Normal Physical Changes in Gastrointestinal and Urinary System

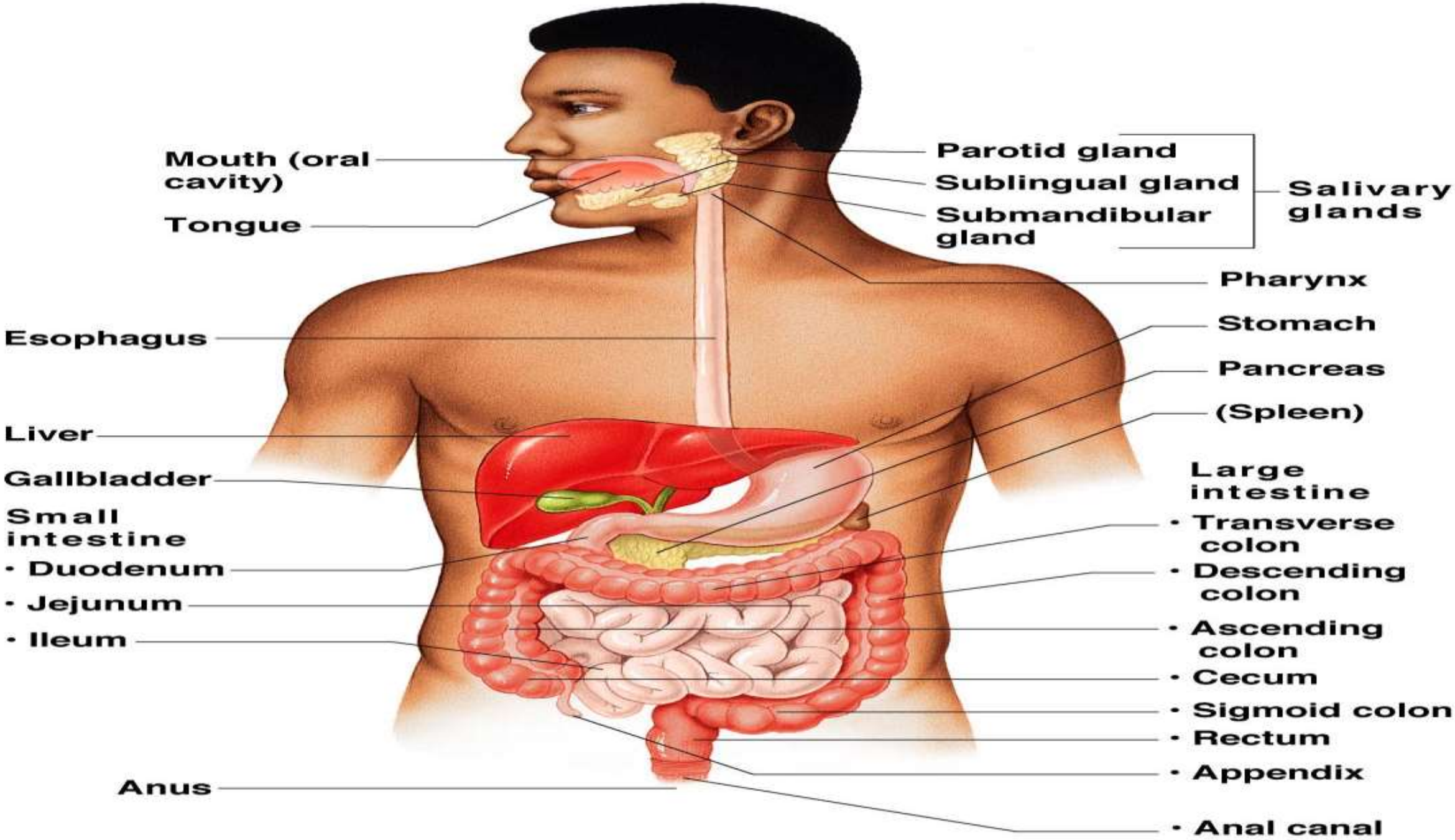
FAIZA AMJAD



The Aging Gastrointestinal Tract

Objectives

- Understand the components of the gastrointestinal (GI) tract
- Understand how aging effects the GI
- Understand problems associated with the aging GI
- Understand dietary interventions to maintain adequate GI function throughout the lifespan



Age-Related Changes in the GI Tract

- Aging affects absorption and metabolism of foods, vitamins and medications
- Aging results in increased susceptibility to foodborne infections and other infections due to decreased immune function.

