Current Controversies in Nutrition

- Nutrition Science
- The Paleo Diet
- Coconut oil
- Gluten
- Beverages
  - High fructose corn syrup
  - Coconut water
  - Maple water
- Organic and conventional produce

Sheri Zidenberg-Cherr, PhD
UCCE
Jan 2014
Why All the Confusion and Conflict?

• The science of nutrition is constantly evolving.

• Old beliefs are discarded and advice changes as nutrition scientists conduct more research and gain greater understanding.
Beyond the Hype

• Nutrition is an inter-disciplinary science

  – “Evidence-based” recommendations

  – Understanding these recommendations can help you identify the hype from those with good scientific evidence
Why is there so much variability with respect to individuals’ responses to diet?
Your actual risk of disease results from the interplay between the genes you inherit and the diet and lifestyle choices you make.

The genes you inherit may give you a greater or lesser tendency to develop conditions like obesity, heart disease, high blood pressure, or diabetes.

The nutrients and food components you consume and the amount of exercise you get can increase or decrease your risk of developing nutrition-related diseases.
• **Genotype:** A person’s genetic makeup from the genes received from mother and father. Your genotype is not outwardly visible.

• **Phenotype:** A person’s characteristics or traits you can see (e.g., height, weight, hair color or disease) directed by the genotype and epigenetics.
Nutrigenomics

The study of how dietary choices & food components affect the human physiologic system, from the genome (genetics) level, to proteome (proteins), to metabolome (metabolites), and ultimately physiologic functioning and health.

Underlying assumptions:

• Diet & dietary components can alter risk of disease development by modifying processes involved with onset, progression or severity

• Food components can act on the human genome directly, or indirectly at levels of protein expression & function, to alter expression of genes and gene products

• Diet can potentially compensate for or accentuate effects of genetic polymorphisms

GOAL: Personalized nutrition therapies to maximize genetic potentials, prevent chronic disease and improve treatment outcomes
Controversial Issues
The Paleo Diet

• Based on claims of “diseases of civilization”
  – Difficulty in constructing what early humans were eating
    • Diets of early humans depended upon
      – How early
      – Location
    • Scientists have discovered traces of seeds and grains on the teeth of fossilized early humans
    • Scientist have discovered remnants of grains on stone cooking tools
The Paleo Diet

• We are not who our ancestors were.
  – Microbiome
    • Billions of microorganisms that are on and in us
    • Essential for normal functioning
    • Differs from person to person, place to place and probably over time
The Paleo Diet

• Our food has changed from that of our ancestors
  – Early humans were not eating plants or animals that are close to what we eat today
  – Ancestors of apples and corn were not desirable
  – Current beef products, even grass-fed have been modified from its ancestors by breeding
The Paleo Diet

• Basic premise: “If it wasn’t on a caveman’s menu, it shouldn’t be on yours”
  – Plenty of meat, poultry, eggs, seafood, vegetables, fruit, honey and nuts
  – NO grains, beans, dairy foods, refined sugars, caffeine, or alcohol
  – “eat 20 ounces of meat, poultry or seafood and 12 cups of vegetables and fruit a day”
The Paleo vs Dash Diet

