



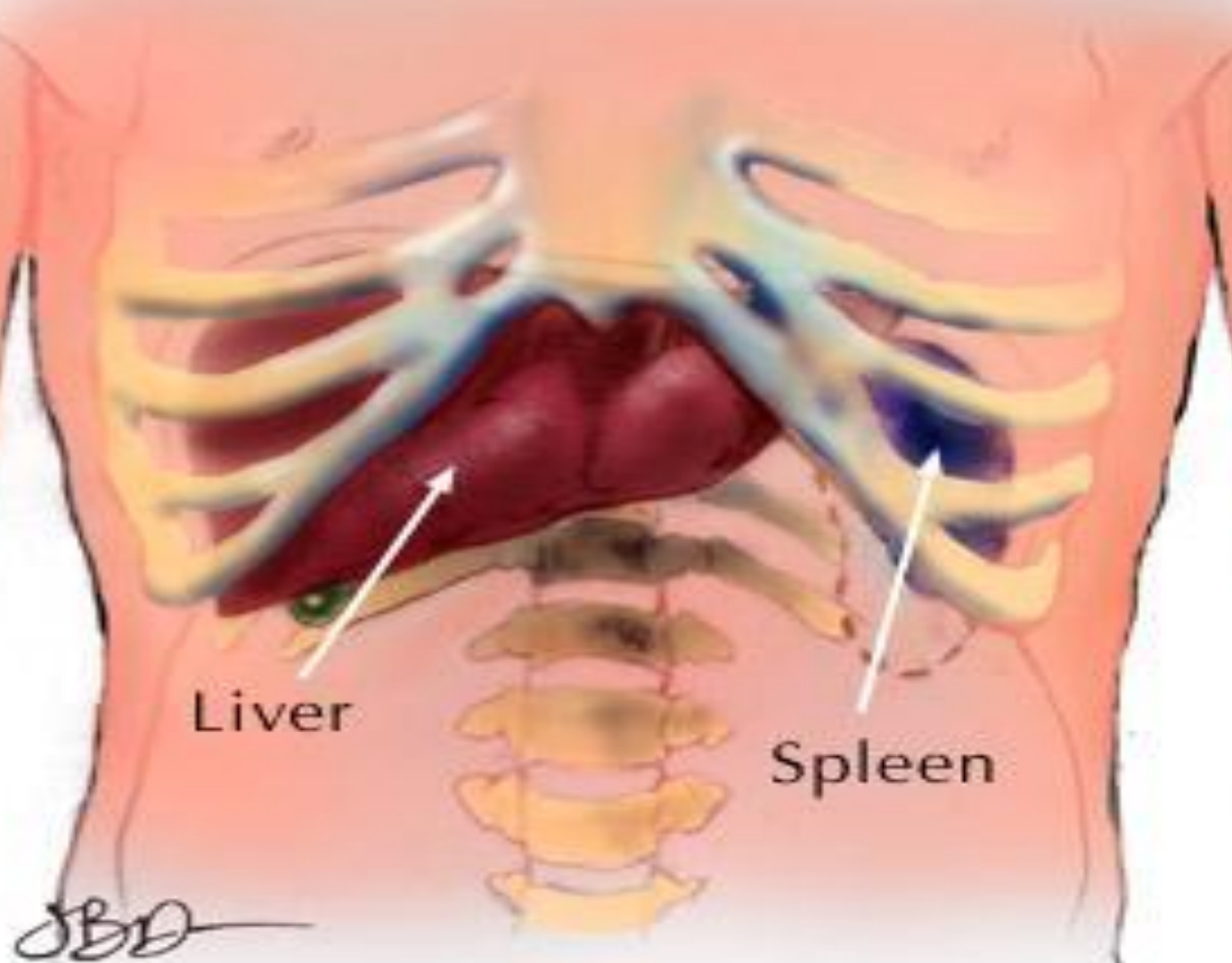
● IMMUNITY SYSTEM

ORGANS OF IMMUNITY SYSTEM

- 1-Spleen
- 2-Lymph node
- 3-Glottis
- 4-Mucosol node
- 5-Thymus
- 6-Reticula – Endothelial System

