Introduction to Clinical Nutrition  
Nutrition Guidelines for Health  
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Objectives
At the completion of this lecture, the student will be able to:

- Define nutritional status, nutrition services, and Medical Nutrition Therapy;
- Outline basic nutrition-related objectives of Healthy People 2010;
- Define and compare the Dietary Reference Intakes (EAR, RDA, AI, UL);
- Estimate energy expenditure and describe the Acceptable Macronutrient Distribution Ranges;
- Use the 2000 Dietary Guidelines for Americans and the Food Guide Pyramid to provide healthy patients with basic nutrition guidance;
- Use the Nutrition Facts panel on food labels to compare food items;
- Identify areas for improvement in their own dietary intake.

Suggested Readings on Reserve at Library

Other Resources
- Website for Healthy People 2010: http://www.healthypeople.gov/
- Website of the American Dietetic Association: www.eatright.org

Defining Nutrition and Nutritional Status
A. Nutrition is the process by which a person assimilates food and nutrients
   1. Obtain, prepare, chew, swallow, digest, absorb, metabolize, store, excrete
B. Nutritional Status
   1. Well nourished
   2. Malnourished
      a. Overnourished: high body weight and/or high body fat
      b. Undernourished: low body weight and/or low body mass and/or low body fat
   3. Good nutritional status
      a. Improves health
      b. Improves/maintains cognitive, emotional and physical functioning
      c. Improves/maintains quality of life
      d. Higher survival rates
      e. Saves health care labor and costs

Diet and Disease
A. Diet is implicated in 7 out of 10 leading causes of death in US in 2001 (those with a diet-disease relationship identified by an asterisk.)
   1. Heart disease*
   2. Malignant neoplasm*
   3. Cerebrovascular disease*
4. Bronchitis, emphysema, asthma*
5. Unintentional injury
6. Diabetes mellitus*
7. Pneumonia and influenza
8. Alzheimer’s disease*
9. Nephritis, Nephrotic syndrome*
10. Septicemia

B. Dietary factors are also implicated in osteoporosis & related hip fractures & mortality in OA

**Healthy People 2010** (see table below)
A. Goals:
1. Increase quality and quantity of healthy years lived
2. Eliminate health disparities
B. Objectives: 15/28 are nutrition-related

**Medical Nutrition Therapy (MNT)**
A. The Institute of Medicine delineated two tiers of nutrition services
1. Basic nutrition services
   a. Nutrition screening
   b. General nutrition counseling
   c. Basic nutrition education
   d. Referral to Registered Dietitian for:
2. Medical Nutrition Therapy
   a. a medically necessary & cost-effective way to prevent, treat and control disease, injury and medical conditions;
   b. identification and documentation of type and degree of macro and micronutrient malnutrition;
   c. assessment of nutritional needs, status and risk followed by treatment including food and/or nutrient modification, nutritional supplements, tube feeding & hyperalimentation;
   d. nutrition intervention to speed recovery & reduce complications leading to shorter hospital stays, fewer hospitalizations, reduced need for drugs, surgery & medical treatment.

**Dietary Reference Intakes (DRIs)**
A. Macronutrients
1. **Estimated Energy Requirement (EER)** = the dietary energy intake that is predicted to maintain energy balance in a healthy adult of a defined age, gender, weight, height, and level of physical activity:
   a. ♂: EER = 662 – 9.53 × Age [y] + PA × (15.91 × Weight [kg] + 539.6 × Height [m])
   b. ♀: EER = 354 – 6.91 × Age [y] + PA × (9.36 × Weight [kg] + 726 × Height [m])
   Where PA is the Physical Activity coefficient:
   - PA = 1.00  Sedentary
   - PA = 1.11  Low active
   - PA = 1.25  Active
   - PA = 1.48  Very active

2. **Acceptable Macronutrient Distribution Ranges (AMDR)** = intakes that minimize the potential for chronic disease over the long-term, permit essential nutrients to be consumed at adequate levels, and should be associated with adequate energy and physical activity to maintain energy balance.
   a. Carbohydrate  45 – 65% of energy
   b. Fat  20 – 35% of energy including:
i  n-6 polyunsaturated fatty acids  5 – 10% of energy
ii  n-3 polyunsaturated fatty acids  0.6 – 1.2% of energy
c. Protein  10 – 35% of energy