Typical Paleo Day

**Breakfast:** Berries in coconut milk

**Lunch:** Salad with chicken, tomatoes, and dressing

**Dinner:** Spaghetti squash with meat sauce

**Dessert:** Macadamia nuts

Typical Dash Day

**Breakfast:** Oatmeal with skim milk, berries and banana

**Lunch:** Veg chili with brown rice, garden salad and small whole wheat pita

**Dinner:** Baked fish, spaghetti squash, brown rice and steamed broccoli

**Dessert:** Fresh fruit and plain non fat yogurt parfait
## The Paleo Diet compared to DASH

<table>
<thead>
<tr>
<th>Food (serving size)</th>
<th>Paleo Diet</th>
<th>DASH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat, poultry, fish (oz)</td>
<td>20</td>
<td>&lt;6</td>
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<tr>
<td>Vegetables, fruit (1/2c)</td>
<td>24-27</td>
<td>8-10</td>
</tr>
<tr>
<td>Nuts (1/4 c)</td>
<td>1.5</td>
<td>1 (4 x week)</td>
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<tr>
<td>Grains (1/2 c or 1 slice bread)</td>
<td>0</td>
<td>5-6</td>
</tr>
<tr>
<td>Low-fat dairy (1 c milk)</td>
<td>0</td>
<td>2-3</td>
</tr>
<tr>
<td>Oil (1 T)</td>
<td>2-3</td>
<td>2-3</td>
</tr>
</tbody>
</table>

www.foodandhealth.com
## The Paleo Diet

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Paleo Diet</th>
<th>DASH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories (kcals)</td>
<td>1817</td>
<td>1705</td>
</tr>
<tr>
<td>Fat (g)</td>
<td>144</td>
<td>57</td>
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<tr>
<td>Sat Fat (g)</td>
<td>49</td>
<td>10</td>
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<tr>
<td>TransFat (g)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Cholesterol (mg)</td>
<td>198</td>
<td>155</td>
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<tr>
<td>Sodium (mg)</td>
<td>2310</td>
<td>638</td>
</tr>
<tr>
<td>Carbohydrate (g)</td>
<td>74</td>
<td>188</td>
</tr>
<tr>
<td>Fiber (g)</td>
<td>23</td>
<td>38</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>72</td>
<td>118</td>
</tr>
<tr>
<td>Calcium (DRI)</td>
<td>30%</td>
<td>108%</td>
</tr>
</tbody>
</table>

www.foodandhealth.com
Diet and Hypertension

• **DASH diet**
  – Dietary Approaches to Stop Hypertension
  – Heart Healthy diet low in saturated fat, trans fat, cholesterol and sodium
    • Low in red meat, sweets and sugar beverages
  – Focus on fresh, whole foods including fruits, vegetables, whole grains
    • Includes small levels of lean meat, fatty fish, low-fat/nonfat dairy
  – Adequate Calcium, Potassium, Magnesium
Coconut Oil

“The Tokelauans...in the South Pacific...eat over 60% of their calories from coconuts and...are in excellent health, with no evidence of heart disease.”
Coconut Oil

- Literature inconclusive on medium-chain fatty acids in coconut oil promoting weight loss
- Neither American Heart Association nor the Dietary Guidelines for Americans 2010 suggest coconut oil is preferable over other saturated fats
  - Limit intake of all saturated fats; recommend less than 10% of calories/day from saturated fats
- Very limited research on benefits of coconut oil
- *Feranil et al, Asia Pac J Clin Nutr, 2012*
  - Association of coconut oil intake with lipid profile of Filipino women
    - Dietary coconut oil positively correlated with HDL
High Fructose Corn Syrup Is No Worse Than 'Real' Sugar

Recommendations for Intake of Added Sugars

- American Heart Association
  - 9 teaspoons per day for men
  - 6 teaspoons per day for women
  - 3 teaspoons per day for children

- Dietary Guidelines for Americans (2010)
  - As Solid Fats and Added Sugars (SoFAS)
    - 5-15% of total kcals

The **Average American** eats 22.2 teaspoons of added sugar per day
High Fructose Corn Syrup (HFCS)

- High-fructose corn syrup is not pure fructose. There are two main types of high-fructose corn syrup that are used in foods:
  - 55% fructose/ 45% glucose: this is mostly used in sugary drinks, like soda, as well as in ice cream and other frozen desserts
  - 42% fructose/ 58% glucose: this is mostly used in baked goods, like cookies and crackers, and canned fruits, condiments, and dairy products
High Fructose Corn Syrup

• Credible experts and scientific societies:
  – “There is not a metabolic difference between high fructose corn syrup and sugar”

Increased caloric intake, not a single sweetener is the likely cause of obesity

When reading about studies….

