Chapter 15

15.1 Toddlers

- Age 1 to 3 years
  - Rapid growth rate of infancy begins to slow
  - Gain 5.5 to 7.5 inches and 9 to 11 pounds
  - High energy requirement due to increased activity level
- Macronutrients
  - 30–40% of total kcal from fat
  - 1.10 g of protein per kg body weight per day
  - 130 g carbohydrates per day
  - 14 g fiber per 1,000 kcal of energy consumed
- Micronutrients
  - Ensure adequate intake of the micronutrients obtained from fruits and vegetables, including
  - Vitamins A, C, E; calcium; iron; zinc
  - Calcium is necessary to promote optimal bone mass
  - Iron-deficiency anemia is the most common nutrient deficiency in young children
- Fluid needs
  - 1.3 liters/day
- Supplements
  - Toddlers may need supplements due to their erratic eating habits, especially for fluoride
  - Supplements should not exceed 100% of the Daily Value for any nutrient

Table 15.1: Nutrients for Children and Adolescents

Nutrient	Toddles (1–3) Years	Children (4–8) Years	Children (9–13) Years	Adolescents (14–18 Years)
Fat	No RDA	No RDA	No RDA	No RDA
Protein	1.10 g/kg body weight per day	0.95 g/kg body weight per day	0.95 g/kg body weight per day	0.85 g/kg body weight per day
Carbohydrate	130 g/day	130 g/day	130 g/day	130 g/day
Vitamin A	300 μg/day	400 μg/day	600 μg/day	Boys: 900 μg/day Girls: 700 μg/day
Vitamin C	15 mg/day	25 mg/day	45 mg/day	Boys: 75 mg/day Girls: 65 μg/day
Vitamin E	6 mg/day	7 mg/day	11 mg/day	15 mg/day
Calcium	700 mg/day	1,000 mg/day	1,300 mg/day	1,300 mg/day
Iron	7 mg/day	10 mg/day	8 mg/day	Boys: 11 mg/day Girls: 15 mg/day
Zinc	3 mg/day	5 mg/day	8 mg/day	Boys: 11 mg/day Girls: 9 mg/day
Fluid	1.3 liters/day	1.7 liters/day	Boys: 2.4 liters/day Girls: 2.1 liters/day	Boys: 3.3 liters/day Girls: 2.3 liters/day

- Nutritious food choices
  - Most toddlers have an innate ability to match their intake with their needs
  - Keeping a nutritious variety of foods available encourages a healthful diet
  - Food should not be forced on a child
  - Do not use bribery to encourage children to eat
  - Foods prepared should be fun

Figure 15.1: Fun Food

Figure 15.2: Portion Sizes for Preschoolers

15.2 Vegan Diets for Toddlers

- Vegan diets may not be healthful for toddlers. Due to the restriction of no foods from animal origin there are potential risks:
  - Protein
  - Calcium
  - Zinc and iron
  - Vitamins D and B_{12}
  - Fiber

15.3 Young Children

- Age 4 to 8 years
  - Dietary Reference Intake (DRI) values are the same for both boys and girls through the age of about 8

  - Growth rate is 2 to 4 inches per year

- Macronutrients
  - Total fat intake should gradually drop to a level closer to adult fat intake
  - 25–35% of total energy from fat
  - 0.95 g of protein per kg body weight per day
  - 130 g carbohydrate per day
  - 14 g fiber per 1,000 kcal of energy consumed

- Micronutrients
  - Vitamins and minerals from fruits and vegetables continue to be a concern
  - Vitamins A, C, E; calcium; iron; zinc
  - Increases in DRIs compared to toddlers

- Fluid
  - 1.7 liters/day (about 5–8 cups), including water

- Supplements
  - May be recommended when particular food groups are not eaten regularly
  - Supplements should be appropriate for the child's age