B. Micronutrients
   1. EAR = Estimated Average Requirement, amount of nutrient intake that meets estimated nutrient need of half of the individuals in a specific age/sex group.
   2. RDA = Recommended Dietary Allowance, average daily dietary intake that is sufficient to meet the nutrient needs of almost all (97 – 98%) healthy individuals in a specific age/sex group.
   3. AI = Adequate Intake, mean intake that appears to sustain a desired indicator of health.
      a. Created when there is not enough scientific evidence available to establish an EAR/RDA –more research needed on nutrient requirements.
      b. May be established for non-essential nutrients.
   4. UL = Tolerable Upper Intake Level, maximum intake by an individual that is unlikely to pose risks of adverse health effects in almost all healthy individuals in a specific age/sex group.
      a. This includes nutrients from both food and dietary supplements
      b. Not intended as a goal - Thus, “more is not better”

Anticipatory guidance
A. 2000 Dietary Guidelines for Americans
   1. Aim for fitness
      a. Aim for a healthy weight
      b. Be physically active every day
   2. Build a healthy base
      a. Let the Pyramid guide your food choices.
      b. Choose a variety of grains daily, especially whole grains.
      c. Choose a variety of fruits and vegetables daily.
      d. Keep foods safe to eat.
   3. Choose sensibly
      a. Choose a diet that is low in saturated fat and cholesterol and moderate in total fat.
      b. Choose beverages and foods to moderate your intake of sugars.
      c. Choose and prepare foods with less salt.
      d. If you drink alcoholic beverages, do so in moderation.

B. The Food Guide Pyramid

Pictorial representation of qualitative and quantitative references
   1. Bread, cereal, rice, grain, & pasta group  6 – 11 servings
   2. Vegetable group  3 – 5 servings
   3. Fruit group  2 – 4 servings
   4. Meat, poultry, fish, dry beans, eggs, & nuts group  2 – 3 servings
   5. Milk, yogurt, & cheese group  2 – 3 servings
   6. Fats, oils, & sweets  Use sparingly
Food Labeling
A. Labeling is required for all packaged foods, including packaged meat, poultry
   1. Point of service information must be available for fruits, vegetables, seafood
   2. Food labels are required to include:
      a. Statement of identity
      b. Net contents
      c. Ingredient list (in descending order, by weight)
      d. Name and place of manufacturer or distributor
      e. “Nutrition Facts” panel
         • Focus on public health recommendations
B. How to read a Nutrition Facts panel
   1. Serving size / servings per container
   2. Calories and Calories from Fat
   3. Nutrient listing
      a. Limit these nutrients
         • Total fat
         • Saturated fat
         • Cholesterol
         • Sodium
      b. Get enough of these nutrients
         • Fiber
         • Vitamin A
         • Vitamin C
         • Calcium
         • Iron
   4. Percent Daily Values
      a. %DVs are based on recommendations for a 2,000 calorie diet
      b. ≤ 5% DV is low
      c. ≥ 20% DV is high
   5. Footnote
C. FDA Approved Health Claims
   1. Calcium & osteoporosis
   2. Sodium & hypertension
   3. Dietary fat & cancer
   4. Dietary saturated fat and cholesterol & risk of coronary heart disease
   5. Fiber-containing grain products, fruits, and vegetables & cancer
   6. Fruits, vegetables, and grain products that contain fiber, particularly soluble fiber, and risk of coronary artery disease
   7. Fruits and vegetables & cancer
   8. Folate & neural tube defects
   9. Dietary sugar alcohol & dental caries
   10. Dietary soluble fiber, such as that found in whole oats and psyllium seed husk & coronary artery disease
   11. Soy protein & coronary artery disease
   12. Plant sterol/stanol esters and risk of coronary artery disease
   13. Whole grain foods and risk of heart disease and certain cancers
   14. Potassium and the risk of high blood pressure and stroke
### Healthy People 2010

