Digestive System

What are the main functions of the digestive system?

1) Ingestion - intake of food 2) Digestion - breaks down into usable forms 3) Absorptions - uptake nutrients into blood (or lymph) 4) Compaction - consolidate indigestible material, absorb water 5) Defecation - eliminate waste (feces)

What is the digestive tract?

The digestive tract is a muscular tube extending from mouth to anus.

What are the accessory digestive organs?

Accessory Digestive organs are the teeth, tongue, salivary glands, liver, gallbladder, and pancreas. Accessory Organ is a smaller organ associated with or embedded in another and performing a related function.

What are the layers of the digestive tract wall?

The layers of the digestive tract wall are the (in order from the inner to the outer surface) 1) Mucosa 2) Submucosa 3) Muscularis externa 4) serosa/adventitia

What are the structures and functions associated with the mucosa?

Mucosa consists of an epithelium, a loose CT layer called the lamina propria, and thin layer of smooth muscles called the muscularis mucosae. It also lines the lumen.

What are the structures and functions associated with the submucosa?

Submucosa is a thicker layer of loose CT containing blood vessels, lymphatic vessels, a nerve plexus, and mucous glands. It protects, support, & secretes.

Digestive System (cont)

What are the structures and functions associated with the muscularis externa?

Muscularis externa has 2 layers of muscle, (1) Inner - circular, (2) Outer - longitudinal. The muscularis externa is responsible for peristalsis and other movements that mix food and digestive enzymes & propel material through the tract.

What are the structures and functions associates with the Serosa?

Serosa/Adventitia is composed of a thin layer of areolar tissue topped by a simple squamous mesothelium. It sheet of Fibrous CT, found in the pharynx, esophagus (most of it), & rectum.

What is the enteric nervous system?

Enteric Nervous System is the largest collection of neurons & neuroglia outside the CNS, residing within the wall of the digestive tact and primarily regulating local gut reflexes involved in gastrointestinal (GI) motility & fluid transport.

What structures are involved in the enteric nervous system?

It is within the walls of alimentary canal & structures involve (1) Submucosal plexus & (2) Myenteric plexus.

What is the peritoneum and the peritoneal cavity?

Peritoneum: a serous membrane that lines the peritoneal cavity of the abdomen and covers the mesenteries & viscera. Peritoneal cavity is potential space between the parietal & visceral peritoneum, contains peritoneal fluid.

What are mesenteries and what are their functions?

Digestive System (cont)

Mesenteries: fold of peritoneum, a serous membrane that binds the intestine together & suspends them from the abdominal wall. Mesenteries (1) Hold organs in proper position, (2) Allow movement (w/ reduced friction), & (3) Provide passage/support for blood vessels, nerves, lymph vessels, lymph nodes.

What does retroperitoneal and intraperitoneal mean?

Retroperitoneal: is behind the peritoneal cavity, involve duodenum, pancreas, parts of large intestines. Intraperitoneal: within peritoneal cavity, involve stomach, liver, parts of small & large intestines.

What organs make up the digestive tract?

Oral cavity, pharynx, esophagus, stomach, small intestine, large intestine, anus, outer body.

Digestive System

What is the function of the mouth (oral cavity)?

Site of ingestion, mastication (mechanical breakdown), chemical breakdown (salivary glands), swallowing (& manipulation), speech & respiration.

What organs and structures are associated with the mouth and oral cavity?

The mouth involves lips (labia), oral fissure, & cheeks. Functions: Speech, sucking, blowing, manipulate food for chewing, fauces (posterior opening).

What are the structures and functions associated to the palate?

Palate is superior border of the mouth (roof), hard palate, soft palate, uvula, separates nasal & oral cavities. Why we can chew & breath

What are the structures and functions associated to the tongue?

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Digestive System (cont)

Functions: (1) Maneuvers food, (2) Compresses food into bolus, (3) Sensory - taste, temp., texture. Involves Lingual papillae w/ taste buds and how we judge food. (4) Speech

What makes up the tongue?

composed of skeletal muscles, it is attached to skull & hyoid. The surface contains stratified squamous epithelium. Contains Lingual papillae (house taste buds) & Lingual frenulum.

What are the structures and functions of the teeth?

Teeth (dentition), function: Mastication. Adults - 32 teeth, Maxillae - 16 teeth, & Mandible - 16 teeth. There are 4 types: Incisors (anterior), Canines, Premolars, Molars. 2 sets: Deciduous (20) & Permanent (32).

What is the pharynx?