- Experimental design: randomized controlled studies are the gold standard
- Subjects tested: human subjects
- Sugars compared: HFCS versus sugar is the best comparison
- Levels tested: range of fructose in diet is 5-17% of kcals
  - Be wary of studies that use excessive fructose levels in humans (25-50% of kcals) and animals (>60% of kcals)
Gluten and Celiac Disease

- Gluten is a protein found in:
  - Wheat
  - Rye
  - Barley
  - Oats
What is celiac disease?

• An autoimmune disorder
• Exposure to gluten results in damage to the intestinal lining
• Damage to the lining of the intestine reduces ability to digest and absorb nutrients
• Treatment consists of completely eliminating gluten from the diet
Gluten-related Disorders

- Celiac Disease
- Wheat Allergy
- Gluten Sensitivity
  - Not diagnosed on allergic or autoimmune mechanisms
  - Subject to risk of placebo effect
Gluten-Free Diets

- Important for individuals with celiac disease
- Newest health fad
  - Claims of more energy, weight loss, etc
  - Very little research available to support or disprove claims
Downsides to Gluten-Free Diet

- **Expense**
  - Gluten-free products can be twice as expensive as gluten-containing products

- **May be low in certain nutrients**
  - Iron, folate, niacin, zinc, and fiber

- **May be higher in calories**
“Have Your Gluten-Free Candy This Halloween and Eat It Too”
Beverages:
Coconut Water

“Dissolves kidney stones”

“Prevents atherosclerosis”

“Enhances immune system”

“Prevents glaucoma and cataracts”

“Balances blood sugar”

“Prevents cancer”

“Revives hair growth”

Coconut Water Benefits

1. Natural Diuretic - unlike pharmaceutical drugs, coconut water does not affect electrolyte balance and hormones to force water removal.
2. Aids in Kidney Function and Dissolves Kidney Stones - releases a therapeutic effect on the urinary and reproductive systems.
3. Improves Blood Cholesterol Levels and Prevents Atherosclerosis - both young and mature coconut water are beneficial in preventing atherosclerosis and reducing risk of heart disease.
4. Enhances Immune System - thanks to monolaurin and arginine.
5. Prevents Glaucoma and Cataracts - effective in reducing fluid pressure in the eyes and fights the symptoms of cataracts.
6. Relieves Constipation - drinking a minimum of 11 ounces a day softens stools and increases the urge to go number two.
7. Balances Blood Sugar - contains arginine, an amino acid that helps moderate sugar absorption. Arginine also improves insulin sensitivity - so blood sugar is more readily transported from the bloodstream into the cells.
8. Boosts Energy Levels - without the jitters! Its colony of living cells makes it a healing liquid with living energy. Drinking coconut water is like getting a blood transfusion!
9. Cytokinin Powerhouse - cytokinins are the plant version of cytokines for humans. Cytokinins are involved in reproduction, growth and development, homeostatic regulation, healing and repair, blood clotting, and immunity. This hormone-like substance contains anti-ageing, anti-cancer and anti-thrombotic benefits in humans.
10. Prevents Cancer - when the growth hormone, cytokinins, are added to cancerous tissue, abnormal growth is retarded. Studies show cytokinins also induces apoptosis or programmed cell death in cancer cells. Cytokinins are proven to have anti-cancer effects.
11. Hair Growth - coconut water has the potential to revive hair growth. Dr Verder-Rowell theorises that cytokinins may be able to stop hair loss and even restore hair to a balding head. Drinking and applying coconut water into the scalp daily over an extended period is needed.
12. Feeds Friendly Gut Bacteria - coconut water kefir cleanses the body and helps rid the body of yeast overgrowth. It stops sugar cravings, prevents eczema flare-ups, balances hormones, and gets rid of heavy metals in the body.
13. Excellent Rehydration Sports Drink - a rich source of electrolytes and natural salts, especially potassium and magnesium. It is a living food with easily absorbable electrolytes, sugars, antioxidants, enzymes, amino acids, vitamins and other nutrients.
14. Provides a Chock-full of Trace Elements - loaded with zinc, selenium, iodine, sulfur, and manganese.