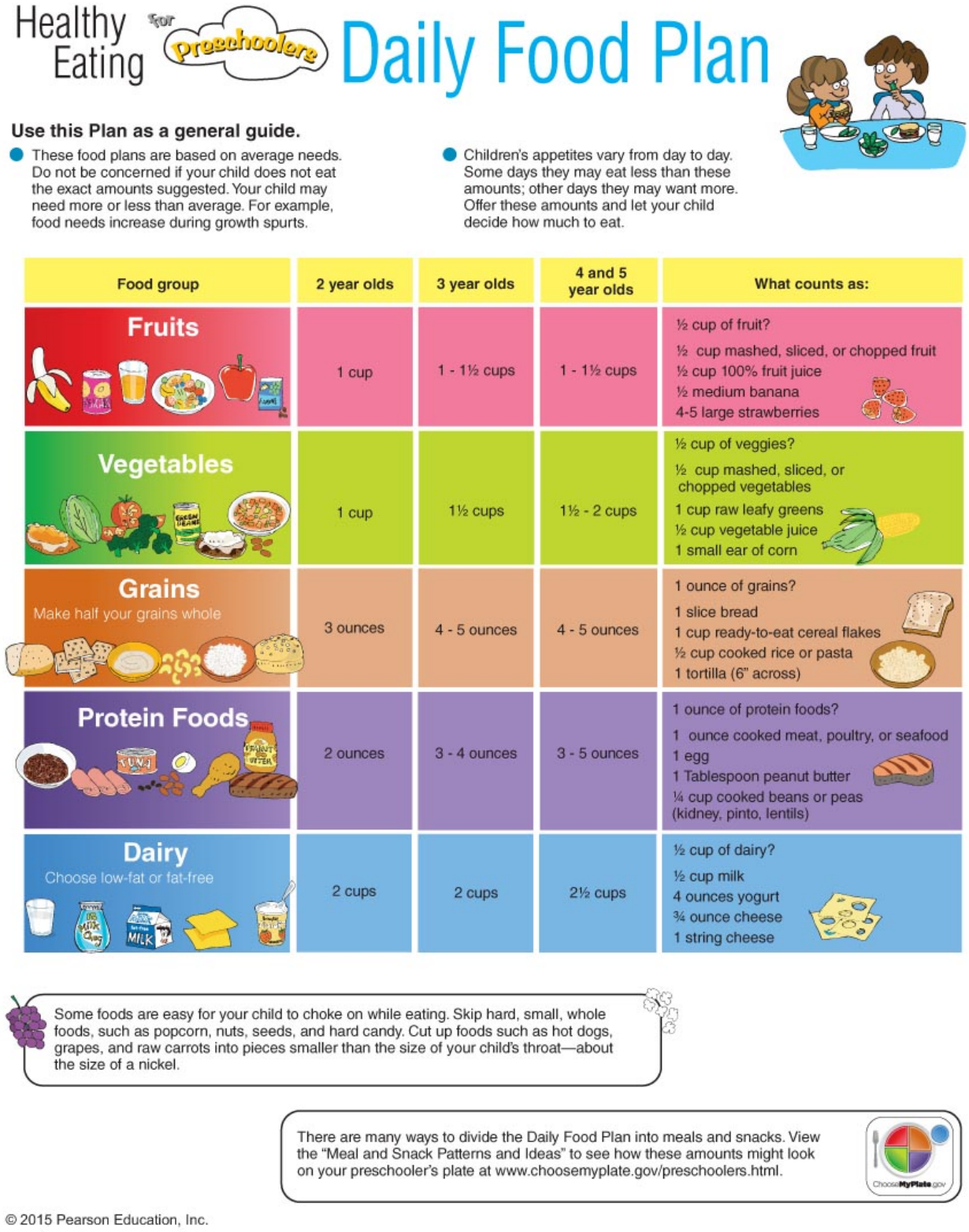

Figure 15.3: MyPlate Daily Food Plan for Preschoolers

- Nutritious food choices

  - Parents can teach children about healthful food choices
    * Some foods "help us grow healthy and strong"
    * Some foods are better used as occasional treats
  - Eating a balanced breakfast has many benefits
  - Some school lunch programs are in need of updated and more healthful menu selections

15.4 Children: Nutrition-Related Concerns

- Overweight and obesity
- Dental caries
- Inadequate calcium intake
- Body image concerns
- Childhood food insecurity

15.5 Older Children

- Age 9 to 13 years
  - Growth is slow and steady–2 to 4 inches per year
  - Growth is primarily driven by hormones during puberty
  - Children begin to make their own food choices
  - Activity levels vary
- Macronutrients
  - 25–35% of total energy from fat
  - 0.95 g protein per kg body weight per day
  - 130 g carbohydrates per day
  - 45–60% of kcal from carbohydrates
  - 14 g fiber per 1,000 kcal of energy consumed
- Micronutrients
  - Micronutrient needs rise sharply as children approach puberty
  - Meeting the needs for calcium and iron is very important
- Fluid

