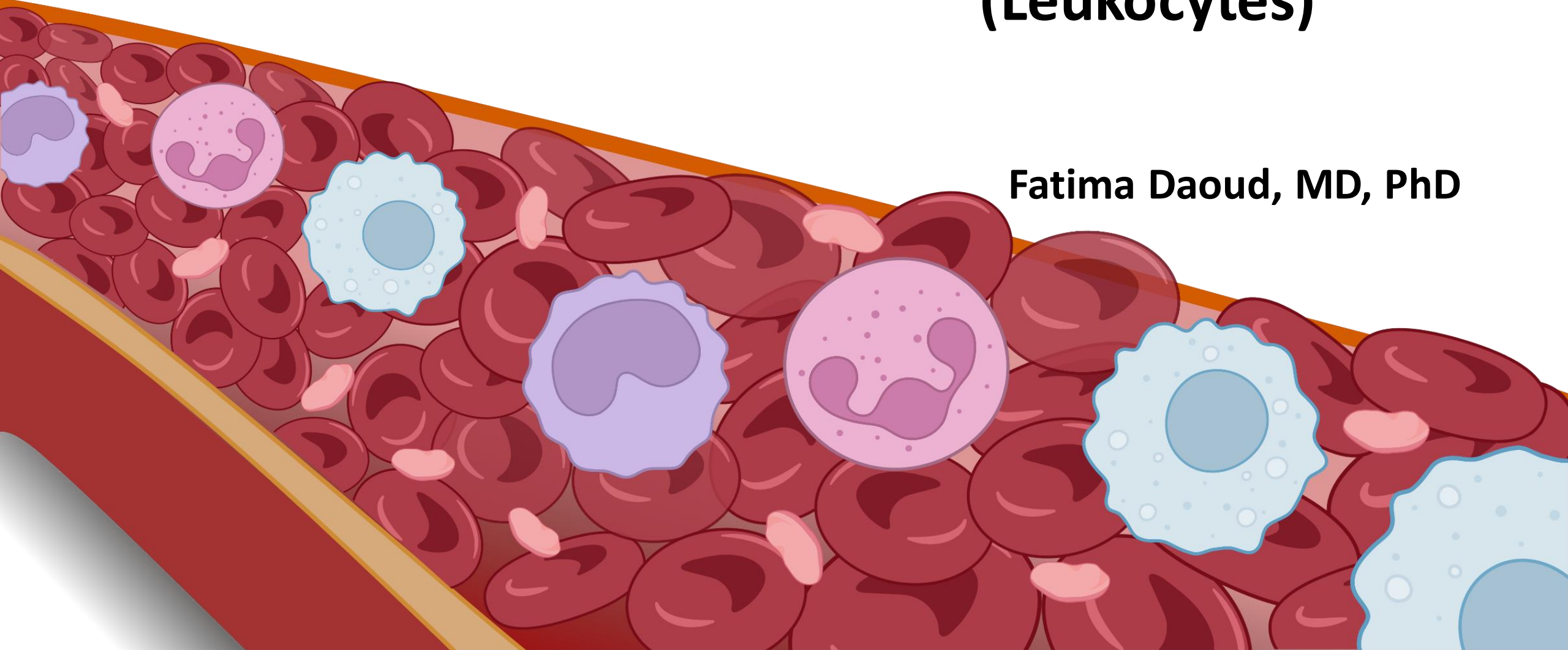


Hematology

Lymphocytes

White Blood Cells (Leukocytes)

