**Immune System**

***Terms you should be able to define by the end of this:***

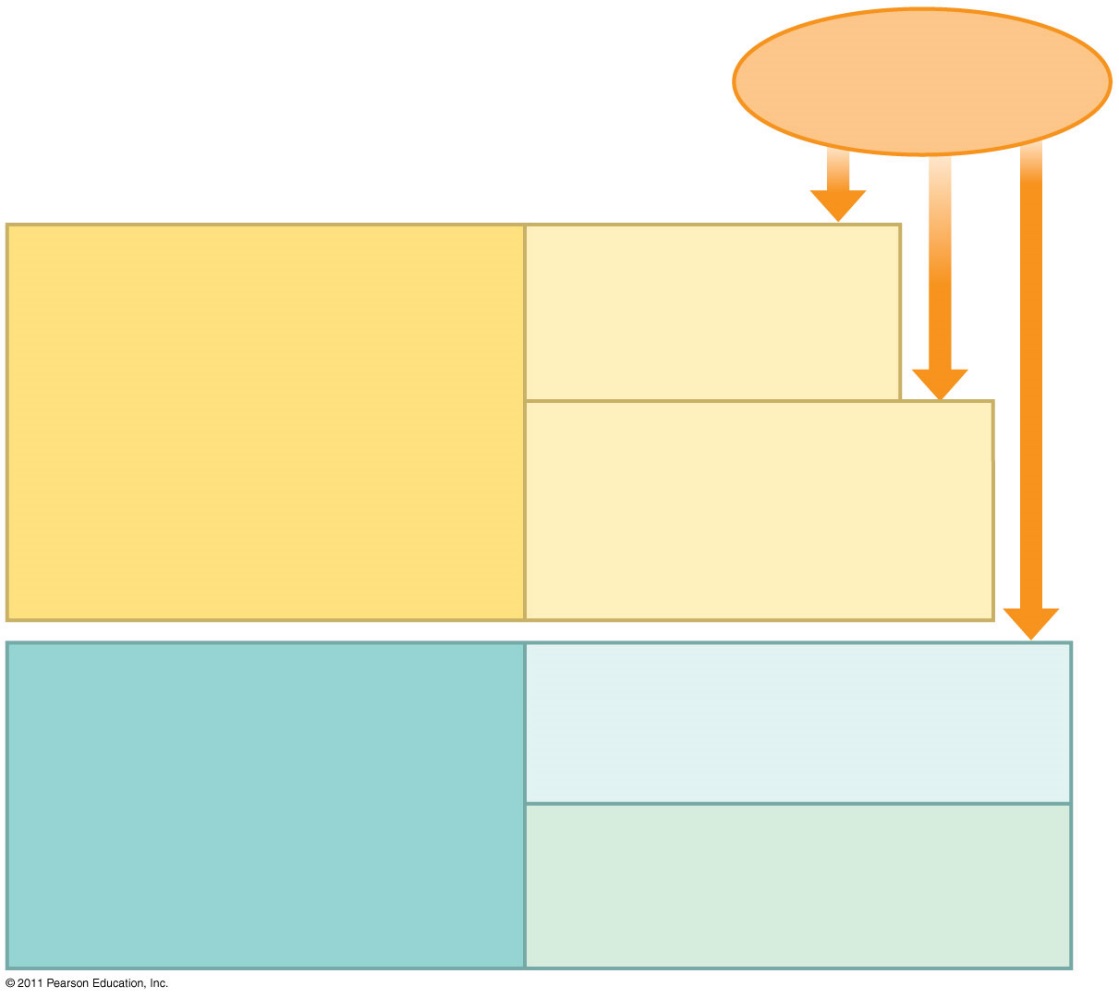
* Pathogen - Antigen
* Antibody - Vaccine
* Allergen

***Questions you should be able to answer by the end of this:***

1. What is the difference between innate vs. adaptive immunity?
2. Contrast the functions of B cells and T cells.
3. How are antigens recognized by immune system cells?
4. What are memory cells?
5. How does HIV affect the immune system?

