Blood supply
- Splanchnic circulation includes:
  - Arteries that branch off aorta to serve digestive organs
  - Hepatic, splenic, and left gastric arteries
  - Inferior and superior mesenteric arteries

- Hepatic portal circulation
  - Drains nutrient-rich blood from digestive organs
  - Delivers blood to liver for processing

GI wall composition:

-Digestive organs: Be familiar with the basic processes carried out by the GI system & know the general laminar structure of the wall of the GI tract and the tissues

- Structures of the GI tract
- Mouth, pharynx, and esophagus:
  - Mouth
• Kidneys: form urine
  • Gross Anatomy
    • Paired, bean shaped
    • Retroperitoneal
  • Microscopic anatomy
    • Nephron = functional unit
  • Blood supply
    • Renal arteries enter kidney at hilus
    • Renal veins exit at hilus
  • Function is to filter blood

Physiology of Kidneys
• Three processes are involved in urine formation and adjustment of blood composition:
  • Glomerular filtration: produces cell- and protein-free filtrate
  • Outward pressures
    • Forces that promote filtrate formation
    • Hydrostatic pressure in glomerular capillaries (HPgc) is essentially glomerular blood pressure
Regulation of Glomerular Filtration

- **Intrinsic controls: Renal autoregulation**
  - Myogenic regulation
  - Increased mean arterial pressure increases GFR myogenic regulation
  - Response to stretch in afferent arteriole
  - Muscle contracts in response to stretch
  - Increased resistance lowers glomerular capillary pressure
    - Counteracts effects of increased MAP
  - Tubuloglomerular feedback
    - Response to rate of blood flow past macula densa
    - Afferent arteriole contracts
    - Increased resistance lowers glomerular capillary pressure
    - Counteracts effects of increased MAP

- **Extrinsic controls: Neural and hormonal mechanisms**
  - Sympathetic nervous system
    - When BP is low
    - Norepinephrine (Sympathetic NS) and Epinephrine (adrenal medulla) cause
      - Systemic vasoconstriction, which increases blood pressure
      - Constriction of afferent arterioles, which decreases GFR
      - Blood volume and pressure increases
  - Renin-angiotensin-aldosterone mechanism
    - Main mechanism for increasing blood pressure

- **Tubular reabsorption**: selectively returns 99% of substances from filtrate to blood in renal tubules and collecting ducts
  - Tubular reabsorption quickly reclaims most of tubular contents and returns them to blood
  - Water and solutes move from renal tubules into peritubular capillaries (returned to blood)
  - Renal tubules to interstitial fluid
  - Most occurs in proximal tubule
    - Selective transport
    - Mostly not regulated
- **Transcellular route**
  - Solute enters apical membrane of tubule cells
  - Travels through cytosol of tubule cells
  - Exits basolateral membrane of tubule cells
  - Enters blood through endothelium of peritubular capillaries
- **Paracellular route**
  - Between tubule cells
    - Limited by tight junctions, but leaky in proximal nephron
      - Water, Ca\(^{2+}\), Mg\(^{2+}\), K\(^{+}\), and some Na\(^{+}\) in the PCT move via this route
- **Primary active transport of Sodium**
  - Na-K ATPase pumps
- **Secondary active transport**
  - Electro chemical gradient creates ‘push’ for other solutes