  - Adequate intake (AI) of fluids varies by gender, ranging from 2.1 liters/day (females) to 2.4 liters/day (males)

- Supplements
  - A vitamin/mineral supplement supplying no more than 100% of the daily values may be warranted

- Nutritious food choices
  - Peer pressure can influence a child's food choices
  - Healthy role models, such as athletes, can be used to encourage good choices
  - School lunches must meet U.S. Department of Agriculture (USDA) guidelines, but this does not control what the child actually eats

15.6 Adolescents

- Age 14 to 18 years
  - Growth spurts begin at age 9 to 10 for girls and 10 to 11 for boys
  - Weight and body composition also change

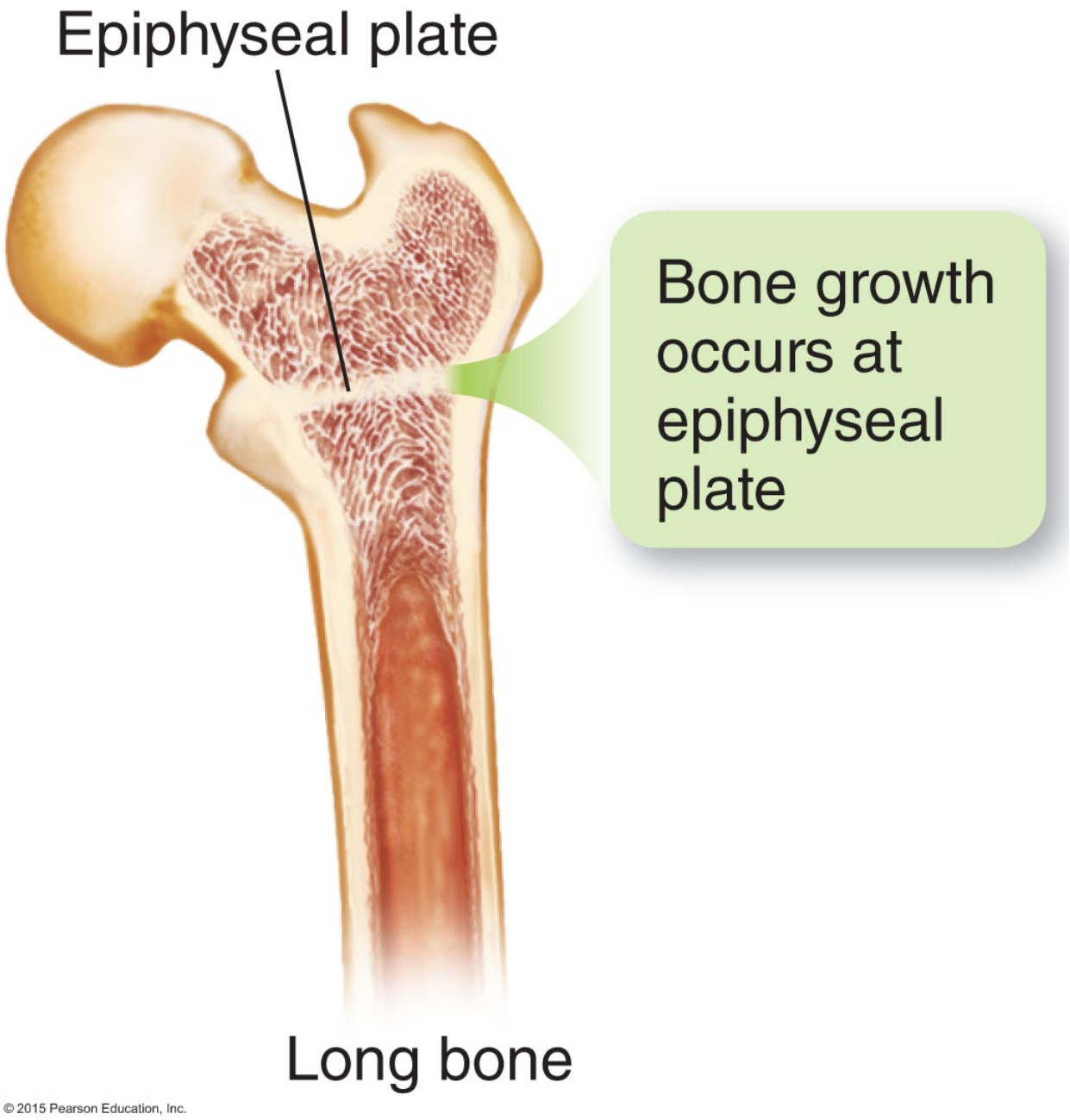

Figure 15.4: Skeletal Growth

- Macronutrients
  - Estimated energy requirements (EERs) for adolescents are based on gender, age, activity level, height, and weight
  - 25–35% of total energy from fat
  - 45–65% of kcal from carbohydrates
  - 0.85 g protein per kg body weight per day

