You Are What You Eat: Food, Nutrition, and Health

Heidi Powell, MD
Deb Greenberg, MD
University of Washington
SGIM April 23, 2015
Workshop Agenda

- Consequences of unhealthy eating in the US
- Review macronutrient studies
- Small group case-based discussions
- Review diet types
- Small group case-based discussions
- Summary
- Q & A
Half of US adults (117 million people) have one or more chronic diseases

- Obesity
- Diabetes
- Cardiovascular disease
- Hyperlipidemia
- Hypertension
- Arthritis (knees)
Chronic Diseases are the Leading Causes of Death and Disability in the United States

- The most common and costly of all health problems

- 80% of US healthcare dollars are spent on diagnosing and treating chronic diseases
  
  Example: diabetes alone cost $245 billion in 2012
  
  - $176 billion in direct medical costs
  - $69 billion in decreased productivity
These are all preventable!

- Exercising/physically active
- Not smoking and avoiding excess alcohol
- Eating a nutritious diet
What are we eating?

Fast Foods
Percentage of calories from fast food among adults aged 20 and over, by sex and age: United States, 2007–2010

![Bar chart showing percentage of calories from fast food by age group and sex.](chart.png)

Processed foods: 70% of our daily diet
Calorie Intake Has Gone up by Around 400 Calories Per Day over 30 years
Obesity and Energy Intake in the US, 1961-2009

% prevalence (20-74 yrs) vs. Loss-adjusted per capita kcal/d

- Obese (BMI >30)
- Very obese (BMI >40)
- Energy intake

CDC NHES and NHANES 1960-2008
USDA ERS loss-adjusted food disappearance
Number and Percentage of U.S. Population with Diagnosed Diabetes, 1958-2009

Percent with Diabetes
Number with Diabetes

Year
1958 61 64 67 70 73 76 79 82 85 88 91 94 97 00 03 06 09

How many fruits and vegetables are we eating?
Percentage of U.S. adults who consumed: fruit ≥ two times per day and vegetables ≥ three per day 2000-2009
Percentage of money spent on different foods
1998 vs 2006
Physicians have poor nutritional training

In a survey of 105 medical schools from 2008-2009

- Only 25% required a dedicated nutrition course
- Only 27% met the minimum 25 required hours set by the National Academy of Sciences down from 38% in 2004

Academic Medicine 2010;85(9):1537-1542
You gotta start eating out of a different parking lot.
Update on macronutrient studies

- Added Sugar
- Red Meat
- Whole grains
What are “added sugars”?

A. Molasses
B. Fructose, dextrose, maltose, and sucrose
C. Honey
D. All of the above
What are “added sugars”?

A. Molasses
B. Fructose, dextrose, maltose, and sucrose
C. Honey
D. All of the above
“Added sugar” includes:

- Brown or white sugar
- Honey, molasses
- Fruit juice concentrates, corn sweetener
- Dextrose, fructose, glucose, maltose, sucrose, lactose
- Malt syrup, corn syrup and any other type of syrup
- Nectars
- Cane juice
Sources of “added sugar” in the American diet

- Pizza, bread, hot dogs
- Soup, crackers
- Spaghetti sauce, lunch meat
- Canned vegetables, fruit drinks
- Ketchup, salad dressing, mayonnaise
- Yogurt
“Added sugar” in Beverages

One 12 oz. can contains 35 gm of sugar or 7% of total calories (based on a 2000 kcal/day diet)
Starbucks Mocha Frappuccino

16 oz with whipped cream

Total Calories: 380
19% of total daily calories!

Sugars: 47 gm
Calories: 188
9% of total daily calories!
Why should we care about “added sugar”? 

- Obesity
- Diabetes
- Cardiovascular disease
- Hypertension
- Metabolic syndrome
“Added Sugar Intake and Cardiovascular Diseases Mortality Among US Adults”

This study determined:

- The amount of added sugar consumed by adults between 1988 and 2010
- The relationship between added sugar consumption and CVD mortality over a 15 year period

What population was studied?

- Data from the NHANES (National Health and Nutritional Examination Survey), 1988 thru 2010

- Adults ≥ age 20 (excluded pregnancy, h/o mi, stroke, CHF, diabetes, cancer, BMI less than 18.5)

- >31,000 participants included in the trend analysis and >11,000 in the association analysis
How was “added sugar” intake determined?

