

Chapter 16: Adult Nutrition

Adulthood

- Adulthood is subdivided into the following segments:
 - **Early Adulthood:** The twenties and thirties
 - **Midlife:** The forties
 - ***sandwich” generation:*** around the fifties
 - women, who are multigenerational caregivers dealing with the complex roles of wife, mother, daughter, caregiver, and employee
 - **Old Age:** early sixties

Importance of Nutrition

- Adulthood is the time when diet, physical activity, smoking, and body weight **strongly influence the future course of health** and wellness
- Table 16.1

Modifiable nutritional risk factors for chronic diseases

Cancer	<i>Carcinogenic diet</i> <ul style="list-style-type: none">• Low fruit and vegetable intake• Low level of antioxidants (especially vitamins A, C)• Low intake of whole grains and fiber• High dietary fat intake• Nitrosamines, burnt and charred food• High intakes of pickled and fermented food• Alcohol consumption• High animal-food, low plant-food intake
Heart Disease	<i>Atherogenic diet</i> <ul style="list-style-type: none">• High saturated fat (>10% calories)• <i>Trans</i>-fatty acid intake• Dietary cholesterol intake >300 mg• Low fruit and vegetable intake• Low antioxidants• Low intake of whole grains• No or excess alcohol intake**• High sodium intake• Low potassium intake• Low intake of milk and dairy foods• High waist circumference (men >40 inches, women >35 inches)
Obesity	<i>Obesogenic diet</i> <ul style="list-style-type: none">• Caloric intake exceeding needs• Unstructured eating• Frequent fast-food consumption• High fat intake• Sugar-sweetened beverage consumption• Energy-dense, low-nutrient food choices
Diabetes	Atherogenic diet Obesogenic diet

Physiological Changes During Adulthood

- individuals have **stopped growing** by the time they reach their **twenties**
- Men and women continue to develop **bone density** until roughly age 30
- **Muscular strength** peaks around 25 to 30 years of age

Physiological Changes During Adulthood

- The type and amount of physical activity has a significant impact **on body composition**, including *lean body mass*, fat accumulation and relocation, and bone density

Physiological Changes During Adulthood

- By middle adulthood, physical changes become more apparent :
 - the decline in size and mass of muscles
 - Increase in body fat
 - Hearing loss
 - Vision changes

Hormonal and Climacteric Change

- The decline of estrogen production in women leads to *menopause* → *end of reproductive capacity*
- Menopause is associated with :
 - an increase in abdominal fat
 - significant increase in risk of cardiovascular disease
 - accelerated loss of bone mass

