

KeyPoint Immune System Physiology



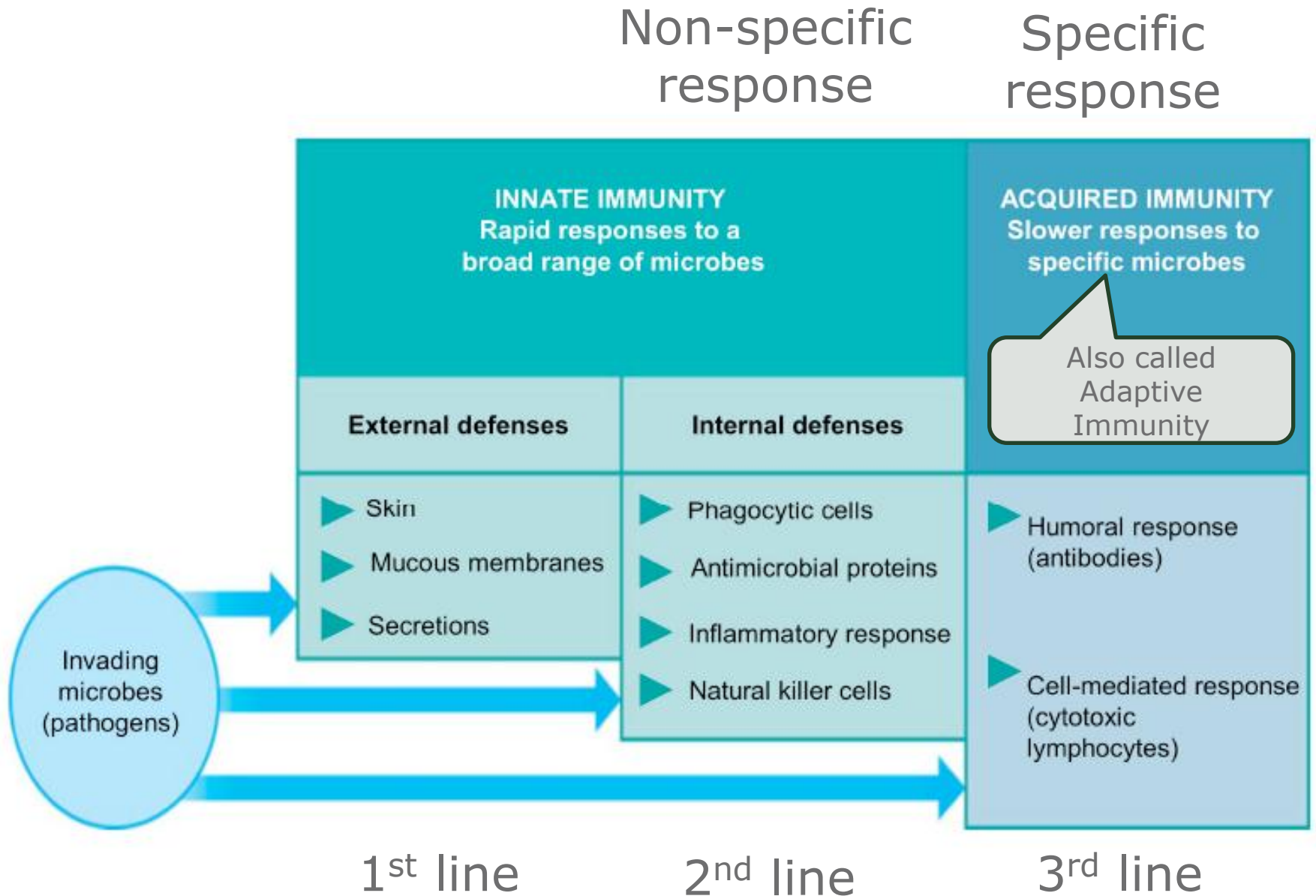
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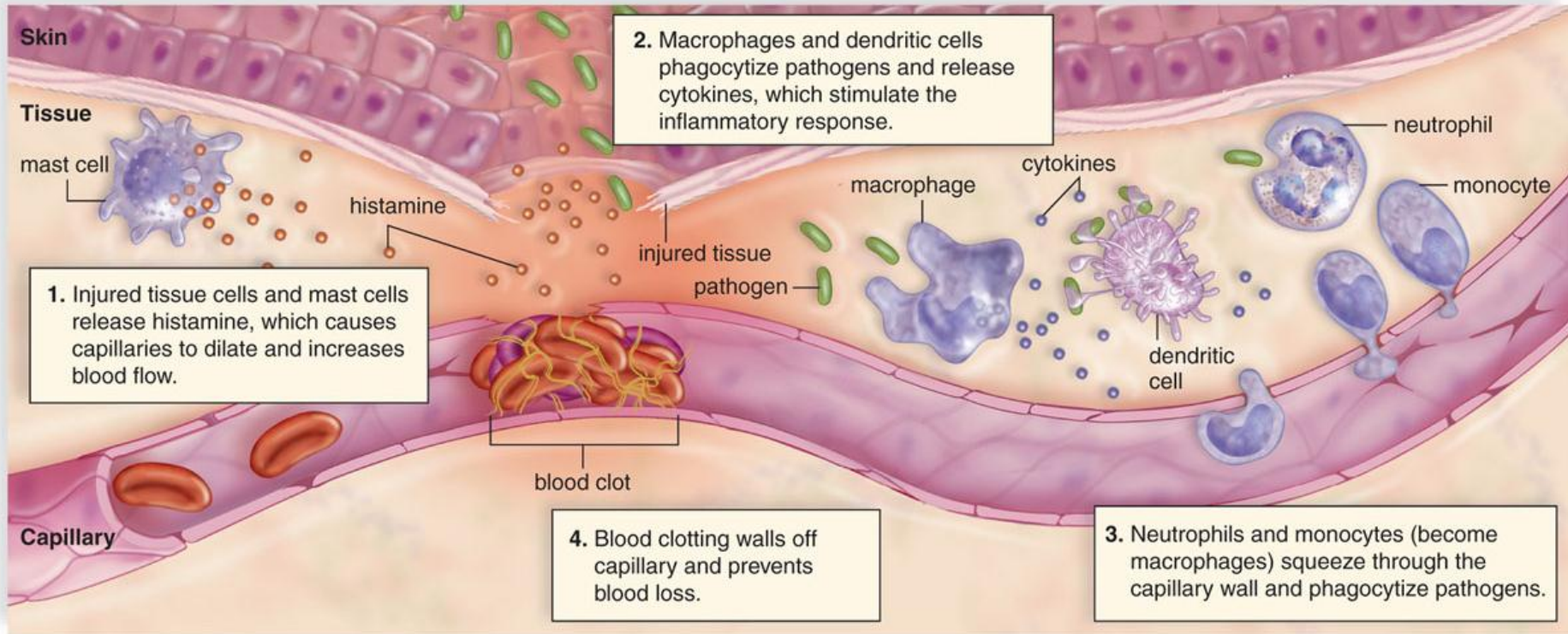
Food Animal Biotechnology