GI Tract Problems in Older Adults

- The Oral Cavity
  - Gum disease
- Teeth
  - Dental caries and periodontal disease
- Oral and Throat Cancers
  - Major cause is tobacco and alcohol

Gum Disease vs. Health Teeth

Oral Health Problems & Food Avoidance/Food Modification

- Oral health issues in older adults have been associated with comprised dietary quality, likely due to decreased fruit, vegetable, and nut intake.
- Older adults adapt their diet (through food modification or avoidance) to address these health problems.
- A report showed that having difficulty fixing meals was associated with a greater risk of mortality, even more than a lack of financial resources.

Methods to Prevent Dental Caries & Periodontal Disease

1. Drink fluoridated water
2. Use fluoride toothpaste
3. Brush teeth carefully with a soft brush after meals
4. Professional oral care (even if no teeth are present)
5. Avoid tobacco (all forms)
6. Limit alcohol
7. Watch for changes in taste and smell (notify health professional)
8. serving of good to excellent sources of **total fiber** was associated with a lower risk of periodontal disease progression and tooth loss.

Dysphagia & Odonophagia

- Dysphagia – difficulty with swallowing
  - Signs: Pocketing of food in cheeks, speech abnormalities with slurring of words, orofacial changes, facial weakness, abnormal tongue movement and foods becoming stuck if swallowed
- Odonophagia – pain upon swallowing
  - Both may be caused by GERD (gastroesophageal reflux disease)

Management of Dysphagia

- Management of dysphagia includes:
  - Targeting the cause (when possible)
  - Consult with a speech therapist
  - Beginning appropriate food and liquid consistencies
  - If esophageal spasm are present, calcium channel blockers may be prescribed.

Aspiration

- **Aspiration** – a serious risk associated with dyphagia and dysphasia (difficulty speaking)
  - Caused by abnormal entry of food or fluid into the airway.
  - Foreign fluid or substance must be removed by suction from the airway to promote breathing when the airway is obstructed.
- Can cause airway obstruction but more commonly results in pneumonia
  - Treatment is antibiotics

Management of Aspiration

- Older adult must concentrate at meals and avoid social occasion at mealtime
- Sit upright in a chair (no eating in bed)
- Food should be taken and swallowed from the strongest side of the mouth (if paralysis or unilateral weakness is present)
- Sit upright for 30 minutes following a meal
- Choose foods which promote salivation
- Smaller, more frequent meals

Gastroesophageal Reflux Disease (*GERD*)

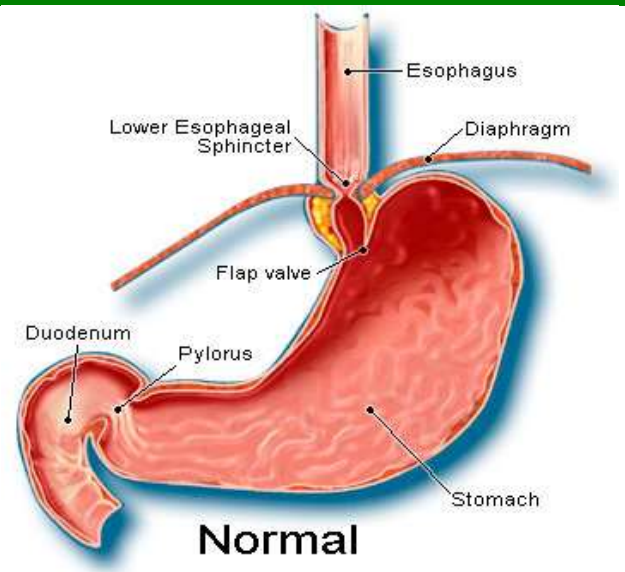
- **GERD** is a condition in which the gastric contents move backward (reflux) into the esophagus causing pain and tissue damage.
  - GERD is the most common GI disorder in older adults
  - Symptoms include heartburn, water brash, sour taste in mouth, belching, indigestion, dysphagia and regurgitation
    - 40% of older adults in the US experience these symptoms

