


CIRCULATORY SYSTEM

Fx =

1. Transport system: series of organs designed to distribute materials to/from cells/tissues
 2. Protection: Circul's WBC's; Ab's (lymph)
 3. Thermoregulation: directs bl to; from body surface
 - bl leads to surface in cold to prevent Δ loss
- Endothelium = lining of vessels; simple sq. epith. cells
 - Permeability barrier
 - Synthesizes extracell. & memb. bound rec's; ligands (localization)
 - Regul's immunity/inflamm. \rightarrow produces cytokines, FN's...
 - Elab's anticoag.; antithromb.; prothromb. molec's
 - \rightarrow von Willebrand factor (marker/clot form.)
 - Modulates bl flow; vasc. activity:
 - \rightarrow von Willebrand factor (marker/clot form.)
 - Endothelium's (endothelins); endothelial (NO₂)
 - Basement memb.; ECM = collagen 2, 4, 5; fibronectin; laminin

CARDIOVASCULAR

Closed

- Arteries, Capillaries, Veins, 
- Continuous tissue w/ diff. morphology (cells, fx)



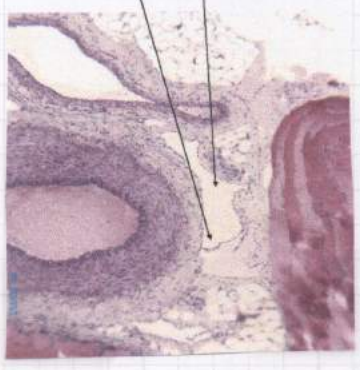
- RA, LV, Pulm. Circuit, Systemic Circuit
- Blood = Exchange = 1° Fx
- RA/LV's = pump away from RA/LV
- RA/LV's = pump toward RA/LV

STRAHMUNG

LYMPHATIC

- Deals w/ tissue fl.
- Unidirectional / discontinuous
- Capill's vessels, ducts
- Collects lymph & returns to CVS
- Removes excess tissue fl from interstitial space → blind sac
- Drains anatomical regions of body
- Lymph nodes = filter
- Valves
- Not in CNS, bone, cartil, placenta
- LM =
 - lg diameters
 - Muscular / angular
- EM =
 - endothelium w/ no pores
 - no intercell. jcs = lg molecules can enter
 - patchy absent basal lamina
 - anchor filaments keep lumen open
- Wall of lymph vessel varies from endothelial cells in capill to thin wall w/ endothelium + elastin layers, sm.m., collagen
- Most feeds into venous end of capill.
- ~10% enters lymph capill.

THE THINNEST WALLED STRUCTURE IN THIS SECTION IS THE LYMPHATIC VESSEL WHICH ALSO CONTAINS A VALVE

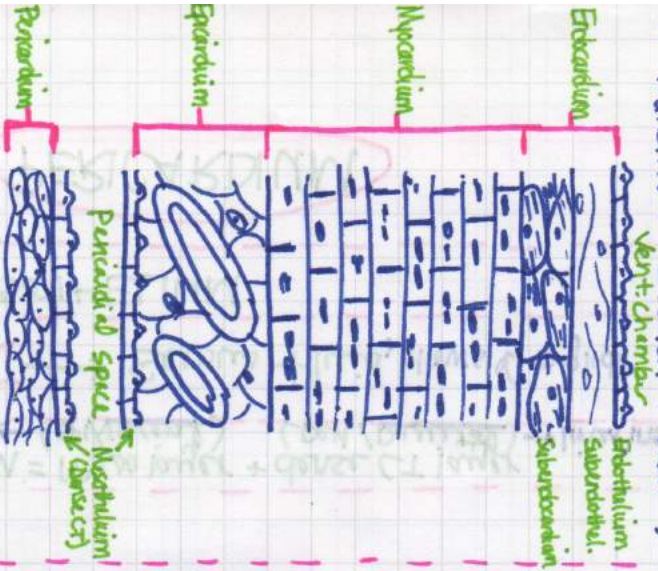


PROTAIDRIS METSIS

- of lymphatic angiogenesis: metastatic progression
- Quiescent cells migrate & disintegrate
- (hypoxia) HIF-1 & VEGF → angiogenesis
- growth of metastasis: Paracrine signaling
- surface protein
- 2nd & 3rd wave of blast in surface of capill
- also: angiogenic signaling: 23 soluble, 2000 = growth factors
- (epithelial) lymphatic endothelium: Mucosal epithelium
- ... interstitial signaling → growth factor signaling
- 2nd wave: angiogenic signaling: pro-angiogenic factors
- (metastasis) vascular endothelium: angiogenesis
- (cellular) signaling: VEGF, bFGF, HIF-1, etc.
- VEGF: VEGFR signaling = HIF-1 driven transcription
- ...

WALL

Transmural Section (thin vent.)



