

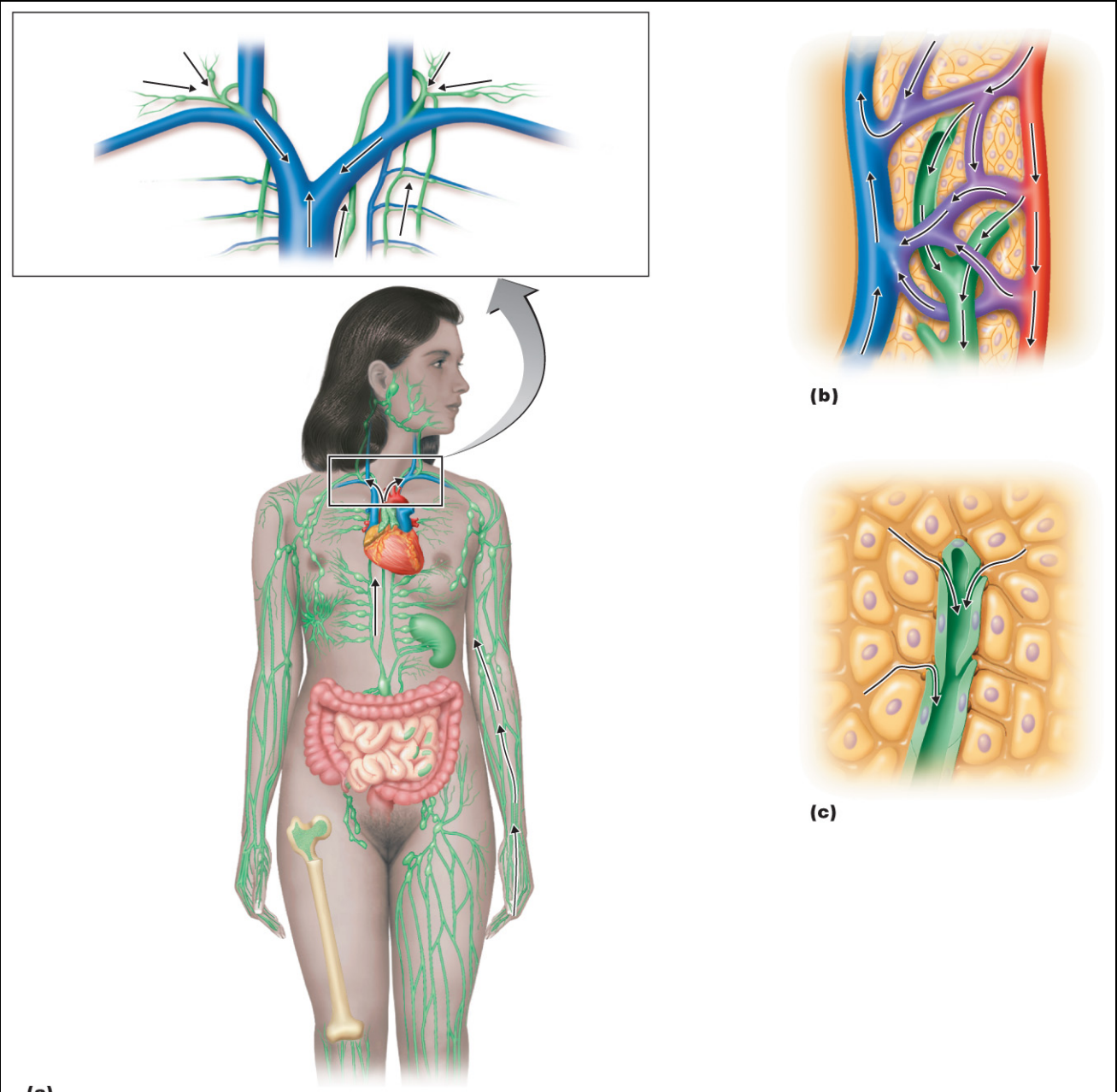
Innate Immunity (Ch.16)

