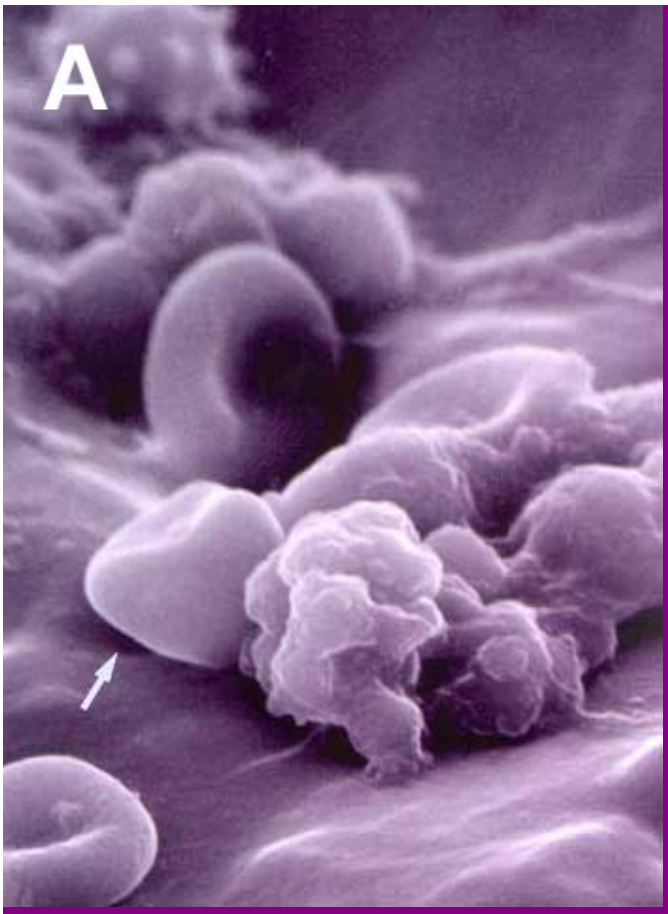
Immune Response

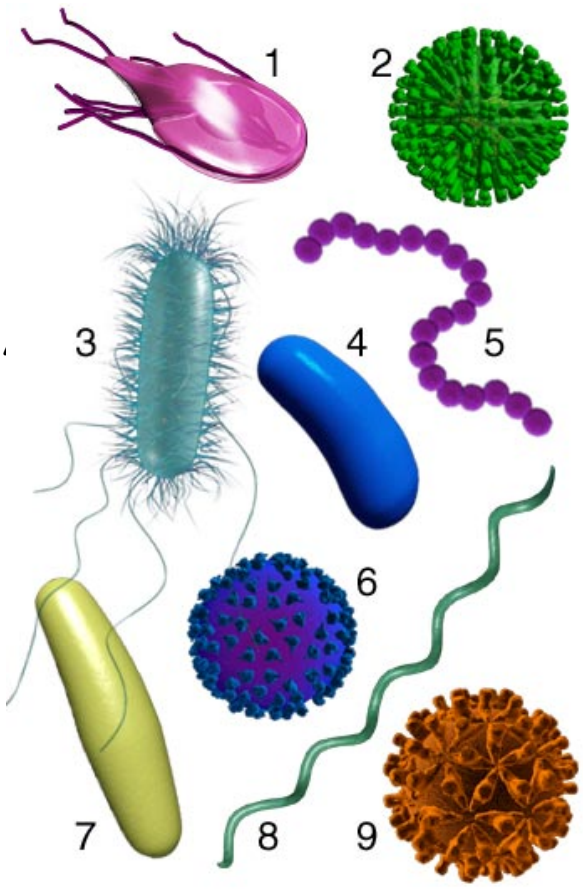
The skin, stomach acids and mucus help prevent microbes from entering our bodies. They are the first line of defense. The second line of defense is the leukocytes. They seek out and destroy potentially dangerous microbes.



