changes in Diet and Lifestyle and Long-Term Weight Gain in Women and Men

Dariush Mozaffarian, M.D., Dr.P.H., Tao Hao, M.P.H., Eric B. Rimm, Sc.D., Walter C. Willett, M.D., Dr.P.H., and Frank B. Hu, M.D., Ph.D.

120,877 U.S. women and men from the Nurses’ Health Study and the Health Professionals Study
Prospective observational study in 3 cohorts 1986-2006
73,710 women in NHS (Nurses’ Health Study) (1984 to 2012), 92,329 women in NHS2 (1991 to 2013), and 43,259 men in Health Professionals Follow-up Study (1986 to 2012)
Type of Food and Heart Disease Risk

![Graph showing the relationship between servings of different types of food and heart disease risk. The graph compares animal foods, less healthy plant foods, and healthy plant foods. The x-axis represents servings of food categories consumed per day, while the y-axis represents the HR for CHD. The graph shows that higher consumption of animal foods and less healthy plant foods is associated with increased heart disease risk, whereas higher consumption of healthy plant foods is associated with decreased risk.]
Vegetarian
Eat Food.
Not Too Much.
Mostly Plants.

#1 NEW YORK TIMES BESTSELLER

MICHAEL POLLAN

AUTHOR OF THE OMNIVORE'S DILEMMA

FOOD RULES
AN EATER'S MANUAL

As Seen On PBS
What is Food?*

**Food**
- Close to the Earth
- Ingredients you recognize
- Ingredients you can pronounce
- If it’s a plant, eat it

**Not Food**
- Highly processed
- Ingredients from chemistry lab
- Impossible pronunciation
- If it was manufactured in a plant, don’t

*According to Michael Pollan*
Dietary Food Pattern Considerations

• Sustainable over the long term
• Prevents disease
• Aligned with personal ethics
• Fits with heritage, nationality, or tradition
Dietary Food Patterns

- Keto (low carb)
  - Carnivore/Atkins
  - Eco Keto
- Vegan/vegetarian
- Paleo
- Mediterranean/DASH
- Many more variations
How do your patients define their diets?

Greek = Mediterranean = Eat more souvlaki & gyro?
Or eat like this?
<table>
<thead>
<tr>
<th>Category</th>
<th>Paleo</th>
<th>Wheat Belly</th>
<th>China Study</th>
<th>DASH</th>
<th>Low Fat</th>
<th>Low Carb</th>
<th>Mediterranean</th>
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<td>Lean red meat</td>
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<td>Fatty red meat</td>
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<td>Full-fat dairy</td>
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<td>Non-starchy vegetables</td>
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<td>Fruits</td>
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<td>Refined grains</td>
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<td>Salt</td>
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<td>Vegetable oils</td>
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<td>Alcohol</td>
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</tbody>
</table>
Vegetarian & Vegan Diet Pyramid

Options For Vegetarians:
- Eggs and/or Dairy including Yogurt, Cheese, Cottage Cheese

Drink Water

Eat these foods every day
- Herbs, Spices, Plant Oils
- Nuts, Peanuts, Seeds, Peanut/Nut Butters
- Beans, Peas, Lentils, Soy
- Whole Grains including Rice, Barley, Millet, Oats, Quinoa, Bread, Cereal, Pasta
- Fruits and Vegetables
PALEO DIET FOOD LIST
YES, NO & MAYBE OPTIONS
Dietary Restriction = Weight Loss

Low Carb vs. Low Fat

- Fewer carbs
  - Fish and seafood
  - Natural fats (butter, olive oil etc.)
  - Meat
  - Eggs
- More carbs
  - Cheese
  - Vegetables that grow above ground

Weight Loss with a Low-Carbohydrate, Mediterranean, or Low-Fat Diet


for the Dietary Intervention Randomized Controlled Trial (DIRECT) Group

322 moderately obese patients, 2 year follow up
Low fat and Med:
1500 cal for women
1800 cal for men

Low fat: up to 30% fat
Med: up to 35% fat
(olive oil and nuts/seeds)

Low carb: no caloric restriction, but recommended plant-based protein sources
The Three-Month Effects of a Ketogenic Diet on Body Composition, Blood Parameters, and Performance Metrics in CrossFit Trainees: A Pilot Study

