Bellringer

Which is a passageway for food and air:

a. Pharynx
b. Larynx
c. Esophagus
d. Uvula

What stores and concentrates bile:

a. Liver
b. Gallbladder
c. Pancreas
d. Large intestine
2.08 Understand the functions and disorders of the digestive system
2.08 Understand the functions and disorders of the digestive system

Essential questions

- What are the functions of the digestive system?
- How do the functions of chemical and physical digestion interrelate?
- What are the common disorders of the digestive system?
- How are disorders of the digestive system treated?
- How do you relate the body’s use of nutrients to the digestive system?
Understand the functions of the digestive system

1. **Mouth**: Teeth and tongue begin mechanical digestion by breaking apart food.

2. **Salivary Glands**: Begin chemical digestion as ptyalin begins to change starch to maltose.

3. **Esophagus**: Peristalsis and gravity move food along.

4. **Stomach**: Hydrochloric acid prepares the gastric area for enzyme action. Pepsin breaks down proteins. In children, rennin breaks down milk proteins. Lipase acts on emulsified fats.

5. **Liver**: Produces bile.

6. **Gallbladder**: Stores bile and releases it into small intestine to emulsify fats.

7. **Pancreas**: Enzymes are released into the small intestine. Amylase breaks down starch. Steapsin breaks down fats. Pancreatic proteases break down proteins.

8. **Small Intestine**: Produces enzymes, prepares foods for absorption, lactase converts lactose, maltase converts maltose, sucrase converts sucrose to simple sugars. Peptidases reduce proteins to amino acids. Primary location of absorption.

9. **Large Intestine**: Absorbs water and some other nutrients, and collects food residue for excretion.
Functions of the digestive system

Mouth (buccal cavity)
- Food is broken down by the teeth and mixed with saliva
- This rounded mass of food is called a bolus
Functions of the digestive system

Tongue
– aids in chewing and swallowing
– taste
Functions of the digestive system

Teeth

- Mastication – process of chewing.
- A tooth’s shape is related to its function:
  - Incisors – have sharp edges for biting
  - Canines – are pointed for tearing
  - Molars – have ridges for crushing and grinding
Functions of the digestive system

Salivary glands

- Secrete a watery fluid in the mouth to help break food down
- This occurs due to ‘ptyalin’ which converts the starches in carbohydrates into simple sugars
Functions of the digestive system

- **Palate** - separates the oral cavity from the nasal cavity and helps us breathe and chew at the same time
- **Uvula** — prevents food from entering the nasal cavity
Functions of the digestive system

**PHARYNX**

- **Throat** - is a passageway for food and air.
Functions of the digestive system

Esophagus

- Transports food and fluid from the pharynx to the stomach
Functions of the digestive system

**Stomach**

- The stomach breaks down and stores food
  - This is done by gastric juices. The action of the gastric juices is aided by the churning of the stomach. The semiliquid food is called chyme.
  - It takes food about 2-4 hours to leave the stomach.
Functions of the digestive system

Gastric juices

- Enteroendocrine glands
  - gastrin
- Parietal cells
  - HCL and intrinsic factor
- Chief type cells
  - pepsinogen
- Mucus cells
  - alkaline mucus
- Rennin
Functions of the digestive system

Small Intestine

- Peristalsis: the wavelike motions of the intestines that move food along the digestive tract
- The process of digestion is completed in the small intestine and absorption occurs
- Small finger like projections called villi protrude from the lining of the intestinal wall. They increase the intestinal absorptive surface area aiding in absorption of nutrients.
- The duodenum receives bile from the gallbladder and liver.
Functions of the digestive system

Pancreas - secretes enzymes to break down food

- **Lipase** - works with bile from the liver to break down fat molecules so they can be absorbed and used by the body.
- **Protease** - break down proteins. They help keep the intestine free of parasites such as bacteria, yeast and protozoa.
- **Amylase** - breaks down carbohydrates (starch) into sugars which are more easily absorbed by the body. This enzyme is also found in saliva.

**Which other system does the pancreas function?**
Functions of the digestive system

- Functions of the liver:
  - Manufacture bile
  - Produce and store glucose
  - Detoxification (ex: alcohol)
  - Manufacture blood proteins for blood clotting and fluid balance
  - Prepare urea
  - Store vitamins A, D and B complex
  - Vitamin D is produced by the liver. It aids in calcium absorption and prevents muscle weakness.
  - Break down hormones
  - Remove worn-out RBC’s

What is the function of:
  - Bile – necessary for the digestion of fat
  - Glycogen – energy storage

2.08 Understand the functions and disorders of the digestive system
Functions of the digestive system

Gallbladder
- Stores and concentrates bile. Secretes bile when foods high in fat enters the duodenum.
Functions of the digestive system

**Large intestine**

- Functions of the large intestines:
  - Absorption
  - Bacterial action
  - Gas formation
  - Fecal formation
  - Defecation

- Purpose of these functions is to regulate the body’s water balance while storing and excreting waste products of digestion.

- A diet high in fiber promotes colon health.
Functions of the digestive system

Appendix:

- The blind sac attached to the cecum and has no known function
Understand the functions of the digestive system

Processes of digestion:

- Ingestion is the process by which food is taken into the alimentary canal.
- Digestion is the process by which ingested (food) material is broken down in the earlier stages of the alimentary canal into a form that can then be absorbed into the tissues of the body.
  - Digestion includes two types of processes -
    - **Mechanical** (e.g. chewing, grinding, churning, mixing), and
    - **Chemical** (e.g. action of digestive enzymes, bile, acids, etc.).
- Absorption is the process in which broken down food moves from the intestine into the blood and lymph.
- Elimination the entire process of excretion of metabolic waste products
Functions of the digestive system

**News Flash... New treatment!!!!**

- **Fecal transplant**
  - Allows the bacteria from the healthy stool to repopulate the gut of the patient who has lost healthy bacteria in their gut

- **Used to treat Clostridium difficile** that grows in human intestines
  - Symptoms range from persistent diarrhea to life-threatening inflammation of the colon to death

2.08 Understand the functions and disorders of the digestive system
Functions of the digestive system

Potty Trivia...