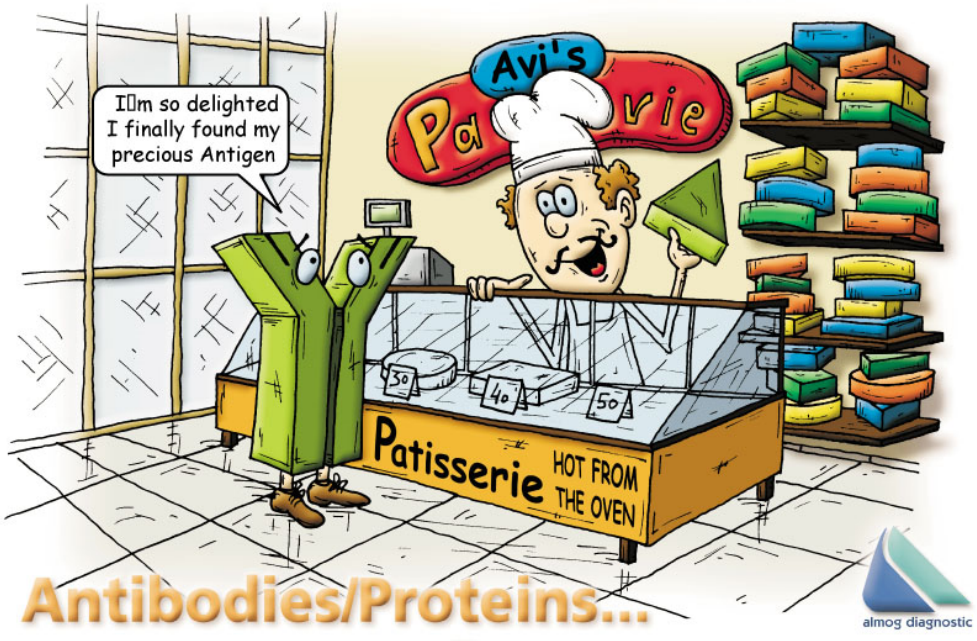
Neutrophils, eosinophils, and monocytes, are white blood cells that engulf microbes by phagocytosis.