Wesley C. Kephart 1,2,†, Coree D. Pledge 3, Paul A. Roberson 1, Petey W. Mumford 1, Matthew A. Romero 1, Christopher B. Mobley 1, Jeffrey S. Martin 1,4, Kaelin C. Young 1,4, Ryan D. Lowery 5, Jacob M. Wilson 5, Kevin W. Huggins 3 and Michael D. Roberts 1,4,*†

12 participants, 12 weeks
No plant-based recommendation

*Corresponding author.
†These authors contributed equally to this work.
Changes in LDL in 12 weeks

Vegetarian Dietary Patterns and Mortality in Adventist Health Study 2

Dr. Michael J. Orlich, MD, Dr. Pramil N Singh, DrPH, Dr. Joan Sabaté, MD, DrPH, Dr. Karen Jaceldo-Siegl, DrPH, Ms. Jing Fan, MS, Dr. Synnove Knutsen, MD, PhD, Dr. W. Lawrence Beeson, DrPH, and Dr. Gary E. Fraser, MBchB, PhD

Schools of Public Health (Drs Orlich, Singh, Sabaté, Jaceldo-Siegl, Knutsen, Beeson, and Fraser, and Ms Fan) and Medicine (Drs Sabaté, Jaceldo-Siegl, Knutsen, and Fraser), Loma Linda University, Loma Linda, California

73,308 patients followed 4.79 years
### Table 4. Associations of Dietary Patterns With All-Cause and Cause-Specific Mortality From a Cox Proportional Hazards Regression Model Among Participants in the Adventist Health Study 2, 2002-2009

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>All-Cause</th>
<th>Ischemic Heart Disease</th>
<th>Cardiovascular Disease</th>
<th>Cancer</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>All (N = 73 308), No. of deaths&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>2560</td>
<td>372</td>
<td>987</td>
<td>706</td>
<td>867</td>
</tr>
<tr>
<td>Vegetarian</td>
<td></td>
<td></td>
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<tr>
<td>Vegan</td>
<td>0.85 (0.73-1.01)</td>
<td>0.90 (0.60-1.33)</td>
<td>0.91 (0.71-1.16)</td>
<td>0.92 (0.68-1.24)</td>
<td>0.74 (0.56-0.99)</td>
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<tr>
<td>Lacto-ovo</td>
<td>0.91 (0.82-1.00)</td>
<td>0.82 (0.62-1.06)</td>
<td>0.90 (0.76-1.06)</td>
<td>0.90 (0.75-1.09)</td>
<td>0.91 (0.77-1.07)</td>
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<tr>
<td>Pesco</td>
<td>0.81 (0.69-0.94)</td>
<td>0.65 (0.43-0.97)</td>
<td>0.80 (0.62-1.03)</td>
<td>0.94 (0.72-1.22)</td>
<td>0.71 (0.54-0.94)</td>
</tr>
<tr>
<td>Semi</td>
<td>0.92 (0.75-1.13)</td>
<td>0.92 (0.57-1.51)</td>
<td>0.85 (0.63-1.16)</td>
<td>0.94 (0.66-1.35)</td>
<td>0.99 (0.72-1.36)</td>
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</tbody>
</table>

<sup>a</sup> Adjusted for sex, age at cohort entry, educational level, marital status, smoking status, alcohol consumption, scores on the California Personality Inventory, physical activity, body mass index, prevalent chronic conditions, and 25(OH)D concentrations. 
<sup>b</sup> Excluding deaths due to accidents and violence.
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</table>
Accumulated Evidence on Fish Consumption and Coronary Heart Disease Mortality
A Meta-Analysis of Cohort Studies

Ka He, MD, ScD; Yiqing Song, MD; Martha L. Daviglus, MD, PhD; Kiang Liu, PhD;
Linda Van Horn, PhD; Alan R. Dyer, PhD; Philip Greenland, MD

222,364 patients over 11.8 years
Fish Intake and Fatal CHD Risk

$P$ for trend = 0.03

Circulation. 2004;109:2705-2711
Dietary carbohydrate intake and mortality: a prospective cohort study and meta-analysis