Spleen

- The spleen involved in;
- - Degradation of old and dead erythrocytes
- - Production of lymphocytes active in the defense of the body
- - It is then produce red bone marrow



Liver

Spleen

JBD

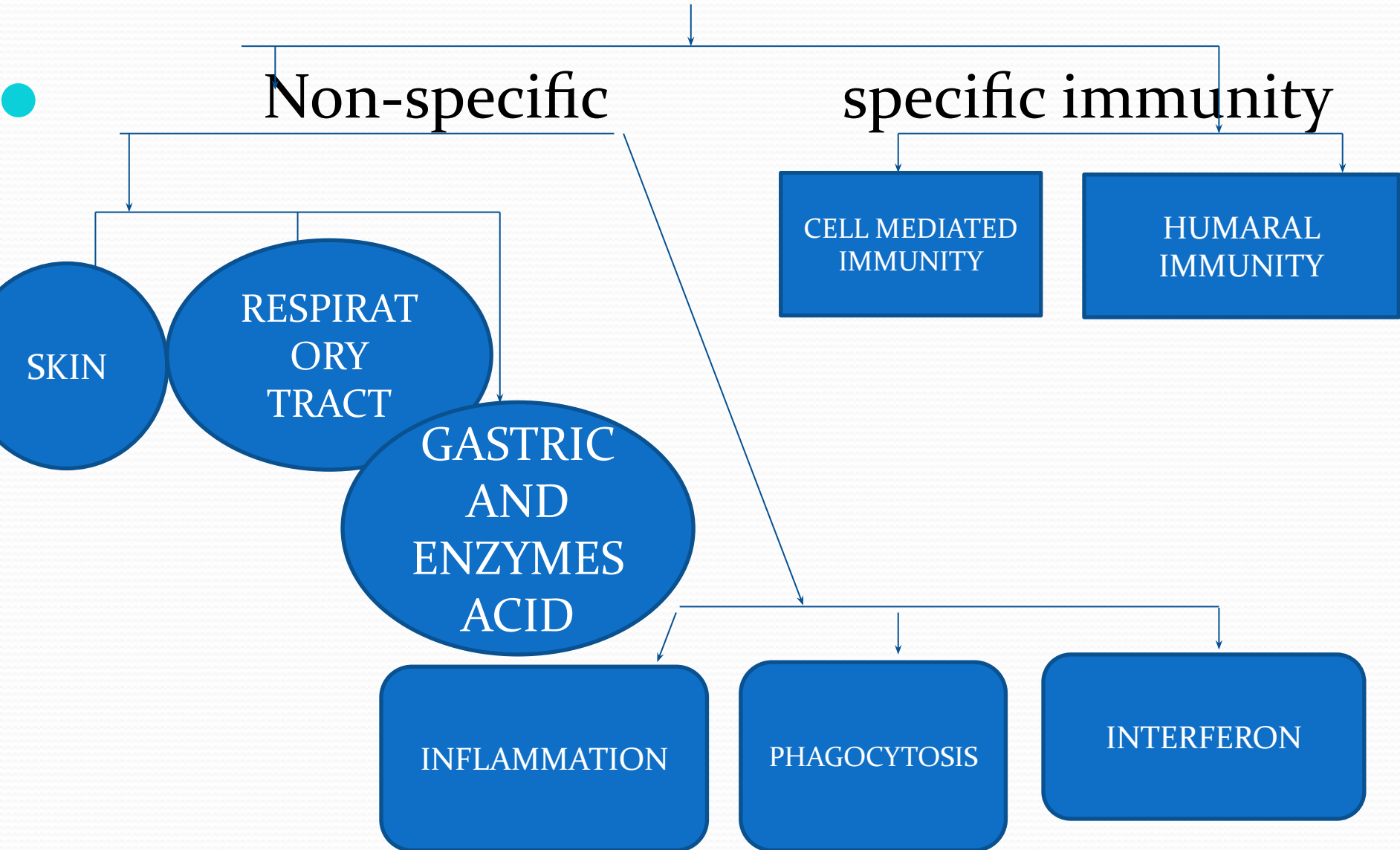
TYPES OF IMMUNITY

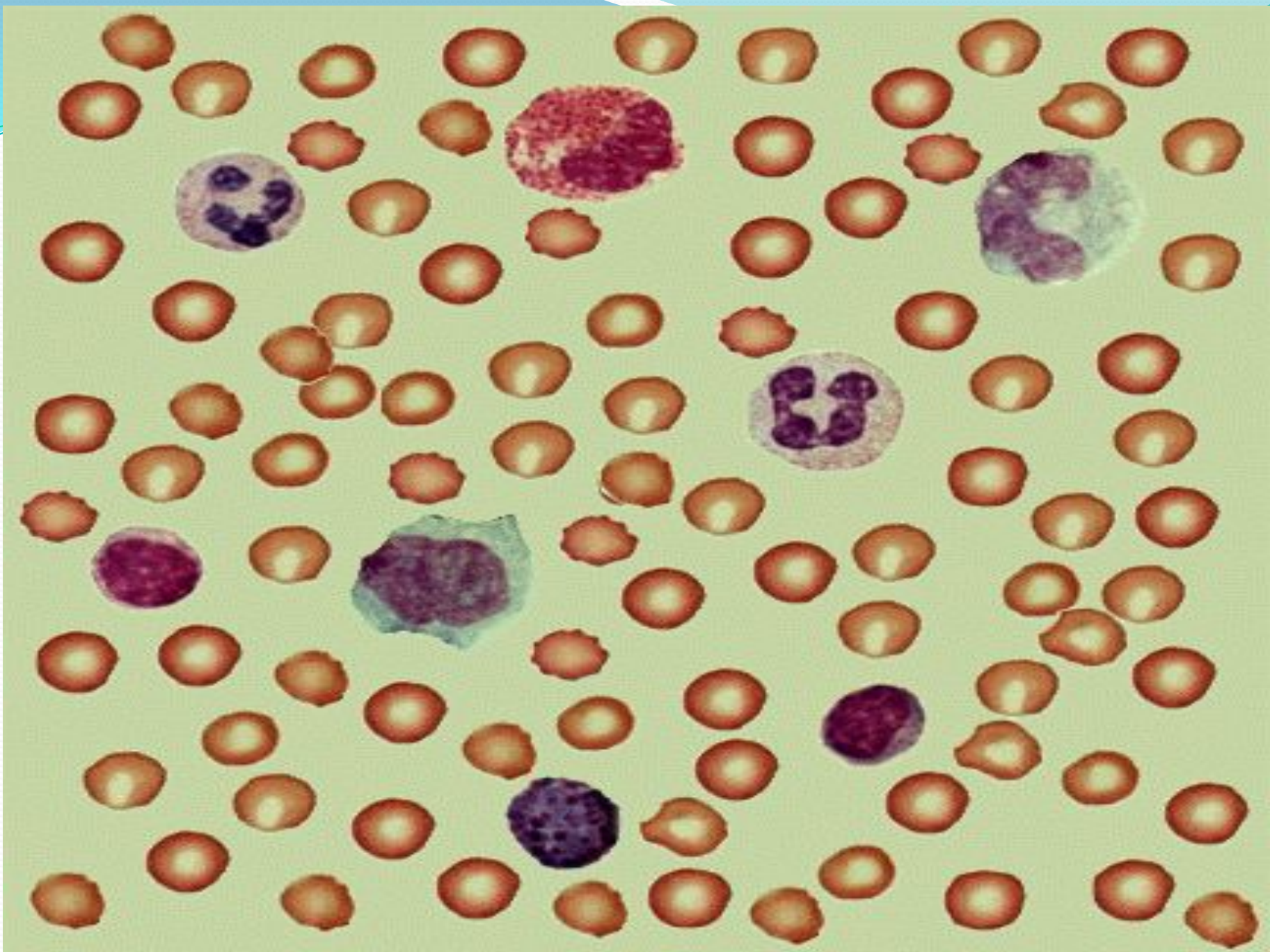
Immunity is maintained by two pathways;

1-Non- specific immunity.

2-Specific immunity.