Pharynx: muscular funnel that connects the oral cavity to the esophagus & the nasal cavity to the larynx.

What are the regions of the pharynx and what do they do?

(1) Nasopharynx, (2) Oropharynx, (3) Laryngopharynx

What is the function of Nasopharynx?

only air passage way

What is the function of Oropharynx?

receives food & air from mouth, involved in swallowing.

What is the function of Laryngopharynx?

where both food & air pass, helps guide food.

What is the esophagus?

muscular tube to move food.

Digestive System (cont)

What structures are associated with the esophagus?

2 sphincters (1) upper (pharynx), (2) Lower esophageal sphincter. It opens to stomach at cardial orifice.

What is the function of the stomach?

(1) Storage-Temporary ~ 4hrs, (2) Mech. Digestion - Churn food to chyme, (3) Chem. Digestion - Starts breakdown of proteins - Acid & Enzymes.

What structures are associated with the stomach?

J-shaped expansion, Greater Curvature, Lesser Curvature, Very Extensible, Rugae

What are the 4 main regions of the stomach?

(1) Cardia (2) Fundus (3) Body (4) Pyloric part, pylorus, & pyloric sphincter

Explain the structure and function of the microanatomy of the stomach.

Layers of the stomach wall 1) Mucosa 2) Submucosa 3) Muscularis externa 4) Serosa

What is the function of Mucus cells?

secrete mucus (unknown role)

What is the function of Parietal cells?

H & Cl

What is the function of Chief cells?

Pepsinogen & lipase

What is the function of Enteroendocrine cells?

Hormone secreting cells, ex. gastrin

What structures and functions are associated to Rugae?

Folds of mucosa & submucosa, contains muscularis externa. Has 3 layers (a) Oblique layer (mixing), (b) circular layer, & (c) Longitudinal layer

What is the function of the small intestine?

Digestive System (cont)

Most digestion, Enzymatic digestion, Almost all absorption! & Nutrient absorption

What structures are associated with the small intestine?

duodenum, jejunum, & Ileum.

What is the function of Duodenum?

Receives chyme from stomach, Curves around pancreas, Internally - circular folds (plicae circulares). Promotes mixing, digestion, absorption

What is the Jejunum?

Circular folds, Well vascularized & Muscular

What is the function of Ileum?

Lesser muscular/vascularized, Fewer/-smaller folds, Ileocecal junction (cecal-cecum) & End of SI

Small Intestine: Microanatomy

Mucosa - absorption, involve Circular folds (plicae circulares), Enterocytes - absorptive cells, Microvilli (brush border) - SA & enzymes,

Small Intestine: Submucosa

-Submucosa: Plicae circulares, Duodenal Glands, Secrete basic (alkaline mucus). Muscularies externa: Circular - thick, Longitudinal - thin.

Small Intestine: Absorption

Most nutrients: Enterocytes --> capillaries --> liver. Fats: Enterocytes --> lacteals --> circulatory system.

What is the function of the large intestine?

(1) Little bit of digestion (2) Absorb water & salts! (3) Eliminate waste (feces) Defecation Food remains here ~ 12-24 hrs

What structures are associated with the large intestine?

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Digestive System (cont)

Four Major regions: (1) Cecum, Appendix (2) Colon (3) Rectum (4) Anal canal

What is the function of Cecum?

1st potion, sac-like, Appendix, Bacterial storage.

What is the Colon?

Involve: Ascending, Transverse, Descending, & Sigmoid. Function: absorbs remaining water/electrolytes.

What is the Rectum?

Function: storage site for waste (feces), lacks tenia coli but has well developed muscle. Involve rectal valves - transverse folds of mucosa.

What is the Anal Canal?

final region, outside of abdominopelvic cavity (in perineum). Function: waste removal/continence.

Large Intestine: Microanatomy

Mucosa - simple columnar epithelium - Colonocytes (enterocytes) -Goblet cells - Intestinal glands (crypts) -No folds, villi ~For absorption (mostly water) -Submucosa - Lots of lymphoid tissue -Muscularis externa -Taeniae coli & Serosa

why does the large intestine contain more lymphoid tissue than elsewhere in the alimentary canal?

Because there are many colonocytes for absorption.

What is the last region of the small intestine that chyme passes through?

Ileum (last region)

What is the primary digestive organ of the alimentary canal (Digestive tract)?

Small intestine

Digestive System: Accessory Organs

Name the accessory digestive organs.

