Nutritional Factors in Health & Performance

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Today’s Agenda

- Recommendations
  - Proteins, carbohydrates & fats
- Disease prevention & hydration
- Calculations of daily requirements
What is the Best Diet?

"INDIVIDUALIZED"
Standard Nutrition Guidelines

- Individuals have a few common dietary goals
  - Eating to maximize daily performance
  - Eating for optimal health
  - Eating to decrease the risk of chronic diseases
Meeting Individual Needs

- Appropriate caloric levels
- Appropriate nutrient levels to prevent deficiency
  - Food Guide Pyramid
Revised Food Pyramid

Exercise

- Adults should be physically active for at least 30 minutes most days of the week, children for 60 minutes.
- Sixty to 90 minutes of daily physical activity may be needed to prevent weight gain or sustain weight loss.

Old food pyramid

- Presented food groups as a hierarchy, with grains as the base of a healthy diet, and each group having a suggested number of servings.
- Emphasized limits on fats, oils and sweets, which were represented as the tip of the pyramid.

Oils

- Most fat should be from fish, nuts and vegetable oils.
- Limit solid fats, such as butter, margarine or lard.
- Keep consumption of saturated fats, trans fats and sodium low.
- Choose foods low in added sugar.

Category

- Grains
- Vegetables
- Fruits
- Milk
- Meat and beans

Recommendation

- Half of all grains consumed should be whole grains.
- Vary the types of vegetables you eat.
- Eat a variety of fruits. Go easy on juices.
- Eat low-fat or fat-free dairy products.
- Eat lean cuts, seafood and beans. Avoid frying.

Daily Amount

- Grains: 6 oz.
- Vegetables: 2.5 cups
- Fruits: 2 cups
- Milk: 3 cups
- Meat and beans: 5.5 oz.

*Based on a 2,000 calorie diet.

Recommended nutrient intakes at 12-calorie levels can be found on mypyramid.gov.

U.S. Dept. of Agriculture
General Nutrition Concepts

- Influence of Nutrition
  - Health
  - Performance
  - Mood

- Role of Nutrients in Diet
  - Essential for growth and development
  - Provide energy
  - Regulate metabolism
Classes of Nutrients

- Proteins
- Carbohydrates
- Fats
- Vitamins
- Minerals
- Water

MACRONUTRIENTS
Types of Protein

- Sources of Protein
  - Animal (complete)
    - meats, dairy
  - Vegetable (incomplete)
    - beans, nuts, legumes, grains

- Types of Amino Acids
  - Nonessential (11) – can be made by body
  - Essential (9) – must be included in your diet since your body can not make them

- 4 kcal/g
Sources of Protein

- Meat, fish, dairy products & eggs
  - High quality – amino acid pattern similar to that needed by the body

- Beans, rice, corn, peanut butter, bread & plant proteins (soy – best quality among plant proteins).
  - Nutritionally less dense – deficient in one or more of the essential amino acids
  - Vegans need to consume a variety of plant foods that provide different amino acids so that all the essential amino acids are consumed over the course of the day
Protein Requirements

- RDA – average (high quality proteins)
  - 0.8 g/kg/day (10-15%)
  - 0.36 g/lb/day
  - **Vegans may require more than 0.8 g/kg/day since they consume nutritionally less dense proteins**
Carbohydrates

- **Monosaccharides** (single sugar molecules)
  - glucose, Fructose, galactose

- **Disaccharides** (2 linked sugar molecules)
  - sucrose, lactose, maltose

- **Polysaccharides** – Complex carbohydrates
  - Starch
  - Fiber – which is GREAT!
  - Glycogen
Types of Carbohydrates

- **Simple**
  - Pop, candy, sweets, fruit
  - Individual glucose or fructose molecules

- **Complex**
  - Pasta, rice, breads, potatoes
  - Chains of glucose molecules
Carbohydrate Requirements