- A 24 hour dietary recall through in-person interviews
- Secondary dietary recall (varied by the time period)
- MyPyramid Equivalents Database (MPED) with the individual food files was used to calculate intake of added sugars.
What variables did they adjust for?

For the trend analysis:
- Day of the week when 24 hour recall was collected (weekday vs weekend)
- Age
- Sex
- Ethnicity

For the association analysis:
- Educational attainment
- Smoking status
- Alcohol consumption
- Antihypertensive medication use
- Physical activity
- Family h/o CVD
- 1995 Health Eating Index scores
Results of the trend analysis

The adjusted mean percentage of daily calories from “added sugar”:

- 15.6% in 1988-1994
- 16.8% in 1999-2004
- 14.9% in 2005-2010

71.4% of adults consumed ≥10%

10% of adults consumed >25%! 
Added sugar consumption and risk of CVD mortality:

HRs (adjusted for all variables) for CVD mortality across quintiles of the percentage of daily calories consumed from added sugar were:

- 1.0 (lowest quintile as reference) 1.07, 1.18, 1.38, and 2.43, respectively
- 2.75 for CVD mortality for those that consumed >25% of daily calories as added sugar
Adjusted HR of the Usual Percentage of Calories from Added Sugar for Cardiovascular Disease Mortality. NHANES linked mortality files 1988-2006.
What is the new recommended daily limit on “added sugar” by the 2015 Dietary Guidelines Advisory Committee?

A. ≤5%
B. ≤10%
C. ≤15%
D. ≤20%
What is the new recommended daily limit on “added sugar” by the 2015 Dietary Guidelines Advisory Committee?

A. $\leq 5\%$
B. $\leq 10\%$
C. $\leq 15\%$
D. $\leq 20\%$
Recommended daily limit on “added sugar”

World Health Organization: 5-10% of daily calories

American Heart Association:
≤ 100 calories (24 gm)/day for women
≤150 calories (36 gm)/day for men

Institute of Medicine: <25% of daily calories
The FDA announced in 2014 a proposal for new food labels. What changes are being made?

- Added sugar will be listed separately
- Serving size will reflect what people actually eat as a serving
- Total calories will be made very prominent
Labels made a difference with Trans Fat!

- Consumption has been significantly reduced due to public education about the associated health risks.

- When the FDA added the trans fat category to food labels in 2006, companies immediately reduced the amount they added to food.

- Trans fat intake has declined from 4.6 grams per day in 2003 to about 1 gram per day in 2012.
Is eating red meat associated with an increased risk of CV mortality?

A. Yes
B. Yes, but only with processed red meat
C. No
Is eating red meat associated with an increased risk of CV mortality?

A. Yes
B. Yes, but only with processed red meat
C. No
Red Meat Consumption and Mortality

- 38,000 men and 84,000 women free of CV disease and cancer at start
- Up to 28 years of follow up
- Food-frequency questionnaires updated every 4 years
- Outcomes measured: death (total, CV, and cancer)

Arch Intern Med. 2012;172(7):555-563
RESULTS

23,926 deaths (5910 CV and 9464 cancer)

Total mortality
HR 1.13 one-serving per day increase of unprocessed meat
HR 1.20 processed meat

CV mortality:
HR 1.18 unprocessed meat
HR 1.21 processed meat

Cancer mortality:
HR 1.10 unprocessed meat
HR 1.16 processed meat
Reduced mortality by substituting one serving of other foods each day for one serving of red meat.

- Nuts 19%
- Whole grains 14%
- Poultry 14%
- Legumes 10%
- Low fat dairy 10%
- Fish 7%
What may be the mechanism causing higher mortality with processed meat as compared with unprocessed meat?

A. Higher fat content
B. Higher content of preservatives/nitrates/sodium
C. Higher cholesterol content
D. All of the above
What may be the mechanism causing higher mortality with processed meat as compared with unprocessed meat?

A. Higher fat content
B. Higher content of preservatives/nitrates/sodium
C. Higher cholesterol content
D. All of the above
Different meat preparation methods may also be influential

High temperature cooking or frying used in processed meats can introduce potential carcinogens which are also associated with CHD and diabetes:

- Nitrosamines
- Heterocyclic amines
- Polycyclic aromatic hydrocarbons which are potential
Environmental health is very important for human health. Factory farms produce what percent of gas emissions?

A. 6%
B. 12%
C. 15%
D. 18%
Environmental health is very important for human health. Factory farms produce what percent of gas emissions?

