A Holistic Approach to Weight Loss and Better Health

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September 23, 2018
Four Part Series

- Week 1: Insulin and Inflammation
- Week 2: Leaky Gut and the Gut Biome
- Week 3: Sleep and Circadian Rhythms
- Week 4: Stress Response- Hypnosis Experience
Prevailing View

Obesity occurs when a person consumes more calories from food than he or she burns.

*National Institute of Health*

Overweight is the result of caloric imbalance (too few calories expended for the amount of calories consumed) and is mediated by genetics and health.

*US Surgeon General*
Emerging View

• A calorie is not a calorie
• Macronutrients i.e., carbs, fats and protein, elicit different metabolic effects (food as information)
• Quality of macronutrients e.g. sugar and refinement of grains will substantially impact metabolic effects
• Quality of calories more important (and interesting) than quantity of calories
• Quality fat sources less harmful than thought
• Poor-quality carbs more harmful than thought
“It’s not what we don’t know that gets us into trouble. It’s what we know that ain’t so.”

Will Rogers

So what do we know that ain’t so?

There’s not much I can do about my DNA!
The Origins of Health
Systems Biology

Disease (how things appear)
Pre-diabetes, Diabetes, **Weight**, HBP, Lipids, Heart Disease, Stroke, Depression, Autoimmunity, Arthritis, Alzheimer’s, Cancer, Fibromyalgia, Chronic fatigue

Core Metabolic Imbalances (what drives them)

*Inflammation*

*Insulin Resistance*
Gut-Barrier Function/Microbiome
Circadian Entrainment
Stress Response

Root Causes (what are their origins)
Environment+Epigenome/genes+Microbiome
Nutrition  Movement  Stress Response  Environmental toxins
Sleep  Social Connection  Trauma  Conflict Management
Forgiveness  Mindfulness  Spirituality-Meaning  Medications
Light quality-entrainment
Social Determinants
Is the choice I am about to make familiar with what my stone-age roots would recognize?
Weight
Inflammation
Insulin Resistance

Lifestyle-Environmental Inputs

- Nutrition
- Movement
- Stress Response
- Sleep Hygiene
- Social Connection
- Meaning in work, love, play
- Environmental Toxins
- Full-spectrum light deprivation
Food and Inflammation
How much sugar is in the human body?

Glucose level = 100 mg/dL

5 liters of blood in the body
4 g/tsp sugar so 5-7g = “heaping spoonful”

100 mg
10 dL
1 gram

5 L blood = 5 grams
The Rise of Commercially Prepared Food

Percent of total food spending

USDA Economic Research Service
Availability of vegetable oil and fish in the USA

Where we get our Omega-6

- Vegetable Seed Oils: 70%
- Shortening
- Margarine
- Other Misc. (10%)
- Chicken: 13%
- Nuts: 6%
- Eggs: 1%

Availability in pounds per person

Year:
- 1908
- 1914
- 1919
- 1924
- 1929
- 1934
- 1939
- 1944
- 1949
- 1954
- 1959
- 1964
- 1969
- 1974
- 1979
- 1984
- 1989
- 1994
- 1999
- 2004
- 2009

Graph showing increasing availability from 1908 to 2009:
- Purple line: Vegetable oils
- Orange line: Fish and shellfish
Lipolysis vs. Lipogenesis

- LOW levels of insulin promote fat breakdown for energy generation: This is what we want
- HIGH levels of insulin promote fat storage and carbohydrate breakdown: This is not what we want
Comparison with ancestral diets suggests dense acellular carbohydrates promote an inflammatory microbiota, and may be the primary dietary cause of leptin resistance and obesity.

Abstract: A novel hypothesis of obesity is suggested by consideration of diet-related inflammation and evolutionary medicine. The obese homeostatically guard their elevated weight. In rodent models of high-fat diet-induced obesity, leptin resistance is seen initially at vagal afferents, blunting the actions of satiety mediators, then centrally, with gastrointestinal bacterial-triggered SOCS3 signaling implicated. In humans, dietary fat and fructose elevate systemic lipopolysaccharide, while dietary glucose also strongly activates SOCS3 signaling. Crucially however, in humans, low-carbohydrate diets spontaneously decrease weight in a way that low-fat diets do not. Furthermore, nutrition transition patterns and the health of those still eating diverse ancestral diets with abundant food suggest that neither glycemic index, altered fat,
Reduce carbohydrate-dense foods