15,428 patients followed over 25 years
Overall p<0.0001
Non-linearity p=0.0001
<table>
<thead>
<tr>
<th>Substitution of carbohydrate for animal protein and fat</th>
<th>Study</th>
<th>HR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-to-moderate carbohydrate consumption</td>
<td>Fung et al&lt;sup&gt;p&lt;/sup&gt; (HPFS)</td>
<td>1·31 (1·19–1·44)</td>
</tr>
<tr>
<td>Low-to-moderate carbohydrate consumption</td>
<td>Fung et al&lt;sup&gt;p&lt;/sup&gt; (NHS)</td>
<td>1·17 (1·08–1·26)</td>
</tr>
<tr>
<td>Low-to-moderate carbohydrate consumption</td>
<td>ARIC</td>
<td>1·20 (1·09–1·32)</td>
</tr>
<tr>
<td>Low-to-moderate carbohydrate consumption</td>
<td>Combined low-to-moderate cohorts</td>
<td>1·22 (1·14–1·31)</td>
</tr>
<tr>
<td>Moderate-to-high carbohydrate consumption</td>
<td>Nakamura et al&lt;sup&gt;24&lt;/sup&gt;</td>
<td>1·00 (0·87–1·19)</td>
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<tr>
<td>Meta-analysis (pooled result)</td>
<td></td>
<td>1·18 (1·08–1·29); p&lt;0·0001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Substitution of carbohydrate for plant protein and fat</th>
<th>Study</th>
<th>HR (95% CI)</th>
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</thead>
<tbody>
<tr>
<td>Low-to-moderate carbohydrate consumption</td>
<td>Fung et al&lt;sup&gt;p&lt;/sup&gt; (HPFS)</td>
<td>0·81 (0·74–0·89)</td>
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<tr>
<td>Low-to-moderate carbohydrate consumption</td>
<td>Fung et al&lt;sup&gt;p&lt;/sup&gt; (NHS)</td>
<td>0·79 (0·73–0·85)</td>
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<tr>
<td>Low-to-moderate carbohydrate consumption</td>
<td>ARIC</td>
<td>0·86 (0·75–0·99)</td>
</tr>
<tr>
<td>Low-to-moderate carbohydrate consumption</td>
<td>Combined low-to-moderate cohorts</td>
<td>0·81 (0·76–0·85)</td>
</tr>
<tr>
<td>Moderate-to-high carbohydrate consumption</td>
<td>Nakamura et al&lt;sup&gt;24&lt;/sup&gt;</td>
<td>0·92 (0·80–1·09)</td>
</tr>
<tr>
<td>Meta-analysis (pooled result)</td>
<td></td>
<td>0·82 (0·78–0·87); p&lt;0·0001</td>
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</tbody>
</table>

Exchange **ANIMAL** protein and fat for carbohydrate, death rate goes **UP**

Exchange **PLANT** protein and fat for carbohydrate, death rate goes **DOWN**
“Both high and low percentages of carbohydrate diets were associated with increased mortality, with minimal risk observed at 50–55% carbohydrate intake. Low carbohydrate dietary patterns favouring animal-derived protein and fat sources, from sources such as lamb, beef, pork, and chicken, were associated with higher mortality, whereas those that favoured plant-derived protein and fat intake, from sources such as vegetables, nuts, peanut butter, and whole-grain breads, were associated with lower mortality, suggesting that the source of food notably modifies the association between carbohydrate intake and mortality.”
Primary Prevention of Cardiovascular Disease with a Mediterranean Diet

Ramón Estruch, M.D., Ph.D., Emilio Ros, M.D., Ph.D., Jordi Salas-Salvadó, M.D., Ph.D., Maria-Isabel Covas, D.Pharm., Ph.D., Dolores Corella, D.Pharm., Ph.D., Fernando Arós, M.D., Ph.D., Enrique Gómez-Gracia, M.D., Ph.D., Valentina Ruiz-Gutierrez, Ph.D., Miquel Fiol, M.D., Ph.D., José Lapetra, M.D., Ph.D., Rosa Maria Lamuela-Raventos, D.Pharm., Ph.D., Lluís Serra-Majem, M.D., Ph.D., Xavier Pintó, M.D., Ph.D., Josep Basora, M.D., Ph.D., Miguel Angel Munoz, M.D., Ph.D., José V. Sorlí, M.D., Ph.D., José Alfredo Martinez, D.Pharm, M.D., Ph.D., and Miguel Angel Martinez-Gonzalez, M.D., Ph.D., for the PREIDEMED Study Investigators*

7,447 patients, trial stopped early at 4.8 years
A Primary End Point (acute myocardial infarction, stroke, or death from cardiovascular causes)

Med diet, EVOO: hazard ratio, 0.70 (95% CI, 0.53–0.91); P=0.009
Med diet, nuts: hazard ratio, 0.70 (95% CI, 0.53–0.94); P=0.02
It’s Not All Or Nothing!