  - 26 g of fiber per day
- Micronutrients
  - Calcium and vitamin D intakes must be sufficient for achieving peak bone density
  - Iron needs are relatively high
    * 15 mg/day for girls
    * 11 mg/day for boys
  - Vitamin A is critical for supporting rapid growth and development
- Fluid
  - The need to maintain fluid intake is increased by higher activity levels
  - Boys: 3.3 liters/day
  - Girls: 2.3 liters/day
- Supplements
  - A multivitamin can be a safety net but should not replace a healthful diet
- Nutritious food choices
  - Peer influences and fast-paced lifestyle can lead adolescents to choose fast foods
  - Parents can act as role models and keep healthful food choices available
  - Adequate intake of fruits, vegetables, and whole grains should be encouraged
- Nutrition-related concerns
  - Bone density concerns arise from inadequate calcium intake
  - Eating disorders and poor body image problems can begin during these years
  - Hormonal changes are largely responsible for acne flare-ups
  - Cigarette smoking, alcohol consumption, and illegal drug use all have a significant impact on growth and health

15.7 Pediatric Obesity

- Obesity in children
  - **Obese** – a BMI at or above the 95th percentile
  - Increased risk of developing type 2 diabetes, hypertension, and other serious medical problems
- Overweight children are at much greater risk of becoming overweight adults
- Obesity is now epidemic in the United States among school-aged children

- Caused by too many Calories and not enough physical activity
- Dietary Guidelines for Americans recommend that children be very active for at least 1 hour per day

15.7.1 Prevention

- Constructive support for physical activity
- Healthful, balanced, regular meals
- Developing healthful eating habits early in life
- Family-wide support for nutritious food choices
- Parental control of food purchase and preparation
- Minimize the amount of meals eaten out of the home, especially fast food
- School support for healthful food choices
- Daily activity and exercise

Table 15.2: Examples of Physical Activities for Children and Adolescents

Type of Physical Activity	Age Group: Children	Age Group: Adolescents
Moderate-intensity aerobic	■ Active recreation, such as hiking, skateboarding, rollerboarding ■ Bicycle riding ■ Brisk walking	■ Active recreation, such as canoeing, hiking, skateboarding, rollerboarding ■ Brisk walking ■ Bicycle riding (stationary or road bike) ■ Housework and yard word, such as sweeping or pushing a lawn mower ■ Games that require catching and throwing, such as baseball and softball
Vigorous-intensity aerobic	■ Active games involving running and chasing, such as tag ■ Bicycle riding ■ Jumping rope ■ Martial arts, such as karate ■ Running ■ Sports such as soccer, ice or field hockey, basketball, swimming, tennis ■ Cross-country skiing	■ Active games involving running and chasing, such as flag football ■ Bicycle riding ■ Jumping rope ■ Martial arts, such as karate ■ Running ■ Sports such as soccer, ice or field hockey, basketball, swimming, tennis ■ Vigorous dancing ■ Cross-country skiing
Muscle-strengthening	■ Games such as tug-of-war ■ Modified push-ups (with knees on the floor) ■ Resistance exercises using body weight or resistance bands ■ Rope or tree climbing ■ Sit-ups (curl-ups or crunches) ■ Swinging on playground equipment/bars	■ Games such as tug-of-war ■ Push-ups and pull-ups ■ Resistance exercises with exercise bands, weight machines, hand-held weights ■ Climbing wall ■ Sit-ups (curl-ups or crunches)
Bone-strengthening	■ Games such as hopscotch ■ Hopping, skipping, jumping ■ Jumping rope	■ Hopping, skipping, jumping ■ Jumping rope ■ Running

