
II. **Nutritional Physiology in the News**

*UCB Wellness Letter*, June 2011, Salt–beyond hypertension

Gain weight by drinking your calories?

*UCB Wellness Letter*, November 2014, Coconuts are on a roll?

III. **Nutrition Primer** (continued) DC Module 2, Sizer & Whitney (S&W) Science Library

A. What’s the best path to losing weight? What about fasting?
   Zuti & Golding 1976; Sacks *AHA NPAM Council* 2009;
   AMDR? Adjusted Macronutrient Distribution Range!

B. **Nutrition Quackery, Balanced Approach** Kleiner, Monaco+

IV. **Digestion** LS 2012 ch 15, pp 437-9, DC Module 3 pp 17-23

A. Steps of digestion Dr. Evonuk + LS pp 437- 9; DC p 23

B. Hydrolysis: the central linking theme! LS p 438, Fox 2009

C. What’s missing? LS fig 15-1 p 438

D. GI-Donut analogy? Dr. Lorraine Brilla WWU


F. Organ-by-organ review LS tab 15-1 pp 440-1 + DC fig 3-1
Sample 1. What is *human physiology*? (+2) How does it differ from *human anatomy*? (+2)

Sample 2. Give 2 *examples* of when *positive feedback* may occur normally in the human body. (+4)

Sample 3. *Cells* are progressively organized into
a. organs, systems, tissues, then the whole body
b. tissues, organs, systems, then the whole body
c. systems, tissues, organs, then the whole body
d. None of the above are correct.
More Reasons to Shake the Salt Habit

Stop me!

①↓blood vessel vasodilation w/in 30 min by ingesting 1500 mg Na+!

②↑Ca²⁺ excretion ↑bone loss, risk of osteoporosis & fractures.

③May directly impair kidney function & ↑risk of kidney stones.

④GI cancer risk, inflammation?

UCB Wellness Letter Jun 2011 p 5
5 times per wk? \( \equiv \) 106,600 calories/yr \( \equiv \) \( \pm \) 30.5 lb fat/yr

Better choices!

**Starbucks**
Cinnamon Dolce Latte, whipped cream
*Venti (20 oz.)*

410 calories

**Jogging**

50 min.
Animal fats and the tropical oils of coconut and palm contain mostly saturated fatty acids.

Some vegetable oils, such as olive and canola, are rich in monounsaturated fatty acids.

Many vegetable oils are rich in omega-6 polyunsaturated fatty acids.

Only a few oils provide significant omega-3 polyunsaturated fatty acids.

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*aThese families of polyunsaturated fatty acids are explained in a later section.

*bSalad or cooking type over 70% linoleic acid.

*cFish oil average values derived from USDA data for salmon, sardine, and herring oils.
The Amazing BENEFITS of Coconut Oil

Nutritional Content in Coconut Oil:
- Antioxidants
- MCT (Medium-Chain Triglycerides)
- Lauric Acid
- Caprylic Acid
- Capric Acid

The Health & Healing Benefits of Coconut Oil:

**Skin Care**
The MCTs in Coconut oil act as a natural skin conditioner. Deeply penetrate & moisturizing, they protect against environmental & free radical damage. It also helps with anti-aging, eczema & even provides some sun protection.

**Weight Loss**
The Fatty Acids in coconut oil destroy candida, (yeast overgrowth) which triggers weight gain, carbohydrate cravings & fatigue. They're easily digested & converted into energy, which helps to speed up metabolism & help burn stored fat.

**Hair Care**
Coconut oil is one of the best ways to provide nutrients to your hair. The fatty acids condition deeply from the inside of the strands out. Providing protein, eliminating dandruff & aiding in re-growth. Many people use it as a conditioner.

**Immunity**
The unique saturated fats of coconut oil contain antibacterial, antiviral, anti-fungal, and anti-parasitic properties that help strengthen the immune system. Consuming coconut oil regularly will reduce incidences of sickness.

**Diabetes**
Coconut oil may improve insulin sensitivity & glucose tolerance over time. It helps regulate blood sugar levels & protects against insulin resistance. It can even help prevent Type II Diabetes.

**Stress Relief**
Coconut oil is very soothing. The natural aroma of coconut is also very soothing. You can apply the oil to your head & gently massage to help remove mental fatigue.

**Infections**
Lauric Acid (found only in breast milk & coconut oil) is converted into monolaurin in the body. This may destroy bacterial & viral infections like measles, influenza, hepatitis C & even HIV. Monolaurin may also eliminate Athlete’s foot.

**Heart Health**
The fat in coconut oil does not have a negative effect on cholesterol. In fact, it helps improve your cholesterol profile. It helps prevent heart attack & stroke & may even cure heart disease.