- What can healthcare professionals learn from observing stool specimens?
- On average, how much flatus does a person produce per day?
Act of Digestion

- Discuss each action of the digestive system...
- Ingestion
- Mastication
- Digestion
- Secretion
- Absorption
- Excretion
Bellringer

- The person experiencing periods of diarrhea alternating with constipation likely has:
  a. Anorexia
  b. Cirrhosis
  c. Hepatitis
  d. Irritable bowel syndrome

- Marvin is experiencing a burning sensation after eating. His symptoms are worse after eating chocolate and fried foods. What digestive disorder does he have?
  a. Colitis
  b. Colon cancer
  c. Diverticulitis
  d. GERD
Disorders of the digestive system

- Anorexia
  - Decreased or poor appetite

- Anorexia nervosa
  - Eating disorder characterized by refusal to eat
  - Mostly seen in young women
  - Distorted body image and fear of weight gain
  - Psychiatric disorder

2.08 Understand the functions and disorders of the digestive system
Disorders of the digestive system

Caries

- What is another name for caries?
  - cavities

- What are caries: decay of teeth

Can you identify preventive measures?

2.08 Understand the functions and disorders of the digestive system
Disorders of the digestive system

Cholecystitis

- Inflammation of the gallbladder

- Symptoms:
  - Severe, steady pain in the upper right part of your abdomen
  - Pain that radiates from your abdomen to your right shoulder or back (between shoulder blades)
  - Nausea
  - Vomiting
  - Fever
  - Chills
Disorders of the digestive system

- Cholecystitis cont.

Treatment

- **Acute cholecystitis** usually requires hospitalization. You need antibiotics given intravenously (into a vein) to treat infection, and medications to control symptoms of nausea and abdominal pain.
- **Chronic cholecystitis** requires the removal of the gallbladder surgically (cholecystectomy).

- **Cholelithiasis**
  - **Gallstones**
    - Can cause jaundice if it blocks the common bile duct
    - Large ones can be removed through laparoscopic surgery
Disorders of the digestive system

CLEFT PALATE

- Cleft lip and cleft palate are openings or splits in the upper lip, the roof of the mouth (palate) or both. Is a birth defect.
- Impacts on health:
  - Ear infections
  - Speech difficulties
  - Dental problems

What specialist(s) should be consulted to correct a cleft palate?
Disorders of the digestive system

Cirrhosis

- Chronic, progressive, inflammatory disease of the liver
- Caused primarily by excessive alcohol consumption
- Symptoms: fatigue, nausea, weakness, weight loss, itchy skin, abdominal pain, ascites (fluid in the abdomen), jaundice
- Treatment: healthy diet, avoiding alcohol, transplant
Disorders of the digestive system

CONSTIPATION

- Difficulty or lack of defecation
- Causes: colon absorbing excessive water from the stool making feces dry and hard; anxiety, fear
- Treatment: eating proper foods (cereals, fruits and veggies), drinking plenty of fluids, exercise
Disorders of the digestive disorders

Diarrhea

- Loose, watery, and frequent BM’s.
- Caused by bacteria, poor diet, nervousness
- Can cause dehydration and electrolyte imbalance
Disorders of the digestive disorders

GASTROENTERITIS

- Inflammation of the mucus membrane lining of the stomach and intestinal tract
- Common cause is a virus causing diarrhea and vomiting for 24-36 hours.
Disorders of the digestive system

Gastroesophageal reflux disease (GERD) – sphincter muscle becomes weak allowing the stomach’s contents to flow up into the esophagus.

Common Causes:

- Being overweight or obese
- Eating a heavy meal and lying on your back or bending over at the waist
- Snacking close to bedtime or lying down right after a meal
- Certain foods
- Smoking
Disorders of the digestive system

Hepatitis - Usually caused by a virus

- Acute
- Chronic
- Hepatitis
  - A – contaminated water or food
  - B – BBP (all healthcare workers should be vaccinated against this)
  - C – IV drug use
  - D – co-infection with B
  - E – through intestinal secretions

Common symptoms:
- Loss of appetite, fatigue, mild fever, muscle or joint aches, nausea and vomiting, abdominal pain
Disorders of the digestive system

IRRITABLE BOWEL SYNDROME

- Irritable bowel syndrome (IBS) is a common disorder that affects your large intestine (colon). Commonly symptoms: cramping, abdominal pain, bloating gas, diarrhea and constipation.

- Treatments:
  - Lifestyle – counseling, manage stress
  - Diet - fiber supplements, eliminating high-gas foods
  - Medication – anticholinergics, anti-diarrheal, antidepressants
Disorders of the digestive system

**Peptic Ulcer**

- Is a sore or lesion that forms in the mucosal lining of the stomach or duodenum

**Causes:**
- H. pylori (bacteria) is primary cause
- NSAIDS, stress, spicy foods, alcohol

**Treatment:**
- Antibiotics, H2 blockers
Relevance of nutrition to the digestive system

- Healthy dietary habits help maintain homeostasis of body systems
Relevance of nutrition to the digestive system

**Vitamins**
- Fat soluble
  - Vitamins A, D, E, K
- Water soluble
  - Vitamins C, B

**Electrolytes**
- Calcium
- Chloride
- Magnesium
- Phosphorus
- Potassium
- Sodium

What roles do electrolytes and vitamins play in the digestive system?