15.8 Older Adults

- Physiologic changes to the bodies of older adults, age 65 years and older, include
  - Decreased muscle and lean tissue
  - Increased fat mass
  - Decreased bone density
  - Impaired absorption of nutrients
  - Taste and smell perception is often diminished
- Macronutrients
  - Energy needs usually decrease due to reduced activity levels and lower lean body mass
  - General recommendations for fat, carbohydrate, and protein intakes are the same as for younger adults
  - Recommended to not consume more than 30% of energy from sugars
  - Fiber recommendations are slightly lower for older adults
- Micronutrients
  - Calcium and vitamin D requirements increase due to poor calcium absorption
  - Iron needs decrease
  - Zinc intake should be maintained for optimizing immune function
  - Adequate intake of B-vitamins is a special concern
  - Vitamin A requirements are the same as for all adults, but older adults should be careful to not exceed the RDA

TABLE 15.3 Nutrient Recommendations That Change with Increased Age

Changes in Nutrient Recommendations	Rationale for Changes
Vitamin D Increased need for vitamin D from 600 IU/day for adults age 18–70 years to 800 IU/day for adults over age 70 years	Decreased bone density Decreased ability to synthesize vitamin D in the skin
Calcium Increased need for calcium from 1,000 mg/day for adults 19–50 years to 1,200 mg/day for women 51 years of age and older, and men 71 years and older	Decreased bone density Decreased absorption of dietary calcium
Fiber Decreased need for fiber from 38 g/day for young men to 30 g/day for men 51 years and older; decreases for women from 25 g/day for young women to 21 g/day for women 51 years and older	Decreased energy intake
B-Vitamins Increased need for vitamin B_6 and need for vitamin B_{12} as a supplement or from fortified foods	Lower levels of gastric juice Decreased absorption of food B_{12} from gastrointestinal tract Increased need to reduce homocysteine levels and to optimize immune function

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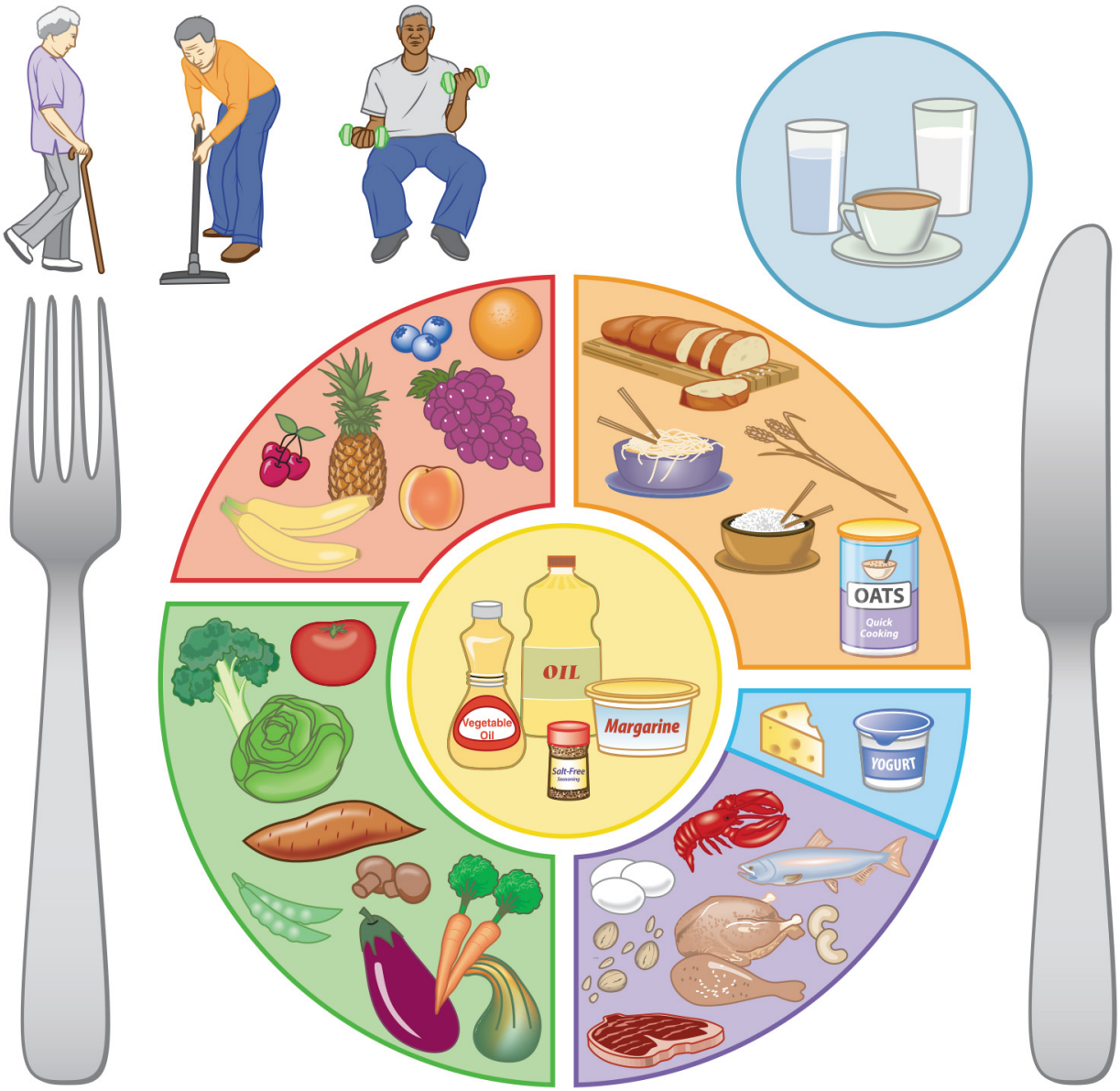