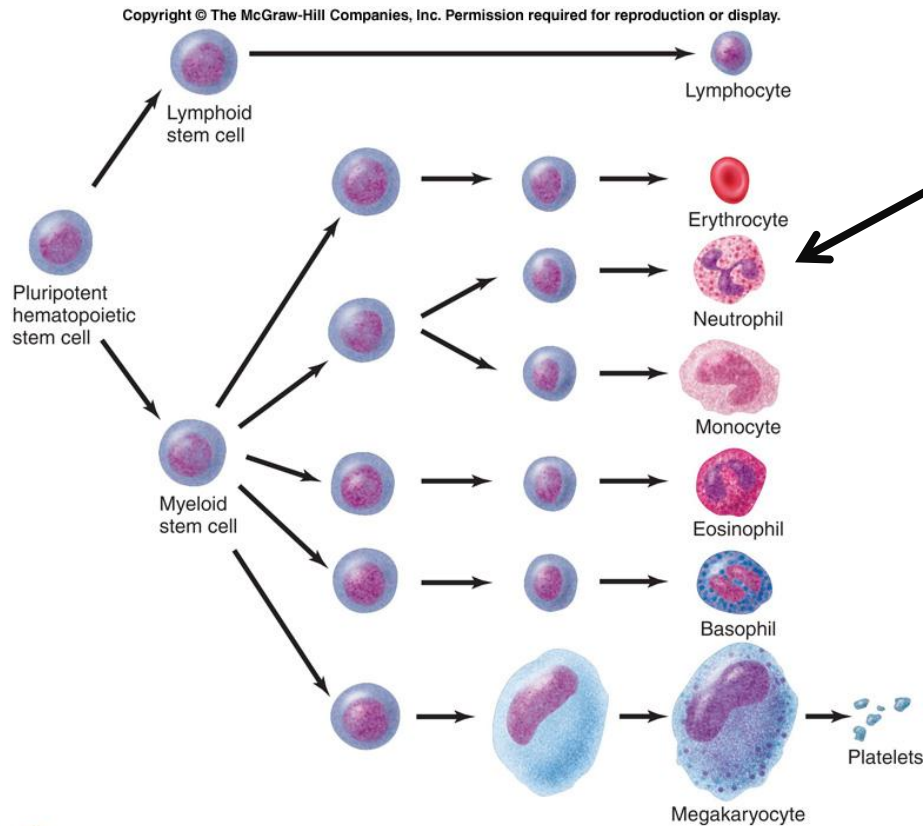
Defence against pathogens



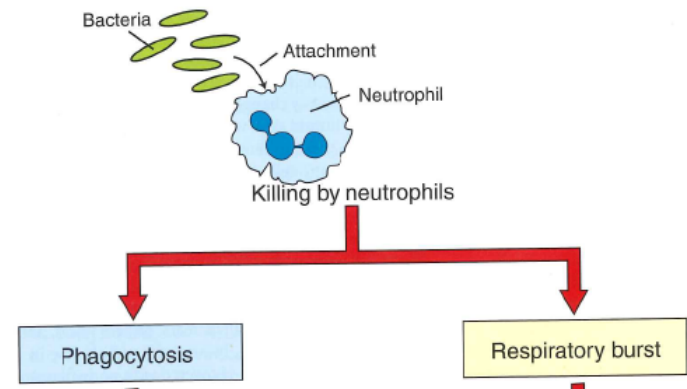