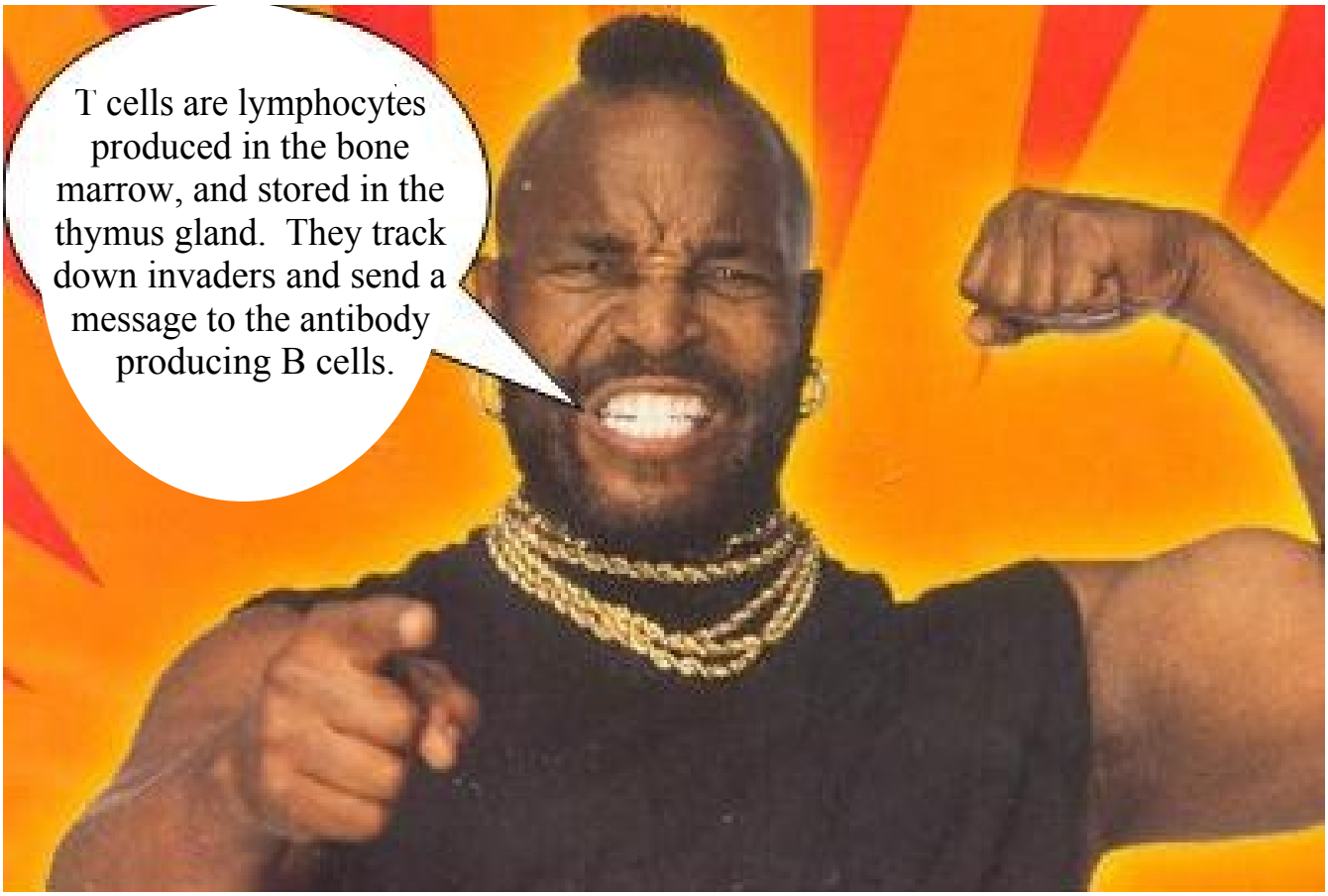
Foreign microbes activate complementary proteins (plasma proteins), which trigger the formation of a coating around the microbe, dissolve the outer membrane, and attract phagocytes, which will engulf the microbe.

It then secretes an enzyme to destroy it (the WBC dies as well).