Liver, Gall Bladder, & Pancreas

What is the liver and what is its function

Metabolic: Pick up/store glucose, Process fats & amino acids, Detoxify blood

What are the structures (and function of each structure) associated with the liver?

consist of **2 Primary lobes**, right (large) & left (smaller), there are **2 smaller lobes**: Quadrate & Caudate.

Where is the liver located?

Inferior to diaphragm, right hypochondriac & epigastric, URQ

Liver: Microanatomy

Hepatocytes - liver cells, Hepatic lobule, Hepatocytes radiate out from central vein, Sinusoids. Hepatic arterioles & Portal venules: at edges of lobules

Blood Flow

Venule/arteriole --> sinusoids --> Central vein --> Hepatic Veins --> IVC

What is the Bile (green tube)?

secreted by hepatocytes, carried to small intestine or gall bladder. Function: Emulsifies fats.

Bile Flow:

Hepatocytes --> bile canaliculi --> bile ductules --> hepatic ducts -> common hepatic duct -> common bile duct (to small intestine or gall bladder)

If there is damage to the liver, the digestion of which type of molecule will be most affected?

Lipids

What is the gall bladder and what is its function?

Digestive System: Accessory Organs (cont)

A muscular sac located depression in right lobe on visceral surface and it stores bile.

What are the structures (and function of each structure) associated with the gall bladder?

Bile flow: cystic duct + common hepatic duct, bile duct --> duodenum

What is the pancreas and what is its function?

spongy/nodular gland, located posterior to stomach, & produce pancreatic juices called enzymes during digestion, helps the digestive system by making hormones.

Pancreas: Exocrine

Exocrine gland (digestive): **Acinar cells** - secrete digestive enzymes & bicarbonate, acini -> ducts -> main pancreatic duct, Accessory pancreatic duct

Pancreas: Endocrine

Endocrine (no ducts), Secretes hormones, Pancreatic islets (islets of langerhans), Regulate glucose levels

From which organs does the duodenum receive products/fluids?

Gallbladder, pancreas, liver & stomach

The exocrine portion of the pancreas consists of **acini**, which make and secrete **digestive enzymes**.

Urinary System

What are the main functions of the urinary system?

(1) Excretion (filter & remove), (2) Regulate water output (3) Regulate acid-base balance (pH) (4) Synthesis & secretion.

What are the organs of the urinary system?

Kidneys, ureters, urinary bladder, & urethra

What is the general structure of the kidney (know both the gross and microanatomy)?

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Urinary System (cont)

place an image

Urine flow through the kidney

Glomerular capsule (filtrate) -> PCT -> Nephron loop -> DCT -> Collecting Ducts -> Papilla of pyramids (papillary ducts) -> Minor Calyx -> Major Calyx -> Renal Pelvis -> Ureters -> Urinary Bladder

Urinary System cont.

What are nephrons?

the functional unit of kidney

What are the functions of nephrons?

remove waste, regulates solutes in blood, regulate pH

Know the classes of nephrons.

(1) **Superficial cortical nephrons**, which have their glomeruli in the outer cortex (2) **Juxtamedullary nephron**,which have their glomeruli near the corticomedullary border

What structures make up a nephron?

(1) Renal corpuscle (2) Renal tubule

What is the function of Renal Corpuscle?

site of filtration

What is the function of Renal Tubule?

site of reabsorption & secretion

How is urine formed in the nephron/collecting ducts?

(1) **Glomerular Filtration:** Creates a plasma like filtrate of the blood (2) **Tubular reabsorption:** removes useful solutes from the tubular fluid, returns them to the blood (3) **Tubular Secretion:** Removes additional wastes from the blood, adds them to the tubular fluid (4) **Water Conservation:** Removes water from the urine & returns it to blood; concentrates wastes

Urinary System cont. (cont)

What are the structures and functions included in the juxtaglomerular complex?

Is a specialized cell, formed by the distal convoluted tubule and the glomerular afferent arteriole. Its main **function** is to regulate BP, monitor fluid entering DCT, & adjust performance of nephron.

Where do the waste that the urinary system excretes originate?

it's waste from metabolism throughout the body

Where in the kidney is urine formed?

Renal cortex

What vessels lie at the border of the cortex & medulla?

arcuate vein & artery

What type of capillaries make up the glomerulus?

Fenestrated

Blood continues from the glomerulus to the efferent arterioles, but where does the filtrate go?

into the renal tubules

Where does filtration occur?

Glomerular capsule

Where does reabsorption occur?

PCT, Nephron loop, DCT

Where fo resorbed solutes go?

bloodstream (& interstitial tissue)

Which type of nephron do you think produces more concentration urine?