Hormonal and Climacteric Change

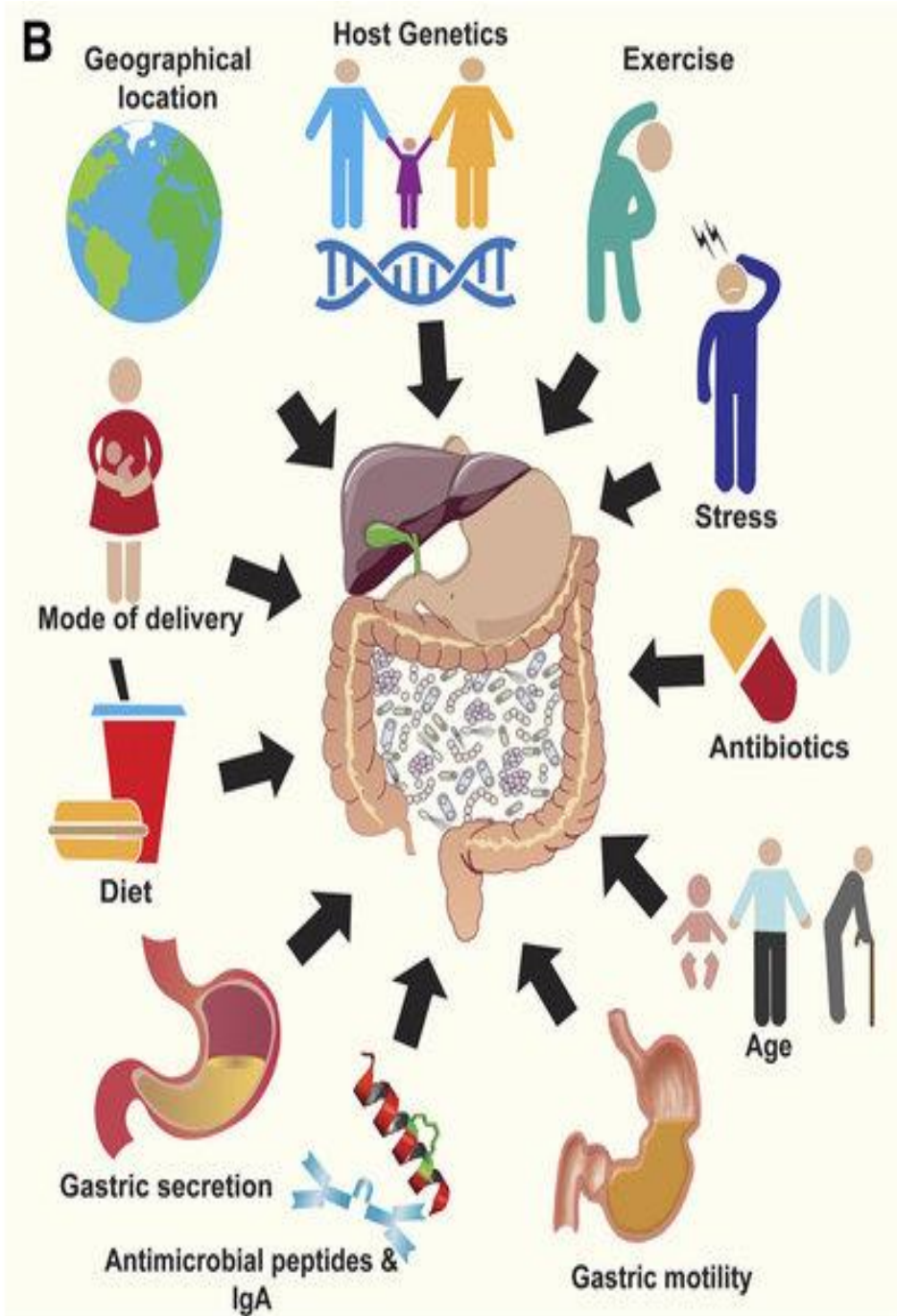
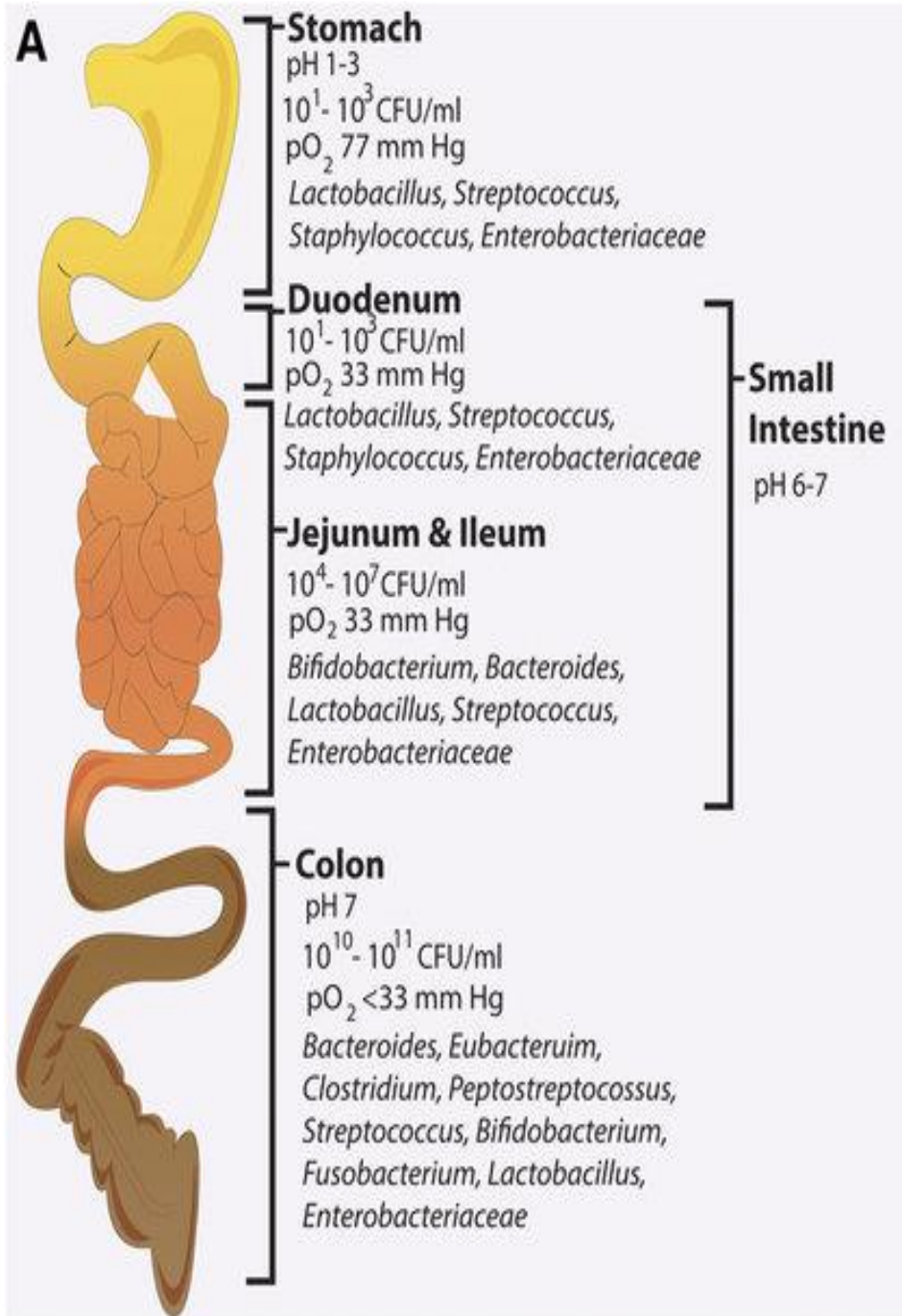
- Men experience a gradual decline in testosterone level and muscle mass
- **Obesity** is associated with **higher estrogen levels in both men and women.**