Summary of the inflammatory response



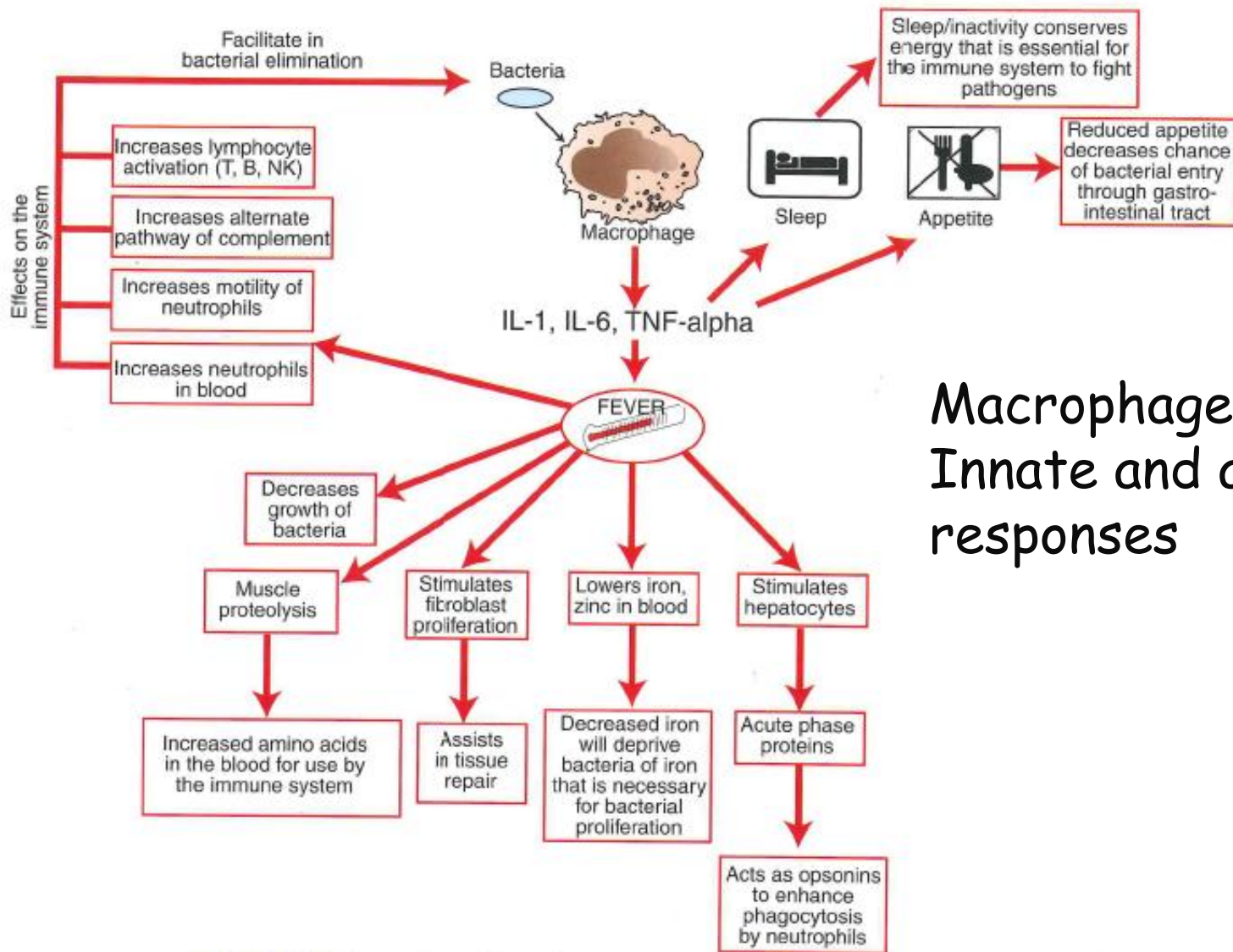
Cells mediating innate immunity: Neutrophils