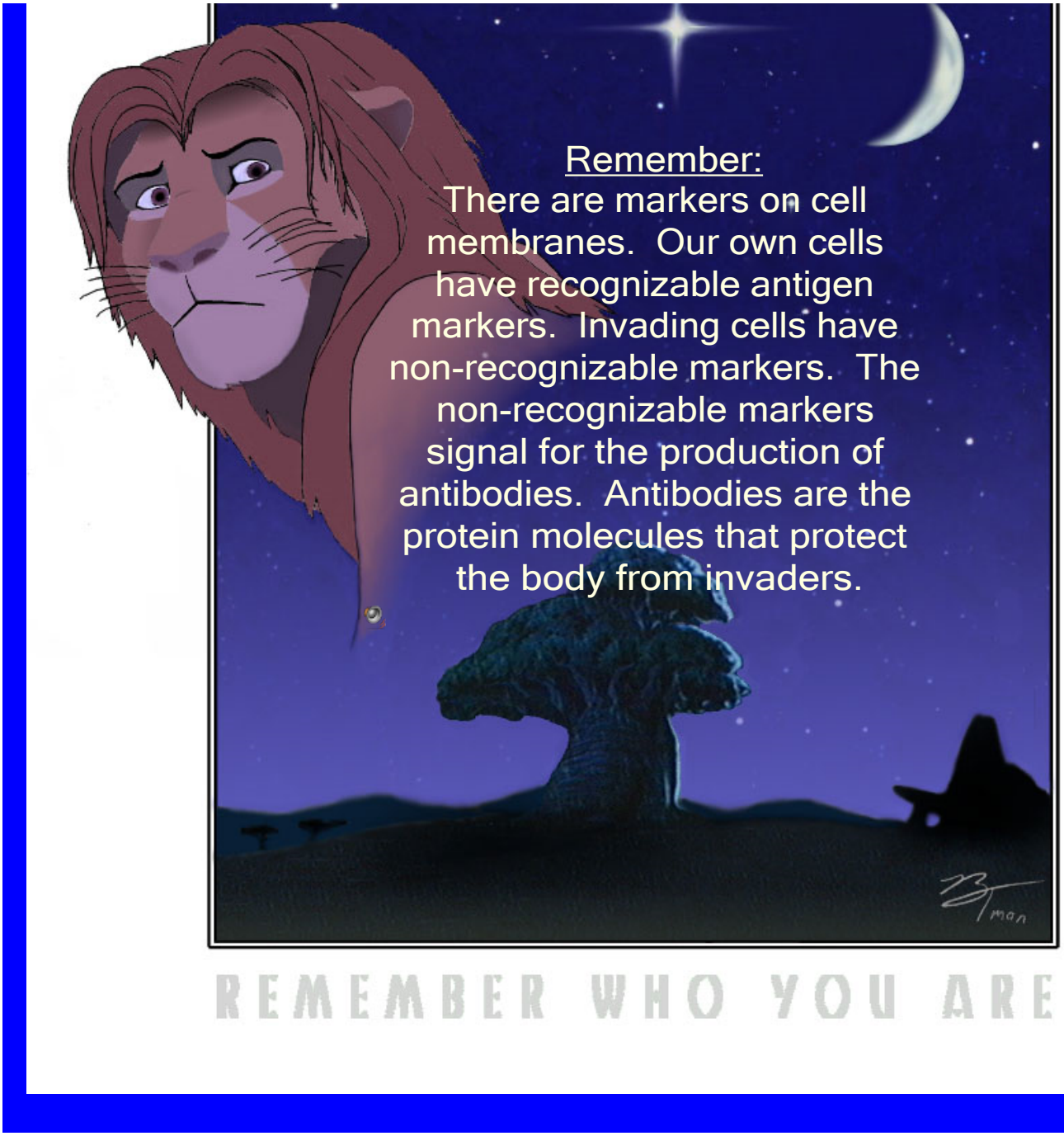


Lymphocytes are white blood cells that produce antibodies. The cell wall of bacterial cells carries antigens which the immune system recognize as foreign. Lymphocytes respond by producing antibodies.

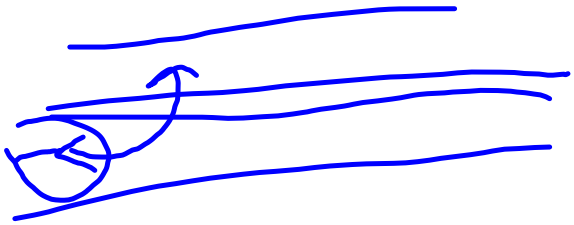



T cells are lymphocytes produced in the bone marrow, and stored in the thymus gland. They track down invaders and send a message to the antibody producing B cells.

B cells multiply, and release antibodies designed to combat the specific antigen on the invader. Antibodies attach to antigens causing them to clump, thus making them easier to find by phagocytes.