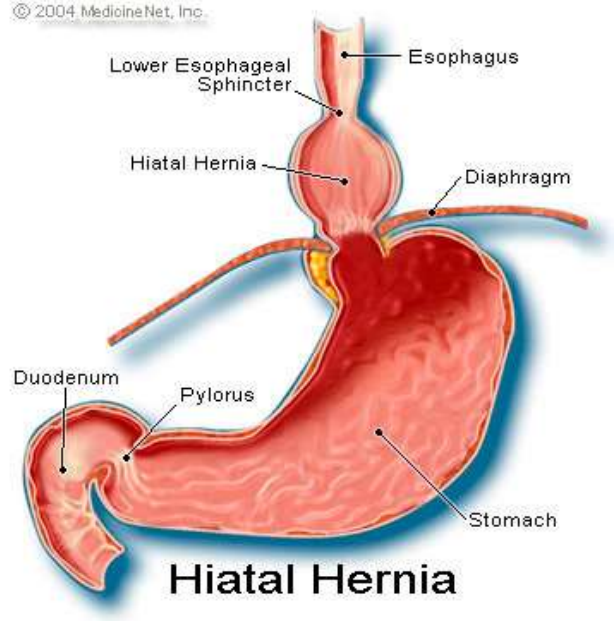
GERD Management
First Line: Nutritional/Positional

- Avoid symptom-causing foods (fruits, chocolates, caffeine drinks or alcohol, fried/fatty foods, garlic and onions, mints, spicy foods, and tomato-based foods
- Stop eating large meals
- Avoid lying down 3 hours after eating
- Avoid tight-fitting clothes
- Lose weight if overweight
- Stop smoking
- Stop drugs that cause reflux (only with a consultation from a primary caregiver)

Hiatal Hernia

- **Hiatal Hernia** – a physical abnormality that allows the stomach to protrude through the diaphragm and up into the chest. Often caused by weakened musculature (specifically esophageal muscles around the opening of the diaphragm)
  - Caused by heavy lifting, coughing, lying flat in bed or performing a Valsalva maneuver





Peptic Ulcer Disease

- **Peptic Ulcer Disease (PUD)** – a duodenal or stomach ulceration often caused by the bacterium *Helicobacter pylori*.
  - 80% of duodenal ulcers and 60% of gastric ulcers caused by *H. pylori*
  - Treatable with antibiotics.
- Second cause of PUD is NSAIDs (Nonsteroidal anti-inflammatory drugs)
  - Risk of ulcers 3x greater in NSAID users
- Signs of PUD include epigastric pain and coffee-ground emesis.

Nausea & Vomiting

- **<u>Nausea and Vomiting</u>**
  - Main concern is dehydration
  - If seriously ill, hospitalization and IV rehydration may be considered
  - Medication to stop nausea and vomiting may be considered
    - Caution: These drugs may cause confusion, sedation and delirium in the older adult.