Neutrophils: Innate response



Cells mediating innate and acquired immunity: Macrophages

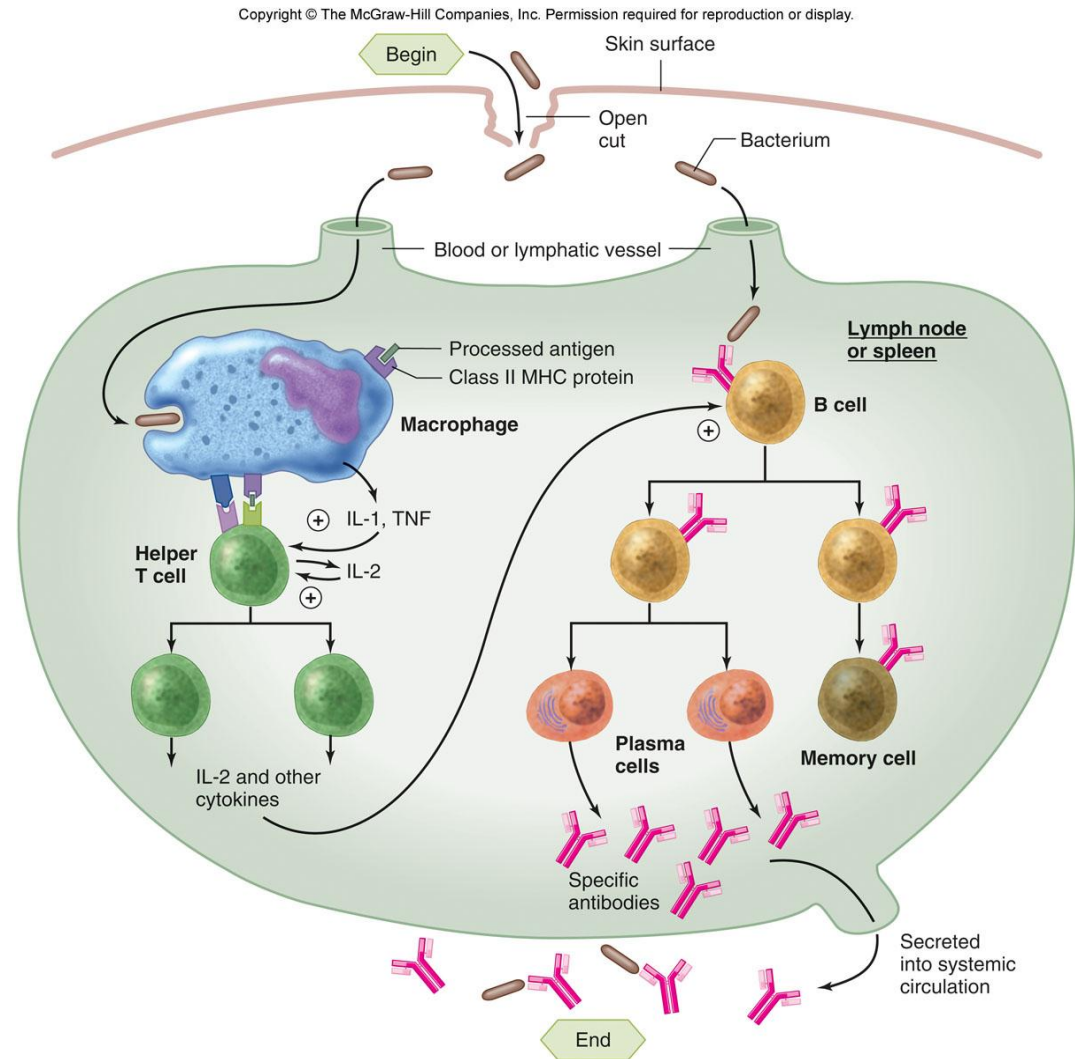


Macrophages:
Innate and acquired
responses

FIGURE 54-6 ■ Pyrogenic cytokines, fever, and pathogen elimination.