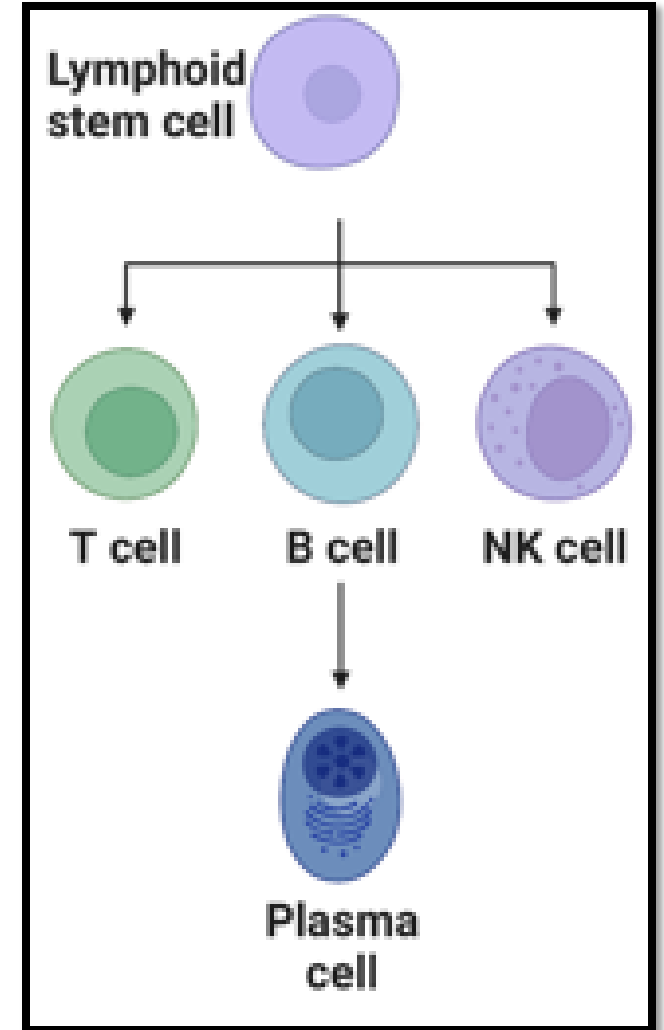
Fatima Daoud, MD, PhD

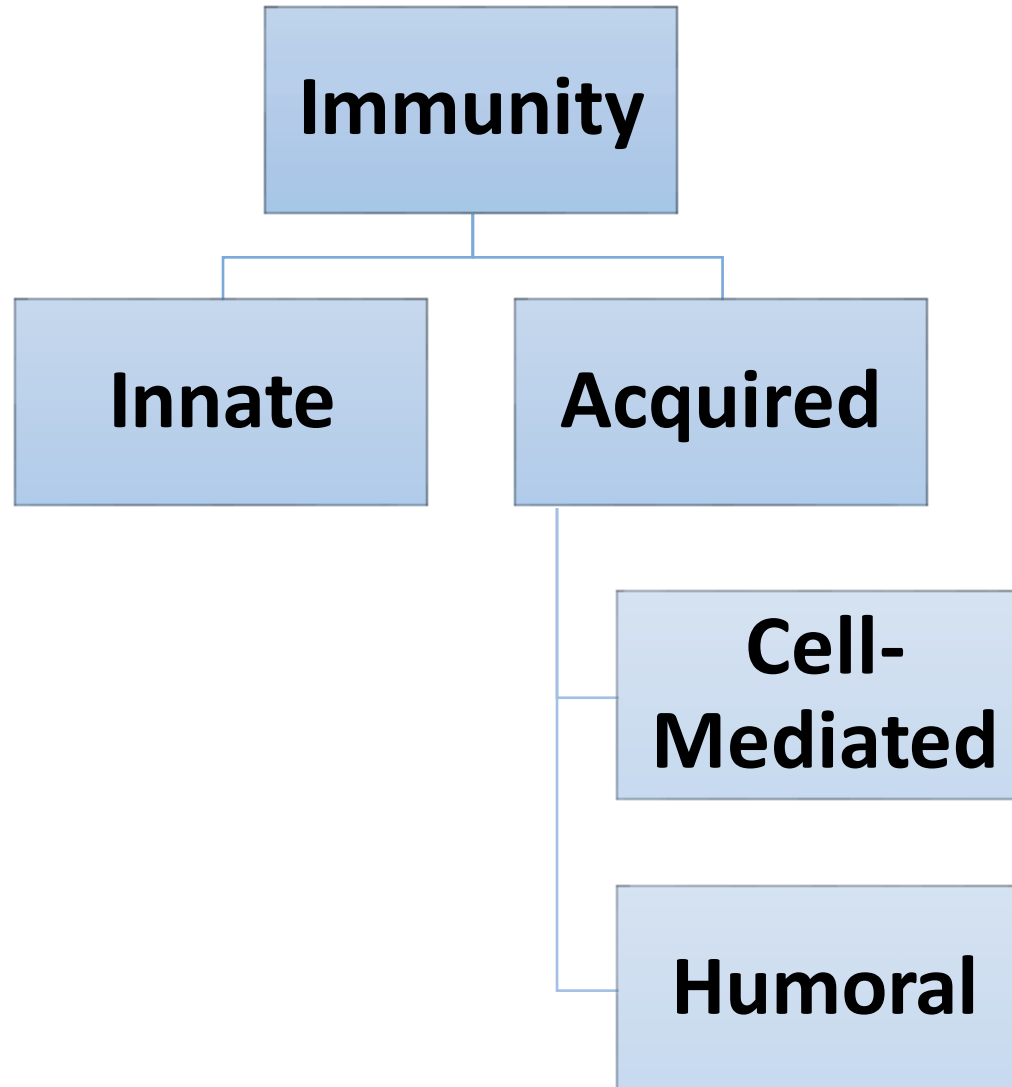


Hematology

Lymphocytes

- Lymphocytes are produced mainly in the various lymphogenous tissues.
- Some of the lymphocytes enter the circulatory system continually.
- Lymphocytes have life spans of weeks or months, depending on the body's need for these cells.





Innate Vs. Acquired (Adaptive)

- Results from general processes.

- Results from processes directed towards specific disease organisms.
- Does not develop until the body is first attacked by a bacterium, virus, or toxin, often requiring weeks or months to develop the immunity.

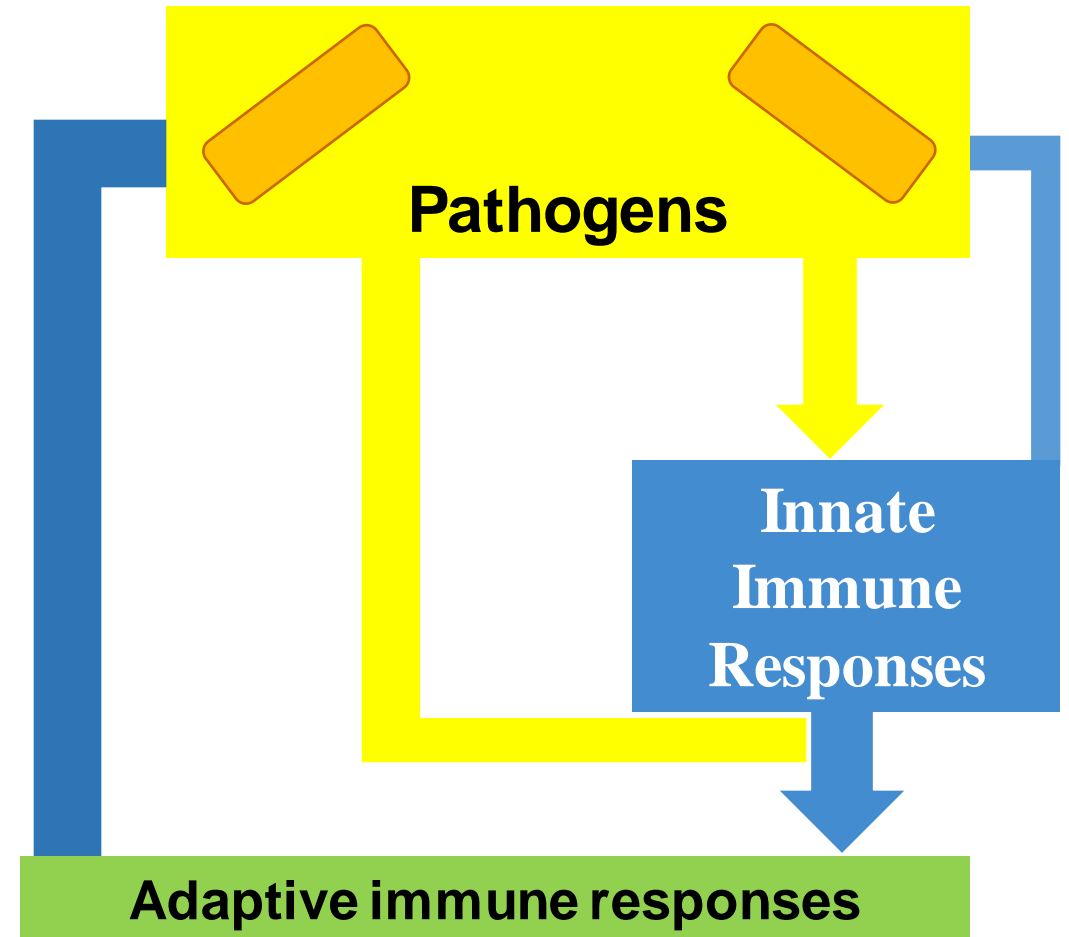
Innate Vs. Acquired (Adaptive)

- Phagocytosis
- Acid secretions of the stomach and the digestive enzymes.
- Skin (tight junctions).
- lysozyme
- Basic polypeptides
- Complement system
- Natural killer lymphocytes

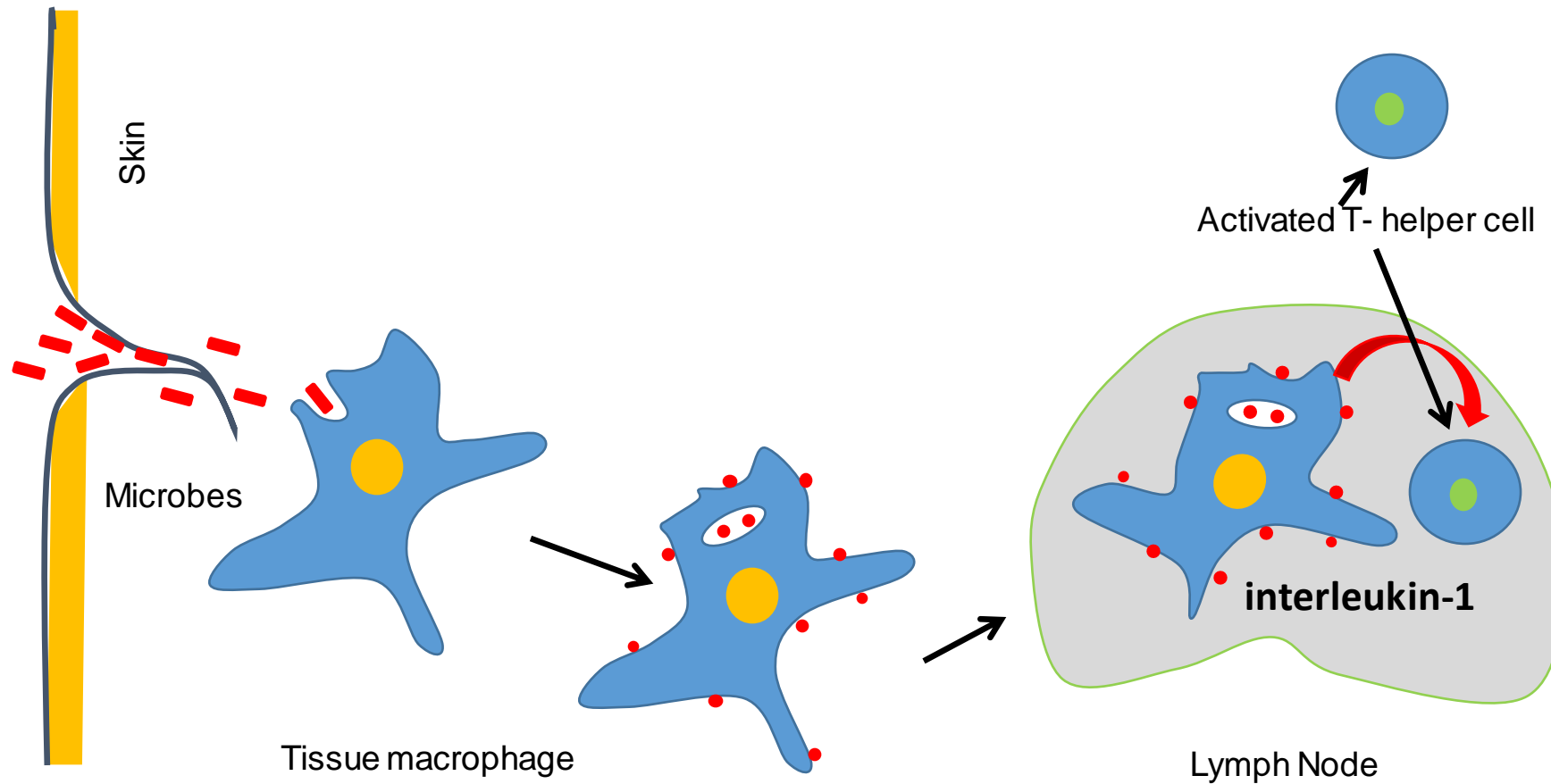
- Antibodies
- Activated lymphocytes

The innate immune system aims to :

- Prevent infection.
- Eliminate invader pathogens.
- Stimulate the acquired immune response.



