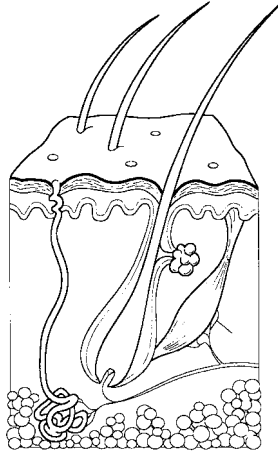


BODY DEFENSES




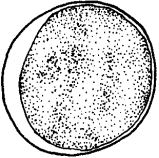
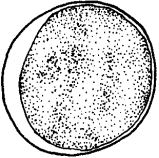
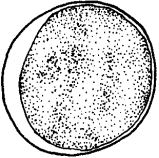
NONSPECIFIC DEFENSES

- Do not discriminate
- Present at birth
- Prevent approach or entry of pathogens

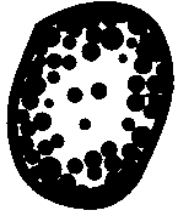
PHYSICAL BARRIERS

	<p><u>Skin</u></p> <ul style="list-style-type: none"> • Creates effective barrier • Multiple layers, keratin coating, Desmosomes <p><u>Hairs</u></p> <ul style="list-style-type: none"> • Provide some protection against abrasion • Keep hazardous materials & insects from contacting skin <p><u>Secretions</u></p> <ul style="list-style-type: none"> • Oil, sweat, mucus • Wash away pathogens & materials • Contain chemical (lysozyme) that kills bacteria
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PHAGOCYTES

<p style="text-align: center;">Neutrophil</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Phagocytize cellular debris & invading bacteria</p>	<p style="text-align: center;">Eosinophil</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Target foreign compounds or pathogens coated with antibodies</p>	<p style="text-align: center;">Macrophage</p> <div style="text-align: center;">  </div> <ul style="list-style-type: none"> • Derived from monocytes • Large, active phagocytes • Exit circulation 		
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; text-align: center; vertical-align: middle;">  </td> <td style="padding-left: 10px;"> <p>NK cell (natural killer cell)</p> <ul style="list-style-type: none"> • Large lymphocyte • Destroys abnormal cells • Constantly monitors normal tissues • Immunological surveillance </td> </tr> </table>				<p>NK cell (natural killer cell)</p> <ul style="list-style-type: none"> • Large lymphocyte • Destroys abnormal cells • Constantly monitors normal tissues • Immunological surveillance
	<p>NK cell (natural killer cell)</p> <ul style="list-style-type: none"> • Large lymphocyte • Destroys abnormal cells • Constantly monitors normal tissues • Immunological surveillance 			

INFLAMMATORY RESPONSE



Mast cell

- Mast cells & basophils release histamine
- Histamine increases diameter & permeability of capillaries
- Advantages of inflammatory response
 - ✓ Increases blood flow
 - ✓ Activates phagocytes, complement, & specific defenses

ANTIMICROBIAL PROTEINS

Complement System

- 20 or more blood proteins
- React in chain reaction
- Attacks & breaks down cell walls
- Attracts phagocytes
- Stimulates inflammation

Interferons

- Small proteins
- Released by virus infected cells
- Causes other cells to produce chemicals that inhibit viral reproduction

SPECIFIC DEFENSES

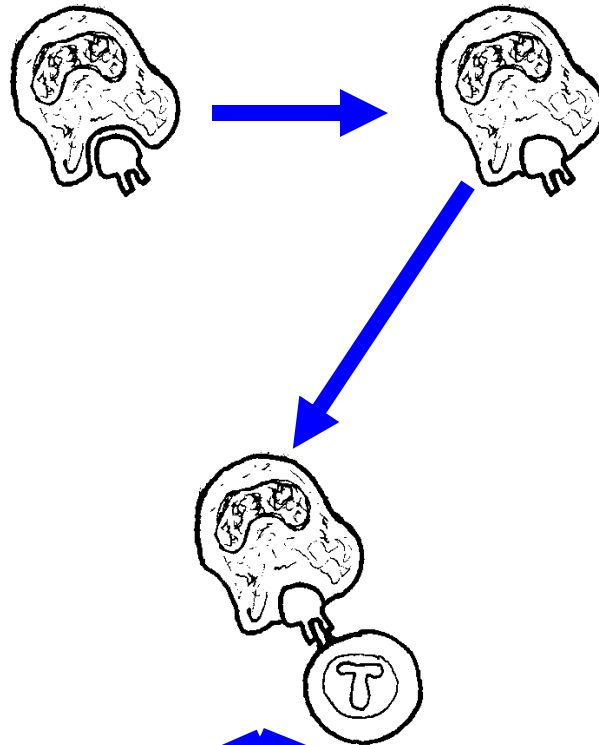
- Target specific antigen
- Antigen = substance capable of initiating immune response
- Involves lymphocytes (millions of different kinds each with different antigen receptors)
- Remembers antigens encountered in past
- Ignores normal (self) and attacks foreign (nonself)