Gastroparesis

- **Gastroparesis** – delayed stomach empting
  - Normal stomach emptying – the stomach contracts (controlled by the Vagus nerve) and food moves down into the small intestine for digestion
  - Symptoms include nausea, early satiety, vomiting, pain and possibly heartburn from reflux
  - Common causes: diabetes, idiopathic, and postsurgical
    - Occurs in 30% of those with type 2 diabetes
    - Occurs in 27% to 58% of those with type 1

Management of Gastroparesis

Dietary Recommendations:

- First Diet:
  - Liquids to prevent dehydration, salt and mineral losses; avoid milk products, vegetables, fruits, and meat; eat saltine crackers and drink Gatorade
- Second Diet:
  - Small amount of dietary fat, skim milk and yogurt; low-fat cheeses; fat-free bouillon and soups made with skim milk and with pasta; cream of wheat; white rice,; eggs; peanut butter; vegetable juice; well-cooked vegetables w/o skins; apple, cranberry, grape, pineapple and prune juices; canned fruits without skins
    - Avoid citrus fruits

Management of Gastroparesis

- Third Diet
  - All items in Diet 2 with the addition of poultry, fish, and lean ground beef; breads and cereals; coffee, tea and water
  - <50 grams of fat/day
  - Restrict non-calorie fluids if calorie intake cannot be maintained
- Enteral and parenteral nutrition if symptoms flare, weight loss (10% over 6 months), nutrient deficiencies, or electrolyte imbalances

Malabsorption

- Some defect that occurs during digestion and absorption of food nutrients
- Can occur at any of the three phases of digestion:
  - (1) **Luminal Phases** – dietary fats, proteins and carbohydrates are hydrolyzed and solubilized
  - (2) **Mucosal Phase** – brush-border membrane of intestinal epithelial cells transport digested nutrients from the lumen into cells
  - (3) **Postabsorptive Phase** – lipids and other nutrients are transported from epithelial cells via the lympatic system and portal circulation to other parts of the body

Malabsorption

- Causes
  - Pancreatic insufficiency (20-30% of older adult malabsorption cases)
  - Anatomic abnormalities (30%) – stasis and predispose to bacterial overgrowth
  - Bacterial Overgrowth Syndrome w/o anatomic abnormalities (20%)– inadequate gastric acid secretion
    - Pernicious anemia and vitamin B12 deficiency are common
- Treatment will be dependent on the cause.