Figure 15.5: MyPlate for Older Adults

- Fluid
  - AI for fluid is the same as for younger adults
    - Men: 3.7 liters/day
    - Women: 2.7 liters/day
  - Older adults are especially susceptible to dehydration because changes in kidney function in older adults can impair their thirst mechanism
  - Important to seek medical attention for incontinence and to drink plenty of fluids
- Nutrition-related concerns

- Many chronic diseases are more prevalent in overweight or obese adults
- Underweight may result from illness, disability, loss of sense of taste or smell, depression, and social isolation
- Dental health issues may cause older adults to avoid meats, firm fruits, and vegetables

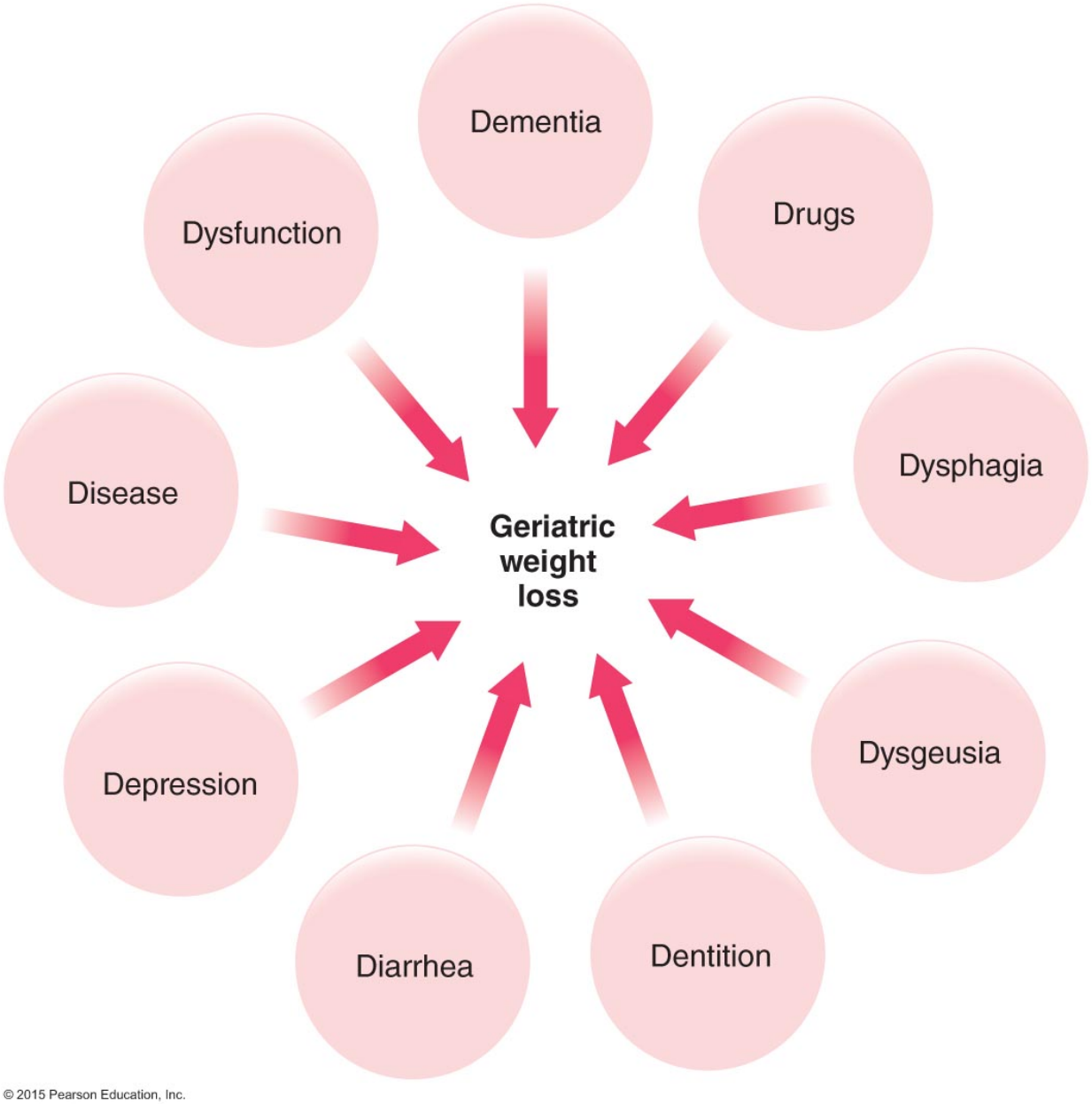

Figure 15.6: Nine Ds of Geriatric Weight Loss

- Nutrition-related concerns
  - Age-related eye diseases can cause vision impairment and blindness

    * Macular degeneration and cataracts
- Some prescription medications can alter nutrient absorption or decrease appetite
- Financial and mobility problems