CELL-MEDIATED IMMUNITY	ANTIBODY-MEDIATED IMMUNITY
<ul style="list-style-type: none"> • Provides defense against abnormal cells & pathogens inside living cells • Involves T cells (lymphocytes) 	<ul style="list-style-type: none"> • Provides defense against antigens & pathogens in body fluids • Involves B cells (lymphocytes)

CELL-MEDIATED IMMUNITY

Macrophage

- Engulfs antigen
- Breaks down antigen
- Presents antigen on surface of cell membrane



Specific T cell activated when contacts macrophage with antigen

Activated T cell divides & differentiates



Cytotoxic T Cells

- Cell-mediated immunity
- Killer T cells
- Track down & attack bacteria, fungi, protists, foreign tissue
- Responsible for rejection of transplanted tissue



Memory T Cells

- Remain in reserve
- Activated with 2nd exposure to antigen



Helper T Cells

- Release cytokines that stimulate immune response & coordinates specific & nonspecific response

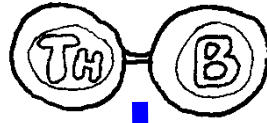


Suppressor T Cells

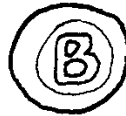
- Depresses response of other T & B cells
- Take longer to activate
- Act after initial response

ANTIBODY-MEDIATED IMMUNITY

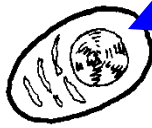
B cell could be activated by direct contact with antigen



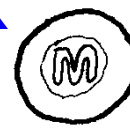
Helper T cell activates specific B cell by secreting cytokines



Activated B cell divides & differentiates

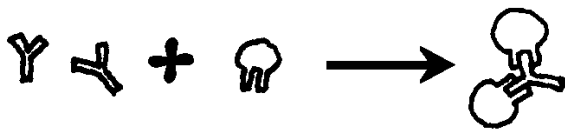


Plasma cells
Produce antibodies

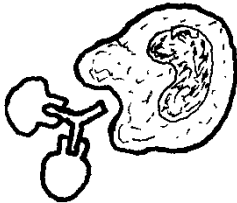


Memory B cells

- Held in reserve
- Activated with 2nd exposure to antigen



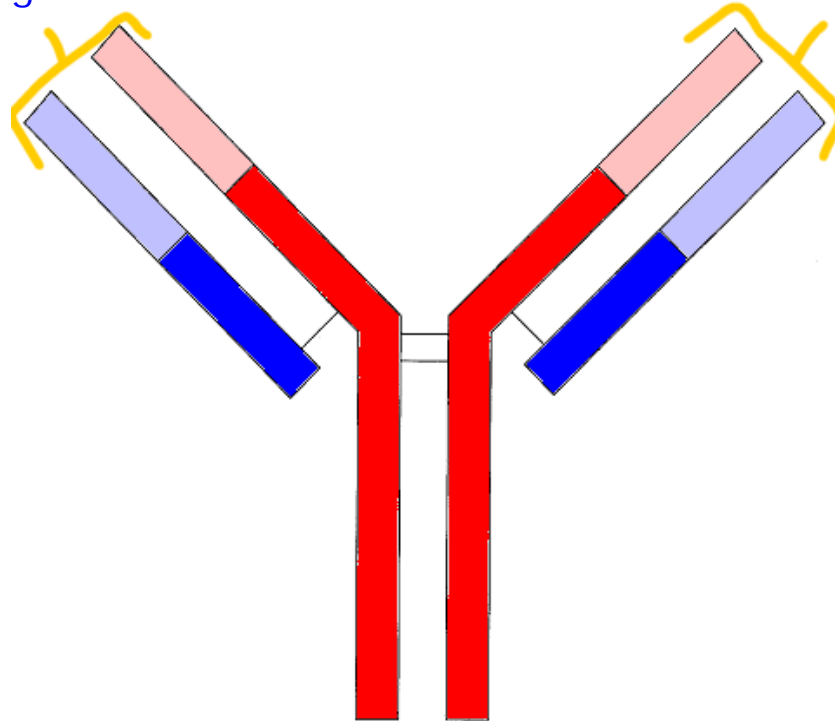
Antibodies bind to antigen



Antigen-antibody complex engulfed & destroyed by phagocytes

ANTIBODY STRUCTURE

Antigen binding site



Antigen binding site

Structure

- 2 parallel polypeptides
 - 2 heavy chains (red)
 - 2 light chains (blue)
- Each chain has
 - Constant segment (dark color)
 - Variable segment (light color) that varies depending on targeted antigen

Action

- Do not target whole antigen
- Targets portion of antigen called antigenic determinant site
- Complete antigen must have 2 antigenic determinate sites – one for each arm