#### A. Weight status and growth
(Refer to lecture notes on *Obesity* and *Pediatrics* for more information)

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Increase the proportion of adults at a <strong>healthy weight</strong> (BMI 18.5 – 25 kg/m²)</td>
<td>42%</td>
<td>60%</td>
</tr>
<tr>
<td>2. Reduce the proportion of adults who are <strong>obese</strong> (BMI ≥ 30.0 kg/m²),</td>
<td>23%</td>
<td>15%</td>
</tr>
<tr>
<td>3. Reduce the proportion of children and adolescents who are <strong>overweight or obese</strong> (gender- and age-specific 95th percentile on CDC Growth Charts).</td>
<td>11%</td>
<td>5%</td>
</tr>
<tr>
<td>4. Reduce <strong>growth retardation</strong> among low-income children under age 5 years (5th percentile of height for age).</td>
<td>8%</td>
<td>5%</td>
</tr>
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#### B. Food and nutrient consumption

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>1. Increase the proportion of persons aged 2 years and older who consume at least two daily servings of <strong>fruit</strong>.</td>
<td>28%</td>
<td>75%</td>
</tr>
<tr>
<td>2. Increase the proportion of persons aged 2 years and older who consume at least three daily servings of <strong>vegetables</strong>, with at least one-third of them being dark green or orange vegetables.</td>
<td>3%</td>
<td>50%</td>
</tr>
<tr>
<td>3. Increase the proportion of persons aged 2 years and older who consume at least six daily servings of <strong>grain products</strong>, with at least three whole grains.</td>
<td>7%</td>
<td>50%</td>
</tr>
<tr>
<td>4. Increase the proportion of persons aged 2 years and older who consume less than 10 percent of <strong>calories from saturated fat</strong>.</td>
<td>36%</td>
<td>75%</td>
</tr>
<tr>
<td>5. Increase the proportion of persons aged 2 years and older who consume no more than 30 percent of <strong>calories from total fat</strong>.</td>
<td>33%</td>
<td>75%</td>
</tr>
<tr>
<td>6. Increase the proportion of persons aged 2 years and older who consume 2,400 mg or less of <strong>sodium</strong> daily.</td>
<td>21%</td>
<td>65%</td>
</tr>
<tr>
<td>7. Increase the proportion of persons aged 2 years and older who meet dietary recommendations for <strong>calcium</strong>.</td>
<td>46%</td>
<td>75%</td>
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#### C. Iron deficiency and anemia

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<tr>
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<tbody>
<tr>
<td>1. Reduce <strong>iron deficiency</strong> among young children/females of childbearing age.</td>
<td>9-11%</td>
<td>5-7%</td>
</tr>
<tr>
<td>2. Reduce <strong>anemia</strong> among low-income pregnant females in their third trimester.</td>
<td>29%</td>
<td>20%</td>
</tr>
<tr>
<td>3. (Developmental) Reduce iron deficiency among pregnant females.</td>
<td>--</td>
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#### D. Schools, worksites, and nutrition counseling

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<tbody>
<tr>
<td>1. (Developmental) Increase the proportion of children and adolescents aged 6 to 19 years whose intake of <strong>meals and snacks at school</strong> contributes to good overall dietary quality.</td>
<td>--</td>
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</tr>
<tr>
<td>2. Increase the proportion of <strong>worksites that offer nutrition</strong> or weight management classes or counseling.</td>
<td>55%</td>
<td>85%</td>
</tr>
<tr>
<td>3. Increase the proportion of <strong>physician office visits</strong> made by patients with a diagnosis of cardiovascular disease, diabetes, or hyperlipidemia that include counseling or education related to diet and nutrition.</td>
<td>42%</td>
<td>75%</td>
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#### E. Food security

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<tbody>
<tr>
<td>1. Increase <strong>food security</strong> among U.S. households and in so doing reduce hunger.</td>
<td>88%</td>
<td>94%</td>
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CASE STUDY 1

Case
You have a 29 y.o. female who comes regularly to your obstetrics and gynecology clinic. She is 7 months pregnant and has had a normal pregnancy with a normal weight gain so far. Today she complains of cramping in her legs at night.

Questions
• How would you assess her intake of magnesium?
• Which DRI would be used to evaluate whether her intake of magnesium is adequate?
• Would you use a DRI to evaluate whether her intake of magnesium is excessive?