Macrophage- activation of lymphocyte



Innate Immune Response

Adaptive Immune Response

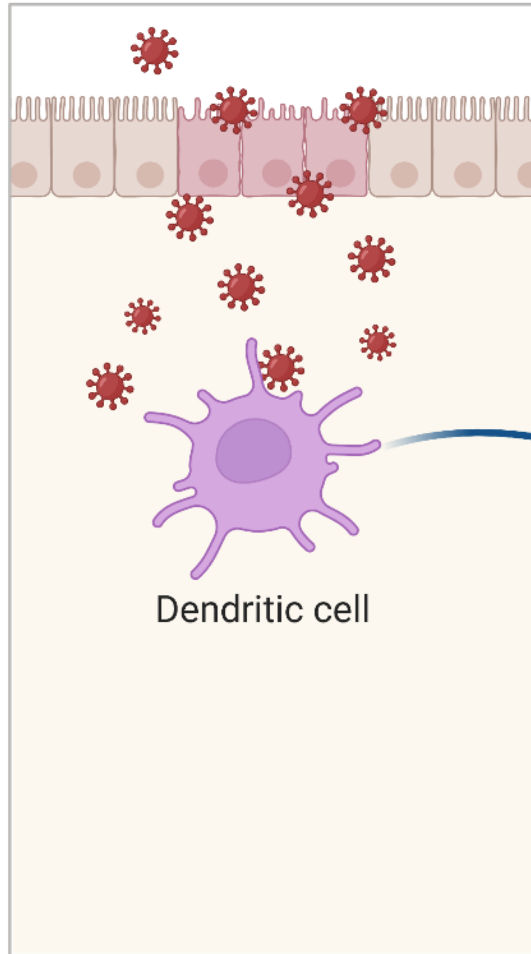
Basic Types of Acquired Immunity—Humoral and Cell-Mediated

- **Humoral (B-cell immunity)**
- Circulating antibodies, which are γ -globulin molecules in the plasma that are capable of attacking the invading agent.

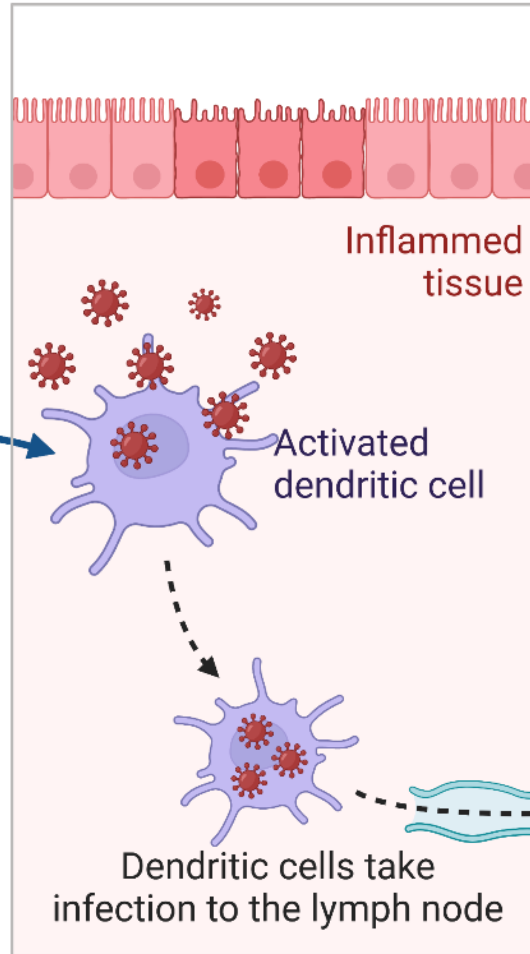
- **Cell-Mediated (T-cell immunity)**
- Achieved through the formation of large numbers of activated T lymphocytes that are specifically crafted in the lymph nodes to destroy the foreign agent.
- (1) *helper T cells*
(2) *cytotoxic T cells*
(3) *suppressor T cells*

Adaptive Immunity

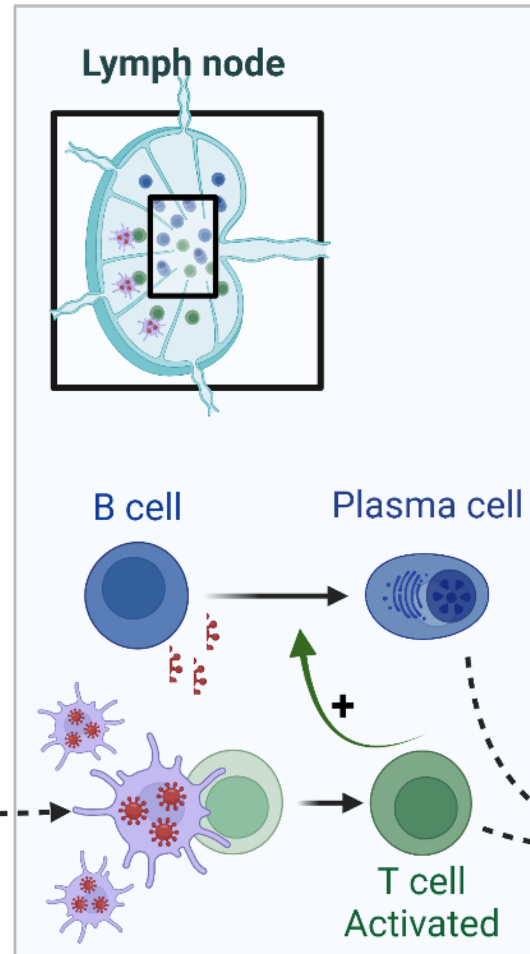
1 Virus infects and replicates within the epithelium