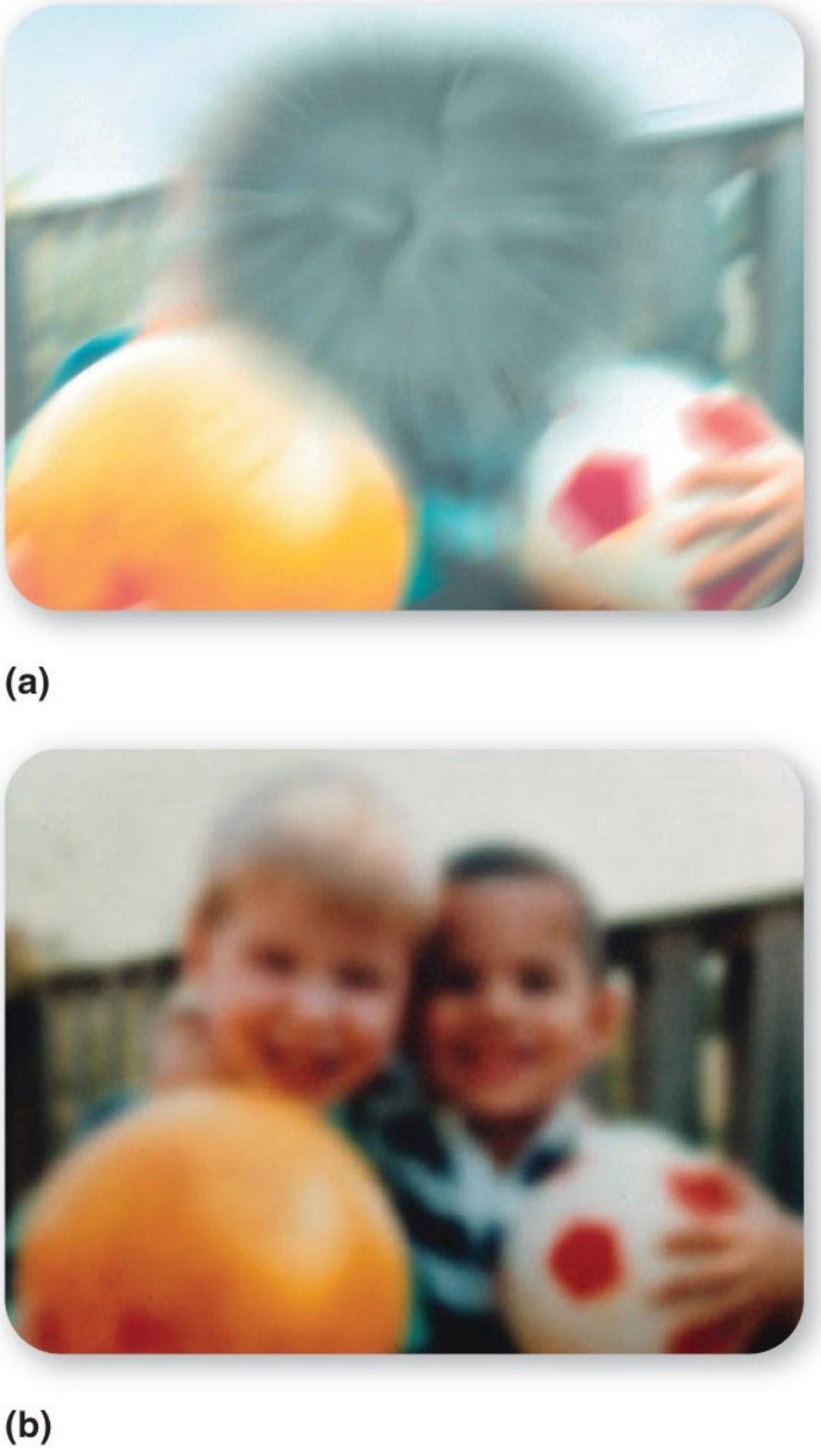

Figure 15.7: Macular Degeneration and Cataracts

TABLE 15.4 Examples of Common Drug–Nutrient Interactions

Category of Drug	Interactions
Antacids	May decrease the absorption of iron, calcium, folate, vitamin B_{12}
Antibiotics	May reduce the absorption of calcium, fat-soluble vitamins; reduces the production of vitamin K by gut bacteria
Anticonvulsants	Interfere with activation of vitamin D
Anticoagulants ("blood thinners")	Reduce the activity of vitamin K
Antidepressants	May cause weight gain as a result of increased appetite
Antiretroviral agents (used in treatment of HIV/AIDS)	Reduce absorption of most nutrients
Aspirin	Lowers blood folate levels; increases iron loss due to gastrointestinal bleeding
Diuretics	May increase urinary excretion of potassium, sodium, calcium, magnesium; may cause retention of potassium, other electrolytes
Laxatives	Increase fecal excretion of dietary fat, fat-soluble vitamins, calcium, and other minerals

Figure 15.8: Common Drug–Nutrient Interactions

15.9 In Depth: The Fountain of Youth

- Growing numbers of people are experimenting with new methods to achieve greater longevity
  - Calorie restriction
  - Intermittent fasting
  - Supplements

15.9.1 Calorie restriction (CR)

- Researchers have not identified a precise number of Calories to qualify as "restricted"
- Typically involves eating fewer Calories than your body needs to maintain normal weight
- Should allow for differences in gender, height, age, body composition, activity level, and so forth

- Many people practicing CR strive to consume 20–30% fewer Calories than usual

15.9.2 Metabolic effects of Calorie restriction

- Decreased fat mass and lean body mass