- Major contributor of obesity, insulin resistance, changes in blood lipids, inflammation, and alterations of the organisms in the human microbiome
- A huge area of opportunity in individuals with increased belly fat, pre-diabetes or diabetes...these are health features of carbohydrate intolerance.
- For most, sugar and refined, grain-based foods are problematic: eliminate and observe.
Sugar, Fructose and Carbohydrate-Dense Grains

- Inflammation
- Altered neurotransmitters
- Insulin Resistance
- Weight and Metabolism
- Mitochondria-Oxidative stress
- HPA axis – Stress Response

High-Quality Plant-Based Carbs

Protection from:
- Inflammation
- Diabetes
- Cancer
- Obesity
Poor Quality Carbs
Acellular carbohydrate density

Excess Insulin

VAT Fat storage-
lipogenesis

Down-regulation of insulin receptors

Insulin Resistance

Leptin resistance

Eat more and do less

Inflammation

- Stress
- Sleep disruption
- *Altered gut-permeability/microbiome*
- Social isolation
- Toxin excess
- Sedentary states
- VAT
Will the choice I am about to make...

• Raise my sugar-insulin or lower my sugar-insulin?

• Rev up my immune system or relax my immune system?

• Raise my stress levels (cortisol) or lower my stress levels (cortisol)

• Be compatible with my ancestral roots?
“Are we fat because we eat too much or do we eat too much because we are fat?”

By DAVID S. LUDWIG and MARK I. FRIEDMAN

The New York Times Bestseller

Always Hungry?
Conquer Cravings, Retrain Your Fat Cells & Lose Weight Permanently

David Ludwig, MD, PhD

“A brilliant book that shatters every myth about weight loss. Read it to end your struggles with weight once and for all.”—Mark Hyman, MD, #1 New York Times bestselling author of The Blood Sugar Solution
From: Increasing Adiposity: Consequence or Cause of Overeating?


A  Prevailing model

Environment of convenient, highly palatable, energy-dense food

Energy intake

↑ Energy expenditure

Circulating metabolic fuels (glucose, lipids, ketones)

↑ Fat storage

Obesity

B  Alternative model

Diet quality, especially carbohydrate amount and type

↑ Fat storage

Circulating metabolic fuels (glucose, lipids, ketones)

↑ Energy intake

↑ Hunger

Energy expenditure

↓ Basal metabolism
↓ Muscular efficiency
↓ Physical activity

Obesity
Five hour rule after eating a meal

• Am I hungry again within a few hours?
• Am I tired and ready for a nap?
• Does my mind feel sharp, attentive and focused?
• Am I experiencing bloating, gas, cramping?

...if the answer to any of these questions is consistently “yes” then there are significant problems with what you are eating!
A calorie is not a calorie...

• Effects of Dietary Composition on Energy Expenditure During Weight-Loss Maintenance
  • Cara B. Ebbeling, PhD; David S. Ludwig, MD, PhD et al

  • Conclusion: Among overweight and obese young adults compared with pre–weight-loss energy expenditure, isocaloric feeding following 10% to 15% weight loss resulted in decreases in REE and TEE that were greatest with the low-fat diet, intermediate with the low–glycemic index diet, and least with the very low-carbohydrate diet.

• Remarkable range between individuals
  • TEE: - 423 [–606 to –239] kcal/d for low fat diet
  • - 57 [–281 to 86] kcal/d for low carb diet
  • Equivalent of 1-hr moderate effort cardio difference

Time-Restricted Eating (TRE)

- Time restricted feeding e.g. consume all food within 10-hour
- Decreases in body weight and visceral fat
- Significant reductions in breast cancer recurrence and improved prognosis (Patterson et al. UCSD)
- Improved cardiovascular disease risk profile
- Decreased inflammation (Biogerontology. 2015 Dec;16(6):775-88)
- Decreased neuroinflammation (Neurobiol Aging. 2015 May;36(5):1914-23)
Food and Reward
Two Reactions to Cake

Lunch is over and you feel full. At the sight of dessert, ‘homeostatic’ eaters say, no thanks. But ‘hedonic’ eaters don’t listen to the body’s built-in mechanism that regulates hunger. They’re more likely to be obese.