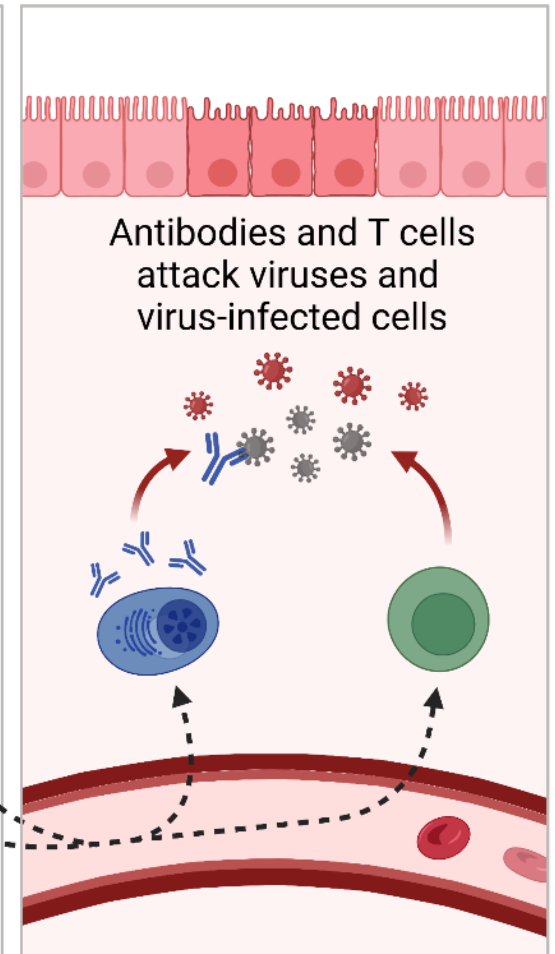
2 Dendritic cell activation



3 T and B cell priming in the lymph node



4 Adaptive immunity



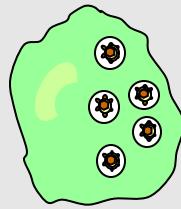
Humoral immunity

Cell-mediated immunity

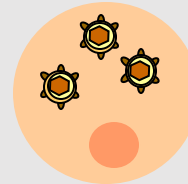
Microbe



Extracellular microbes

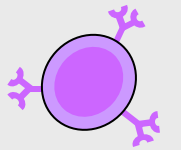


Phagocytosed Microbes in macrophage

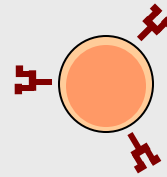


Intracellular Microbes (e.g., viruses) Replicating within Infected cell

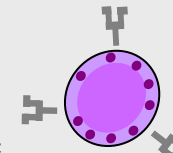
Responding lymphocytes



B lymphocyte



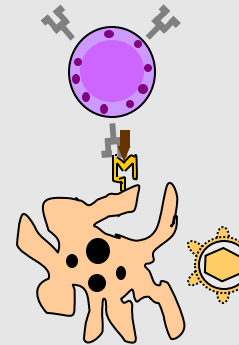
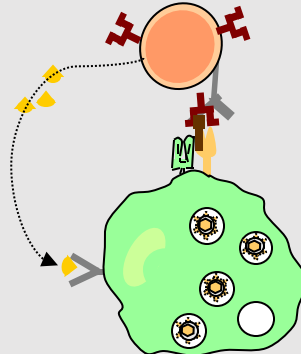
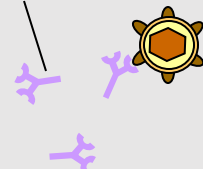
Helper T lymphocyte



Cytolytic T lymphocyte

Effector mechanism

Secreted antibody



Functions

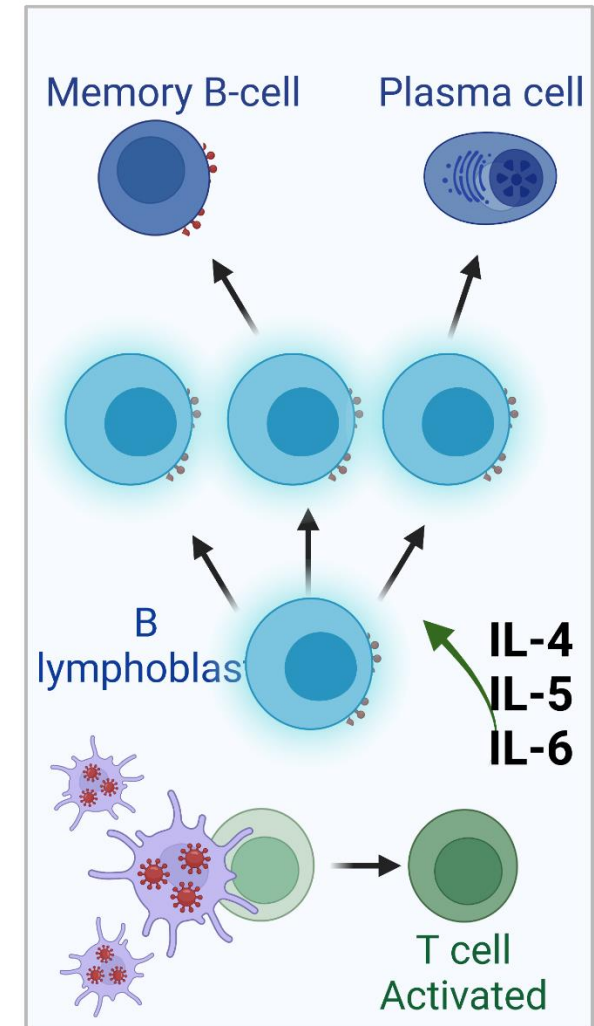
Block infections and eliminate extracellular microbes

Activate macrophages to kill phagocytosed microbes

Kill infected cells and eliminate reservoirs of infection

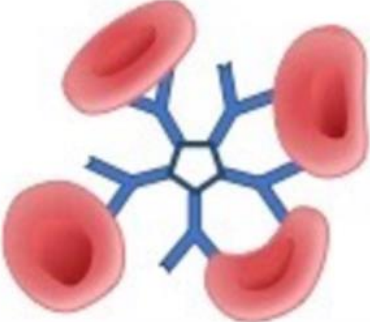
Formation of Memory cells (B-lymphocyte)

- Moderate numbers of new B lymphocytes similar to those of the original clone.
- They also circulate throughout the body to populate all the lymphoid tissue; immunologically, however, they remain dormant until activated once again by a new quantity of the same antigen



Mechanisms of Action of Antibodies

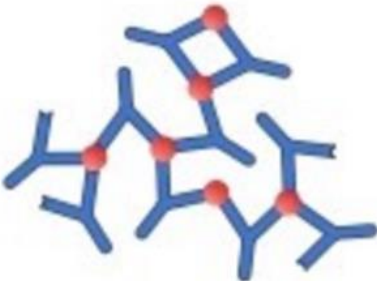
Agglutination



Links cell-bound antigens together, causing clumping

The diagram shows several red blood cells (red discs) being pulled together by a central network of blue Y-shaped antibody molecules. The antibodies have red dots at their tips, which are bound to antigens on the surface of the red blood cells.

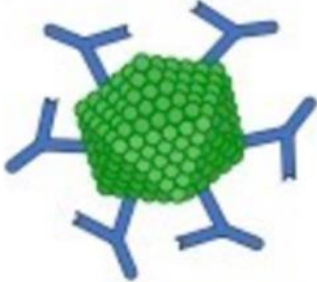
Precipitation



Makes soluble antigens insoluble, aiding elimination

The diagram shows a cluster of blue Y-shaped antibody molecules. Each antibody has a red dot at its tip, representing an antigen. The antibodies are bound to these antigens, forming a large, insoluble complex.

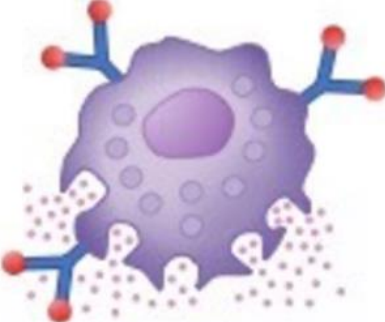
Neutralisation



Masks dangerous parts of pathogen (e.g. exotoxins, etc.)

The diagram shows a green, spherical pathogen with a textured surface. It is surrounded by several blue Y-shaped antibody molecules. The antibodies are bound to the pathogen, effectively covering its surface and preventing it from interacting with host cells.

Lysis



Directly attacking membranes cause rupture

The diagram shows a purple, irregularly shaped cell with a nucleus. It is surrounded by several blue Y-shaped antibody molecules. The antibodies are bound to the cell's membrane, causing it to rupture and release its contents, represented by small white dots.