**Types of Immunity**

|  |  |
| --- | --- |
| **Innate Immunity** | **Adaptive Immunity** |
|  |  |



**Plant Defenses**

* Nonspecific responses
* Receptors recognize pathogen molecules 🡪 trigger defense responses
  + Thicken cell wall, produce antimicrobial compounds, cell death
* Localize effects

**INNATE IMMUNITY** **Barrier Defenses:**

( all \_\_\_\_\_\_\_\_\_\_\_)

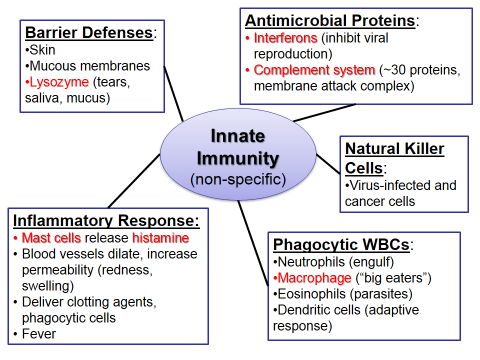
**Internal Defenses:**

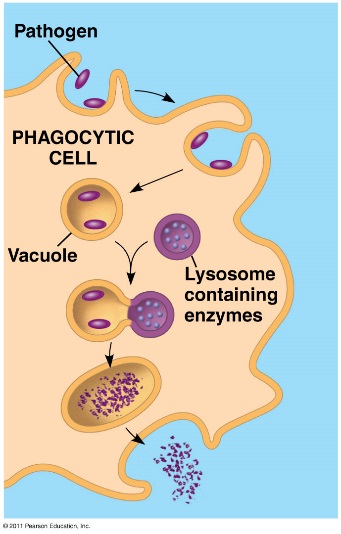
Phagocytic cells  
Natural killer cells  
Antimicrobial proteins  
Inflammatory response

