

Nutrition and Wellness Section
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(1)

(A) Classify nutrients, their functions, food sources

- Carbohydrate: 4 calories/g
 - Break down into glucose and are used for immediate energy or stored as glycogen for reserve energy; important for energy for brain & red blood cells
 - Intake should be about 50-60% of total daily calories
 - Includes fiber: structural parts of plants; not digested by human digestive enzymes (need 20-35 grams/day)
 - Examples: Cellulose, hemicellulose, mucilages, pectin, gums, lignins, cutins, tannins
 - Body responds to ingestion of glucose by secreting insulin to aid in absorption of glucose into cells to use for energy
 - Food examples: starches (breads, cereals, grains, rice), fruits and vegetables, sweets (cakes, cookies, candy), beans
- Protein: 4 calories/g
 - Broken down during digestion into amino acids
 - Provide sustaining energy; iron
 - Suggested intake: .8 g/kg (increase with increased physical activity)
 - Functions:
 - Building materials for growth and maintenance (collagen) → hair, teeth, nails, skin, muscle tissue
 - Enzymes & Hormones
 - Transporters: hemoglobin, lipoproteins
 - Good food sources: animal products (meats, dairy, eggs), nuts, soy, peanut butter
- Fat: 9 calories/g (calorie dense source of energy)
 - Provide energy reserve when stored in body's fat tissue
 - Contributes to satiety
 - Helps with absorption of fat-soluble vitamins
 - Provides essential fatty acids (omega-6 & omega-3 fatty acids) → polyunsaturated fatty acids
 - Omega-3:
 - Triglycerides: chief form of fat in the diet and major storage form of fat in body
 - Types: saturated & unsaturated
 - Saturated: triglycerides in which most fatty acids are saturated with hydrogen atoms (ex. butter, lard)
 - Unsaturated: triglycerides in which most fatty acids are unsaturated (double bonds) (ex. Olive oil, canola oil, soybean oil)
 - Trans-fats: refers to location of double bonds in fatty acids

- Contributes to heart disease (act like saturated fats in the body) (ex. Hydrogenated oil)
- Food sources: oils, butter, high fat animal products (cheese, milk, meats), fried foods, “junk” foods (chips, cakes, cookies, pastries, doughnuts, crackers), nuts & seeds, avocados

Dietary Guidelines Through the Life Cycle

- Pregnancy
 - Recommended weight gain:
 - Normal weight at conception: 25 pounds
 - Underweight at conception: 28-40 pounds
 - Overweight at conception: 15-25 pounds
 - Weight gain patterns:
 - 3.5 pounds/week during 1st trimester
 - 1 pound/week during last 2 trimesters
 - Energy and Nutrient Needs:
 - Calories: extra 340/day during 2nd trimester; extra 450/day during 3rd trimester
 - Should be eating nutrient-dense foods as extra calories
 - Protein: RDA is an additional 25 grams/day
 - Folate: important for proper neural tube formation (600 micrograms/day)
 - If intake of folate is low, can cause neural tube defects (Spina Bifida)
 - Vitamin B12: 2.6 micrograms/day for activation of folate enzyme
 - Iron: 27 mg/day to support increased blood volume and provide for placenta and fetus
 - AI for Ca does not increase during pregnancy, but it is vital that the woman gets at least the AI
 - Prenatal vitamins can provide from 15% to 167% of certain nutrients that are important in pregnancy
 - Pregnant women should avoid caffeine, alcohol, drugs during pregnancy
 - Breastfeeding is important for mother and baby
 - Mother: contracts uterus, conserves iron stores, may protect against breast and ovarian cancers, can help mother lose baby weight
 - Baby: provides appropriate composition and balance of nutrients with high bioavailability, provides hormones for physiological development, improves cognitive development, protects against various infections
 - Physically fit women can continue to exercise during pregnancy; improves fitness, prevents/manages gestational diabetes, facilitates labor and reduces stress