Hematology

Inflammation

Inflammation



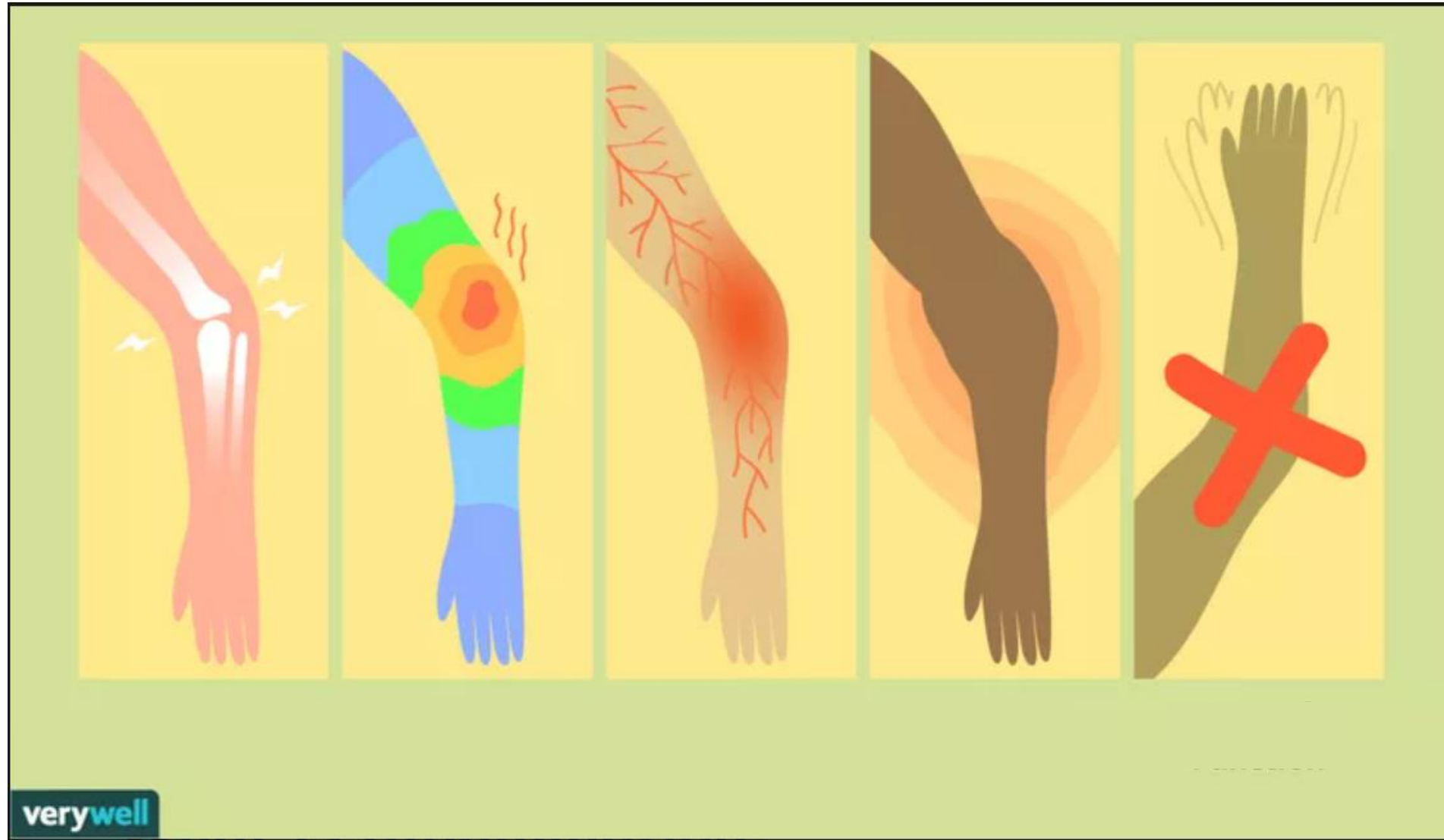
Inflammation

- The complex of changes that accompany tissue damage including vascular and cellular events that aim to clean up any cellular debris or pathogen and initiate repair.

Types/causes of Inflammation:



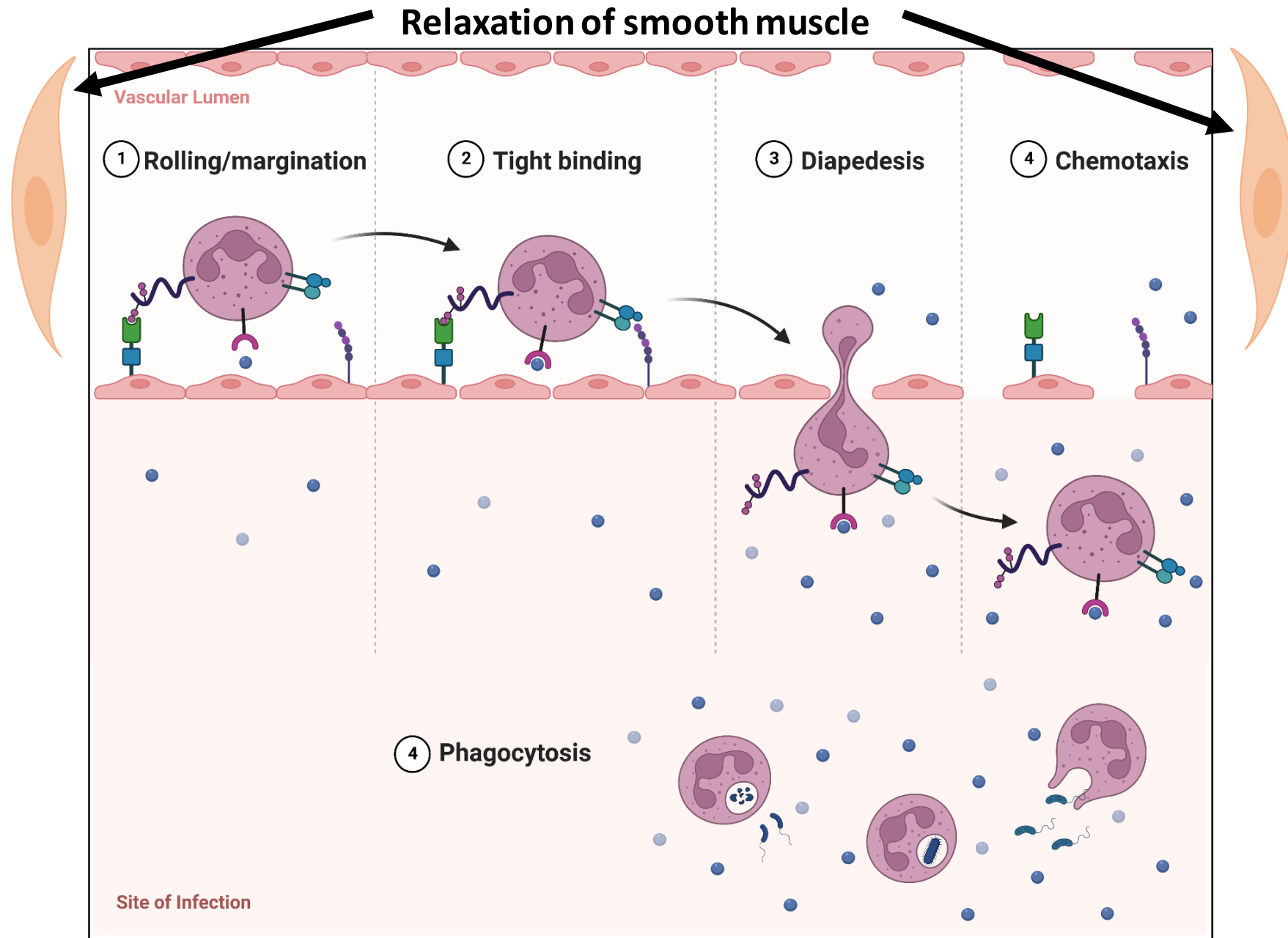
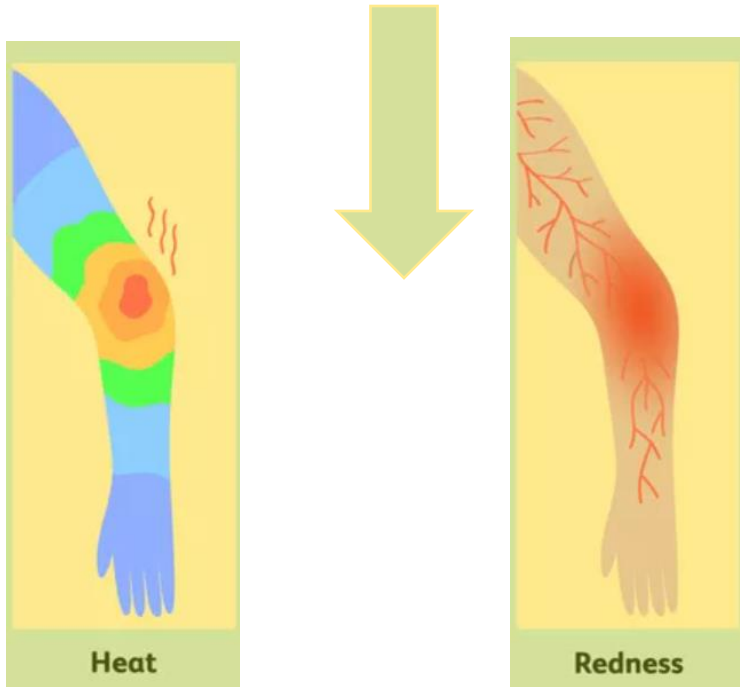
Signs of Inflammation