IMMUNITY







- Acquisition of immunity

- a) Active immunity


- b) Passive immunity

active immunity

- 1. In the case of **active immunity**, the animal undergoes an immunological response to an antigen and produces the cells and factors responsible for the immunity, i.e., the animal produces its own antibodies and/or immuno-reactive lymphocytes. Active immunity can persist a long time in the animal, up to many years in humans.

2. Passive immunity

- 2. **Passive immunity** is the acquisition by an animal of immune factors which were produced in another animal, i.e., the host receives antibodies and/or immuno-reactive lymphocytes originally produced during an active response in another animal. Passive immunity is typically short-lived and usually persists for only a few weeks or months.

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- Furthermore, either active or passive immunity may be acquired by **natural** means (e.g. self production of antibodies during infection or transfer of antibodies from mother to offspring) or by **artificial** means (i.e., vaccination and other immunization procedures). Some familiar examples of active and passive immunity are given in the table below.

Examples of Active and Passive Immunity

Type of Immunity	How Acquired by Host	Examples
Active Immunity	As a result of exposure to an infectious agent or one of its products (antigens)	Natural: Antibodies are produced by the host in response to the infectious agent itself (e.g. recovery from the disease).
		Artificial: immunization (vaccination) with some product derived from the infectious agent (e.g. toxoid, killed cells, structural components of cells, inactivated or attenuated viruses, etc.).
Passive Immunity	As a result of the acquisition of antibodies which have been produced in another animal (by active means) or derived from cells grown in tissue culture (e.g. monoclonal antibodies)	Natural: Transplacental transfer of antibodies from mother to fetus; transfer of antibodies from mother to infant in milk by nursing.
		Artificial: Injection of immune serum from an individual previously immunized or

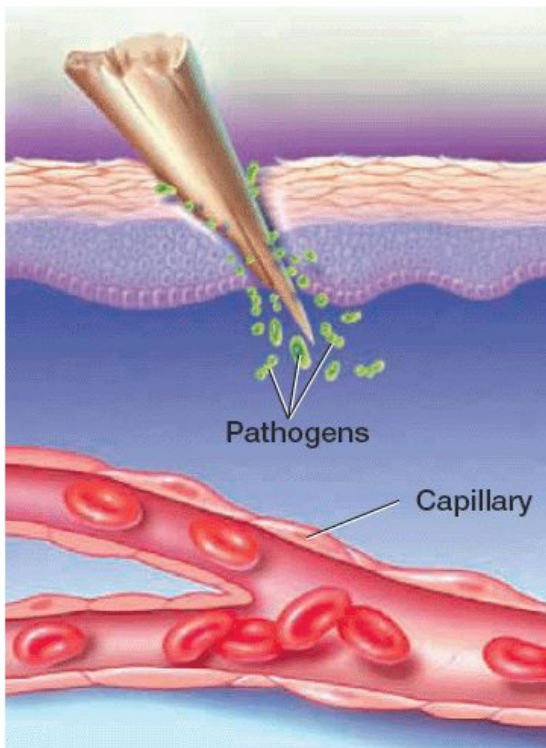
1-NON-SPECIFIC IMMUNITY:

- It is maintained by three pathways; Interferon, Phagocytosis and Inflammation.
 - a) Interferon:
- Interferon is the term given to protein molecules which are produced by the host organisms in response to infection by a pathogenic virus, their function being to deactivate viruses.
- They are non-specific to viruses however; they do occur in different forms.

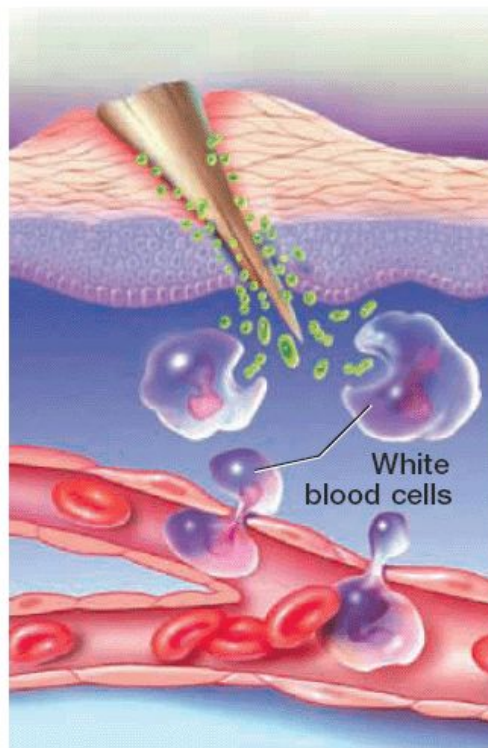
● b) **Phagocytosis:**

- Leucocytes are involved in the maintenance of immunity against pathogenic microbes.
- Neutrophils are monocytes that digest microbes by Phagocytosis.