Source: "Coconut Water for Health and Healing" by Dr Bruce Fife
Beverages: Coconut Water

- Evidence in the literature
    - Both coconut water and low calorie sports drink effective at rehydrating exercise participants
    - Coconut water, carbohydrate-electrolyte beverage, and pure water effective at rehydration during a 2 hour rehydration period following exercise-induced dehydration
    - Results indicate coconut water caused less nausea, fullness, and no stomach upset, as compared to carb-electrolyte beverage and pure water upon rehydration period
    - Case study: Solomon Island patient was administered coconut water intravenously for rehydration
Are Organic Foods Safer or Healthier Than Conventional Alternatives?
Current Organic Legislature

- As of October 2002, all foods with the USDA organic symbol must have at least 95% organic ingredients.

- Currently, the USDA makes no claims that organic foods are safer or more nutritious than conventionally produced food.

- This is a complex issue and there is not enough research to support a national recommendation regarding consumption of organic foods.
Why Do Consumers Purchase Organic Foods?

• Some people are concerned about the effects of conventional farming practices on:
  – The environment
  – Human health
  – Animal welfare

• Some people believe that organic foods are tastier or healthier than their conventional alternatives
The Majority of Americans are not Meeting Current Recommendations for Fruit and Vegetable Consumption
Are Consumers Being Scared Away from Healthy Foods?
About the Alliance for Food and Farming

- Non-profit formed in 1989
- Organic and conventional farmers.
- Alliance contributors are farmers of fruits and vegetables; companies that sell, market or ship produce; or organizations representing farmers.
- Mission: to deliver credible information to consumers about the safety of fruits and vegetables.
- The Alliance does not engage in lobbying activities, nor does it accept money or support from the pesticide industry.
Why the Confusion?

- Everyone agrees that consumers should eat more fruits and vegetables.

- Consumer research suggest the most credible people to deliver health messages to consumers are physicians, nutritionists and dietitians.

However, the popular media is increasingly where many get their nutritional facts.
2013 Dirty Dozen

“Is the Produce You Eat Covered in Pesticides?” --Chicagoist

“Terrifying Toxic Fruit List Will Change the Way You Eat” --The Stir

“14 Pesticide-Covered Foods That Will Change The Way You Shop” --Business Insider

“Watch Out for the…Dirty Dozen” --CNN
Scientific Basis of the “Dirty Dozen” is Lacking

- Risk = Exposure x Toxicity
- The “Dirty Dozen” list considers exposure, but makes no attempt to address toxicity
- There are reliable, well-established and accepted methods for assessing the risk of small doses of chemicals.
- The authors of the “Dirty Dozen” list acknowledge this and clearly state on their website that the list “is not built on a complex assessment of pesticide risks.”
Alliance for Food and Farming
Expert Panel Conclusions

• Negative messages about food safety is not promoting consumption of fruits and vegetables.
• The Media/Internet may be increasing our fears about food safety, and lowering our faith in government oversight of the safety of our food.
• It is inaccurate to suggest that organic produce is the only “safe” choice.
• Some consumers feel like they are making inferior choices when they buy conventionally grown produce.
• The key health message should be – eat your fruits and vegetables.
SafeFruitsandVeggies.com

- Promotes all fruits and vegetables.
- Provides credible information.
- Developed by experts in nutrition, toxicology, risk assessment and farming.
- Pesticide Residue Calculator
- Farmer videos
- Blog
- Scientific Reports
- Facebook, Twitter, YouTube

www.safefruitsandveggies.com
Cancer and non-cancer health effects from food contaminant exposures for CA children and adults

  - Cancer and con-cancer benchmarks frequently exceeded by children
  - New dietary strategies need to be developed to reduce exposure

- Response: Carl K. Winter, Extension Food Toxicologist, Fellow, Institute of Food Toxicologist, [ckwinter@ucdavis.edu](mailto:ckwinter@ucdavis.edu)
  - The authors dramatically overestimated food consumption rates
    (more than 5 x higher than national survey data)
  - Used outdated benchmarks

Organic Advantages

Organic plant foods may have an advantage over conventionally grown foods by:

• Having an increased concentration in:
  – Vitamin C
  – Carotenoids
  – Polyphenols
Organic and Conventional Produce

Whether grown organically or conventionally, plant foods contain:

- Fiber
- Vitamins
- Minerals
- Phytochemicals
What is the REAL Truth?