- Decreased blood glucose levels
- Decreased LDL and total cholesterol and increased HDL cholesterol
- Decreased core body temperature and blood pressure
- Decreased energy expenditure
- Decreased oxidative stress
- Lower levels of DNA damage
- Lower levels of chronic inflammation
- Protective changes in some hormone levels

15.9.3 Challenges of Calorie restriction

- Data are still preliminary
- May be ethical concerns for some people's participation (potential malnutrition)
- Much of the data are self-reported from CR groups
- May be necessary for CR to last many years to see longevity benefits
- Reported side effects include constant hunger, feeling cold, lower sex drive
- Long-term effects are not known

15.9.4 Alternatives to Calorie restriction

- Intermittent fasting (IF):
  - Alters the pattern of food consumption
  - Has shown positive effects in animals
  - May be tolerable for more people
- Limiting total protein intake
- Exercise-induced leanness

15.9.5 Supplements

- The "anti-aging" market is rife with supplements making longevity claims
- No research trials to date have shown a clear connection between increased nutrient intake from supplements and lower rates of death
- Greatly increased nutrient intake levels may pose dangers to some people
- Many non-nutrient supplements (such as gingko, DHEA) can have potentially serious side effects
- *Proven* things you can do to increase your chances of living a long and healthful life:
  - Get regular physical activity
  - Eat nutritious, balanced meals
  - Take only supplements recommended by a qualified healthcare provider, in only the amounts recommended
  - Maintain a healthful body weight
  - Don't smoke or use tobacco products
  - Consume alcohol in moderation