Innate Immunity		Adaptive Immunity (Chapter 17)
First line of defense	Second line of defense	Third line of defense
<ul style="list-style-type: none">• Intact skin• Mucous membranes and their secretions• Normal microbiota	<ul style="list-style-type: none">• Phagocytes, such as neutrophils, eosinophils, dendritic cells, and macrophages• Inflammation• Fever• Antimicrobial substances	<ul style="list-style-type: none">• Specialized lymphocytes: T cells and B cells• Antibodies

Innate Immunity (Ch.16)

Second line of defense

Phagocytes: Lymphatic system



(a)

(b)

(c)

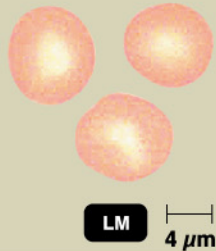
Fig 16.5

Phagocytes

TABLE 16.1 Formed Elements in Blood

I. Erythrocytes (Red Blood Cells)

4.8–5.4 million per μl or mm^3
Function: Transport of O_2 and CO_2

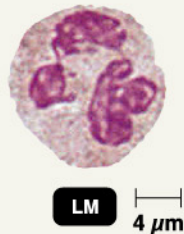


II. Leukocytes (White Blood Cells)

5000–10,000 per μl or mm^3

A. Granulocytes (stained)

1. Neutrophils (PMNs)
(60–70% of leukocytes)
Function: Phagocytosis

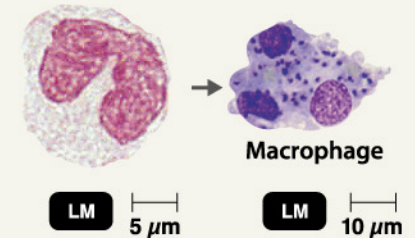


2. Basophils (0.5–1%)
Function: Production
of histamine



B. Agranulocytes (stained)

1. Monocytes (3–8%)
Function: Phagocytosis
(when they mature into
macrophages)



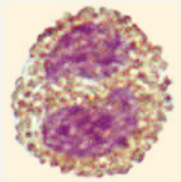
2. Dendritic cells
Functions: Derived from
monocytes; phagocytosis and
initiation of adaptive immune
responses



Phagocytes

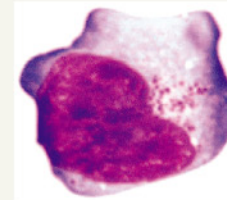
TABLE 16.1 Formed Elements in Blood

3. Eosinophils (2–4%)
Functions: Production of toxic proteins against certain parasites; some phagocytosis



LM 4 μm

3. Lymphocytes (20–25%)
• Natural killer (NK) cells
Function: Destroy target cells by cytolysis and apoptosis



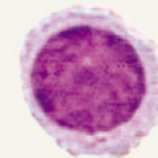
LM 2.5 μm

• T cells
Function: Cell-mediated immunity (discussed in Chapter 17)



LM 15 μm

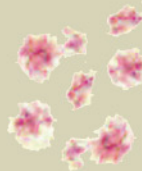
• B cells
Function: Descendants of B cells (plasma cells) produce antibodies