Is there **scientific consensus** that the small amounts of pesticide residues reported to occur on some food sources are harmful?

Is there evidence that the benefits of eating fruits and vegetables outweigh the potential risks associated with the small amounts of pesticides that might be obtained by eating these foods?
It is Well Accepted that Fruits and Vegetables are Good For You

► No convincing evidence that pesticide residues (at current levels) on fruits and vegetables pose a risk to health.
► The data on health benefits of consuming fruits and vegetables is substantial and convincing.
► Health benefits of diets rich in fruits and vegetables:
  • Decreased risk of:
    ▶ High blood pressure
    ▶ Stroke
    ▶ Heart disease
    ▶ Some cancers
    ▶ Digestive problems
Remaining Uncertainties About Fruit and Vegetable Health Benefits

- The precise ways fruits and vegetables produce positive health effects are still poorly understood and represent an area of significant research.

- Limiting one’s diet to certain fruits and vegetables, and excluding others, due to fears over pesticide residues, is risky.
  - May result in missing out on the health benefits of eating a wide variety of fruits and vegetables.
Are Organic Foods Safer or Healthier Than Conventional Alternatives?

- No differences in vitamin or mineral content between conventionally and organically grown fruits and vegetables
  - with the exception of phosphorus
- No differences in protein or fat content in milk from conventionally and organically raised animals
  - limited evidence for higher omega 3 fatty acids in milk from organically raised animals
- Pesticide levels of organic and conventional foods fell within allowable safety limits
  - lower levels of pesticide residues in urine of children consuming organic diets

Annals of Internal Medicine 2012; 157: 348-366
I Encourage You To . . .

• Check out the website
  www.safefruitsandveggies.com

• Sign up for the newsletter
It is our responsibility as nutrition scientists and educators to act as credible sources of science-based nutrition recommendations.

We must work to prevent the attitude:

“Just eat whatever the heck you want. One day something’s bad for you, one day it’s good for you. Maybe I’ll get lucky and smoking will be good for me too.”
UC Davis
Department of Nutrition
Nutrition Information

- http://nutrition.ucdavis.edu
- http://chnr.ucdavis.edu
Thank you
Additional Slides Provided For Your Enjoyment
Food and Nutrition Misinformation

- Consumers are taking charge of their self-care more than ever.
  - Positive in that sound nutrition can play an important part in one’s life
  - Negative in that it makes people more susceptible to food and nutrition misinformation that can impact their health and economic well-being

- Nutrition misinformation can lead consumers to lose faith in good sources of nutrition information and pay less attention to results of new findings
Accurate Food And Nutrition Information

- Is a result of widespread scientific agreement from studies that have withstood peer review

- Is a result of studies that have been replicated
EVALUATING INFORMATION YOU FIND ONLINE

• Food and Nutrition Information Center
    • Consumer corner
    • Eating for health
    • On-line health information
  – Evaluating Health Information on the Internet
  – http://fnic.nal.usda.gov/consumers/online-health-information/evaluating-information-you-find-online
  – Evaluating Internet Health Information: A Tutorial from the National Library of Medicine
  – Online Health Information: Should You Believe What you See?
  – Tips for Healthy Surfing Online

• Nutrition and Health Search Engines
  – Healthfinder.gov
  – MEDLINEplus Health Information
  – Health Information-National Institutes of Health
Websites with Reliable Nutrition and Health Information

