Daily Fuel: Hype, Hope or Truth?

Learning Objectives:
1. Define and discuss the primary macronutrients and micronutrients and their role in maintaining a healthy, balanced diet
2. Classify vitamins and minerals, recognize their sources and function, and describe the syndromes/complications associated with their deficiency or toxicity
3. Compare current recommended daily values of nutrients against the average American diet
4. Explore the hype regarding multivitamins and supplements and compare to evidence from clinical trials
5. Assess the need for nutrient supplementation and make appropriate recommendations based on patient cases

Introduction

What are some examples of machines or systems engineered with the highest level of precision and efficiency?

Introduction – Fuel

* The human body – an amazing machine
  — Incredibly complicated, high efficiency
  — Requires correct fuel

* Nutrients
  — Macro vs micro
  — Definition, sources
  — Requirements, roles in physiology
  — Typical American diet
  — What happens if deficient?

The Hype

* Hype regarding daily supplements
  — Direct to consumer ads
  — Other media attention

* Hype regarding daily nutrition
  — Celebrity/fad diets
  — More direct to consumer ads
  — “Cool” or trendy
  — Social media “thinspiration”
**The Truth**

- Reconcile the hype…
  - Fuel required by the amazing machine
  - Who, what, when, why supplementation would be actually needed

- Macronutrients
  - Consumed in largest quantities, provide bulk energy
  - Carbohydrates, fats, and protein

- Micronutrients
  - Needed in very small amounts, provided from diet
  - Includes vitamins and several minerals

**Macronutrients**

**Protein**

- RI: 10-35% of total caloric intake
  - Protein-rich: fish, lean meat, eggs, beans, nuts
  - Avoid/limit: sources w/ high trans/saturated fats (red meat)

**Fat**

- RI: 20-35% of total caloric intake
  - Type of fat more important than amount
    - Trans/saturated \(\rightarrow\) heart disease
    - Unsaturated = protective

**Carbohydrates**

- AKA “sugars”
  - Recommended intake (RI): 45-65% total caloric intake
    - Complex > simple, whole grain > refined
    - Low “glycemic index” (fruits, vegetables) > high glycemic index (pizza, rice, pancakes)

  * Added sugars (sweetened beverages, processed foods) should not exceed 10% of total calories

**Micronutrients**

**Vitamins**

- Water-soluble
  - Mainly the variety of B vitamins and Vitamin C

- Fat-soluble
  - Vitamins A, D, K, and E

**Minerals**

- Calcium, potassium, magnesium, iron, copper, zinc, etc.

**Macronutrients**

**Micronutrients**

**Vitamins: H\textsubscript{2}O-Soluble**

- B-Vitamins
  - B\textsubscript{1} (Thiamine)
  - B\textsubscript{2} (Riboflavin)
  - B\textsubscript{3} (Niacin)
  - B\textsubscript{5} (Pantethenic acid)
  - B\textsubscript{6} (Pyridoxine)
  - B\textsubscript{9} (Folate, aka Folic Acid)
  - B\textsubscript{12} (Cyanocobalamin)

- Vitamin C (Ascorbic acid)

**Vitamins: Fat-Soluble**

- Vitamin A (Retinol)
  - Vitamin D
    - D\textsubscript{2} (Ergocalciferol)
    - D\textsubscript{3} (Cholecalciferol)

- Vitamin K (Phytonadione, brand = Mephyton)

- Vitamin E (Tocopherol)
Minerals

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<tbody>
<tr>
<td>Calcium</td>
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<td>Magnesium</td>
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<td>Iron</td>
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**Fuel: Finding the Balance**

2015-2020 Dietary Guidelines for Americans

- Foci on more on “big picture”
- **Five general recommendations**
  1. Follow a healthy eating plan across the lifespan (all choices add up)
  2. Focus on variety, nutrient density, and amount
  3. Limit calories from added sugars and saturated fats and reduce sodium intake
  4. Shift to healthier food and beverage choices
  5. Support healthy eating patterns for all

*Guidelines also recommend following Physical Activity Guidelines for Americans*

**Average American Diet**

Adherence of Americans ages 2 years and older to 2010 guidelines:

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage of Americans meeting guidelines</th>
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<tbody>
<tr>
<td>2010</td>
<td>2013</td>
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<tr>
<td>2014</td>
<td>2015</td>
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**Average American Physical Activity**

Percentage of adults meeting Physical Activity Guidelines:

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<th>Percentage</th>
<th>2010</th>
<th>2013</th>
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<tbody>
<tr>
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<td>2013</td>
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<tr>
<td>Men</td>
<td>2010</td>
<td>2013</td>
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<tr>
<td>Women</td>
<td>2010</td>
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**Making a Change**

**Fast food**

- Excessive energy (calories)...“volume” = “value”
- Excess total saturated fats, cholesterol, sodium
- Deficient in Vit A, Vit C, folic acid, fiber, calcium
- Fast food associated w/ other bad nutritional habits
- Eliminating the problem – not realistic

- **Drive-Thru Diet**
- Exercise expenditure

Can also tip the balance in other direction

- “Thinspiration”, other trends to avoid “fattening” foods
- 2x as likely: calcium, zinc, selenium, iron deficiency anemia

[www.choosemyplate.org](http://www.choosemyplate.org)
Supplements

Hype and advertisements
— Claims
— Popular belief

Vs.

Evidence
— Cardiovascular health
— Cancer prevention
— Osteoporosis
— Immunity
— Others

Supplementation – Summary

Average adult w/ balanced diet
— No evidence for benefit or harm in daily multivitamins/minerals

Special populations: ↑ risk of deficiency
— Poor intake (poverty, elderly, alcoholics, restrictive diets, e.g. vegan)
— Malabsorption (Celiac, Crohn’s, short bowel, elderly, gastric bypass)
— Abnormal losses (hormonal, diarrhea)
— Abnormal metabolism (genetic, alcoholism)
— Inadequate synthesis (vitamin D – homewon, little exposed skin)

Special circumstances
— Pregnant or trying to conceive: ↑ folic acid
— Elderly: calcium + vitamin D
— Children in developing countries: vitamin A

Beware toxicities

“Knowledge is like paint. It does no good until it’s applied” -Unknown

Fats should typically comprise how much of an adults total daily caloric intake?

A. 45-65%
B. 0-15%
C. 10-35%
D. 20-35%

“Education is the kindling of a flame, not the filling of a vessel” -Socrates

Women who are pregnant or trying to conceive should increase their intake of which specific micronutrient?

A. Retinol
B. Folic acid
C. Ascorbic acid
D. Ergocalciferol

“What happens if you take too much vitamin B6 (Pyridoxine)?

A. Nothing – it’s totally fine
B. You feel really strong
C. You get better looking and your jokes get funnier
D. You risk severe sensory and peripheral neuropathy

“Never argue with stupid people. They will drag you down to their level then beat you with experience” -Mark Twain

Questions?

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Google images, 2016
References