LM 8 μm

III. Platelets

150,000–400,000 per μl or mm^3
Function: Blood clotting



LM 2.5 μm

Phagocytes: Phagocytosis

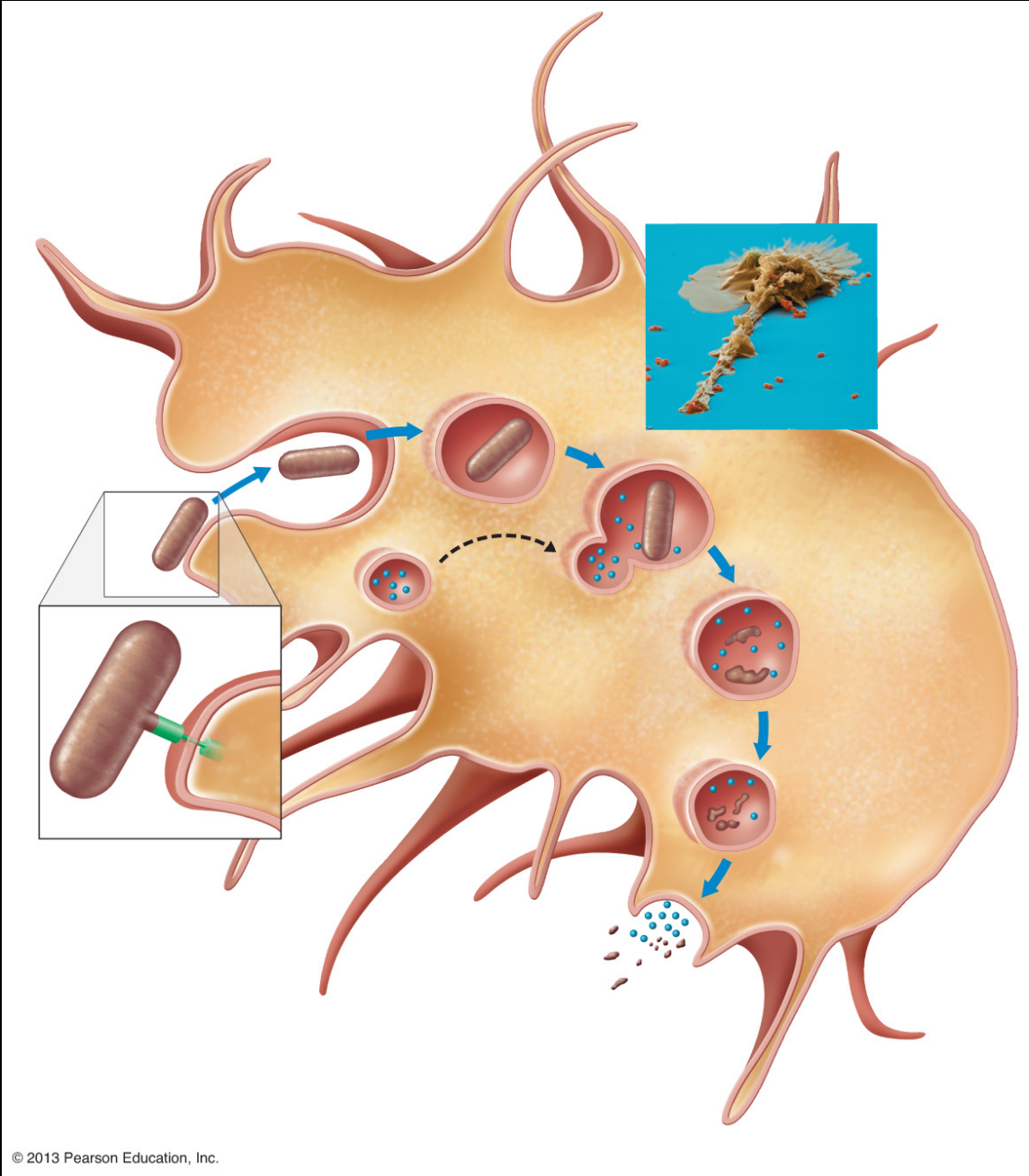