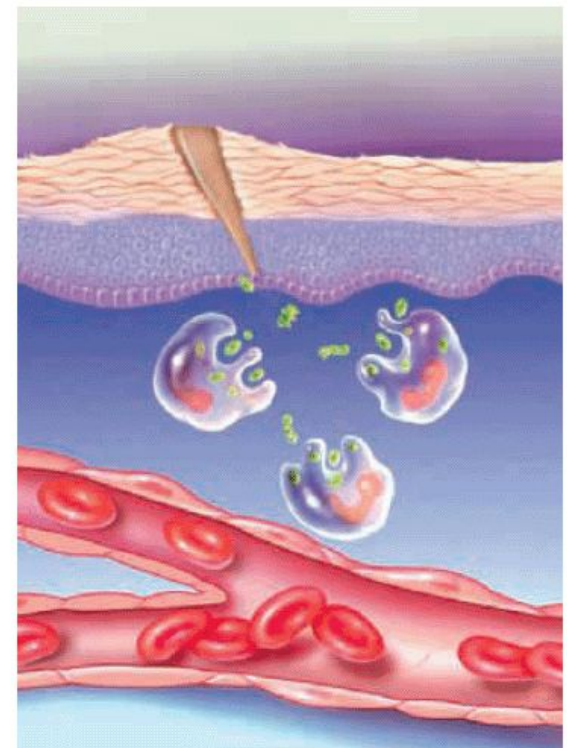
c) Inflammatory Response



1. When the skin is punctured, pathogens enter the body.



2. Blood flow to the area increases, causing swelling and redness.



3. White blood cells attack and destroy the pathogens.

SPECIFIC IMMUNITY:

Cells Involved in the Immune Response

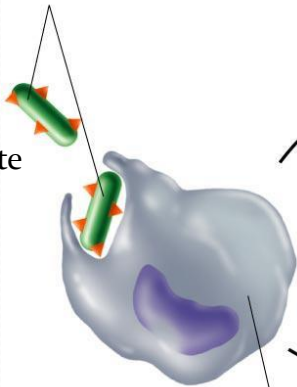
- **Cytotoxic T cells attack and kill infected cells.**
- **B cells label invaders for later destruction by macrophages.**
- **Helper T cells activate both cytotoxic T cells and B cells.**

Figure 40–9 Humoral Immunity

Bacterial antigens also stimulate B cells

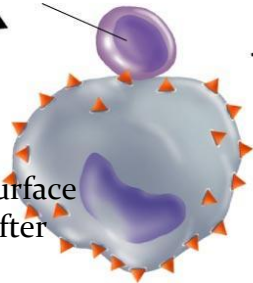
Bacteria With Antigens on Surface

A large phagocyte called a macrophage engulfs a bacterium



Macrophage

Antigens are displayed on surface of macrophage after digestion of bacterium



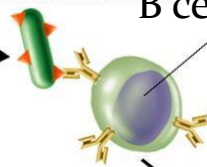
T cell

T cell binds to activated macrophage

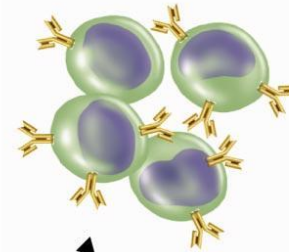


T cell, activated by macrophage, becomes a helper T cell

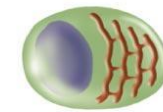
B cell



Helper T cell assists the activated B cell to develop into an antibody-producing plasma cell