American Dietetic Association  
http://www.eatright.org

National Institutes of Health  
http://www.nih.gov

Food and Drug Administration  
http://www.fda.gov

Centers for Disease Control and Prevention  
http://www.cdc.gov
More Websites with Reliable Nutrition and Health Information (continued)

American Council on Science and Health
http://www.acsh.org

Quackwatch
http://www.quackwatch.org

National Council Against Health Fraud
http://www.ncahf.org
## The DASH Eating Plan

<table>
<thead>
<tr>
<th>Food Group</th>
<th>1600 kcals</th>
<th>2000 kcals</th>
<th>Serving Sizes</th>
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<tbody>
<tr>
<td>Grains</td>
<td>6</td>
<td>6-8</td>
<td>1 slice bread 1 oz dry cereal ½ c cooked rice, pasta</td>
</tr>
<tr>
<td>Vegetables</td>
<td>3-4</td>
<td>4-5</td>
<td>1 c leafy, ½ c raw/cooked; ½ c veg juice</td>
</tr>
<tr>
<td>Fruits</td>
<td>4</td>
<td>4-5</td>
<td>1 medium fruit; ¼ c dried fruit; 1/2 c fresh, frozen or canned; ½ fruit juice</td>
</tr>
<tr>
<td>Fat-free or low-fat milk and milk products</td>
<td>2-3</td>
<td>2-3</td>
<td>1 c milk or yogurt; 1 1/2 ounce cheese</td>
</tr>
<tr>
<td>Lean meats, poultry, fish</td>
<td>3-4 or less</td>
<td>6 or less</td>
<td>1 oz cooked meats, poultry, fish 1 egg</td>
</tr>
<tr>
<td>Nuts, seeds and legumes</td>
<td>3-4 per week</td>
<td>4-5 per week</td>
<td>1/3 c or 1.5 oz; 2 T peanut butter; 2 T seeds; 1/2 c cooked legumes</td>
</tr>
<tr>
<td>Fats and oils</td>
<td>2</td>
<td>2-3</td>
<td>1 tsp soft marg; 1 tsp veg oil; 1 T mayo</td>
</tr>
<tr>
<td>Sweets and added sugars</td>
<td>3 or less</td>
<td>5 or less</td>
<td>1T sugar; 1 T jam; 1/2 c sorbet</td>
</tr>
<tr>
<td>Maximum sodium limit</td>
<td>2300 mg/d</td>
<td>2300 mg/d</td>
<td></td>
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</table>
## The DASH Eating Plan

<table>
<thead>
<tr>
<th>Food Group</th>
<th>Serving Sizes</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grains</td>
<td>1 slice bread 1 oz dry cereal ½ c cooked rice, pasta</td>
<td>Energy and fiber</td>
</tr>
<tr>
<td>Vegetables</td>
<td>1 c leafy, ½ c raw/cooked; ½ c veg juice</td>
<td>Potassium, magnesium, fiber</td>
</tr>
<tr>
<td>Fruits</td>
<td>1 medium fruit; ¼ c dried fruit; ½ c veg juice</td>
<td>Potassium, magnesium, fiber</td>
</tr>
<tr>
<td>Fat-free or low-fat milk and milk products</td>
<td>1 c milk or yogurt; 1 1/2 ounce cheese</td>
<td>Calcium and protein</td>
</tr>
<tr>
<td>Lean meats, poultry, fish</td>
<td>1 oz cooked meats, poultry, fish 1 egg</td>
<td>Protein and magnesium</td>
</tr>
<tr>
<td>Nuts, seeds and legumes</td>
<td>1/3 c or 1.5 oz; 2 T peanut butter; 2 T seeds; ½ c cooked legumes</td>
<td>Energy, magnesium, potassium, fiber</td>
</tr>
<tr>
<td>Fats and oils</td>
<td>1 tsp soft marg; 1 tsp veg oil; 1 T mayo</td>
<td>27% of Kcals as fat</td>
</tr>
<tr>
<td>Sweets and added sugars</td>
<td>1T sugar; 1 T jam; ½ c sorbet</td>
<td></td>
</tr>
</tbody>
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