A. 6%
B. 12%
C. 15%
D. 18%
Factory Farms

- 18 percent of all human-induced greenhouse gas emissions (more than automobiles)

- Staggering volumes of water are used which cannot be sustainable

- Environmentally damaging
Dietary Whole Grain Intake and Risk of Mortality

- 74,341 women: Nurses’ Health Study (1984-2010)
- 43,744 men: Health Professionals Follow-Up Study (1978-2010)

- All individuals free of CV disease and cancer at start to study

- Outcomes: total mortality, CV mortality, cancer mortality according to quintiles of whole grain consumption

AMA Intern Med. Published online January 05, 2015
Results of Whole Grain Study

Total Mortality
HR 0.99, 0.98, 0.97, 0.91 (P<.001)

CV mortality
HR 0.94, 0.94, 0.87, 0.85 (P<.001)

Cancer mortality
HR 1.02, 1.05, 1.04, 0.97 (P=.43)

Bran intake and CVD mortality HR 0.80 (P<.001)
It's the latest thing.
It's called the veterinarian diet.
Diet
Dietary Habits

Habitual decisions an individual or culture makes when choosing what foods to eat.

The word diet often implies the use of specific intake of nutrition for health or weight-management reasons.

it's not a diet
IT'S CALLED EATING HEALTHY
Examples of Dietary Patterns

- Vegan
- Vegetarian Diet
- Mediterranean Diet
- Western Diet
- Paleolithic Diet
Seven Countries Study

- 12,763 men in 7 countries
  - US, Japan, Finland, former Yugoslavia, Italy, Greece, The Netherlands

- Initial dietary information gathered 1958
- 25 year follow-up
- Endpoint: CHD mortality

European J Epi 1999:15;507-15
## Seven Countries Study (25-year follow-up)

<table>
<thead>
<tr>
<th>Cohort</th>
<th>N</th>
<th>CHD (Death rates/1000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crete, Greece</td>
<td>686</td>
<td>25</td>
</tr>
<tr>
<td>Tanushimaru, Japan</td>
<td>508</td>
<td>30</td>
</tr>
<tr>
<td>Ushibuka, Japan</td>
<td>502</td>
<td>36</td>
</tr>
<tr>
<td>Velika Krsna, Serbia</td>
<td>511</td>
<td>43</td>
</tr>
<tr>
<td>US Railroad, USA</td>
<td>2571</td>
<td>160</td>
</tr>
<tr>
<td>Zutphen, The Netherlands</td>
<td>878</td>
<td>169</td>
</tr>
<tr>
<td>West Finland, Finland</td>
<td>860</td>
<td>180</td>
</tr>
<tr>
<td>East Finland, Finland</td>
<td>817</td>
<td>268</td>
</tr>
</tbody>
</table>

Seven Countries Study (Food Intake Patterns)

More cereal, legumes, vegetable products, fish, oils, wine $\leftrightarrow$ less CHD death

More butter, dairy products, other animal products $\leftrightarrow$ more CHD deaths

Mediterranean Diet

Primarily Plant-based:

- fruits/vegetables, grains/legumes
- olive oil, nut/seeds
- fish, moderate wine with meals
- selective dairy
- limited meat and sweets
Mediterranean Diet Pyramid

- **Wine**: In moderation
- **Meats and Sweets**: Less often
- **Poultry, Eggs, Cheese, and Yogurt**: Moderate portions, daily to weekly
- **Fish and Seafood**: Often, at least two times per week
- **Fruits, Vegetables, Grains (mostly whole), Olive oil, Beans, Nuts, Legumes and Seeds, Herbs and Spices**: Base every meal on these foods

Be Physically Active; Enjoy Meals with Others

Illustration by George Middleton

© 2009 Oldways Preservation and Exchange Trust www.oldwayspt.org
Lyon Diet Heart Study

- CAD secondary prevention trial
- Consecutive patients after 1st MI
- Randomized to prudent Western diet or Mediterranean diet
- Composite endpoint: cardiac death and non-fatal MI

Lyon Diet Heart Study

- Stopped early due to significant difference between groups at 27 months
- At 27 months the risk ratio for cardiac death or first MI was **0.27 (0.12-0.59)**
- At almost 4 years the risk ratio for cardiac death or first MI was **0.28 (0.25-0.53)** for Med diet group compared to controls

It has been argued that it is easier to prescribe drugs than to change dietary habits of patients, and unfortunately, after some attempts, most physicians give up.
Primary Prevention of Cardiovascular Disease with Mediterranean Diet (PREDIMED)