Fig 16.5

Inflammation

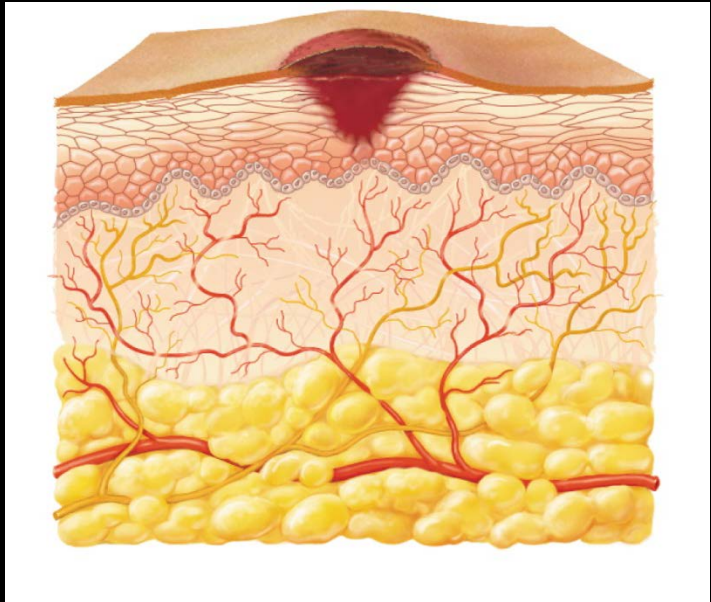
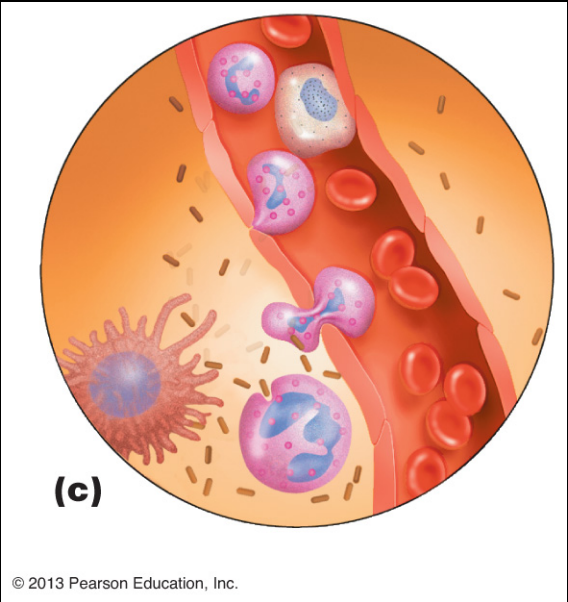
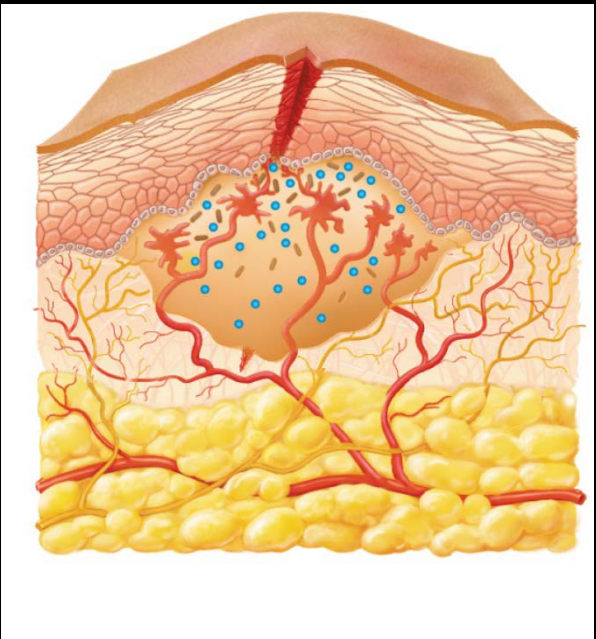