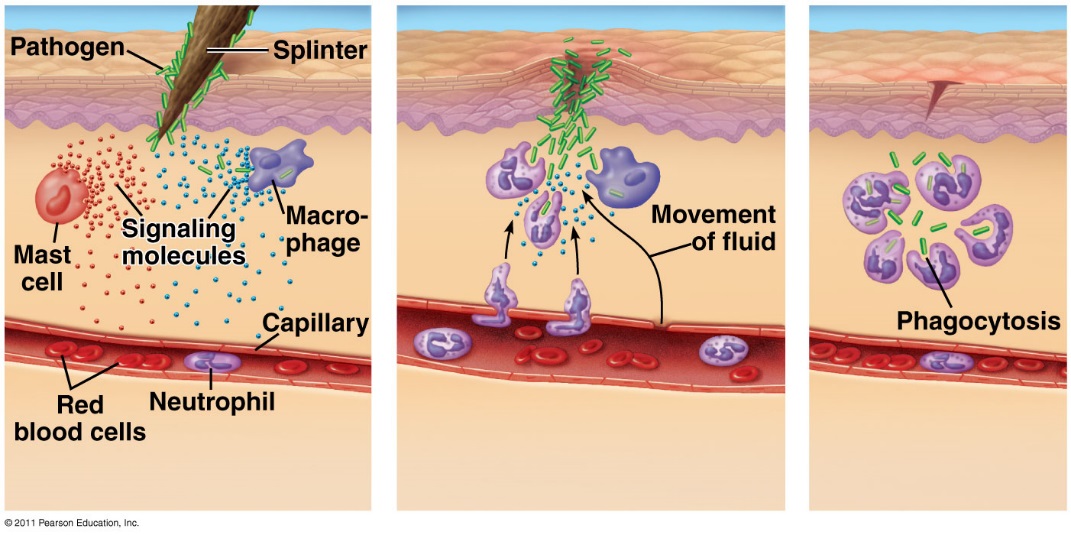
**ADAPTIVE IMMUNITY Humoral Response:**

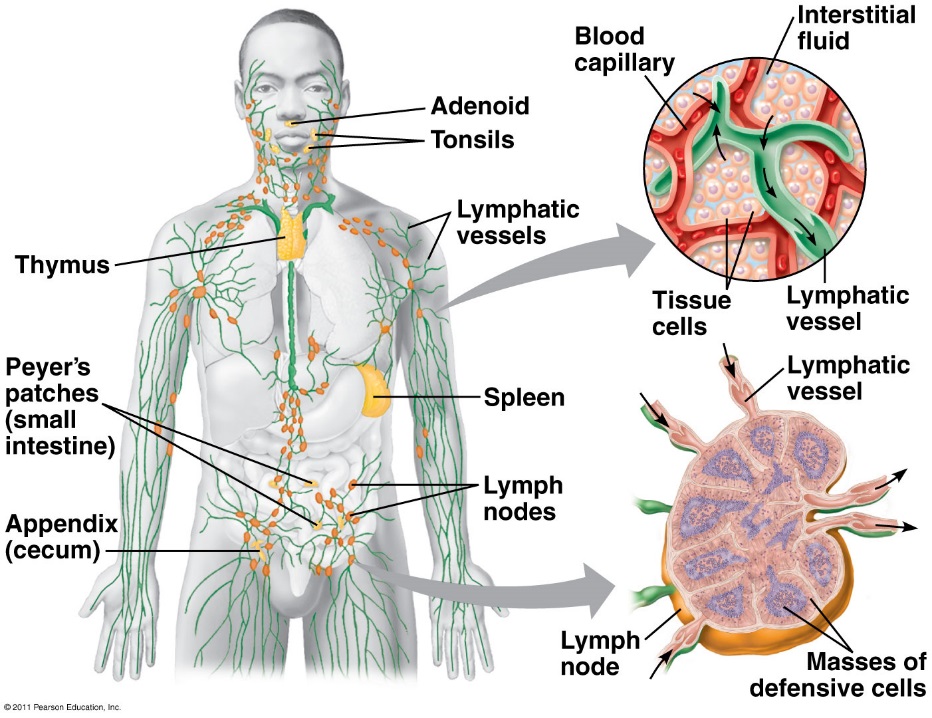
( \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ only)

**Cell Mediated Response:**

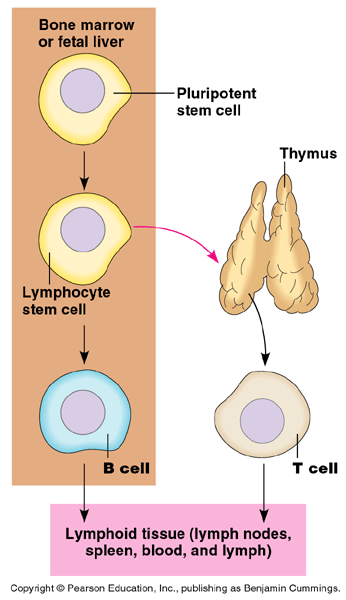
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**Phagocytosis: Inflammatory Response:**

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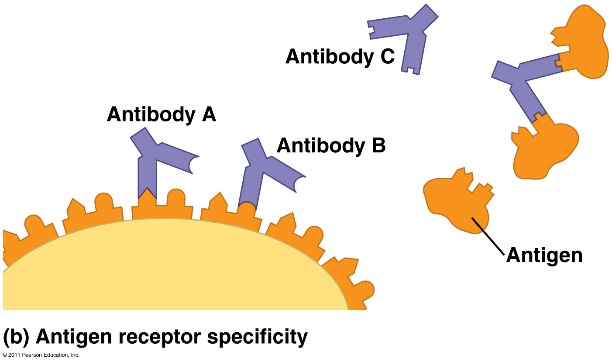
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**Lymphatic System:**

**Adaptive Response**

Lymphocytes (\_\_\_\_\_)

* T Cells
* B Cells



* Antigen
* Antibody

**Major Histocompatibility Complex (\_\_\_\_\_)**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ displayed on \_\_\_\_\_\_\_\_\_\_\_\_\_
* Responsible for tissue/organ rejection (“self” vs. “non-self”)
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Class I: all body cells (except RBCs)
* Class II: displayed by immune cells; “non-self”