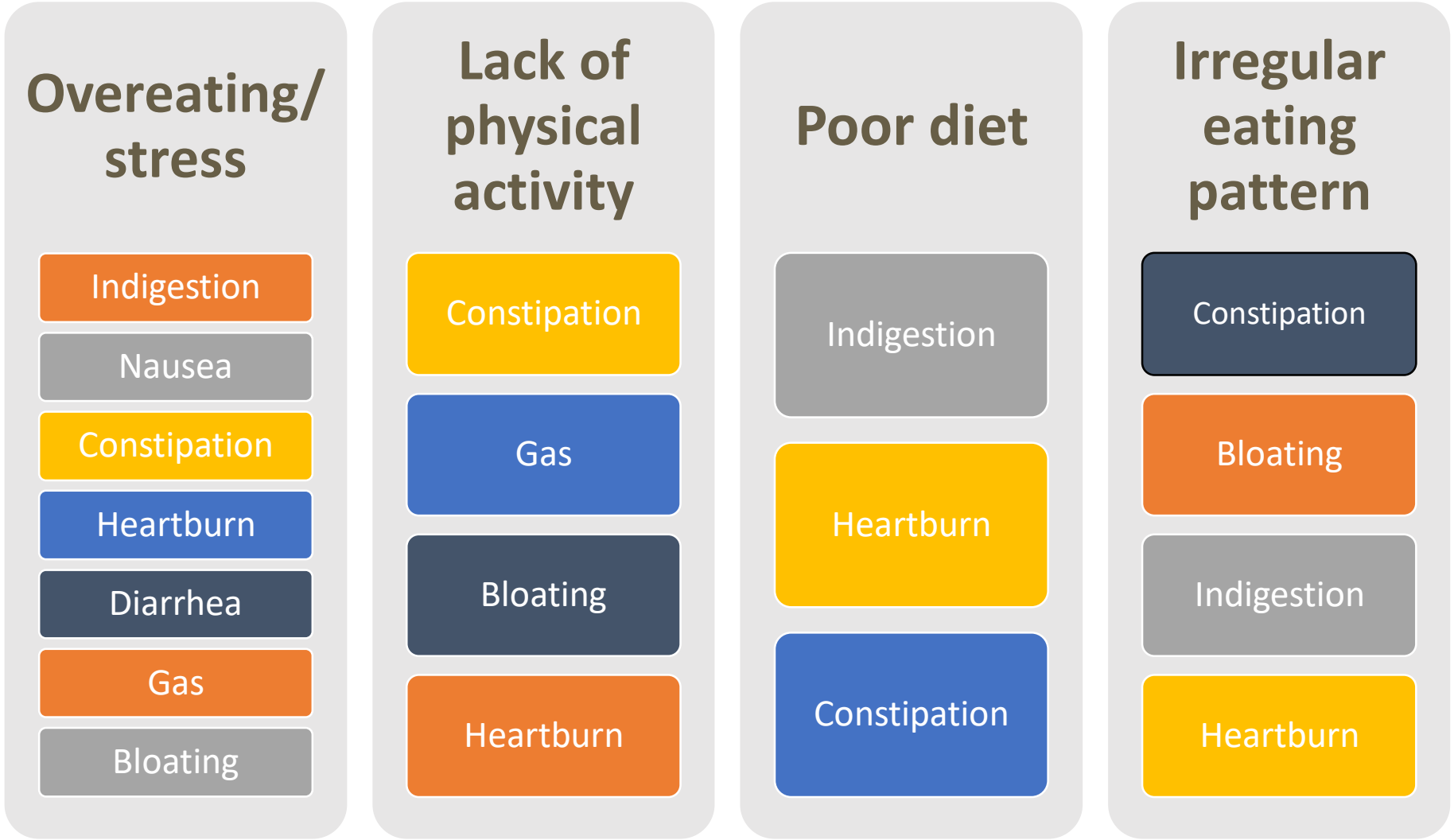
Steatorrhea

- **Steatorrhea** – production of stools containing an abnormally high amount of fat
  - Hallmark of malabsorption
  - Stool smells foul, bulky and difficult to flush down the toilet
  - >6% of dietary fat is excreted in feces
  - Clinical signs: anemia, deficiencies in iron, folate, B12, Vit K or a combination, easy bruising

Steatorrhea

- Diagnosis: 72-Hour Stool Collection
  - If fecal fat is >40 g, pancreatic insufficiency or small intestine mucosal disease indicated
    - D-xylose test to differentiate
- Treatment: Correct nutrient deficiencies and treat underlying causes
  - Iron supplement via ferrous sulfate or gluconate tablets
  - Monthly B12 injections
  - Supplement fat-soluble vitamins and calcium
  - High protein/calorie, low-fat diet prescribed