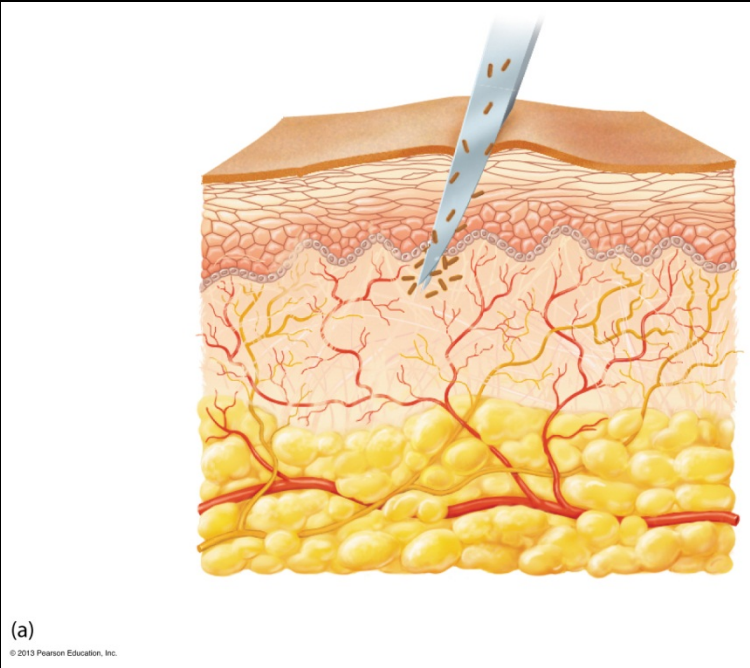
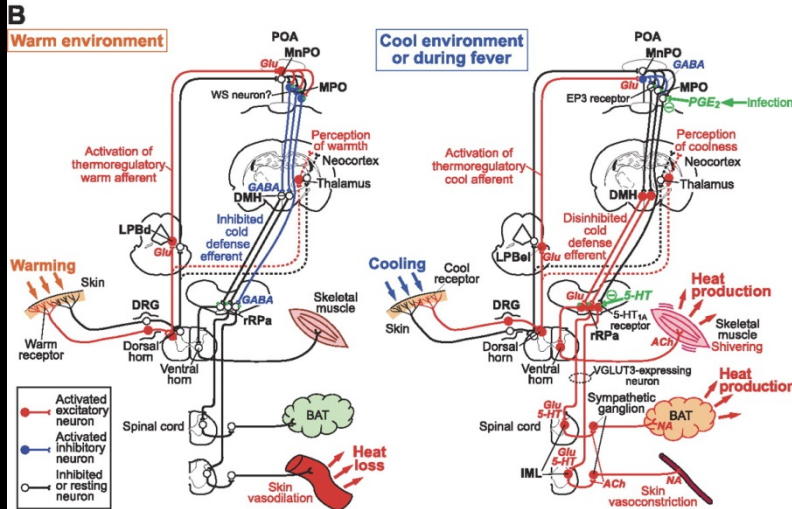
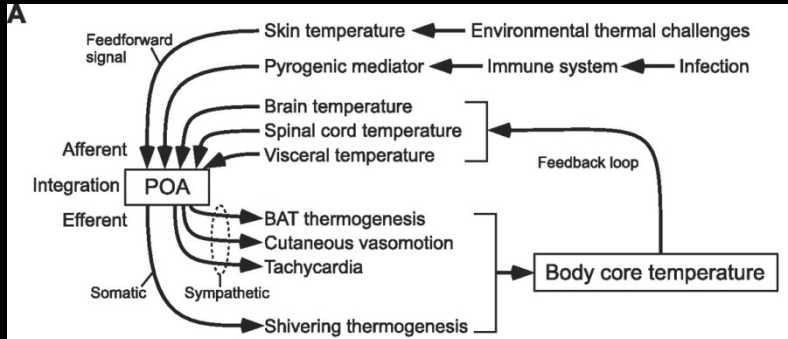