- Infancy
 - Birthweight doubles by five months of age, and triples by one year
 - Length changes about 10 inches from birth to one year
 - BMR is 2x that of an adult
 - Newborn baby: needs 450 calories/day
 - Infancy: 100 calories/kg
 - Energy nutrients:
 - Fat provides most energy in breast milk/formula → supports rapid growth
 - Protein: most essential for growth
 - Increased nutrients in infant compared to adult: Vitamin A, D, E, C, folate, riboflavin, thiamin, B12, Calcium, Iodine, Zinc
 - Introduce solid foods at 4-6 months
 - Introduce cow's milk at 1 year but only whole milk
 - Infants should not eat honey → risk of botulism
- Childhood
 - Calorie needs vary widely (800 calories at 1 yr, 1200 for 6 year old, 2000 by age 10)
 - Amount of physical activity determines calorie needs
 - Carbohydrate needs are similar to those of an adult
 - Children need at least 5 grams of fiber/day
 - Fat intake: 30-40% of calories (1-3 yo); 25-35% at 4-18 yo
 - Protein: declines from 1.5 g/kg at 1 year to .8 g/kg at age 19
 - Vitamin and mineral needs increase with age
- Later adulthood
 - 6 lifestyle behaviors that have the greatest influence on people's health:
 - Sleeping regularly and adequately
 - Eating well-balanced meals, including breakfast
 - Engaging in physical activity regularly
 - Not smoking
 - Not using alcohol, or using it in moderation
 - Maintaining a healthy body weight
 - Physiological changes
 - Increase in fat stores and decrease in muscle mass (sarcopenia)
 - GI complications which can affect intake (dysphagia, tooth loss)
 - Sensory losses: diminished taste
 - Older adults are at risk for dehydration → increases risk for pressure ulcers (should drink at least 6 glasses of water/day)
 - Energy needs: men subtract 10 kcal/day for each year over age 19; women subtract 7 kcal/day for each year over age 19

- Protein needs are lower; must be obtained from low-calorie sources
 - Important for healthy immune system and prevent muscle wasting
- Abundant carbohydrate needed; Fiber= 14 grams/1000 calories
- Fat intake should be moderate; high intake can increase risk of cancer, atherosclerosis
- Important vitamins and minerals: B12, Iron, Calcium, Vitamin D
- Digestion and Metabolism
 - Digestion: the process by which food is broken down into absorbable units
 - Gastrointestinal (GI) tract: digestive tract; key organs are stomach and intestines
 - Includes: mouth, pharynx, salivary glands, trachea, esophagus, sphincters, stomach, liver, gallbladders, bile duct, small intestine, large intestine, pancreas, rectum. Anus
 - Peristalsis: wavelike muscular contractions of the GI tract that push its contents along
 - Digestive enzymes: proteins found in digestive juices that act on food substances, causing them to breakdown into simpler compounds
 - Carbohydrase, lipase, protease
 - Hydrochloric acid: found in stomach
 - Bile: emulsifies fat; made by liver and stored in gallbladder
 - Absorption: the uptake of nutrients by the cells of the small intestine for transport into either blood or lymph
 - Microvilli: tiny projects on each villi in the small intestine that trap nutrient particles and transport them into cells
 - Crypts: tubular glands that lie between intestinal villi and secrete intestinal juices into the small intestine
 - Nutrients are transported via blood and lymph
 - Nutrients leaving the digestive system via the blood are routed directly to the liver before being transported to the body's cells; those leaving via lymph eventually enter the vascular system but by-pass the liver at first
 - Hormones:
 - Gastrin: secreted by cells in stomach and stimulate secretion of HCl
 - Secretin: produced by cells in duodenum and stimulates pancreas to release bicarbonate
 - Cholecystokinin (CCK): produced by cells in gallbladder and stimulates release of bile

- Gastric-inhibitory peptide: produced by intestine and slows the digestive process by slowing secretion of gastric juices and of GI motility
- Basal and Activity Metabolism
 - Basal metabolic rate: the rate of energy use for metabolism under specified conditions – after a 12-hour fast and restful sleep, without any physical activity, and in a comfortable setting; expressed as calories per kilogram per hour
 - Calculated by exchange of oxygen and carbohydrate
 - Basal metabolism: the energy needed to maintain life when a body is at complete digestive, physical and emotional rest
 - Thermogenesis: generation of heat; used as an index of how much energy the body is expending
 - Can be used to calculate daily calorie needs
 - Factors affecting BMR:
 - Age, height, growth, body composition/gender, fever, stresses, environmental temperature, fasting/starvation, malnutrition, hormones, smoking, caffeine, sleep
 - Body Mass Index: describes relative weight for height
 - $BMI = \text{weight (kg)} / \text{height (m)}^2$
 - $BMI = \text{weight (lb)} \times 703 / \text{height (in)}^2$
 - Daily energy needs based on weight, height, age, gender and amount of physical activity
 - Can calculate it using different equations and including an activity factor based on activity level OR by calories/kg
- Weight Management/Physical Activity
 - Calories in > Calories out = weight gain
 - Calories in < Calories out = weight loss
 - Calories in = Calories out = weight maintenance
 - 1 lb of body fat = 3500 calories
 - Ex. To lose 1 pound of body fat, one must reduce caloric intake by 3500 calories or increase calorie expenditures by 3500 calories
 - Can increase caloric expenditure through exercise
 - Healthy weight loss is .5-1 pound of body weight/wk
 - Calorie needs increase with increased physical activity
 - Weight management: combining a proper, healthy diet and regular physical activity
- Food labels
 - Serving size: appropriate portions for one sitting
 - All numbers on label correspond with one serving size
 - Calories: amount of energy provided by the food
 - Fat: categorizes saturated, trans fats
 - Carbohydrates: includes sugar, fiber, other carbohydrates