Juxtamedullary (next to medulla, have long nephron loops)

What are the ureters?

Slender hollow tubes, they carry urine from kidneys to urinary bladder.

Understand the structure of the ureter walls

Urinary System cont. (cont)

3 layers of the wall: (1) **Mucosa:** transitional epi. (2) **Muscularis:** 2-3 layer (3) **Adventitia**

What is the urinary bladder?

extensible muscular sac, **functions:** store & expel urine

What structures are associated with the urinary bladder (including layers of the its wall)?

3 layers related to function: (1) **Mucosa:** Transitional epi., rugae (like stomach) (2) **Detrusor:** thick smooth muscle layer (3) **Parietal peritoneum/adventitia**

What are the structure/regions and functions of the urethra?

thin-walled tube (inner mucosa, outer smooth muscle), **function:** drains urine from the bladder --> out of the body

Urethra: Female

Shorter, **Function:** carry urine of the body, External urethral orifice, Anterior to vaginal orifice, Posterior to clitoris

Urethra: Male

3 regions: (1) **Prostatic** (2) **Membranous** (3) **Spongy**, **function:** carries urine & semen out of the body. Detrusor, Smooth muscle, External urethral sphincter, Skeletal muscle, Within pelvic floor, Males: Internal urethral sphincter

Male Reproductive System

What are the primary sex organs?

gonads: testes & ovaries

What are the accessory sex organs?

vas deferens, seminal vesicles, prostate gland, and bulbourethral (Cowper's) glands.

What are the testes and what is their function?

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Male Reproductive System (cont)

Produce sperm & produce androgens - testosterone, housed in scrotum

What is the scrotum and what is its functions?

pouch of skin & muscle outside body cavity, contains testes & spermatic cord, **functions:** regulate the temperature of the testes.

What are the organs/structures of the male reproductive tract?

scrotum, testes, epididymis, vas deferens, prostate, and seminal vesicles.

What is the structure/function of epididymis?

Posterior & lateral side of testes, comma shaped, duct of epididymis, sperm maturation/storage.

What is the structure/function of Vas deferens (Ductus deferens)?

functions: transport sperm, travels from epididymis to ejaculatory duct, ampulla of ductus deferens.

What is the correct sequence that moves sperm from the testes out of the body?

Seminiferous tubules → rete testis → efferent ductules → epididymis → ductus deferens → ejaculatory ducts → urethra

What are the male accessory glands?

seminal vesicle, prostate, & Bulbourethral

What are the functions of the accessory glands?

Secrete seminal fluid: Facilitate sperm transport & Promote successful Fertilization

What structures make up the penis and what is the function of the penis?

Function: deliver semen to female reproductive tract, Gross Anatomy: Root, Body (shaft), Glans penis, Prepuce (foreskin)

Female Reproductive System

What are the primary sex organs of females?

vagina, uterus, fallopian tubes, and ovaries

What are the accessory sex organs?

They are the mons pubis (also called the mons veneris), the labia majora and minora, the clitoris, the vestibule of the vagina, the bulb of the vestibule, and the greater vestibular glands

What is the gross anatomy of the ovaries?

paired, almond size, **Function:** produce ova. Microanatomy: Cortes (outer), Oogenesis, Oocytes (eggs), Follicles, medulla (inner), & Loose CT, vessels, nerves.

What is a follicle?

an ovarian **follicle** is a fluid-filled sac that contains an immature egg, or oocyte

What are the organs/structures of the female reproductive tract?

vagina, uterus, fallopian tubes, cervix, and ovary

What is the function of each organ/structure?

(1) **Uterine tube function**: receive/move oocyte from ovary -> uterus & size of fertilization. (2) **Uterus**: hollow, thick walled, **function:** receive, support, & nourish fertilized egg/embryo. (3) **Cervix:** uterine wall (4) **Vagina:** Muscular canal, **function:** birth canal & receives penis during intercourse.

What are the accessory glands of the female reproductive system and what is their function?

(1) Greater vestibular Gland (bartholin gland): production of a mucoid secretion that aids in vaginal and vulvar lubrication (2) Lesser vestibular Gland:secrete a substance to lubricate the urethra opening

Female Reproductive System (cont)

What are the organs/structures that make up female external genitalia?

mons pubis, labia majora, labia minora, Bartholin glands, and clitoris. The area containing these organs is called the vulva. The external genital organs have three main **functions**: Enabling sperm to enter the body

What are the functions of the external genitalia and how are these accomplished?

The external female genitalia serves the purposes of reproduction and urination

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