TUBES - GI Layering

1. Layers?

   mucosa (includes m. mucosa), submucosa (CT), muscularis externa (2 layers, perpendicular to one another), serosa (s. sq epith) or adventitia (CT)

2. Epithelium?

   St squamous - esophagus or anus
   Differentiate by presence of muscularis mucosa (esophagus); anus has no m. mucosa
   S. columnar – stomach, small intestine, large intestine

3. Number of cell types in s. columnar epithelium?

   1 type = surface mucous cells = Stomach
   2 types = enterocytes have microvilli + goblets = small intestine, large intestine

4. Pits, crypts or villi?

   Pits = wide bore in X sect lined by 1 cell type (surface mucous, s. col); lumen in center of X sect = stomach
   Crypts = Lumen in center of X sect = large intestine if only crypts lined by goblets + enterocytes
   Villi = lamina propria in center of X sect = sm. Intestine

5. Final ID:

   Pits = surface mucous cells = stomach
   Stomach Glands = narrow bore (lumen in center of Xsect)
   mucous neck cells only, short glands = cardiac stomach; deep glands = pyloric mucous neck + parietal + chief = fundic stomach
   Villi and crypts = small intestine = villi have goblets + enterocytes, crypts paneth cells
   Submucosal mucous glands = Duodenum
   Peyer’s Patches = ileum
   Crypts only = same bore, goblets + enterocytes = large intestine, look for t. coli (3 muscle bands in outer muscularis externa)

TUBES – NOT GI layering

1. Epithelium?

   s. squamous = blood vessel, heart
   st. squamous = skin, anus, vagina
   s. columnar = one cell type + microvilli = gall bladder
   s. columnar = 2 cell types: peg + ciliated = oviduct, uterus
   PSC + cilia and goblets = trachea, bronchus
   PSC + stereocilia = male reproductive = epididymis, vas deferens
   transitional = urinary system = ureter, bladder, urethra

2. Layering?

   Cardiac muscle? Yes = heart (endocardium, myocardium, epicardium)
   Smooth muscle layer? No = skin
   epidermis (st. basale, st. spinosum, st. granulosum, st. lucidum, st.corneum)
   dermis = ct sweat glands & ducts?, hair follicles?
hypodermis = fat, CT

**Smooth muscle layer? Yes**

*Not well oriented* – gall bladder, trachea + bronchus, urethra, vagina, anus

*Well defined*, then number of muscle layers, orientation of muscle and thickness of muscle layer to lumen?

Blood vessel: tunica. intima, t. media, t. adventititia

Artery (muscular? elastic?), arteriole (2-5 sm musc, small lumen large wall), large vein (circ sm muscle in media, long sm muscle in adventitia)

Oviduct (2, c-L, luminal folds and size?)
Uterus (stage of glands, endometrium, myometrium = swirls for girls, perimetrium)

Epididymis (2 c, L)
Vas deferens (3 L-c-L, size of lumen and folds?)
Ureter (2 L-c, 3rd L layer in lower 1/3 near bladder); bladder (3 L-c-L)

**Cartilage? Yes. Trachea (C shaped); bronchus (plates)**

3. Serosa? mesothelium = free surface inside body cavity – check for this, if not there = adventitia

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**SOLIDS**

1. Encapsulated? Yes = organ
Compact organ with hilus?

2. Parenchyma = lymphocytes = Lymphoid organ = spleen, thymus, lymph node

3. Cortex/medulla? Yes = Thymus, lymph node
No = spleen (red and white pulp) - red pulp has cords of Billroth and venous sinuses; white pulp has nodules with artery

4. ID confirm? *Nodules?*
No = thymus = presence of Hassall’ corpuscles, no hilus, no serosa
Yes = lymph node = look for subcapsular sinus; hilus, no serosa
Yes *nodule associated with artery* = spleen (white pulp), red pulp, hilus, and serosa

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**SOLIDS**

1. Encapsulated? Yes = organ, check for hilus
2. Parenchyma Not lymphocytes = Gland

*s. cuboidal* = liver, salivary, pancreas, mammary, thyroid, anterior pituitary, parathyroid

*PSC (or s. cuboidal)* = male repro = prostate, seminal vesicle

3. Ducts? *Yes = exocrine* = salivary, pancreas, breast, prostate, liver
Jakoi approach to slide ID - final review

No = endocrine = thyroid, pituitary, parathyroid,

4. Confirm/organization?

A. exocrine:  
acinus = serous, centroacinar cells = pancreas, Islets of Langerhans  
serous, striated ducts, fat, heavy CT septa = parotid salivary  
serous and mucous, heavy CT septa, striated ducts = submandibular  
mucous some serous demilunes, NO striated ducts = sublingual  

REMEMBER! Excretory duct will have similar epithelium to the surface that it secretes onto...s. col for pancreatic; st columnar for parotid and submandibular salivary.

cords + portal tracts = liver

tubulo-alveolar = prostate, mammary gland (breast)  
prostate = sm muscle under epithelium  
mammary = myoid cells, st. cuboidal in interlobular ducts

folds = seminal vesicle, 2 layer smooth muscle away from epithelium (in circ, out long)

B. endocrine:  
Follicles with central colloid = Thyroid

Unmyelinated nervous tissue = posterior pituitary

Clusters of s. cuboidal or round cells stain as acidophils, basophils, and chromophobes = anterior pituitary

Cords of chief cells and oxyphils (acidophils) = parathyroid

Divided into cortex-medulla = adrenal  
cortex = foamy cells in 3 zones (balls = z. glomerulosa, pale cords=z. fasciculata, reticulum=z. reticularis)  
medulla = chromaffin cells and large central veins

Islets of Langerhans, serous acini + s. cuboidal ducts = pancreas

OTHER SOLIDS:
1. Encapsulated? Yes. All of these have a hilus (mediastinum in testes)

2. Cortex-medulla  
Yes = kidney, ovary  
No = lung, testis

3. Parenchyma?  
Tubules and renal corporcles = kidney cortex, medulla has tubules  

s. col + developing sperm = seminiferous tubules, Sertoli cells = testis  
s. cuboidal mesothelium + developing follicles/egg = ovary

s. squamous alveoli, PSC in bronchi + cartilage = lung