**Parts of the brain**
- Prefrontal Cortex
- Hypothalamus
- Amygdala
- Hippocampus

**Eating for Survival**
The ‘homeostatic system’

When food reaches the stomach and intestines, chemical messengers slow down digestion and signal to the brain to stop eating. Seeing cake isn’t as tempting.

The hormone leptin also tells the brain to stop eating, but in obese people, the brain stops responding to it.

**Eating for Pleasure**
The ‘hedonic system’

Seeing, smelling, and even hearing the word ‘cake’ activate areas of the brain involved in reward, emotion, memory and thinking, triggering the release of dopamine, the brain’s ‘pleasure chemical.’

Brain scans show that obese people have stronger reactions to images of food than non-obese people.

Jabr F, *SA Mind* December 2015
Low Carb-High Fat Fears

- Saturated fats
- Cholesterol
- My brain needs carbs
- Low-carb is bad for the environment
- Too much protein
- Not enough vitamins and minerals

- Thyroid function
- Kidney damage
- Changes in mood
- Hard to exercise
- Changes to the gut flora
- Constipation
Dyslipidemia: Triglycerides

Most reliable response to carbohydrate restriction

A

\[ \Delta \text{Triglycerides (mg/dL)} \]

CRD

LFD

-51%

-19%

Dyslipidemia: HDL-C

- More effective than other lifestyle changes (exercise, smoking cessation, weight loss, n-3 PUFA)
- Not dependent on starting levels
- Stronger effect in women
- Dependent on the cholesterol content of diet

Low carbohydrate diets consistently increase LDL particle size.
If you have HBP and Diabetes

- Lightheadedness may be a sign of a drop in BP; bone broth, bouillon, and may need to reduce medications
- For symptoms of hypoglycemia e.g. sweating, palpitations, lethargy it is important to self-monitor BS as medications for diabetes frequently need to be reduced
- Wellness staff can assist with BP readings and BS results
Eat All You Like

- **Meat:** Any type, including beef, pork, game meat, chicken, etc. Feel free to eat the fat on the meat as well as the skin on the chicken. If possible try to choose organic or grass fed meat.

- **Fish and shellfish:** All kinds: Fatty fish such as salmon, mackerel or herring are great. Avoid breading.

- **Eggs:** All kinds: Boiled, fried, omelettes, etc. Preferably organic eggs.

- **Natural fat, high-fat sauces:** Using butter and cream for cooking can make your food taste better and make you feel more satiated. Try a Béarnaise or Hollandaise sauce, check the ingredients or make it yourself. Coconut oil and olive oil are also good options.

- **Vegetables that grow above ground:** All kinds of cabbage, such as cauliflower, broccoli, cabbage and Brussels sprouts. Asparagus, zucchini, eggplant, olives, spinach, mushrooms, cucumber, lettuce, avocado, onions, peppers, tomatoes etc. [Learn more]

- **Dairy products:** Always select full-fat options like real butter, cream (40% fat), sour cream, Greek/Turkish yogurt and high-fat cheeses. Be careful with regular milk and skim milk as they contain a lot of milk sugar. Avoid flavored, sugary and low-fat products.

- **Nuts:** Great for a TV treat instead of candy (ideally in moderation). [Learn more]

- **Berries:** Okay in moderation, if you are not a super strict or sensitive. Great with whipped cream.
More quality fat sources

- Pasture-raised eggs
- Fatty fish e.g. salmon, sardines, anchovies, mackerel, trout
- Grass-fed butter
- Whole fat dairy, yogurt
- Extra virgin olive oil
- Extra virgin coconut oil
- Avocados, olives
- Nuts - almonds, macadamia, walnuts
www.dietdoctor.com

Low Carb Made Simple

Start here>
2. Avoid sugar and starch
Here’s what you should not eat on low carb – foods full of sugar and starch:

- Potatoes: 17
- Pasta, cooked: 29
- Rice, cooked: 28
- Beer: 13 (per 12 oz - 33 cl)
- Soda / Juice: 52 (per 16 oz - 50 cl)
- Chocolate bar: 60
- Donut: 49
- Candy: 70

Less carbs → More carbs
6 possible symptoms when starting a LCHF program

- Flu-like symptoms
- Frequent urination
- Leg cramps
- Constipation
- Bad breath
- Reduced tolerance to alcohol
Precautionary steps