- Other nutrients on label: sodium, % Vitamins A, C
- Ingredients: first 3 ingredients listed are the ones in highest amount in the food
- Meals: 500-600 calories each; Snacks: 100-300 calories each
- Nutritional serving sizes (1 serving)
 - Carbohydrates (6-11 servings/day)
 - 1 slices of bread, ½ c cooked cereal, rice or pasta, ½ bun or bagel
 - Vegetables (3-5 servings/day)
 - ½ cup cooked or raw vegetables, 1 c leafy raw vegetables, ½ c cooked legumes, ¾ c vegetable juice
 - Fruits (2-4 servings/day)
 - 1 medium-sized fruit, ¾ c juice, ½ c diced, cooked, canned fruit, ¼ c dried fruit. ½ c berries
 - Meat, Poultry, Fish (2-3 servings/day)
 - 2-3 oz lean, cooked meat, 1 egg, ½ c cooked legumes, 2 Tbsp peanut butter, 1/3 c nuts or seeds
 - Milk, Cheese, Yogurt (2 servings/day)
 - 1 c milk or yogurt, 2 oz processed cheese, 1 ½ oz cheese
- Quick and Easy Estimates of Portion Sizes
 - 1 c cooked vegetable= a fist
 - 1 medium fruit= a baseball
 - ¼ c dried fruit= a golf ball
 - 3 oz meat= a deck of cards
 - 2 tbsp peanut butter= a ping pong ball
 - 1 ½ oz cheese= 6 stacked dice
- Foodborne Illness: illness transmitted to human beings through food and water, caused by either an infectious agent (foodborne infection) or a poisonous substance (food intoxication); commonly known as food poisoning
 - Prevention methods: cook food thoroughly, use sanitary food handling methods, avoid cross-contamination, practice good personal hygiene, refrigerate and store foods properly
 - Common foodborne infections/intoxications:
 - Giardiasis: from contaminated water, uncooked foods
 - Listeriosis: from raw meat, poultry, seafood, milk
 - Salmonellosis: from raw or undercooked eggs, meats, poultry, milk
 - E. coli infection: from undercooked ground beef, unpasteurized milk, contaminated water
 - Shigellosis: from raw foods, salads, dairy products, contaminated water
 - Botulism: from canning (look for dents)
 - Staphylococcal food poisoning: toxin produced in meats, poultry, egg products, tuna

- Symptoms: diarrhea, fever, nausea, vomiting, abdominal cramps
- Food Preparation Techniques
 - To reduce overall fat:
 - Bake, broil, grill, sautee foods using olive/canola oil instead of frying with hydrogenated oil
 - Trade cream for a lower fat alternative
 - Avoid using large amounts of butter or lard
 - To maintain nutrient values:
 - Steam vegetables instead of boil
 - If using microwave, use little water on the lowest heat for the shortest amount of time
 - Eat foods as fresh as possible (time will reduce nutrient value)
- Food Storage Principles
 - Foods meant to be cold should be stored in a refrigerator at 40°F or lower
 - 1-2 days: raw ground meats, raw sausages, raw fish or poultry; gravies
 - 3-5 days: raw steaks, roasts or chops; cooked meats, poultry, vegetables, and mixed dishes; lunch meats (opened); mayonnaise salads
 - 1 week: hard-cooked eggs, bacon or hot dogs (opened); smoked sausages or seafood
 - 2-4 weeks: raw eggs (in shells); lunch meats, bacon or hot dogs (unopened); most aged and processed cheeses
 - 2 months: mayonnaise, most dry cheese
- Careers in Nutrition
 - Registered dietitian: earn a bachelor's degree in nutrition/meet educational pre-requisites and completes a supervised practice internship in order to take and pass a national exam and maintains registration through continuing professional education; certified through the American Dietetic Association
 - Dietetic technician: a person who has completed a minimum of an associate's degree and an approved dietetic technician program that includes a supervised practice experience; becomes registered by passing a national examination and maintains registration through continuing professional education
 - Nutritionist: a person who specializes in the study of nutrition