Summary of acquired immunity

Bacterial invasion in this scenario begins with a cut in the skin. A macrophage (or a B-cell) in the lymph node engulfs a bacterium and then presents bacterial antigens to helper T-cells, which results in the activation of B-cells to plasma cells, generating many antibodies, which enter the systemic circulation to bind to bacterial antigens and “mark” them for destruction.



Cells mediating specific immunity: Lymphocytes

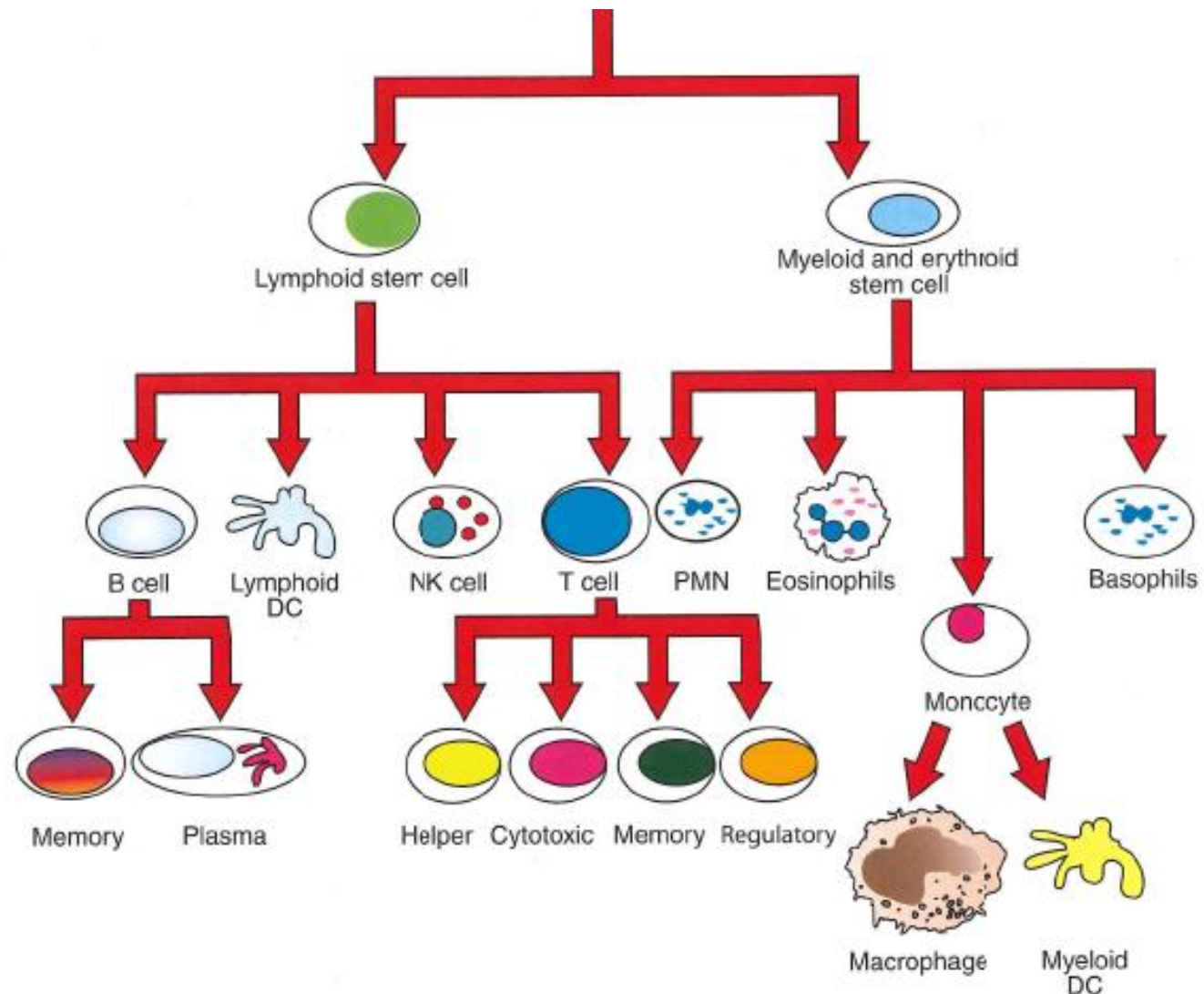
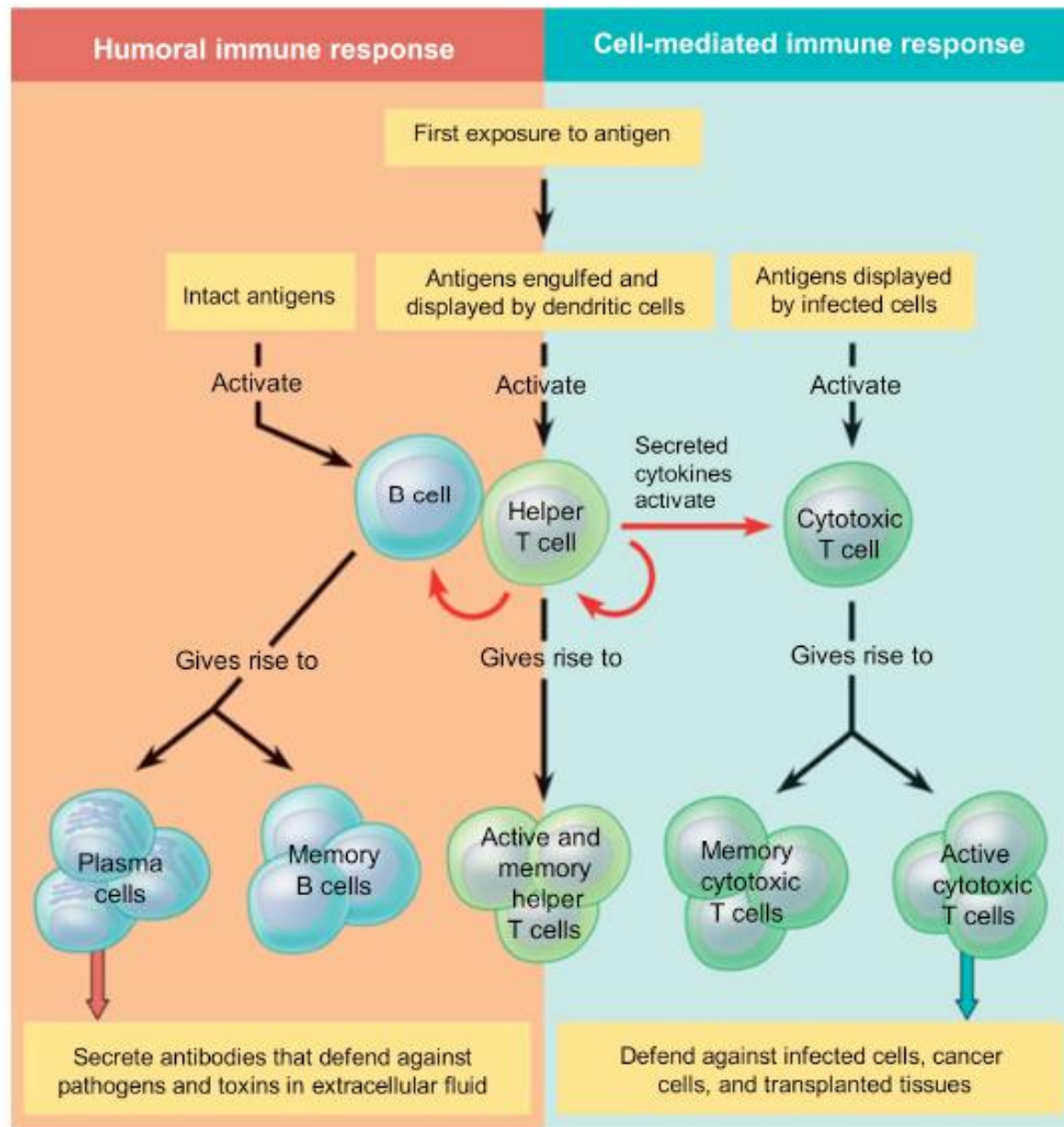
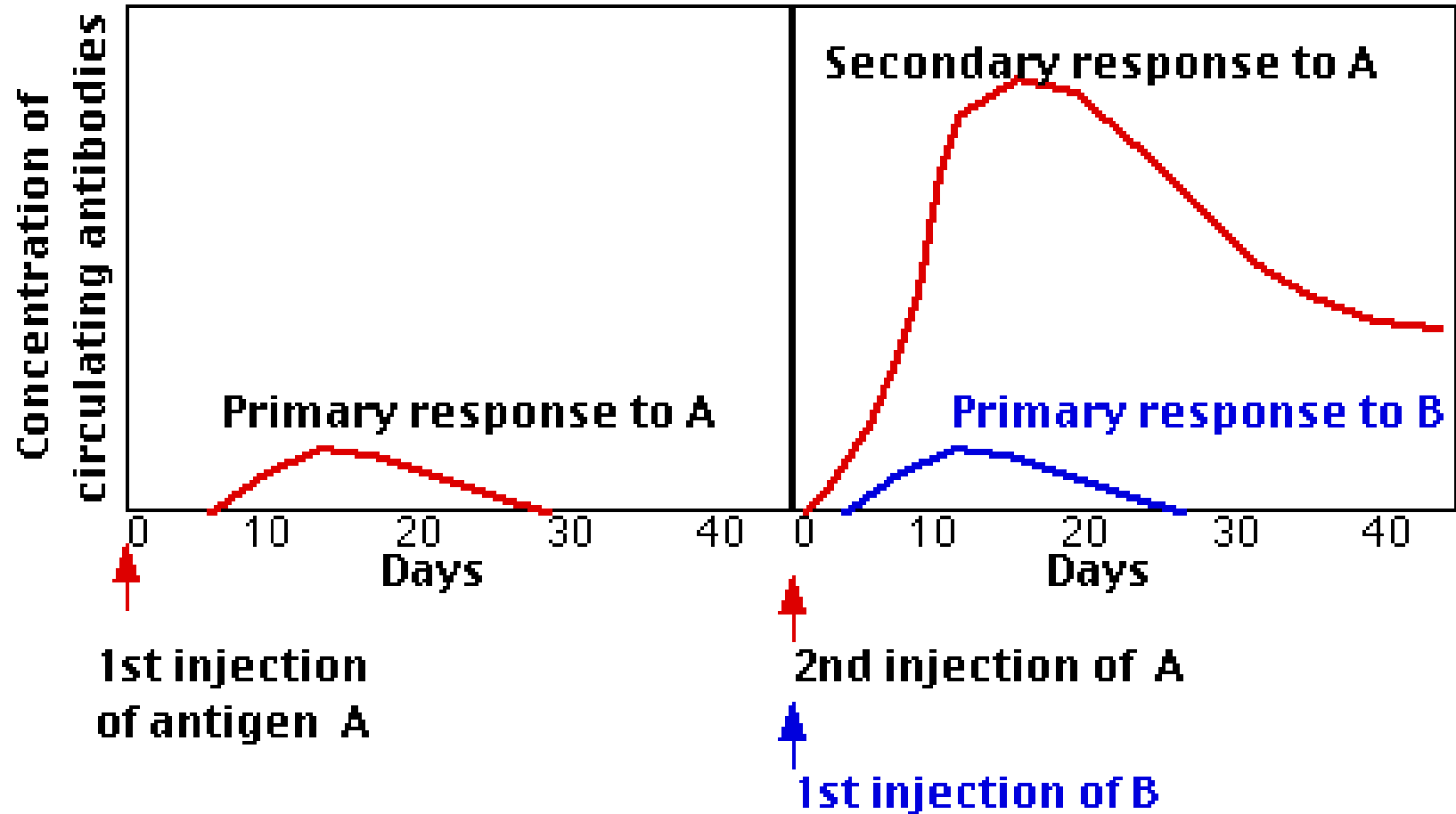


