15/01/2024

neutrophils → inflammation

always >50% in blood count (differential count)

during infection → >80%

fast-acting

dendritic cells

macrophages

Antigen-presenting cells (APCs)

↓

cells of the innate immune system

connect the innate & adaptive immune systems

Barriers

first line of defence

Physical

does not allow foreign particles to go in

↓

physical filter

skin

enzymes in mouth

hairs in nostrils

Chemical

if pathogens cross the physical barrier

↓

release of small molecules/chemicals

↓

cytokines

histamine

a very common molecule of the innate immune system.

released during allergy → anti-histamines → block the histamine receptors

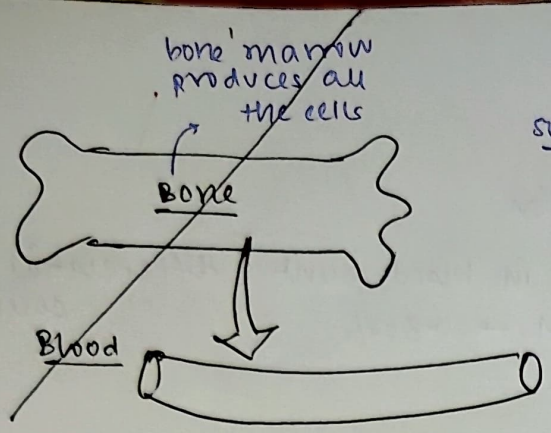
eg: cetrazine

H1 most common

H2

granulocytes → eosinophils, basophils → contain granules

↳ release these granules → release histamines



superficial cut → topical activation

deep cut → antibiotics
↳ neomycin cream

act as signaling molecules

& some dendritic cells ← tissue macrophages

THE LOCAL SYSTEM

pathogen recognition receptors (PRRs)

invasion of physical barrier

MΦ

MΦ

Blood

skin → physical barrier

endocytosis (phagocytosis)

PAMP

pathogen-associated membrane patterns

signaling molecules on recogn

recognized by MΦ

NAG-NAM containing cell walls

leads to gene transcription

Bone

produces all the blood cells

IL1β (interleukin-6)

eg: IL6

upregulated ← pro-inflammatory

cytokines

glyco-proteins

bind to cytokine receptors

anti-inflammatory

interleukin

↳ link one leukocyte to the other

↳ signaling molecules

pro-inflammatory CKs

complement proteins

↳ produced from liver

neutrophils migrate

↓

more & more prodn of neutrophils & migrn to the site of injury

raise body temp. by acting on the hypothalamus

↳ to check the growth of pathogens

activate eosinophils, basophils to release histamine

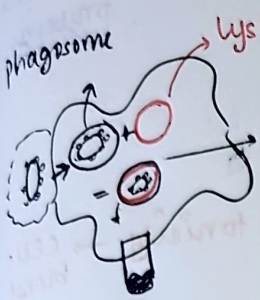
↳ vasodilator

↳ opens up the high endothelial venules (HEV)

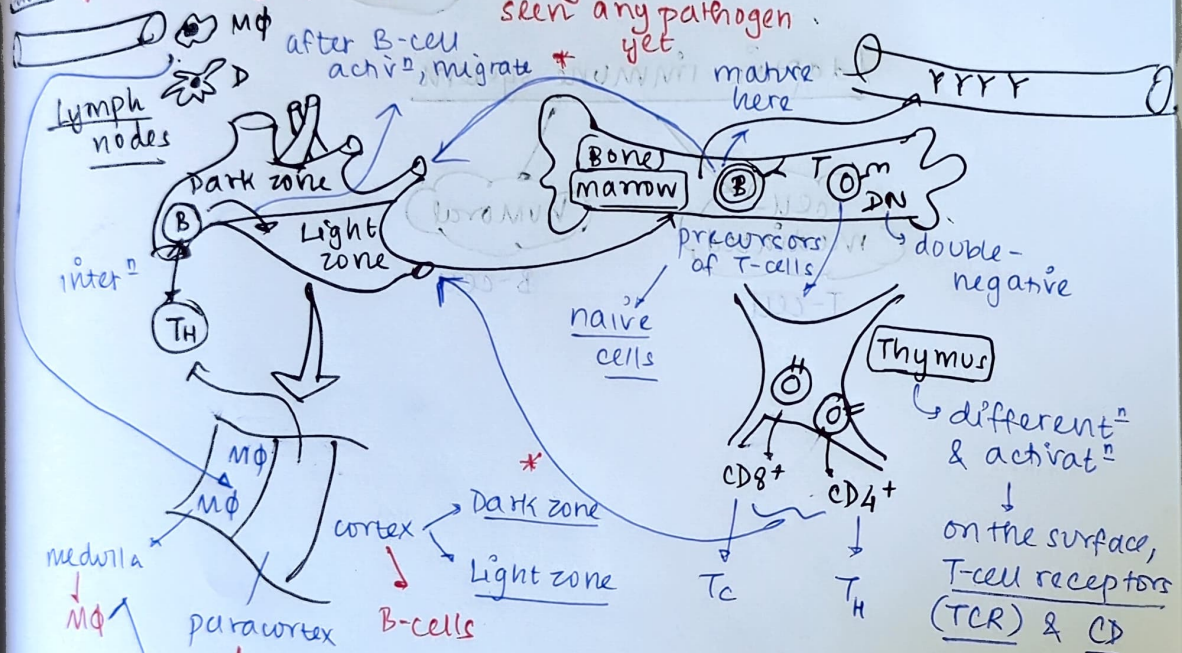
start producing more lymphoid precursors

if the pathogen fools/overwhelms the innate system → it is required to inform the adaptive system

chemoattraction
chemokine receptor on D cells
chemokines → produced thru efferent vesicles of lymph nodes
D → APCs → large surf. area
licensing of dendritic cells → to enter lymphatic system



phagolysosome
kills the bacteria & chops them up
small pieces now act as antigens → presented on the surface of Mϕ → MHCs → MHC-I, MHC-II



* naive lymphocytes → they have not seen any pathogen yet.
after B-cell activ^n, migrate * → mature here
different^n & activat^n
on the surface, T-cell receptors (TCR) & CD receptors → CD8, CD4
diff^n of T cells → T-helper cells (T_H) → activ^n of B-cells & Ab prod^n
T-cytotoxic cells (T_c) → directly kill the pathogens

generic rearrangements
somatic hypermut^n
D cells → affinity / ~~specificity~~ selection → offer antigens to the B cells → in the light zone
B-cells killed by apoptosis ← not so specific Abs
production of specific antibodies → these cells survive
class switching → plasma cells
class switching → memory cells (variants of Ab-prod. B-cells)

blood cells move out → extravasation

opsonization

neutralization } antibodies with the help of complement proteins

complement

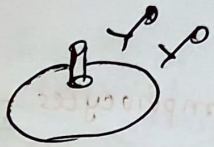
part of innate system → assist adaptive immune system

30-35 complement proteins

acts by complementing the activity of Abs

produce pores on bacterial surface → disrupt tonicity → cells burst

→ membrane attack complexes



Adaptive immune system

cell-mediated → T-cell

humoral → B-cell