- 45-65% of total daily caloric intake

General calculations
- Raisin bran – 40g x 4 kcal/g = 160 x 2 servings = 320 kcal
- Total calories in cereal = 260 x 2 servings = 520 kcal
- 320 kcal / 520 kcal = 62% coming from carbohydrates
Fiber

- **Soluble** - ↓ cholesterol levels
  - found in oat bran, fruits and veggies

- **Insoluble** - ↓ risk of colon cancer
  - found in wheat bran and grains

Recommendation: 25-38 g per day
Are you getting enough?
Ways to Get More Fiber

- Eat more fruits & vegetables
- Eat unrefined & unprocessed whole grain or multi-grain foods
Cholesterol

Important for

- Structure & function of cell membranes
- Production
  - bile salts
  - hormones (estrogen, androgen, progesterone & cortisol)
Cholesterol

- **LDLs – Bad Cholesterol**
  - < 100 mg/dL – Optimal
  - 100-129 mg/dL – Near Optimal / Above Optimal
  - 130-159 mg/dL – Borderline High
  - 160–189 mg/dL – High
  - ≥ 190 mg/dL – Very High

- **HDLs – Good Cholesterol**
  - < 40 mg/dL – Low
  - ≥ 60 mg/dL – High

- **Total Cholesterol**
  - < 200 mg/dL – Desirable
  - 200-239 mg/dL – Borderline High
  - ≥ 240 mg/dL – High
Types of Fats

- Triglycerides
- Saturated FA
  - Animal sources
- Unsaturated FA
  - Monounsaturated FA
  - Polyunsaturated FA
    - Vegetable sources
- 9 kcal/g
Fat: Functions

- Insulation
- Protects organs
- Hormonal regulation
- Carrier of fat-soluble vitamins A, D, E & K
Trans Fatty Acids

- Fats that has hydrogen added to it to make it more solid

- Hydrogenation transforms unsaturated fats so that they take on the characteristics of saturated fats, as in the case for margarine and shortening
Fat Requirements & Recommendations

Dietary fat recommendations
- Fat should constitute 20-35% of the total calories consumed
  - 5-10% of energy from omega-6 fatty acids
  - 0.6-1.2% from omega-3 fatty acids
  - < 10% from saturated fats (1/3 of total fat intake)

General calculations
- Subway – 6 inch tuna sandwich
  - Fat – 31g (7 g saturated & 0.5 g trans fat) 31g x 9 kcal/g = 279 kcal
  - 279 kcal / 530 kcal = 53% fat
Ways to Decrease Intake of Fat

- Minimize "fast" foods
- Minimize processed foods
- Use better cuts of meats (lean meats)
- Use low fat alternatives
- Use of condiments
- Eat lower fat snacks
- Choose foods lower in saturated fat & higher in monounsaturated & polyunsaturated fats
Vitamins

- Organic substances that regulate numerous and diverse physiological processes in the body
- Do not contain calories
- Two types
  - Fat soluble
  - Water soluble
Fat Soluble Vitamins

- Supply essential fatty acids & are necessary for the
  - formation of healthy cell membrane
  - formation of healthy bones
  - ↓ risk of stress fractures
  - proper development & functioning of the brain and nervous system
  - production of hormones

- Absorbed at the small intestine in the presence of bile

- Overdoses can be toxic (A & D)
Water Soluble Vitamins

- B-1 (thiamine)
- B-2 (riboflavin)
- B-6 (pyridoxine)
- B-12 (cobalamin)
- Niacin (nicotinic acid)
- Pantothenic Acid
- Folic Acid
- Biotin
- C (Ascorbic acid)
Vitamin Guidelines

- A balanced diet containing recommended servings of carbohydrates, fats & proteins will meet the RDA standards.

- Extra servings of green & yellow vegetables may be beneficial.

- Extra consumption of citrus and other fruits may be beneficial.
Vitamin Supplementation?