Body Composition Changes in Adults

- The years between ages 20 and 64 are typically associated with a positive *energy balance*
 - with an increase in weight and adiposity
 - decrease in muscle mass
- Redistribution of fat occurs with gains in the central and intra-abdominal space
 - Increased risk for hypertension, insulin resistance, diabetes, stroke, gallbladder disease, and coronary artery disease

Gut Microbiome

- The constellation of bacteria and other microbes that live in the gut is determined early in life.
- This complex microbial community shifts and adapts with age, diet, geographic location, stress, supplements, and medications;
- but each individual has a gut microbiota “fingerprint” that is relatively stable.

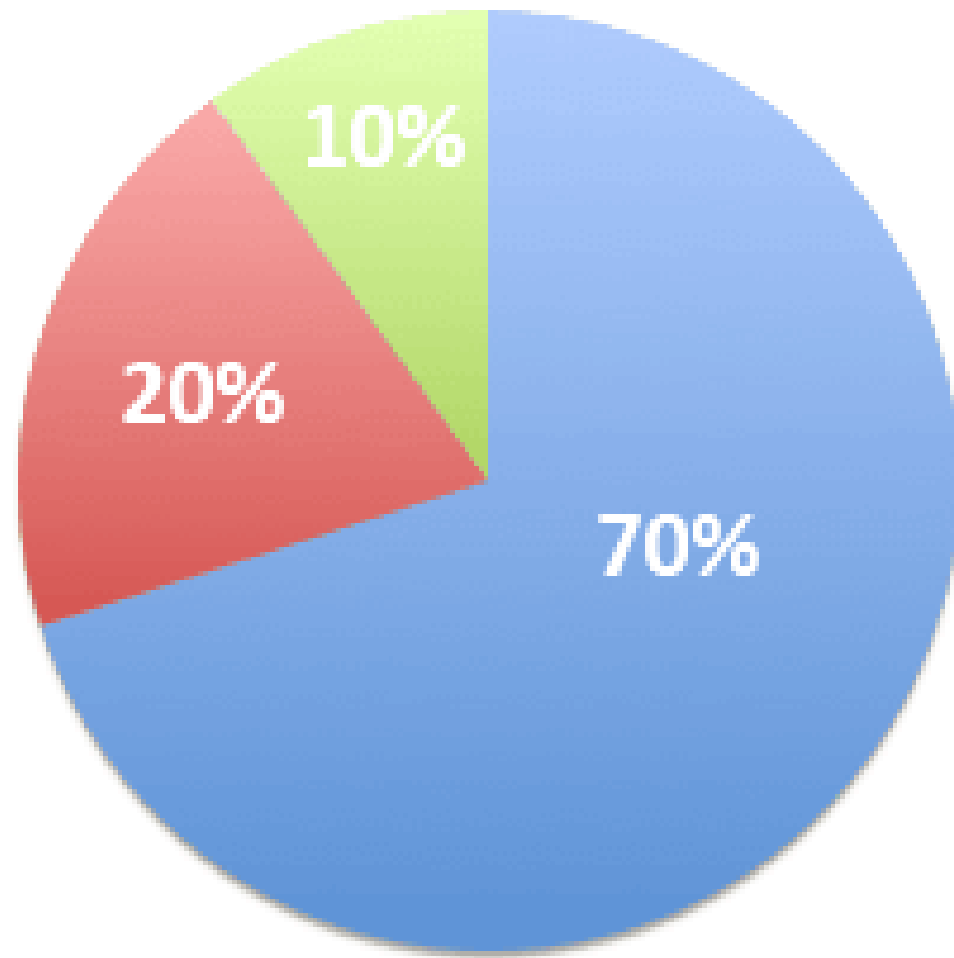


FUNCTIONS OF MICRIBIOTA

- activate and support the immune system
- Protect against opportunistic pathogens
- digest food to release nutrients and energy from diet
- ferment nondigestible carbohydrates
- synthesize vitamins (K, B12, biotin, carnitine)
- stimulate renewal of cells of intestinal lining,
- control colonic motility and transit time,
- Provide regulatory signals through the gut–brain axis

Estimating Energy Needs in Adults

- Energy needs are based on an individual's:
 - *basic metabolic rate (BMR) : 60%*
 - *the thermic effect of food (TEF) : 10%*
 - **Activity thermogenesis** (energy expended through exercise and non-exercise activity): **20-40%**



- Basal Metabolic Rate
- Physical Activity
- Thermic Effect of Food

Estimating Energy Needs in Adults

- Amount of energy to sustain healthy weight
- Energy needs is estimated by:
 - Indirect calorimetry to get REE
 - Special formula (The Mifflin-St. Jeor formula)

Mifflin–St. Jeor Energy Estimation Formula

$$\text{Males: REE} = (10 \times \text{wt}) + (6.25 \times \text{ht}) \\ - (5 \times \text{age}) + 5$$

$$\text{Females: REE} = (10 \times \text{wt}) + (6.25 \times \text{ht}) \\ - (5 \times \text{age}) - 161$$

- the value is multiplied by an **activity factor**
- (1.2 sedentary, 1.55 moderately active, or 1.725 very active)

Harris-Benedict Formula

1. Calculate your BMR (basal metabolic rate):

- Women: $BMR = 655 + (4.35 \times \text{weight in pounds}) + (4.7 \times \text{height in inches}) - (4.7 \times \text{age in years})$
- Men: $BMR = 66 + (6.23 \times \text{weight in pounds}) + (12.7 \times \text{height in inches}) - (6.8 \times \text{age in years})$

2. Multiply your BMR by the appropriate activity factor, as follows:

- Sedentary (little or no exercise): $BMR \times 1.2$
- Lightly active (light exercise/sports 1-3 days/week): $BMR \times 1.375$
- Moderately active (moderate exercise/sports 3-5 days/week): $BMR \times 1.55$
- Very active (hard exercise/sports 6-7 days a week): $BMR \times 1.725$
- Extra active (very hard exercise/sports & physical job or 2x training): $BMR \times 1.9$

3. Your final number is the approximate number of calories you need each day to maintain your weight.

Energy Adjustments for Weight Change

- A pound of body weight is the equivalent of approximately 3500 calories
- **To lose 1 lb a week, an adult would need to create a negative calorie balance of 500 calories daily.**
- These 500 calories can be generated from a combination of **decreased calorie intake** and **increased physical activity**

Striking the balance - the seesaw

Weight
Maintenance

$$EI = EO$$



Weight
Gain

$$EI > EO$$



Weight Loss

$$EI < EO$$



Age-Related Changes in Energy Expenditure

- **Metabolic rate and energy expenditure** begin to decline in early adulthood at a rate of about 2% per decade
- These reductions generally correspond to :
 - declines in physical activity
 - Declines in lean muscle mass