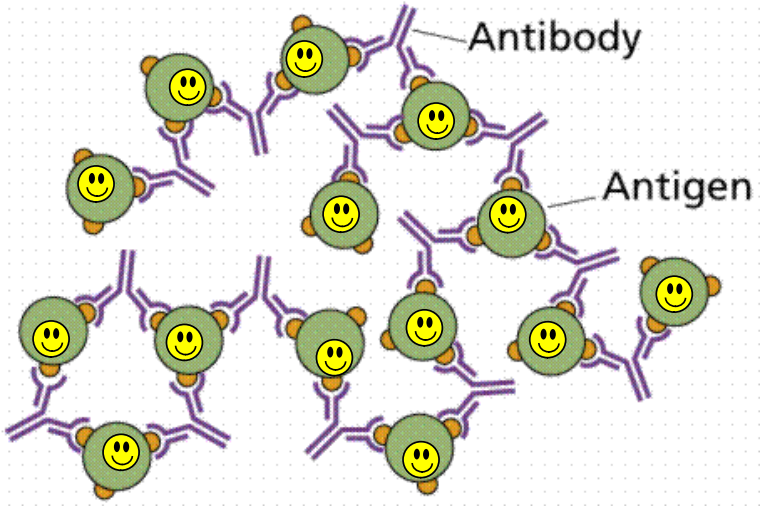

Remember:
There are markers on cell membranes. Our own cells have recognizable antigen markers. Invading cells have non-recognizable markers. The non-recognizable markers signal for the production of antibodies. Antibodies are the protein molecules that protect the body from invaders.
REMEMBER WHO YOU ARE

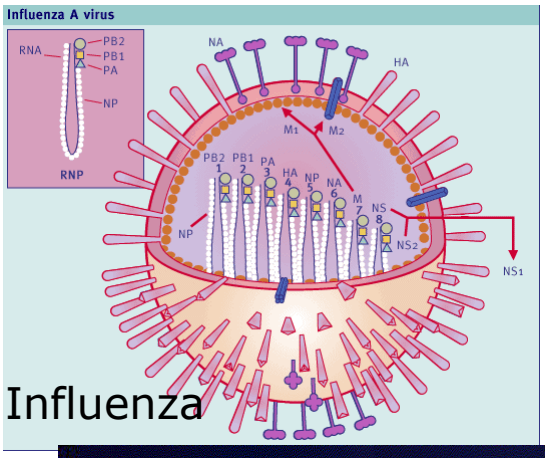
1. Why is blood type O the universal donor and why is AB the universal acceptor?
2. Why does erythroblastosis fetalis affect woman's second and third child, but not their first?
3. How do T-cells differ from B-cells?
4. What is the difference between antigen and antibody?

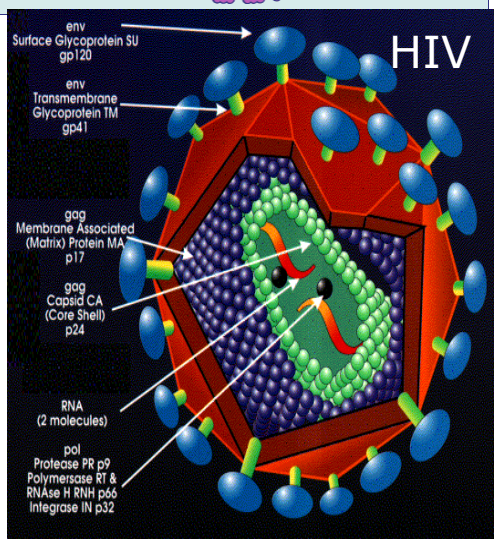


Antigen Antibody Reactions

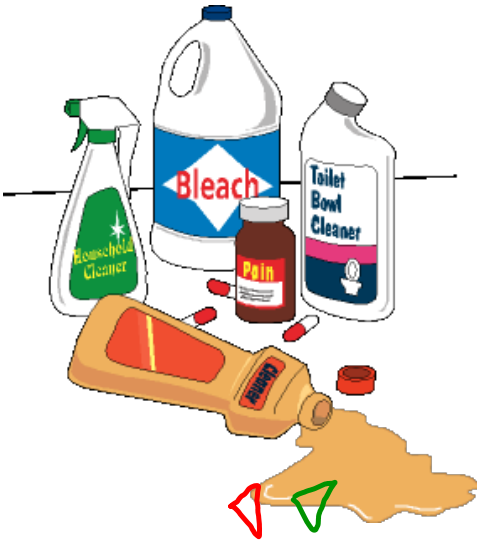
Antibodies are Y-shaped proteins made to target foreign invaders. They are specific in that they only attack a specific antigen (see fig. 7.12). The differences in antibodies can be seen on the outer edge of its arms, where it combines with the antigen.