5 Signs of Inflammation: Pain, Heat, Redness, Swelling, and Loss of Function. By Lana Barhum

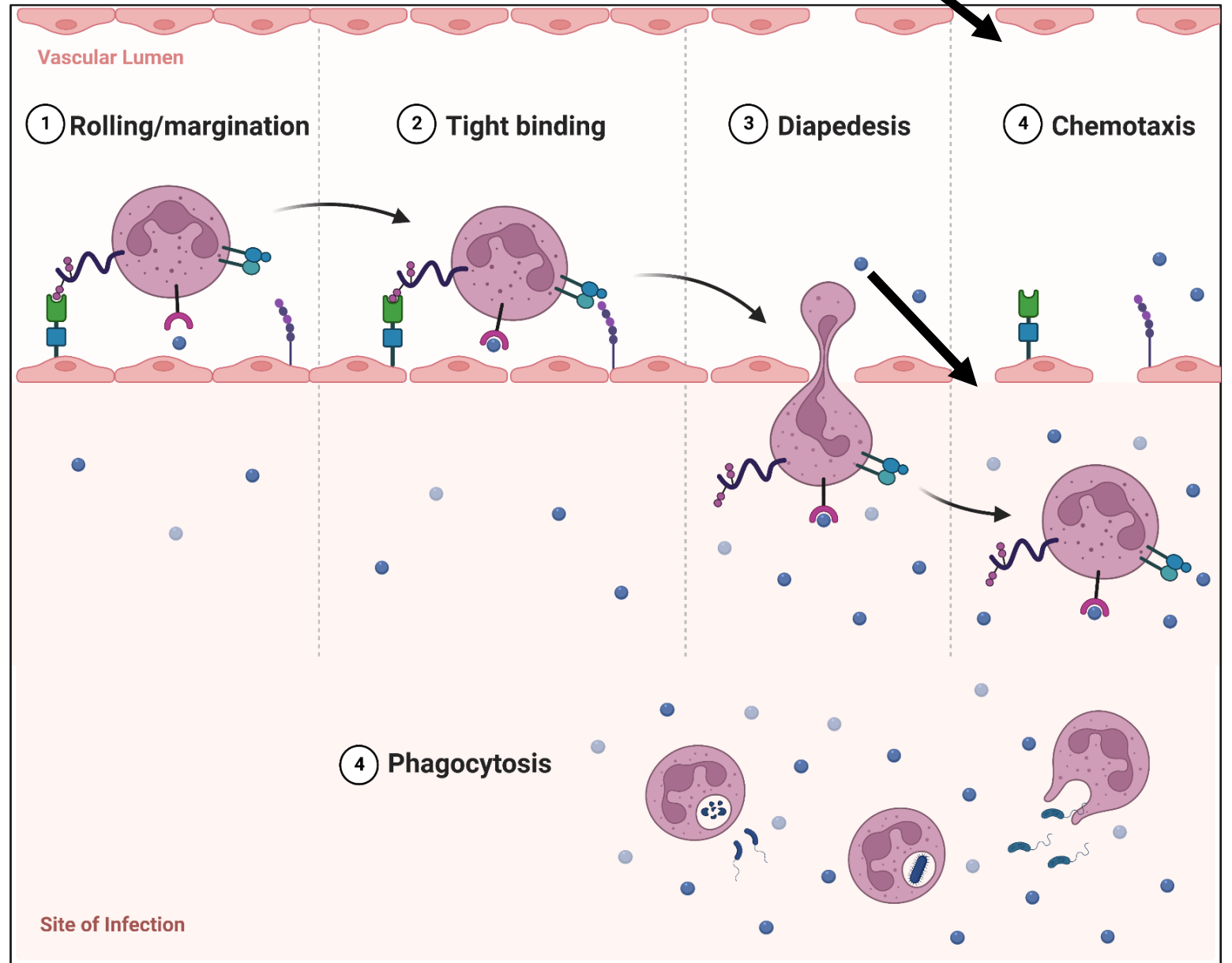
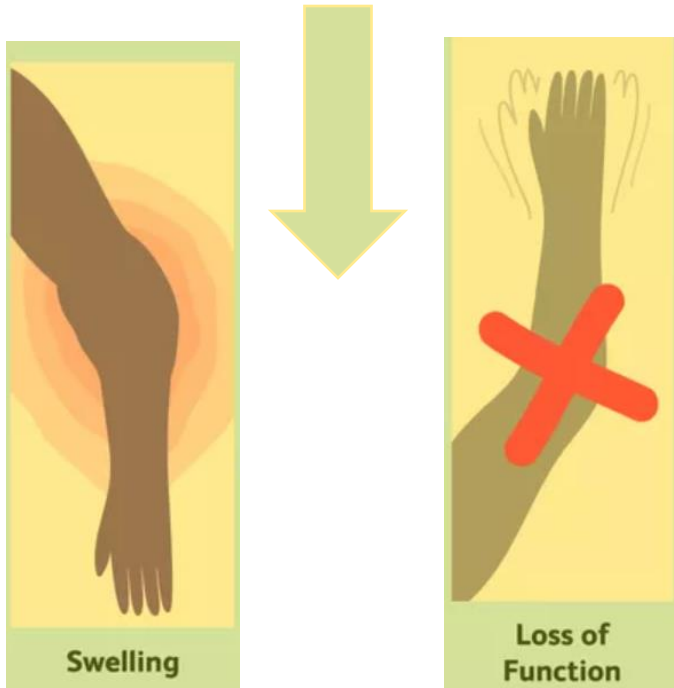
Inflammation is characterized by:

1. Vasodilation of the local blood vessels.



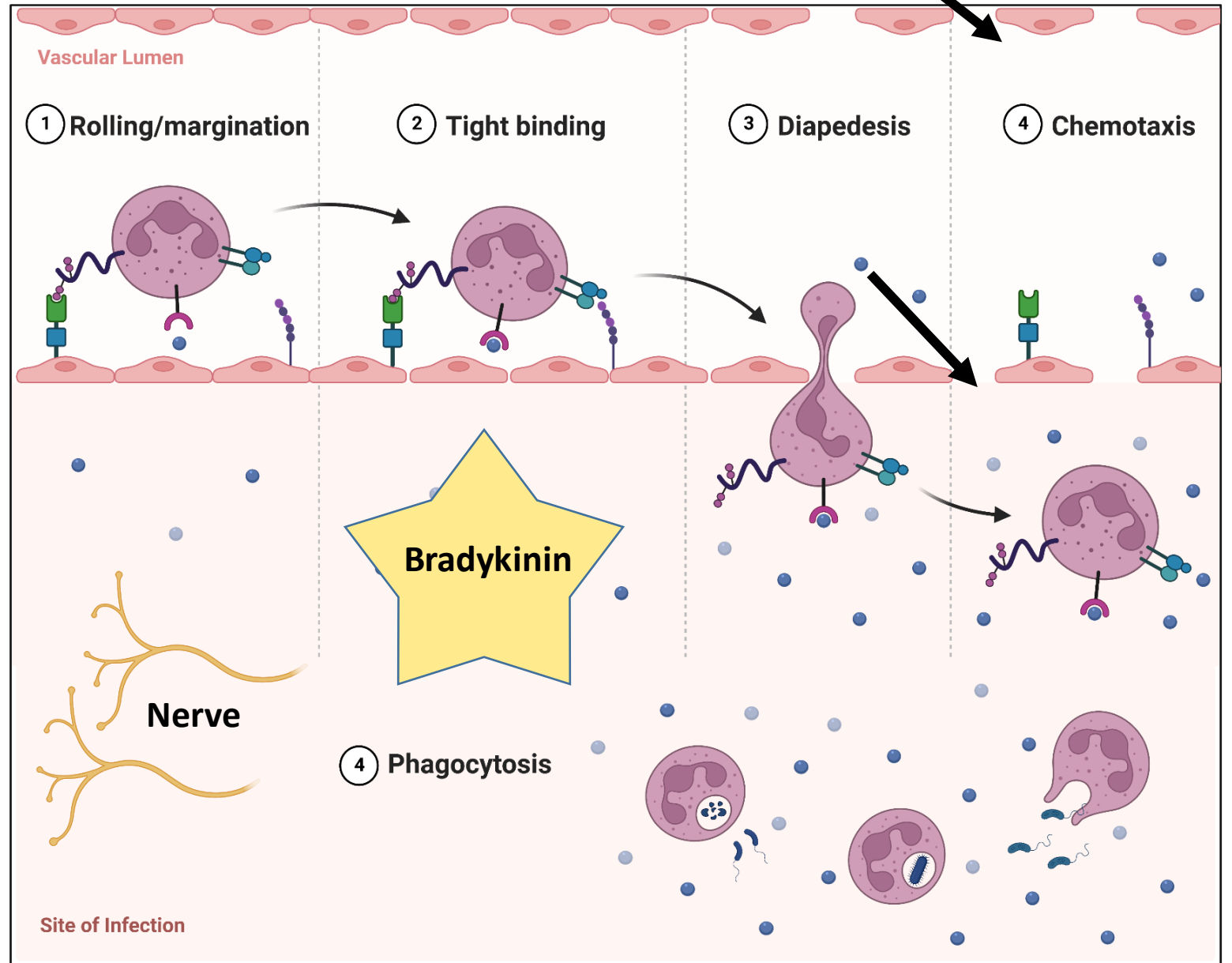
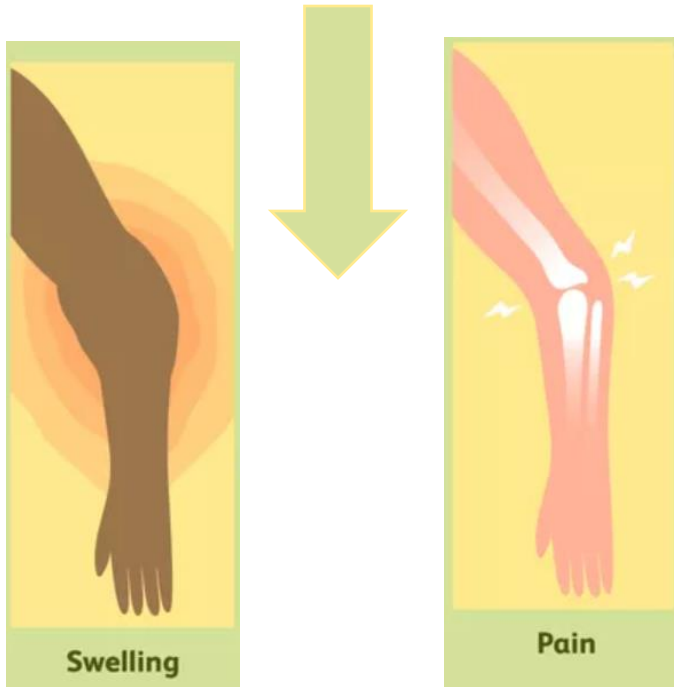
Inflammation is characterized by:

2. Increased permeability of the capillaries.



Inflammation is characterized by:

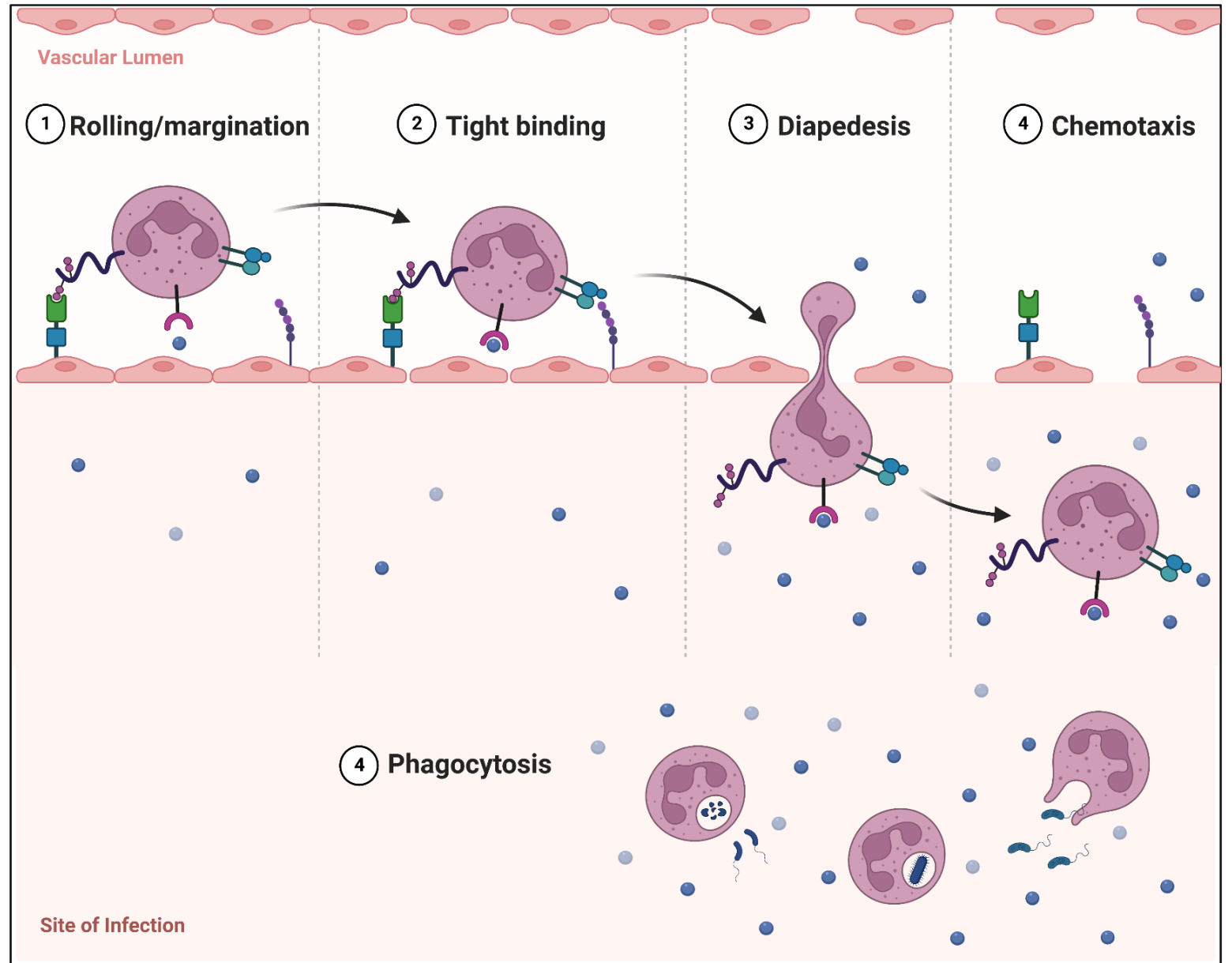
2. Increased permeability of the capillaries.