- Lots of water (tsp salt/8oz) or bone broth, bouillon
- Make sure you’re getting enough fat with each meal
- Magnesium supplements: 2/day for 3 weeks, then 1/day thereafter (bedtime is a good time)
- Miralax each day for constipation
- Good oral hygiene; breath mints
- Moderate alcohol e.g. 1 drink/day max
Summary: Enhancing metabolic efficiency:

…. Reduce inflammation, insulin and leptin resistance

- Eliminate – reduce sugar in all its forms
- Eliminate-reduce refined grain flours, and carbohydrate-dense processed foods.
- Reduce hydrogenated oils and processed seed oils cooked at high temperatures
- More abundant healthy fats sources e.g. extra virgin olive oil, fatty fish, grass-fed butter; eggs; extra virgin coconut oil (MCT Oil); pasture-raised animal fat, ghee, avocados, nuts (almonds, walnuts and macadamia) and nut butters
- Time-restricted eating….all consumption within a 10-12-hour window e.g. nothing after 7p
Summary: Enhancing metabolic efficiency

.... Reduce inflammation, insulin and leptin resistance

- OK to consume pasture-raised meats and eggs
- Motion is the lotion: Walk as much as possible, stairs as tolerated, stand for 2-3” every hour
- Stress management
- Circadian rhythm – sleep entrainment; sleep hygiene
- Full spectrum light; light box
Continuous Self-Improvement PDSA Cycle

- Reduce sweetened soft drinks by 1/day
- Take 2,000 more steps/day

- Measure waist circumference
- Measure weight
- Monitor BP changes

- Lose 10 lbs
- Improve my BP
- Take 1 – less medication

- Cut out 2 portions of sugar/flour
- Eat 2 more servings of greens/day
- Add 1 more healthy fat source

ACT
Make another small change

PLAN
Plan your small change

STUDY
What impact did this small change have?

DO
Implement this small change
Continuous Self-Improvement  PDSA Virtuous Cycle

- Consider Light Box
- Change CFUs to warm LEDS

- 30-60” full-spectrum light each day
- Reduce Blue light at night

- Journal response to stressors for 10” at end of day

- Walk outdoors
- Sit-lunch outside
- Sit near windows
- Screen filters
- Incandescent bulb in family room/bedroom
Thank You !
Circadian Entrainment

- Sleep hygiene basics
- 30-60” full spectrum lighting/day
- Vitamin D as a nuclear transcription factor
- Blue light during the day is important
- Evening light: Incandescent 2700k, Halogen 3,000k, warm LED on dimmer
- Blue light filters 2-3 hrs before bedtime
- Blue blocker glasses 2-3 hrs before bedtime
- Time Restricted Feeding: 10-hr window a powerful intervention; nothing to eat 2-3 hrs prior to bedtime.

Satchin Panda, PhD  The Circadian Code

Effectiveness and Safety of a Novel Care Model for the Management of Type 2 Diabetes at 1 Year: An Open-Label, Non-Randomized, Controlled Study

- N=262, Type 2 diabetes, BMI 40.4, Caucasian
- Ketogenic diet taught through classes or web-based program
- Goal: nutritional ketosis for 1 year
- Blood ketones, body weight, “app”
- HbgA1c reduced from 7.6% to 6.3%
- Body weight change: - 14 kg
- Insulin therapy was reduced or eliminated in 94% of the 78 subjects on insulin

Effect of Low-Fat vs Low-Carbohydrate Diet on 12-Month Weight Loss in Overweight Adults and the Association With Genotype Pattern or Insulin Secretion

The DIETFITS Randomized Clinical Trial

- BMI 33, 60% Caucasian, 20% Hispanic
- Diabetes excluded
- Weight change over 12 months
  - Low Fat: -5.3 kg
  - Low Carb: -6.0 kg
- “Low carb” defined as 30% daily caloric intake (90-120 grams of carbohydrate per day)
- Not a “keto” study
### Table 2. Dietary Intake by Time Point