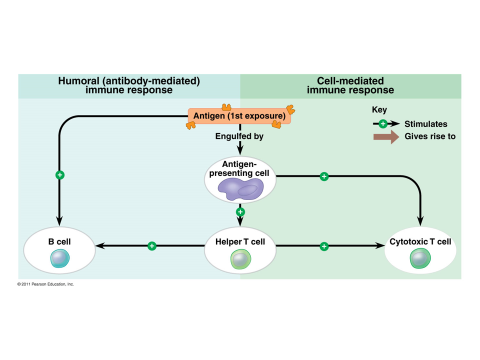
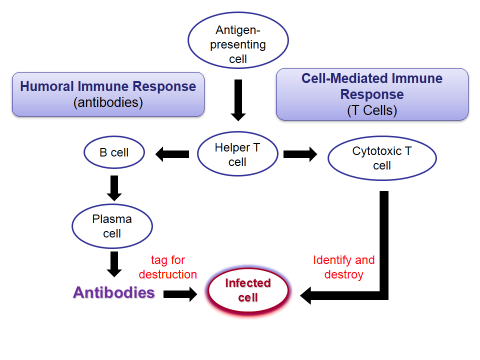
**Proliferation of B and T cells**

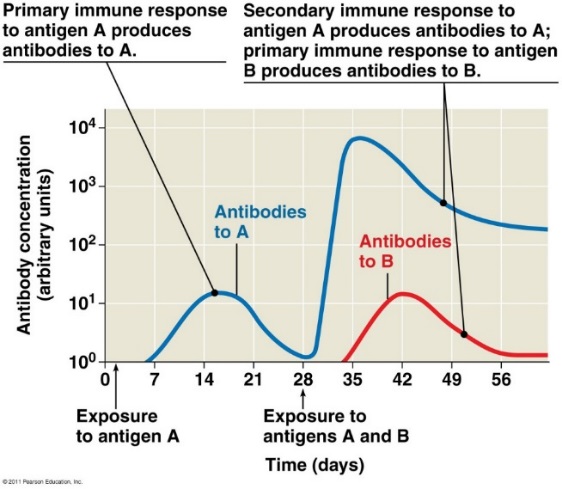
* In the body there are few lymphocytes with antigen receptors for any particular epitope
* In the lymph nodes, an antigen is exposed to a steady stream of lymphocytes until a match is made
* This binding of a mature lymphocyte to an antigen initiates events that activate the lymphocyte

*Once activated…*

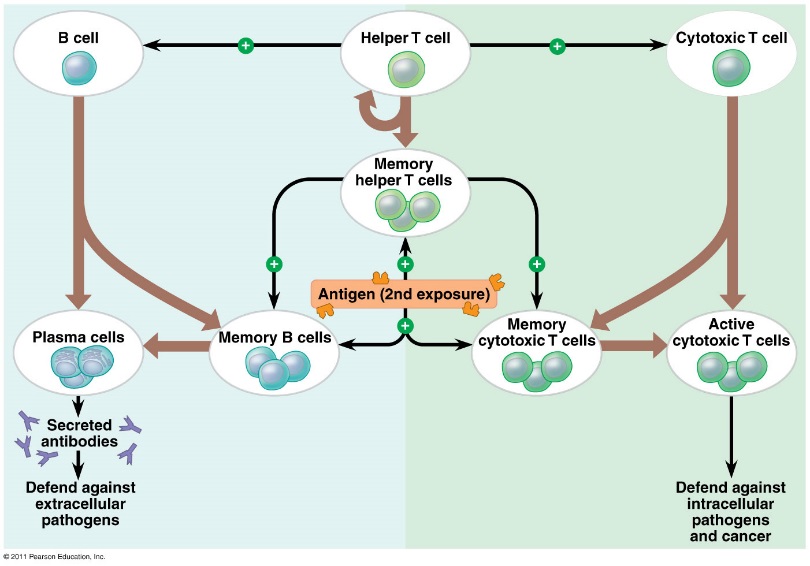
* a B or T cell undergoes multiple \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* This proliferation of lymphocytes is called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* Two types of clones are produced: short-lived activated **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

that act immediately against the antigen and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that can give rise to effector cells if the same antigen is encountered again





**Immunological Memory**

* Primary immune response:
* **Memory cells:**
  + Secondary immune response:

**Adaptive immunity defends against infection of body fluids and body cells**

* Acquired immunity has 2 branches:

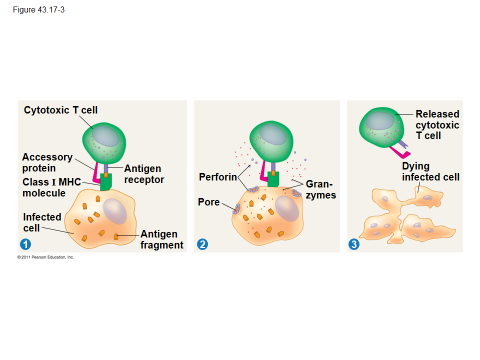
Humoral Immune Response:

Cell Mediated Immune Response:

**The Different Types of Cells Involved in Immune Response**

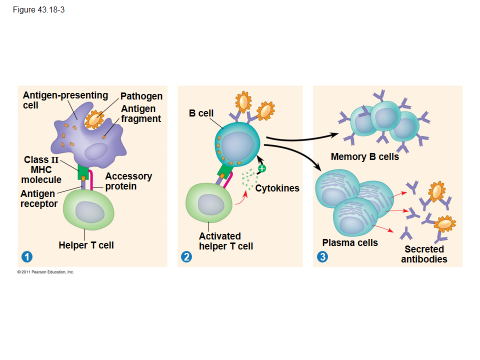
***Helper T-Cells:*** *A response to nearly all antigens*

* **Antigen-presenting cells** have class I and class II MHC molecules on their surfacesClass II MHC molecules are the basis upon which antigen-presenting cells are recognized
* Antigen receptors on the surface of helper T cells bind to the antigen and the class II MHC molecule; then signals are exchanged between the two cells
* The helper T cell is activated, proliferates, and forms a clone of helper T cells, which then activate the appropriate B cells

**

***Cytotoxic T Cells:*** *A Response to Infected Cells*

***B Cells and Antibodies:*** *A Response to Extracellular Pathogens*

* The humoral response is characterized by secretion of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Activation of the humoral immune response involves \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

as well as \_\_\_\_\_\_\_\_\_\_\_\_\_ on the surface of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* In response to cytokines from helper T cells and an antigen, a B cell proliferates

and differentiates into \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and antibody secreting effector cells

called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***Antibody Function:***

\*\*

* In Neutralization…
* In Opsonization…
* Ultimately a membrane attack complex forms a pore in the membrane of the foreign cell, leading to its lysis

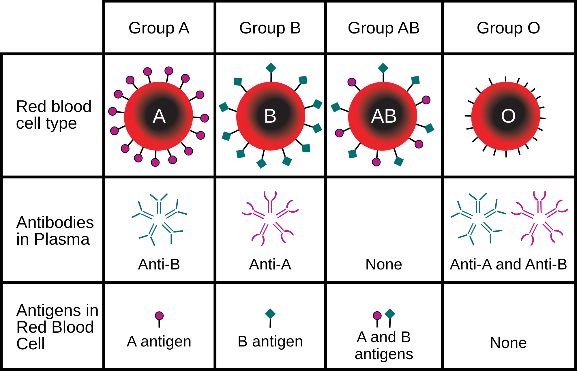
**B cells can express five different forms (or classes) of immunoglobulin (Ig)** with similar antigen-binding specificity but different heavy chain C regions:

***Immunizations/vaccines:***

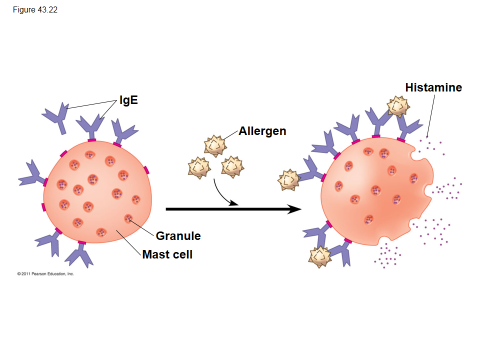
***Passive immunity:***

***Allergies:***

***Autoimmune Diseases:***

***HIV:***

**Immune Rejection:**

**Tissue and Organ Transplants:**

**Allergies:**

**Autoimmune Diseases:**