**TIP: Buy Organic, Unrefined, Cold-Pressed, Extra-Virgin Coconut Oil!**

Sources:
- http://www.coconutresearchcenter.org
- http://www.naturalnews.com
- www.NaturalHealthyConcepts.com
Many claims with little scientific, peer-reviewed, research support

http://www.doctoroz.com/videos/surprising-health-benefits-coconut-oil

Coconut Oil
Health Benefits

- Improves or Reverses Alzheimer's Disease
- Improves Type 2 AND Type 1 Diabetes
- Improves or Heals Many Skin Diseases
  - Fungal Infections
  - Acne
  - Eczema
  - Keratosis Polaris
  - Psoriasis
  - Rosacea
- Provides Peak Performance Energy
  - Drug-free Energy
  - Longer Endurance
- Kills Candida Fungus
- Helps with Hypothroidism
  - Increases Metabolism
  - Raises Body Temperature
- Conditions and Strengthens Hair
  - Penetrates Roots
  - Kills Lice
  - Improves Dandruff
- Kills many Bacteria AND Viruses
- Promotes Weight Loss
  - Preserves Muscle Mass
  - Promotes Ketosis

Find all the research at: CoconutOil.com
Coconut Oil
Nutritional Wonder?

Claims?

http://coconutoil.com/about-us/

Review articles, last 5 yr (1) on health benefits?


Other articles?


The bottom line?

http://www.cspinet.org/nah/articles/coconut-oil.html
http://health.clevelandclinic.org/2012/05/heart-healthy-cooking-oils-101/
http://en.wikipedia.org/wiki/Smoke_point
Coconuts are on a roll?

1. **Blood Cholesterol & Health?** Lauric acid, $1^0$ saturated fat may ↑ HDL good > LDL bad cholesterol, but depends on fat replaced. Neutral effect? Still don’t really know!

2. **Weight Loss?** Medium change fatty acids metabolized uniquely. Few human studies on body weight have had inconsistent results. Like all edible oils, high in kcal (120/Tbsp) so counterproductive.
We’re better at storing fat vs carbohydrate!

Dietary Fat

3 % Kcal

Body Fat

23 % Kcal

Dietary Carbohydrate
To Help Lower Body Wt & %Fat

EXERCISE!! +Minimize These!!

FAT  9 Kcal/g
ETOH  7 Kcal/g
CARB  4 Kcal/g
PRO  4 Kcal/g

NB:  Minimize not Eliminate!
     Moderation not Abstinence!!
I'm not sure I believe you! Why can't I just starve to lose weight?
TOTAL FAST =
No Energy Nutrients
(No Carbohydrates, Fats or Proteins)

ONLY

1. Water
2. Vitamins
3. Minerals

ML Pollock & JH Wilmore 1990.
60-day Fast???

Lost 60 lb!! Wow!!

Yet

- 26 lb Water
- 20 lb Lean Body Mass
- 14 lb Fat

76.7% Fat < ¼ total wt loss!
You can lose weight by starving – but it's mostly water & muscle! Also, there can be complications!
Potential Complications of Total Fasting

Nausea, diarrhea, persistent vomiting, postural hypotension, nutritional deficiencies, menstrual irregularities, and...sudden death.

Positive Aspect??

General loss of appetite within first 2 days, maintained throughout fasting period.

ML Pollock & JH Wilmore 1990.
Dietary Carbohydrate, Fat and Protein in Weight-Loss Diets: A Report and Insider’s Reflections on the Pounds Lost Trial

Frank M. Sacks, MD

Well-controlled studies of energy-reduced diets conducted in controlled environments showed that the macronutrient composition of the diet did not affect weight loss (1). Nonetheless, theories persisted that specific macronutrients would be superior for weight loss. For example, the traditional paradigm for low-fat, high-carbohydrate diets was based on the lower energy density of carbohydrate compared to fat, and the metabolic efficiency of converting dietary fat to body fat (2). Indeed strict vegetarians sustain lower body weight for years on low-fat diets (3). However, meaningful differences in body weight usually were not achieved in population-based trials of conventional low-fat diets (4). Thus, higher-fat, Mediterranean-style diets were proposed to be better for long-term weight loss because of their variety and satisfaction. Two trials found that Mediterranean diets were superior to low-fat diets for weight loss (5,6). Others claimed that a radically different approach that used low-carbohydrate, high-fat, and high-protein foods could produce weight loss without attention to reducing intake because of the satiety of protein-rich foods. Low-carbohydrate diets succeeded in the first few months with more rapid weight loss than low-fat diets but by one year, none of the trials found that weight loss on low-carbohydrate
Dr. Sacks’ Conclusions:
We conclude that healthful diets with varying emphases on carbohydrate, fat & protein levels can all achieve clinically meaningful weight loss & maintenance of weight loss over a 2-yr period. The results give people who need to lose weight the flexibility to choose a diet that they can stick with, as long as it’s heart healthy. Such diets can also be tailored for individuals based on their personal & cultural preferences & in this regard may have the best chance for long-term success.
<table>
<thead>
<tr>
<th>Energy Nutrient</th>
<th>% Total Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrate</td>
<td>45-65%</td>
</tr>
<tr>
<td>Fat</td>
<td>20-35%</td>
</tr>
<tr>
<td>Protein</td>
<td>10-35%</td>
</tr>
</tbody>
</table>
Emphasize ABCs + Variety & Moderation!
All of these factors help to build a nutritious diet.
Kleiner's & Monaco's Top 10 Hit List for Nutrition Quackery