What do you mean he don’t eat no meat?
A provegetarian food pattern and reduction in total mortality in the Prevención con Dieta Mediterránea (PREDIMED) study\textsuperscript{1–4}

Miguel A Martínez-González, Ana Sánchez-Tainta, Dolores Corella, Jordi Salas-Salvadó, Emilio Ros, Fernando Arós, Enrique Gómez-Gracia, Miquel Fiol, Rosa M Lamuela-Raventós, Helmut Schröder, Jose Lapetra, Lluís Serra-Majem, Xavier Pinto, Valentina Ruiz-Gutierrez, and Ramon Estruch for the PREDIMED Group

• 373,803 patients followed 5 years
**FIGURE 1.** Absolute risk of death across baseline quintiles of the pro-vegetarian food pattern: the Prevención con Dieta Mediterránea trial, 2003–2010. Quintile score limits were as follows for quintiles 1–5: <33, 33–35, 36–37, 38–40, >40, respectively.
74,886 patients followed over 20 years
IT’S NOT TOO LATE!
Lyon Heart Study:
605 patients enrolled in a rolling fashion 1988-1992, stopped early in 1993

Mediterranean Diet, Traditional Risk Factors, and the Rate of Cardiovascular Complications After Myocardial Infarction: Final Report of the Lyon Diet Heart Study
Michel de Lorgeril, Patricia Salen, Jean-Louis Martin, Isabelle Monjaud, Jacques Delaye and Nicole Mamelle

Circulation. 1999;99:779-785
Survival With Mediterranean Diet after MI

Figure 3. Cumulative survival without nonfatal infarction, without major secondary end points, and without minor secondary end points (CO 3).
Effect of an Indo-Mediterranean diet on progression of coronary artery disease in high risk patients (Indo-Mediterranean Diet Heart Study): a randomised single-blind trial

Ram B Singh, Gal Dubnov, Mohammad A Niaz, Saraswati Ghosh, Reema Singh, Shanti S Rastogi, Orly Manor, Daniel Pella, Elliot M Berry

1000 patients followed for 2 years
Singh RB et al, Indo-Mediterranean DietHeart Study, 2002

**Figure 2: Kaplan-Meier cumulative event curves**
Proportion of patients with fatal myocardial infarction, non-fatal myocardial infarction, or sudden cardiac death.

<table>
<thead>
<tr>
<th>Numbers at risk</th>
<th>Weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention group</td>
<td>499 490 482 471 456 450</td>
</tr>
<tr>
<td>Control group</td>
<td>501 478 457 437 414 419</td>
</tr>
</tbody>
</table>
• **MAXIMIZE:**
  - Eating “close to the ground”
  - Heart healthy fats (nuts, seeds, olive oil, avocado, fatty fish)
  - Plant-based sources of protein
  - Treating meat as a treat/side-dish
  - Whole grains, legumes
  - Eating “the rainbow”

• **MINIMIZE:**
  - Processed foods
  - Saturated fats
  - Animal protein (especially red and processed meat)
  - Sugar sweetened beverages
  - Refined carbohydrates
  - Eating “beige food”
WHOLE FOOD, PLANT-STRONG DIET!
Eat Food.
Not Too Much.
Mostly Plants.
Case Study

- N.J., 49 yo AA female
- 5’7”, 265 lbs
- Past Medical History
  - Bilateral PEs
  - Anemia (heavy menses)
  - DVTs flight from Florida
  - HTN
  - Diabetes
  - Hypercholesterolemia
  - Meniscus (right)
  - Fibroids
  - Cold sore x 20 years
  - Varicella

Exam: visceral adiposity, acanthosis nigricans, MSQ 69

MEDICATIONS/SUPPLEMENTS

- Diltiazem - 120mg ER (once a day)
- Losartan 100mg/HCTZ 25mg (once a day)
- Eliquis 2.5 mg (twice day)
- MVI
- Vitamin D 10,000 ius
- Lysine 500 mg qday
- Probiotic

*Did not want pharmaceutical intervention*

Labs 12/21/2021:

- Chol 251
- LDL 161
- HDL 68
- Trig 102
- Fasting glucose 127
- ALT 39
- HgbA1C 6.0
Hunger: Very
Thoughts After Eating: Not the best meal option and I need to eat more veggies.
Category: Meal