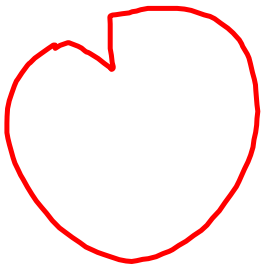




Antigen markers on the influenza marker are different from those on the HIV virus. The same antibody will not attack both. Antibodies attach only to the complementary antigen markers. This makes a larger package, which is more easily seen and are engulfed and destroyed by WBC (macrophages).



Poisons have a specialized geometry which may explain why different poisons affect different systems of the body. The poison is disguised as a protein or hormone and binds to the receptor site on the membranes and enters the cell. Antibodies can bind to poisons and prevent them from fitting into receptor sites.



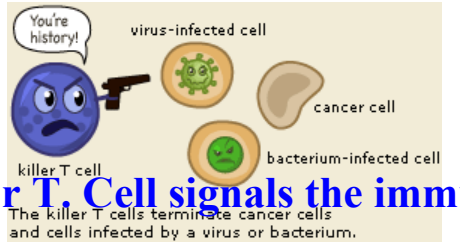
Viruses also use receptor sites to gain entry into cells and they inject their hereditary material into the cell leaving the protein covering (capsid) behind. Different viruses bind to different receptor sites. If antibodies bind to these viruses, the viruses will no longer fit the receptor site and therefore they cannot gain access to the cells (fig. 7.13 & 7.14).

V I R U S

Recognizing Harmful Antigens

- Bacterium with foreign antigen enters the body.
- Macrophage engulfs the bacterium and pushes the foreign antigen to the outer membrane.
- Helper T. Cells identify the foreign antigen on the cell membrane of the macrophage.
- B. Cells read the antigen blueprint and begin to produce antibodies.
- Antibodies attach to antigens. Helper T. Cells also activate killer T. Cells.

Killer T. Cells (KTC) search and destroy foreign microbes. They attach to the microbes and puncture it. The result is death of the microbe. Viruses are harder to locate because they hide in cells where they will reproduce. KTC locate the capsid, which is left on the outer membrane of the host cell. KTC destroys the host cell and virus. They can no longer reproduce. KTCs also destroy mutated cells that may become cancerous. They also may attack foreign markers on transplanted organs resulting in rejection or complications of the transplanted organ. Immune suppressant drugs may slow KTC that may aid in the transplant but may leave the body susceptible to bacterial infections. Pneumonia is a common result and often leads to death.



Once the battle is over, the suppressor T, Cell signals the immune system to shut down.

Immune Systems Memory

Before the body can produce antibodies, they must be exposed to the disease. Once exposed, an antibody blueprint is stored in case of further infections by the same disease. Memory T. Cells remain. If another infection is incurred, the memory T. Cells will activate the antibody-producing B. Cells. This is why you catch the chicken pox only once.

Allergies are when your body mistakes harmless cells as potentially dangerous and attack it. This may cause tissue swelling, mucus secretion, constricted air passages, etc.

Killer T Cells
Poisons
enucleated
Thrombus
Antigen
Erythropoiesis
Monocytes
Leukocytes
Bacterium
Helper T Cells
Lymphocytes
Universal Recipient
Universal Donor
Capsid
Immune System
Bone Marrow

B Cells
Plasma
Antibodies
Macrophage
Virus
Rhesus factor
Platelets
Suppressor T Cells
Hemoglobin
Anemia
Erythrocytes
Erythroblastosis Fetalis
Embolus
Blood Groups
Fibrin
Receptor sites
Agglutinates