FIGURE 55-1 ■ Lymphopoiesis: development of various types of lymphocytes. DC, Dendritic cell; NK, natural killer; PMN, polymorphonuclear neutrophil leukocytes.

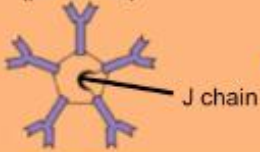

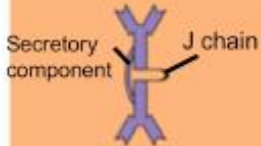

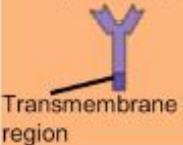
Components of acquired (specific) immunity



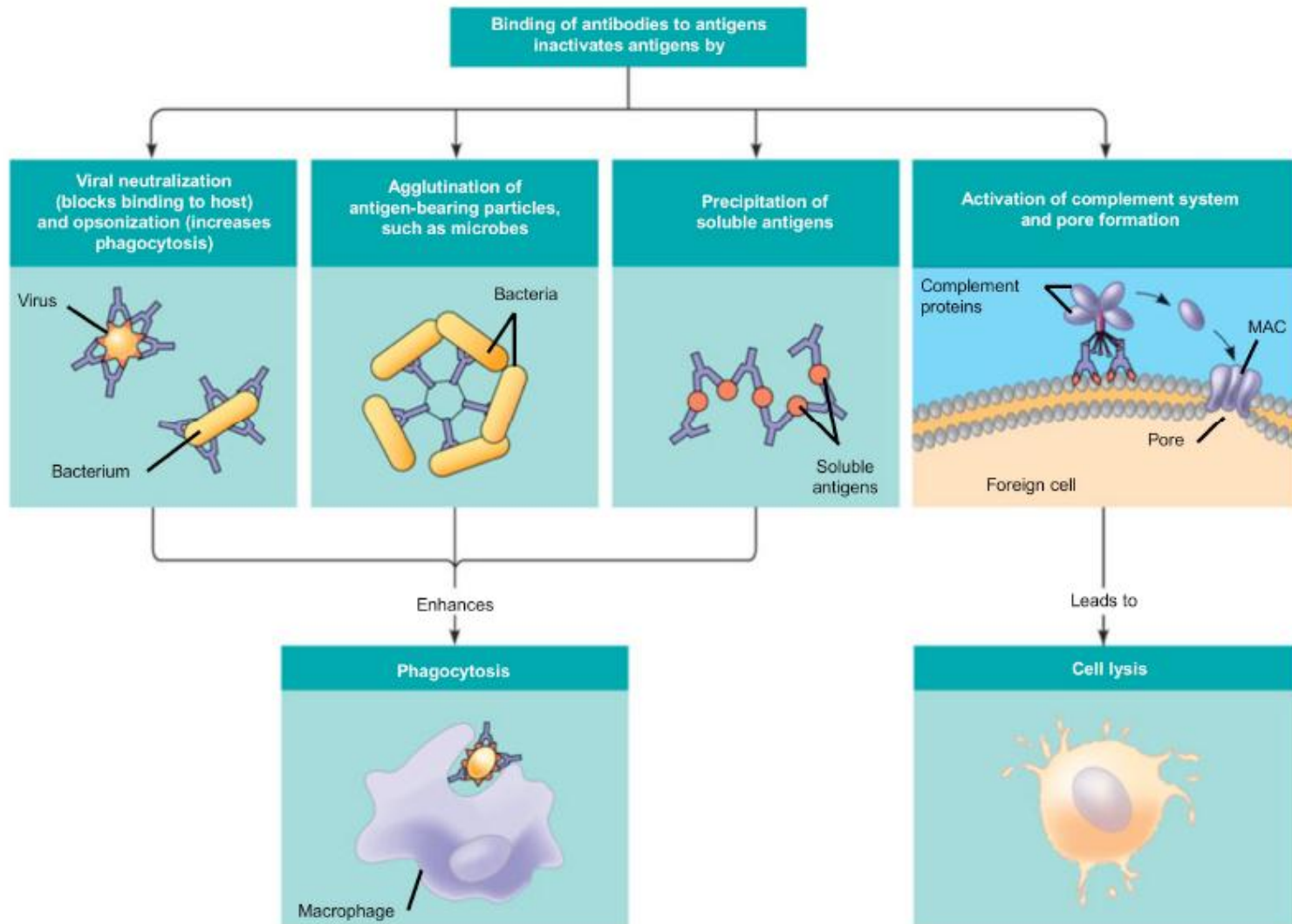
Memory



Antibodies: Mediators of the acquired response

<p>IgM (pentamer)</p>  <p>J chain</p>	<ul style="list-style-type: none">▶ First Ig class produced after initial exposure to antigen; then its concentration in the blood declines▶ Promotes neutralization and agglutination of antigens; very effective in complement activation (see Figure 43.19)
<p>IgG (monomer)</p> 	<ul style="list-style-type: none">▶ Most abundant Ig class in blood; also present in tissue fluids▶ Only Ig class that crosses placenta, thus conferring passive immunity on fetus▶ Promotes opsonization, neutralization, and agglutination of antigens; less effective in complement activation than IgM (see Figure 43.19)
<p>IgA (dimer)</p>  <p>Secretory component</p> <p>J chain</p>	<ul style="list-style-type: none">▶ Present in secretions such as tears, saliva, mucus, and breast milk▶ Provides localized defense of mucous membranes by agglutination and neutralization of antigens (see Figure 43.19)▶ Presence in breast milk confers passive immunity on nursing infant
<p>IgE (monomer)</p> 	<ul style="list-style-type: none">▶ Triggers release from mast cells and basophils of histamine and other chemicals that cause allergic reactions (see Figure 43.20)
<p>IgD (monomer)</p>  <p>Transmembrane region</p>	<ul style="list-style-type: none">▶ Present primarily on surface of naive B cells that have not been exposed to antigens▶ Acts as antigen receptor in antigen-stimulated proliferation and differentiation of B cells (clonal selection)

Actions of Antibodies



Non-cellular defensive proteins

Complement :

- Group of blood plasma proteins
- Involved in the inflammatory response by binding to mast cells to release histamine
- Attract phagocytes to pathogens by binding
- Form a membrane attack complex that make holes in some bacteria and viruses that causes them to burst

Interferons:

- Proteins produced by virally infected cells sent out to warn neighboring healthy cells

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