- Not necessary if diet is healthy
- Multivitamins are safe (100% RDA)
- Not all vitamins are “pure”
- Can be toxic at high doses
Mineral Guidelines

- Inorganic elements found in food that are essential to life processes
  - About 25 are essential

- A diet containing recommended servings of carbohydrates, fats and proteins will meet the RDA standards

- Extra servings of green & yellow vegetables may be beneficial

- Dietary supplementation of calcium is beneficial for post-menopausal women

- Salt should be limited in the diet
Minerals with Established RDA Guidelines

- Calcium
- Phosphorus
- Iodine
- Iron
- Magnesium
- Zinc
- Selenium
Calcium

- Important for preventing osteoporosis
- RDA = 1000 - 1500 mg/ day
- Found in dairy products and vegetables

High protein diets leach calcium from bones and promote osteoporosis
Populations who may Benefit from Supplementation

- Pregnant / lactating women
- Alcoholics
- Elderly
- Women with severe menstrual losses
- Strict vegetarians
- Individuals taking medications or with diseases which inhibit nutrient absorption
Functions of Water

- Vital to life
  - Comprises about 60% of body weight
- Chief component of blood plasma
- Aids in temperature regulation
- Lubricates joints
- Active participant in many chemical reactions
Sport Drinks

What are the benefits?

- Provide energy surrounding exercise
- Replace electrolytes
- Shown to:
  - Maintain blood glucose levels late during exercise
  - Maintain fluid balance
  - Delay fatigue/time to exhaustion
  - ↑ performance
  - Improve immune status after exercise
  - Maintain/improve cognitive performance in some sports
Guidelines for Healthy Eating

- Eat regular meals (Most important meal of the day = breakfast)
- Eat foods from all food groups & according to the food pyramid
- Limit processed foods
- Get adequate amounts of vitamins & minerals
- Drink plenty of water & limit alcohol & caffeine
  - Diuretic – cause dehydration
Antioxidants

- Inactivate free radicals

- Free radicals are naturally created by human cells but are also caused by environmental factors, such as smoke & radiation

- Free radicals may cause cell damage that leads to various diseases

- Antioxidants may inactivate the free radicals before they do their damage
Antioxidant All-Stars

- Broccoli
- Cantaloupe
- Carrot
- Kale
- Mango
- Pumpkin
- Red pepper
- Spinach
- Strawberries
- Sweet potato
Hydration

- **Before Activity** = At least 1 pint of fluid 2 hours before activity

- **During Activity** = Start drinking before sensing thirst & continue to drink at regular intervals

- **After Activity** = Monitor body weight. Each lb lost represents 1 pint of fluid loss. This must be replaced
Signs of Dehydration

- Dark yellow, strong-smelling urine
- ↓ frequency of urination
- Rapid resting heart rate
- Prolonged muscle soreness

* Normal urine is the color of lemon juice
* Vitamin Intake – Urine bright yellow
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<tr>
<th>Nutrient</th>
<th>Caloric Content (kcal/g)</th>
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<tr>
<td>Protein</td>
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<td>Fats</td>
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<td>Alcohol</td>
<td>7</td>
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What is Baloney?

- 80% "fat free"
- 52 calories / slice
- 4 g fat / slice

Calories from fat:

\[ \text{Calories from fat} = 4 \text{ g/slice} \times 9 \text{ cal/g} = 36 \text{ calories} \]

Percentage of calories from fat:

\[ \text{Percentage of calories from fat} = \frac{36 \text{ cal}}{52 \text{ cal total}} = 69\% \]
What about Sliced Turkey?

- 98% "fat free"
- 30 calories / slice
- 1 g fat / slice

Calories from fat: $1 \text{ g/slice} \times 9 \text{ cal/g} = 9 \text{ calories}$

Percentage of calories from fat: $\frac{9 \text{ cal}}{30 \text{ cal total}} = 30\%$