Fig 16.8

Fever: It's complicated!



ajp.physiology.org

Complement system

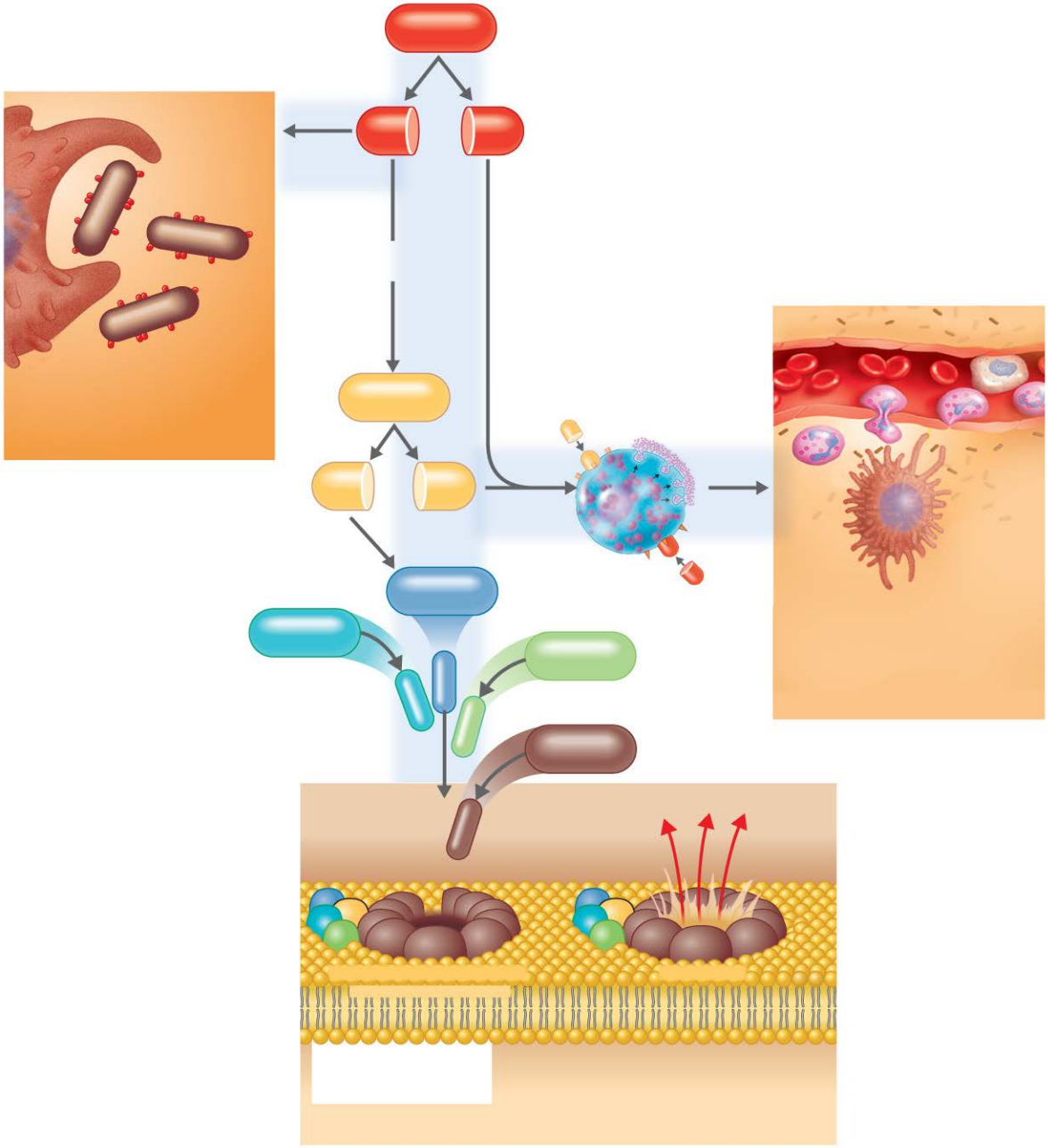


Fig 16.9

TABLE 16.2 Summary of Innate Immunity Defenses

SECOND LINE OF DEFENSE

DEFENSIVE CELLS

Phagocytes	Phagocytosis by cells such as neutrophils, eosinophils, dendritic cells, and macrophages.
Natural killer (NK) cells	Kill infected target cells by releasing granules that contain perforin and granzymes. Phagocytes then kill the infected microbes.

INFLAMMATION

Confines and destroys microbes and initiates tissue repair.

FEVER

Intensifies the effects of interferons, inhibits growth of some microbes, and speeds up body reactions that aid repair.

ANTIMICROBIAL SUBSTANCES

Complement system	Causes cytolysis of microbes, promotes phagocytosis, and contributes to inflammation.
Interferons	Protect uninfected host cells from viral infection.
Iron-binding proteins	Inhibit growth of certain bacteria by reducing the amount of available iron.
Antimicrobial peptides (AMPs)	Inhibit cell wall synthesis, form pores in the plasma membrane that cause lysis; and destroy DNA and RNA.