Hunger: Very
Thoughts After Eating: felt full but wondered how long I would stay full after the meal.
Category: Meal

Hunger: Very
Thoughts After Eating: felt satisfied but started to crave wanting something sweet.
Category: Meal

Hunger: Very
Thoughts After Eating: I know that it was a quick option because I did not have anything ready that I really wanted to eat. Felt disappointed.
Category: Meal
<table>
<thead>
<tr>
<th>Dietary and Exercise Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole food, plant-predominant diet</td>
</tr>
<tr>
<td>Minimize fast food</td>
</tr>
<tr>
<td>Meal prep on Sundays</td>
</tr>
<tr>
<td>2 days/week Pilates</td>
</tr>
<tr>
<td>1 day a week of 30 minutes aerobic activity</td>
</tr>
<tr>
<td>Post daily food pics</td>
</tr>
<tr>
<td>Time restricted eating 11:30 AM - 7:00 PM</td>
</tr>
</tbody>
</table>
Thoughts After Eating: Meal was good but think I should add more veggies next time
Category: Meal

- Salmon nuggets, onions and spinach. Felt full after.
  Jan 8, 3:00 pm

@Katerina – This is outstanding! Yes, feel free to add more veggies!!!
  Jan 8, 3:48 pm
Thoughts After Eating: Felt full but not overly full. No other immediate thoughts.

Category: Meal

Roasted Broccoli and Wild Rice. I added a little low sodium soy sauce yo amp up the taste a bit.

Jan 14, 11:50 am

Katerina – Other ways to amp up the taste: black pepper, turmeric, mustard seed powder, and garlic powder

Jan 14, 3:29 pm
Thoughts After Eating: Waited too long to eat due to several back to back meetings at work. Glad I had everything already in the fridge so I could assemble a quick meal.

Category: Meal

[Image] - Brown tomato rice, spinach and chickpeas on a chickpea tortilla
Bean chili with tofu crumbs, roasted kale and onions and brown rice

Katerina – When something tastes so-so I usually add garlic powder! 😊

Great idea! Will try adding...
Thoughts After Eating: Started to get hungry about an hour after the beans. I'm now full. I felt like I had enough variety today with meals.

Category: Meal

[Name] – Sardines boneless and skinless in EVOO. Spinach salad with crispy onions and radish roots with lemons turmeric dressing.
Jan 11, 6:34 pm

Katerina – This is incredible! Your food variety and quality has SOARED in the last week!
Jan 12, 2:10 pm
Thoughts After Eating: Grabbed a palm full of nuts to eat until I can eat later. Due to today being a day full of back to back meetings, I had to delay eating after I ate the oatmeal earlier today.
Weight

![Weight Graph]

- The graph shows the weight changes over time.
- The weight decreases significantly from January to August.
- There is a slight increase in weight from September to October.
- The weight stabilizes from October onwards.
Waist Circumference
<table>
<thead>
<tr>
<th>Date</th>
<th>Cholesterol</th>
<th>LDL</th>
<th>HDL</th>
<th>Triglycerides</th>
<th>Fasting Glucose</th>
<th>ALT</th>
<th>HgbA1C</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/21/2021</td>
<td>251</td>
<td>161</td>
<td>68</td>
<td>102</td>
<td>127</td>
<td>39</td>
<td>6.0</td>
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<tr>
<td>9/23/2023</td>
<td>196</td>
<td>106</td>
<td>74</td>
<td>70</td>
<td>106</td>
<td>15</td>
<td>5.1</td>
</tr>
</tbody>
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Diet and Lifestyle changes only
No statins/metformin
EXAM

• Noticeably thinner
• Gained 1 \( \frac{3}{4} \) inches in height!
• Acanthosis nigricans gone
• MSQ 69 -> 5
Personally: I Practiced what I Preached
From this…

To this

"Our food should be our medicine and our medicine should be our food."

~ Hippocrates

Someone once told me that doctors know only how to cure not prevent. And also they only can make money if you are sick not healthy!!

My sister is a physician, and she shared with me that doctors receive training on diseases, tests, equipment, treatments, the systems of the body, surgery, etc... but nutrition is a few hours in one class. It is not that doctors are evil; it is just not the current focus of their medical training. It is going against all their training and knowledge of "best practice" to vary from current treatment protocols. She also said, though, who can argue with healthy eating?
Physician Heal Thyself

Let Food Be Thy Medicine

Get Thee To a Farmacy!
Thank You!

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