1. Treatment based on *unproven theory* calling for non-toxic, painless therapy.

2. Author's/purveyor's *credentials aren't recognized* in scientific community.

3. *No reports* in scientific, peer-reviewed literature but rather mass media used for marketing.

4. Purveyors claim *medical establishment is against them* & play on public's paranoia about phantom greed of medical establishment.

5. Treatments, potions, drugs manufactured according to *secret formula*.

6. Excessive claims promising *miraculous cures*, disease prevention or life extension.

7. *Emotional images* rather than facts used to support claims.

8. Treatments require *special nutritional support* including health food products, vitamins and/or minerals.

9. Clients are cautioned about discussing program to avoid negative.

10. Programs based on *drugs or treatments not labeled* for such use.
AHA + DASH + MAYO CLINIC

PEER-REVIEWED = TEXTS → RESEARCH

LOWER CARBOHYDRATE

ELIMINATE CALORIES or FOOD GROUPS

ENCOURAGE FASTING

LOWER FAT

ADEQUACY BALANCE CONSISTENCY & MODERATION

NOT PEER-REVIEWED = TRADE BOOKS

PEER-REVIEWED = TRADE BOOKS

Choose MyPlate.gov

Fruits Grains

Vegetables Protein

Dairy


Digestion Steps

1. Ingestion
2. Mechanical Digestion
3. Chemical Digestion
4. Peristalsis
5. Absorption
6. Storage
7. Defecation

Hi gang!!
You need me for digestion!!

H₂O + Enzyme → Hydrolysis of Energy Nutrients
**FIGURE 15-1** An example of hydrolysis. In this example, the disaccharide maltose (the intermediate breakdown product of polysaccharides) is broken down into two glucose molecules by the addition of $\text{H}_2\text{O}$ at the bond site.
Polymer to Monomer (Many to One)

Carbohydrate

Protein + Fat

Fat

Protein

Glucose

Amino Acids

Fatty Acids + Glycerol

Amino Acid Structure

...Central-linking theme!!
GI-DONUT ANALOGY

GI LUMEN

BODY
<table>
<thead>
<tr>
<th>Secretion</th>
<th>Release Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mucus</td>
<td>into GI Lumen</td>
</tr>
<tr>
<td>2. Enzymes</td>
<td>into GI Lumen</td>
</tr>
<tr>
<td>3. H₂O, acids, bases+</td>
<td>into GI Lumen</td>
</tr>
<tr>
<td>4. Hormones</td>
<td>into Blood</td>
</tr>
</tbody>
</table>
1. **Mouth**

*Ingestion* entry way
salivary gland secretion
mucus + enzymes
enzymatic digestion: carbohydrate
mastication = chewing
deglutition = swallowing

2. **Esophagus**

*Rapid transit*
peristalsis
secretion mucus

3. **Stomach**

*Mixing*
peristalsis
secretion mucus + HCl
+ enzymes
*enzymatic digestion:*
protein + butter fat!

4. **Liver-Gall Bladder**

*Emulsification* =
detergent action of bile
+ secretion

5. **Pancreas**

*Secretion*
mucus + NaHCO₃ + enzymes
*enzymatic digestion:*
carbohydrate, fat, protein

6. **Small Intestine**

*Absorption*
secretion mucus
+ enzymes
enzymatic digestion: carbohydrate, fat, protein

7. **Large Intestine**

*Dehydration*
secretion + absorption
storage + peristalsis
External influences

Local changes in digestive tract

Receptors in digestive tract

Intrinsic nerve plexuses

Extrinsic autonomic nerves

Gastrointestinal hormones

Smooth muscle (contraction for motility)

Exocrine gland cells (secretion of digestive juices)

Endocrine gland cells (secretion of gastrointestinal hormones)

Self-excitable

LS 2006, 2012 fig 15-3 p 443
Common Control Mechanisms

1. Local (autoregulation)
2. Nervous (rapidly-acting)
3. Hormonal (slower-acting/reinforcing)