Behavior Assessment



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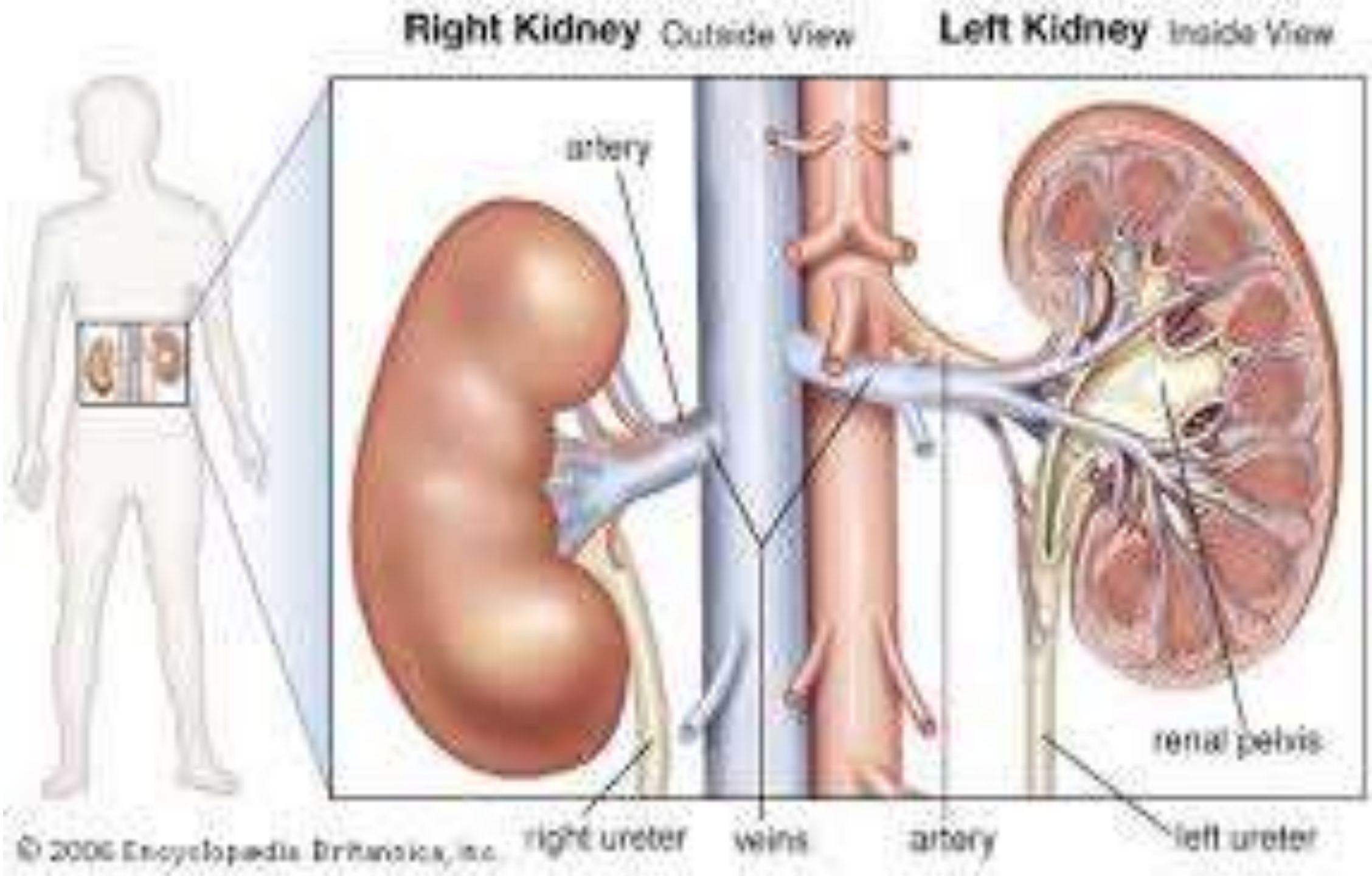
The kidney


Right Kidney Outside View
Left Kidney Inside View
artery
renal pelvis
right ureter
veins
artery
left ureter
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INTRODUCTION

- The kidney functions to maintain fluid balance in the body and to assist in the process of excretion of metabolic waste products.

AGING EFFECTS

- With normal ageing the efficiency of these functions decreases as there is a reduction in kidney plasma flow of around 45% by the age of 80.
- Chronic and acute renal failure are relatively common in the elderly.
- There is also a decrease in renal weight due to decline in nephrons.
- Accompanying this is a decreased filtration rate and impaired excretion, specifically of urea and creatinine, as well as less efficient fluid balance control.
- Also of importance is the effect of reduced renal function on drug excretion.
- This will result in high plasma levels and potential side effects that might increase the risk of falls for the resident.

- An important function of the kidney is the second stage of conversion of vitamin D into 1,25-dihydroxycholecalciferol after initial conversion in the liver so that calcium can be absorbed from the intestine.
- Obviously this is important for maintenance of bone mineral density by allowing access to dietary calcium.
- Although ageing changes in renal function alone will not need to be considered a problem, the prevalence of renal failure in residents in aged care is such that physiotherapists must understand the implications in the context of functional capacity