Achievable

USMLE STEP 1 DUMP SHEET

General pathology

Cell adaptations

- **Hyperplasia:** ↑ cell number (pregnant uterus, liver regrowth)
- **Hypertrophy:** ↑ cell size; myocardium can only hypertrophy
- **Atrophy:** disuse, denervation, ischemia; autophagy, lipofuscin
- **Metaplasia:** reversible swap; Barrett esophagus (glandular), smokers' bronchi (squamous)
- **Dysplasia:** ↑ nuclear:cytoplasmic ratio, hyperchromasia; preneoplastic, reversible

Cell injury

- **Reversible:** ↓ ATP → Na+/K+ pump fails → swelling, blebs
- **Irreversible:** membranes rupture; pyknosis, karyorrhexis, karyolysis
- **Ca2+ influx:** activates lytic enzymes; frees cytochrome c
- **Free radicals:** radiation, reperfusion, iron → lipid peroxidation
- **Defenses:** superoxide dismutase, catalase, glutathione peroxidase

Apoptosis

	Apoptosis	Necrosis
Cell	Shrinks; apoptotic bodies	Swells, ruptures
Inflammation	None	Present
DNA gel	Ladder (180—200 bp)	Smear

- **Intrinsic:** Bax, Bak → cytochrome c → caspases; Bcl-2 blocks
- **Extrinsic:** FasL on Fas, TNF on TNFR1 → FADD → caspases

Types of necrosis

Type	Where
Coagulative	Infarcts except brain; outlines kept
Liquefactive	Brain infarct, abscess, wet gangrene
Caseous	Tuberculosis granulomas
Fat	Pancreatitis; saponification with Ca2+
Fibrinoid	Vasculitis, malignant hypertension

Calcification and deposits

- **Dystrophic:** dead tissue, normal Ca2+ (atheroma, valves)
- **Metastatic:** normal tissue, ↑ Ca2+ or phosphate (renal failure, ↑ PTH)
- **Psammoma bodies:** papillary thyroid, serous ovary, meningioma, mesothelioma
- **Amyloid:** Congo red, apple-green birefringence

Acute inflammation

- **Neutrophils** first; macrophages replace them by 24—48 h
- **Rolling:** selectins (E, P) bind sialyl Lewis X
- **Adhesion:** integrin CD11a/CD18 binds ICAM-1
- **Transmigration:** PECAM-1. **Chemotaxis:** LTB4, C5a, IL-8
- **Killing:** NADPH oxidase burst; myeloperoxidase makes HOCl
- **LAD I:** CD18 defect; delayed cord separation, no pus

Mediators

Mediator	Main actions
Histamine	Vasodilation, ↑ permeability
Bradykinin	From HMWK (kallikrein); pain; ACE degrades
PGI2	Vasodilation; blocks platelets
TXA2	Platelet aggregation, vasoconstriction
LTB4	Neutrophil chemotaxis
LTC4, D4, E4	Bronchoconstriction
IL-1, TNF-α	Fever; acute phase (CRP, serum amyloid A)
C3b; C5a	Opsonin; chemotaxis

Chronic and granulomatous

- **Granuloma:** epithelioid macrophages, giant cells; IL-12 → Th1 → IFN-γ; TNF-α
- **Langhans giant cell:** horseshoe nuclei (TB). Foreign body: scattered nuclei
- **Causes:** TB, leprosy, fungi, cat scratch, sarcoidosis, berylliosis, Crohn

Healing

- **Permanent cells** (neurons, myocardium) scar; CNS forms gliosis
- **Granulation tissue:** fibroblasts, new vessels; collagen III → I
- **Impaired by:** diabetes, glucocorticoids; lack of vitamin C, zinc
- **Keloid** grows beyond the wound; a hypertrophic scar stays within

Effusions

	Transudate	Exudate
Protein	Under 3 g/dL	Over 3 g/dL
LDH ratio	Under 0.6	Over 0.6
Fluid LDH	Under ⅔ serum upper limit	Over ⅔ serum upper limit
Causes	Heart failure, cirrhosis	Infection, cancer