- Multicenter randomized trial in Spain
- >7000 high risk patients without CV disease

Randomized to:
- Mediterranean diet with extra olive oil
- Mediterranean diet with extra nuts
- Low fat diet

NEJM 2013:368;1279-90
PREDIMED Participants

- Men age 55-80, Women age 60-80
- Diabetes or at 3 Risk Factors
- Average age 67 years, 57% women
- >45% overweight, >45% obese
- >90% white, >80% Htn, ≈50% DM

NEJM 2013:368;1279-90
PREDIMED Protocol

- Randomized to one of 3 diets
- Quarterly dietary education
- Dietary questionnaires and biomarkers

- 1° Endpoint: Composite CV events
- 2° Endpoints: MI, stroke, CV death

NEJM 2013:368;1279-90
# PREDIMED Results

<table>
<thead>
<tr>
<th></th>
<th>HRs EVOO</th>
<th>Nuts</th>
<th>Low Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV events</td>
<td>0.70</td>
<td>0.72</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(.54-.92)</td>
<td>(.54-.96)</td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>0.67</td>
<td>0.54</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(.46-.98)</td>
<td>(.35-.84)</td>
<td></td>
</tr>
<tr>
<td>MI</td>
<td>0.80</td>
<td>0.74</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(.51-1.26)</td>
<td>(.46-1.19)</td>
<td></td>
</tr>
<tr>
<td>CV Death</td>
<td>0.69</td>
<td>1.01</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(.41-1.16)</td>
<td>(.61-1.66)</td>
<td></td>
</tr>
<tr>
<td>Any Death</td>
<td>0.82</td>
<td>0.97</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(.64-1.07)</td>
<td>(.74-1.26)</td>
<td></td>
</tr>
</tbody>
</table>

NEJM 2013:368;1279-90
Paleo Diet

The Paleo Diet
- Vegetables
- Tart Fruits
- Wild Meats
- Coconut & Olive Oil

Not in the Paleo Diet
- Refined, Processed Foods
- Sugars, Candy Bars
- Sweet Fruits, Juices
- Grains, bread, beans, GMO foods
- Extracted Seed Oils
- Dairy
No carbs, no sugar, no fat, no calories.
How many calories?

- Depends on age, gender, height, weight and activity level
- Calculators online (americanheart.org) or apps (myfitnesspal) to determine calories for weight goals
- Example: reduce calories by 250/day to lose ½ lb per week.
Macronutrients

- Carbohydrates (4 calories/gram)
  - 45-65% calories/day
  - Whole grain >> refined

- Protein (4 calories/gram)
  - 0.8gm-1.2/kg/day
  - Plant-based or lean animal >>> fatty animal

- Fat (9 calories/gram)
  - 20-35% calories/day
  - Unsaturated >>> saturated (<10% calories)
Your patient is following a Mediterranean diet but would like to lose weight

They should reduce:

A. Fat Intake
B. Carbohydrate Intake
C. Protein Intake
D. All macronutrients proportionally
E. Whichever they prefer
Your patient is following a Mediterranean diet but would like to lose weight

They should reduce:

A. Fat Intake
B. Carbohydrate Intake
C. Protein Intake
D. All macronutrients proportionally
E. Whichever they prefer (except protein intake)
Low-Carbohydrate Diets

- Restriction of carbohydrate intake to <45% of total daily calories
- Atkins, Zone
Low fat diets

- Restriction of fat intake to less <30% of total daily calories
- Therapeutic Lifestyle Changes, or TLC diet
- Ornish diet <10%
- AHA diet
DIRECT Trial
(Dietary Intervention Randomized Controlled Trial)

- 2 year trial of 322 moderately obese workers (BMI 31 kg/m²)
- 86% men, mean age 52
- Randomized to:
  - Mediterranean diet, calorie-restricted
  - Low-fat diet, calorie-restricted
  - Low-carb diet, calorie non-restricted

Summary

- Maintain calorie balance over time to achieve and sustain a healthy weight
- Focus on consuming nutrient-dense foods: vegetables, fruits, whole grains, seafood, lean meats and poultry, eggs, beans and peas, nuts and seeds, fat free or low-fat dairy products *
- Limit: saturated fat, added sugar, refined grains

* Moderate consumption of alcohol and caffeine OK
Lead by Example

- Keep a food journal for 1 week
- Calculate your calorie intake and distribution of protein, fat and carbohydrate
- Try changing one aspect of your diet to improve your health