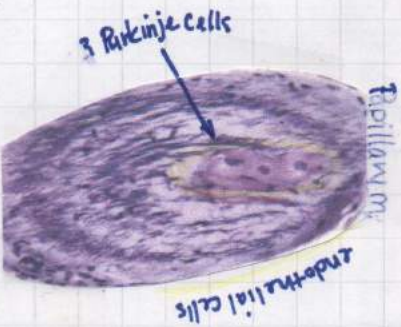
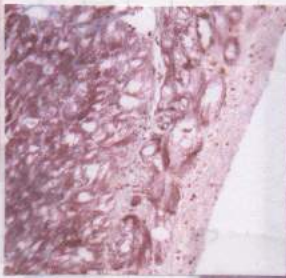
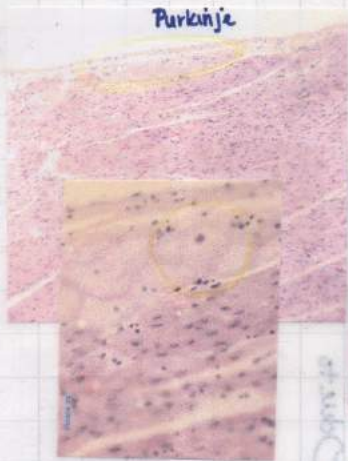
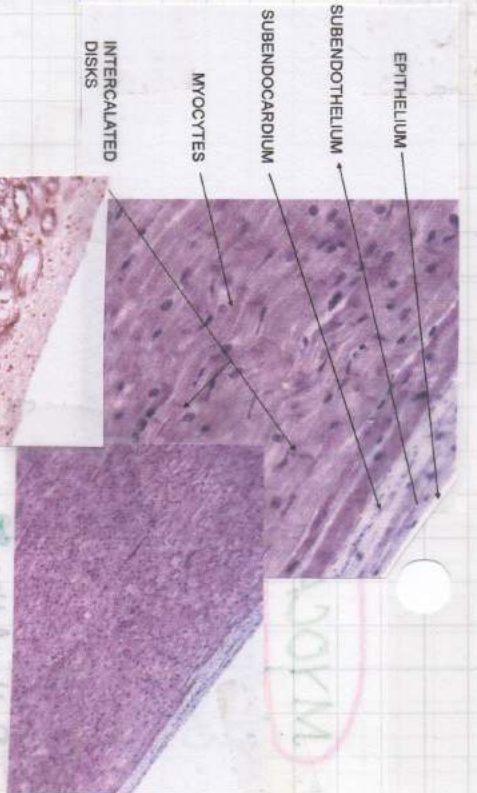
- Atria = thin walls for receiving bl.
- Lt Vent = Pump; thick for ↑ BP
- Rt Vent = Pump; thin for ↓ BP

ENDOCARDIUM

Border lumen of V

Innermost; more prominent in atria

- **Atriums =**
 1. endothelium
 2. Subendothelium → collagen, elastic fibers, fibroblasts, smooth m.
 3. Subepicardium → loose CT, B.V. nerve, Purkinje cells
- Purkinje cells = modified m. cells
- conducting cells of V; spread impulse of contraction thru the V
- by pale staining/central nuclei
- make up Lt's Rt bundle br's
- Papillary m. = attached to chordae tendineae to leaflets of V
- can ID endothelial cells on periphery; Purkinje on inside
- Semilunar Valves = contain dense CT surrounded by endothel.
- can ID from AV valve bc contain elastic a's

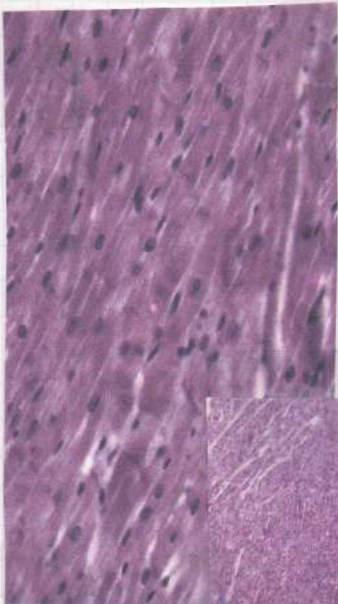
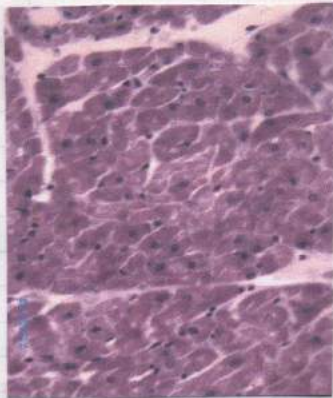


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MYOCARDIUM

Middle

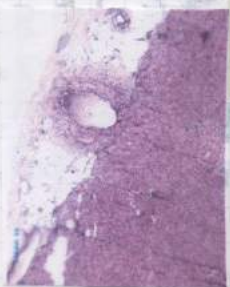
- Contains =
 1. Myocytes (most)
 2. Capillaries (vascularized)
 3. Small nerves
- Thickness =
 - LV > RV > Atria
- Bulk of the Cardiac myocyte
 - Central nuclei
 - 1-2 nuclei/cell
 - Cell jct's (intercalated disks)
 - Irregular shape due to branching



EPICARDIUM

Outermost

- Contains =
 1. Fat cells
 2. Coronary blood vessels
 3. Nerves & ganglia
- Visceral pericardium covers epicardium



MESOTHELIUM = Meso layer + dense CT layer
 lines surface ← (epi/visceral) (peri/dorsal) → lines inside of fibrous pericardium

PERICARDIAL SPACE → Serous fluid, allows heart to glide

MESOTHELIUM

PERICARDIUM