<table>
<thead>
<tr>
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<th>Healthy Low-Fat Diet</th>
<th>Healthy Low-Carbohydrate Diet</th>
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<tbody>
<tr>
<td></td>
<td>No. of Participants</td>
<td>Mean (SD)</td>
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<tr>
<td>Total Energy Intake, kcal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>304</td>
<td>2148.1 (39.4)</td>
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<tr>
<td>3 mo</td>
<td>274</td>
<td>1515.0 (27.7)</td>
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<tr>
<td>6 mo</td>
<td>240</td>
<td>1624.4 (37.3)</td>
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<tr>
<td>12 mo</td>
<td>225</td>
<td>1716.1 (34.5)</td>
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<tr>
<td>Carbohydrates, g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>304</td>
<td>241.8 (5.0)</td>
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<tr>
<td>3 mo</td>
<td>274</td>
<td>205.2 (4.3)</td>
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<td>6 mo</td>
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<td>211.2 (5.3)</td>
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<td>12 mo</td>
<td>225</td>
<td>212.9 (5.0)</td>
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<td>Carbohydrates, % kcal</td>
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<tr>
<td>Baseline</td>
<td>304</td>
<td>44.5 (0.5)</td>
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<td>274</td>
<td>52.6 (0.6)</td>
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<td>6 mo</td>
<td>240</td>
<td>50.8 (0.7)</td>
</tr>
<tr>
<td>12 mo</td>
<td>225</td>
<td>48.4 (0.7)</td>
</tr>
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</table>
The DIETFITS Randomized Clinical Trial

- Briefly, the main goals were to achieve maximal differentiation in intake of fats and carbohydrates between the 2 diet groups while otherwise maintaining equal intensity and an emphasis on high-quality foods and beverages. Thus, participants were instructed to reduce intake of total fat or digestible carbohydrates to 20 g/d during the first 8 weeks. Higher priorities for reduction were given to specific foods and food groups that derived their energy content primarily from fats or carbohydrates. For example, the reduction of edible oils, fatty meats, whole-fat dairy, and nuts was prioritized for the healthy low-fat group, whereas the reduction of cereals, grains, rice, starchy vegetables, and legumes was prioritized for the healthy low-carbohydrate group. Then individuals slowly added fats or carbohydrates back to their diets in increments of 5 to 15 g/d per week until they reached the lowest level of intake they believed could be maintained indefinitely. No explicit instructions for energy (kilocalories) restriction were given. Both diet groups were instructed to (1) maximize vegetable intake; (2) minimize intake of added sugars, refined flours, and trans fats; and (3) focus on whole foods that were minimally processed, nutrient dense, and prepared at home whenever possible.

Diets, Carbohydrates and Calories

Carb grams/day

300

Typical American Diet

200

Very Low Fat Diet
Low Glycemic Index Diet
Mediterranean Diet

100

Paleo Diet
Atkins Maintenance

50

Low Carbohydrate Ketogenic Diet
(Ketone Threshold)

0

(Keto, Atkins Induction, Protein Power
HEALCare, VirtaHealth

1000 Calories/day

2000

The DIETFITS Randomized Clinical Trial

Carb grams/day

- 300
- 200
- 100
- 50
- 0

“Low Fat” 200-210 g -5.3 kg

“Low Carb” 90-130 g -6.0 kg

Low Carbohydrate Ketogenic Diet

(Ketone Threshold)

1000 Calories/day 1600 kcal 2000

Education for Physicians and Organizations
Leadership training and education for tomorrow’s physician leaders

For Physicians

For Organizations
The Gut Microbiota Mediates the Anti-Seizure Effects of the Ketogenic Diet

Christine A. Olson • Helen E. Vuong • Jessica M. Yano • Qingxing Y. Liang • David J. Nusbaum • Elaine Y. Hsiao ² • Show footnotes

Published: May 24, 2018 • DOI: https://doi.org/10.1016/j.cell.2018.04.027 • Check for updates
Basal Thermogenesis

- Futile Cycles
- $\text{Na}^+/\text{K}^+$ ATPase activity
- Mitochondrial proton leak

Matrix

$\text{H}^+ + \text{NADH} \rightarrow \text{NAD}^+ + 2\text{H}^+$

$2\text{H}^+ + \frac{1}{2}\text{O}_2 \rightarrow \text{H}_2\text{O}$

Intermembrane Space

$4\text{H}^+$

$\text{cyt c}$

$4\text{H}^+$

$2\text{H}^+$

$\text{H}^+$

https://www.rpi.edu/dept/bcbp/molbiochem/MBWeb/ml1/part2/images/uncouple.gif