Inflammation is characterized by:

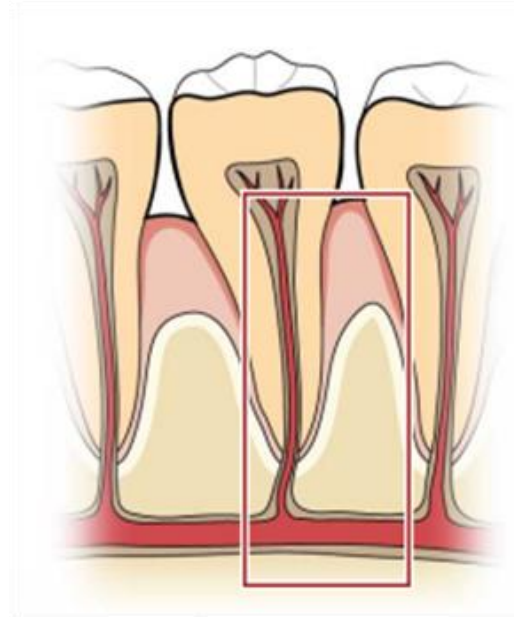
3. Migration of large numbers of granulocytes and monocytes into the tissue.

Leukocytosis



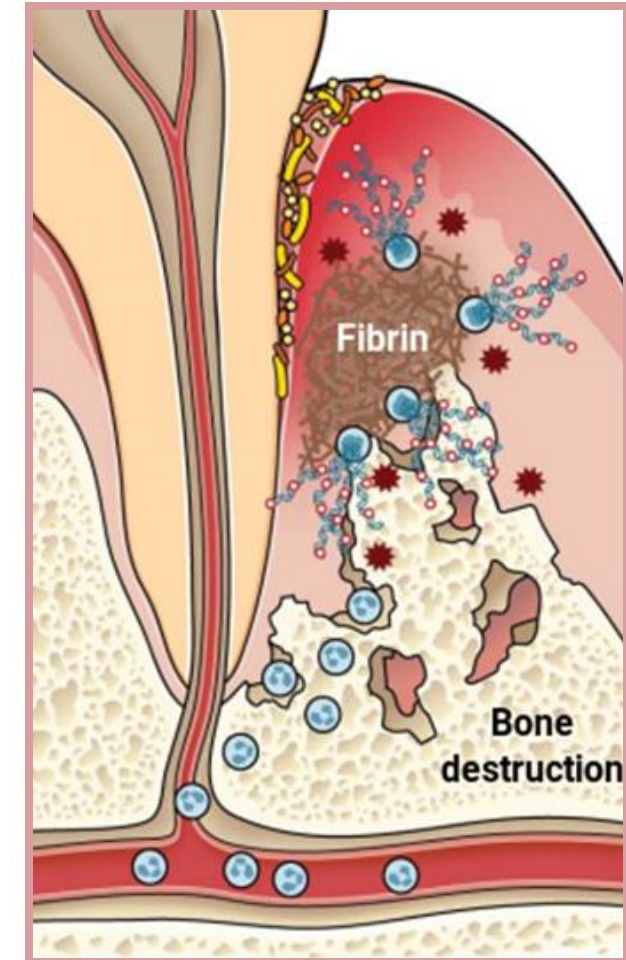
Inflammation is characterized by:

4. Increased amounts of fibrinogen and other proteins leaking from the capillaries.



Walling-Off

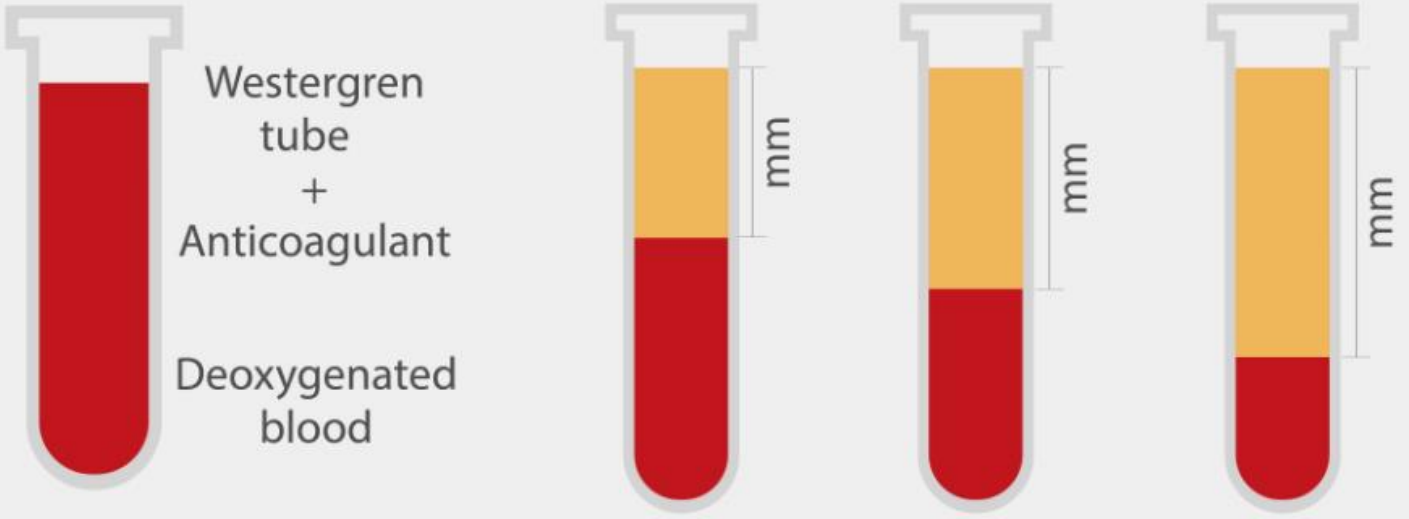
Pathogenic (periodontitis)



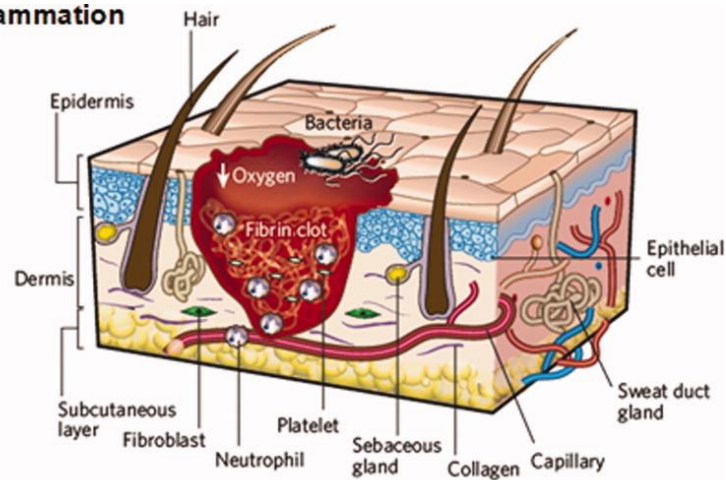
Erythrocyte sedimentation rate (ESR)



When blood is left alone in an upright test tube, the sedimentation increases over time, but the ESR stays the same, which indicates how quickly the sedimentation happens.

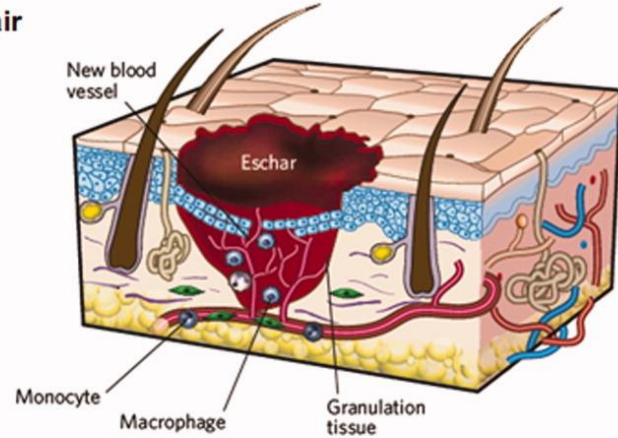


A Inflammation



➤ (A) A fibrin clot is formed and inflammatory cells enter the wound site.

B Repair



➤ (B) Re-epithelialization

➤ (C) Remodeling is the final stage of wound healing. ECM remodeling factors modulate and revise the scar tissue.

C Remodelling