Key points to consider
• EAR
  o for Mg in Pregnancy = 35 mg above EAR for age
  o for women aged 19-30 y = 255 mg / day
• RDA
  o for Mg in Pregnancy for women aged 19-30 y = 350 mg
• UL
  o Mg from food sources: no adverse effects
  o UL for Mg determined from nonfood sources
  o UL for Mg in Pregnancy = 350 mg of supplementary magnesium

Steps to take
• Obtain accurate information on dietary intake of Mg from foods and supplements
  o Refer to RD for assessment of usual intake, eg, average intake of 3 days
• Choose appropriate DRI to use as a reference standard and compare her mean intake
  o EAR of 290 mg as the median requirement for Mg for her age and gender and pregnant state
• Only use UL to evaluate whether any supplemental Mg intake puts her at risk for adverse events

CASE STUDY 2

Case
You see a 42-year-old male in your office for a routine physical examination. He is a single tax attorney, he lives alone, has no time for cooking dinner, and he plays golf 2 weekends a month. He is usually 25-30 pounds overweight but has no history of chronic disease. He mentions that his father recently had a heart attack and underwent a CABG procedure. He is worried about his own cardiac risk. He brought labels from two favorite meals to ask you which is a better pre-packaged dinner choice? (see below)

Questions
• How does it compare to the 2000 DGs?
• Which Healthy People 2010 objectives apply?
• What nutrition services could benefit him?

Key points
• Which Healthy People 2010 Goals might apply to this patient?
  – Increase the proportion of adults at a healthy weight.
  – Increase the proportion of persons aged 2 years and older who consume no more than 30 percent of calories from fat.
  – Increase the proportion of persons aged 2 years and older who consume less than 10 percent of calories from saturated fat.
  – Increase the proportion of persons aged 2 years and older who consume 2,400 mg. or less of sodium daily.
• What nutrition services could benefit him?
  – Nutrition education and counseling
Key take home points
A. Know the role of nutrition in health and disease;
B. Know the types of nutrition services provided and what MNT is;
C. Know the definitions of the DRIs & AMDRS;
   • You do not need to know specific values for various micronutrients - you can refer to a table
D. Know the A, B, C’s of the 2000 Dietary Guidelines for Americans;
E. Know the Food Guide Pyramid: food categories and recommended servings of foods in each;
F. Be able to read a Nutrition Facts panel;
G. Identify nutrition-related objectives of Healthy People 2010;
H. Be able to implement anticipatory guidance in case scenarios.

Sample Exam Questions
1. In which of the following chronic diseases is the “typical” American diet implicated (select all that apply)?
   a. Coronary heart disease
   b. Nephrotic syndrome
   c. Stroke
   d. Arthritis
2. The RDA is the amount of a nutrient that __________.
   a. Is adequate to meet the needs of 97–98% of all healthy Americans
   b. Is adequate to meet the needs of 50% of all healthy Americans
   c. Is the maximum amount unlikely to pose an adverse risk
   d. Is adequate to sustain a desired health outcome

3. Which of the following is not one of the Dietary Guidelines for Americans?
   a. Aim for a healthy weight
   b. Be physically active every day
   c. If you drink alcoholic beverages, do so in moderation
   d. Drink at least eight glasses of water daily

4. According to the Food Guide Pyramid, healthy American adults should consume _____ servings of milk, yogurt, and cheese products daily.
   a. 0 – 1
   b. 1 – 2
   c. 2 – 3
   d. 3 – 4

5. According to the Institute of Medicine, which of the following nutrition services should be conducted by a Registered Dietitian?
   a. Basic nutrition counseling
   b. Nutrition screening
   c. Nutrition assessment
   d. General nutrition education

Answers
1. a, c
2. a
3. d
4. c
5. c

Selected References
Diet and Disease


RDAs and DRIs


*Dietary Guidelines for Americans


Troiano RP, Macera CA, Ballard-Barbrash R. Be physically active each day. How can we know? *J Nutr.* 2001; 131:451S – 460S.


Dixon LB, Ernst ND. Choose a diet that is low in saturated fat and cholesterol and moderate in total fat: Subtle changes to a familiar message. *J Nutr.* 2001; 131:510S – 526S.


Loria CM, Obarzanek E, Ernst ND. Choose and prepare foods with less salt: Advice for all Americans. *J Nutr.* 2001; 131:536S – 551S.

Dufour MC. If you drink alcoholic beverages do so in moderation: What does this mean? *J Nutr.* 2001; 131:552S – 561S.

**The Food Guide Pyramid**


*Healthy People 2000* and *Healthy People 2010*


To follow the latest progress on *Healthy People 2010*, go to: [http://wonder.cdc.gov/data2010/focus.htm](http://wonder.cdc.gov/data2010/focus.htm).