Active B cells proliferate to produce clones of memory cells



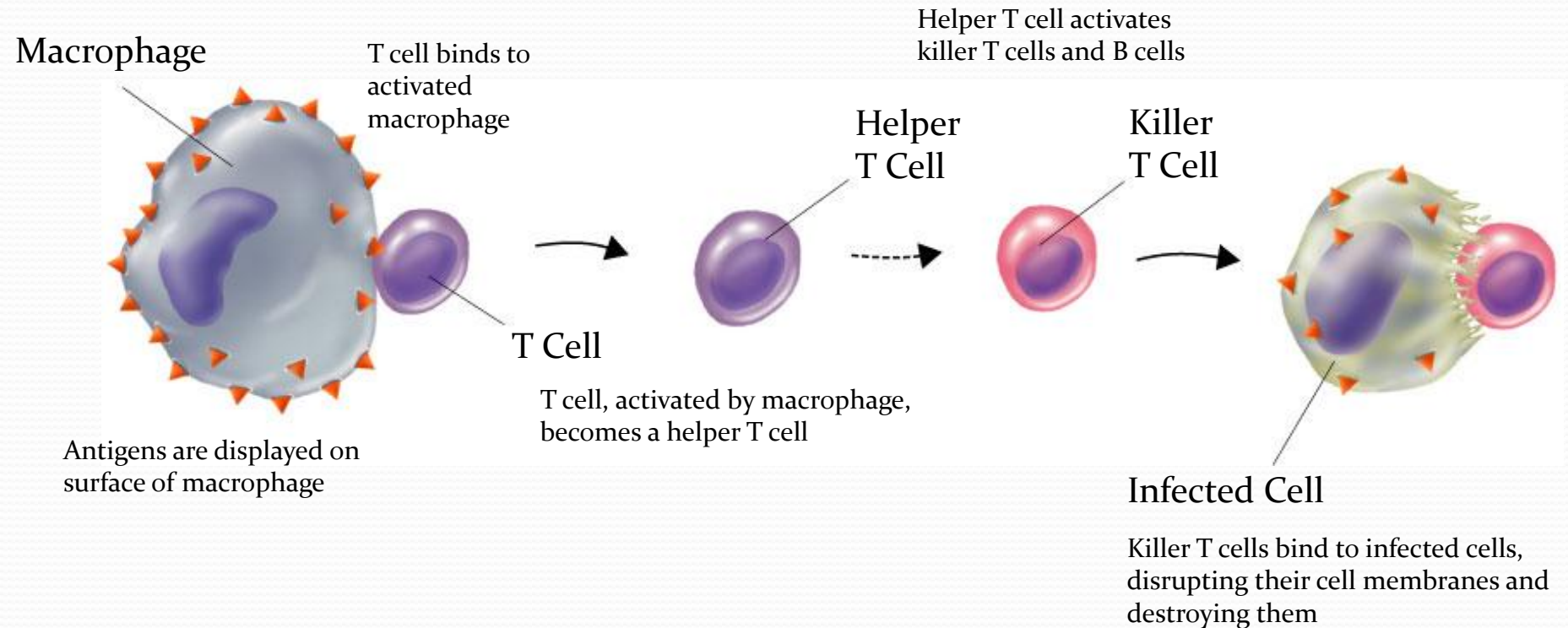
Plasma cell produces large amounts of antibody proteins, released into the bloodstream



Circulating antibodies bind to bacterial antigens, helping other immune cells to identify and destroy bacteria



Figure 40–10 Cell-Mediated Immune Response



SPECIFIC IMMUNITY:

It is maintained by two pathways; Humeral immunity and Cell mediated immunity.

a) Humeral immunity:

This type of immunity is the most effective immunity against diseases such as typhoid and diphtheria.

The factors which are effective in humeral immunity.

ACQUISITION OF HUMORAL IMMUNITY

- **ANTIGENS:**
- **Antigens consist of foreign substances that initiated the formation of antibodies againsts them.**
- **When they enter the body of humans or other animals.**
- **Antigens facilitate the the formation of antibodies and also react with them go inside and outside of the body.**
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- **A functionally operational antigen should be;**
 - **in high molecular weight**
 - **recognise as hostile to the host organism**
 - **Persistent enough to remain in the host.**

Figure 40–7 The Inflammatory Response

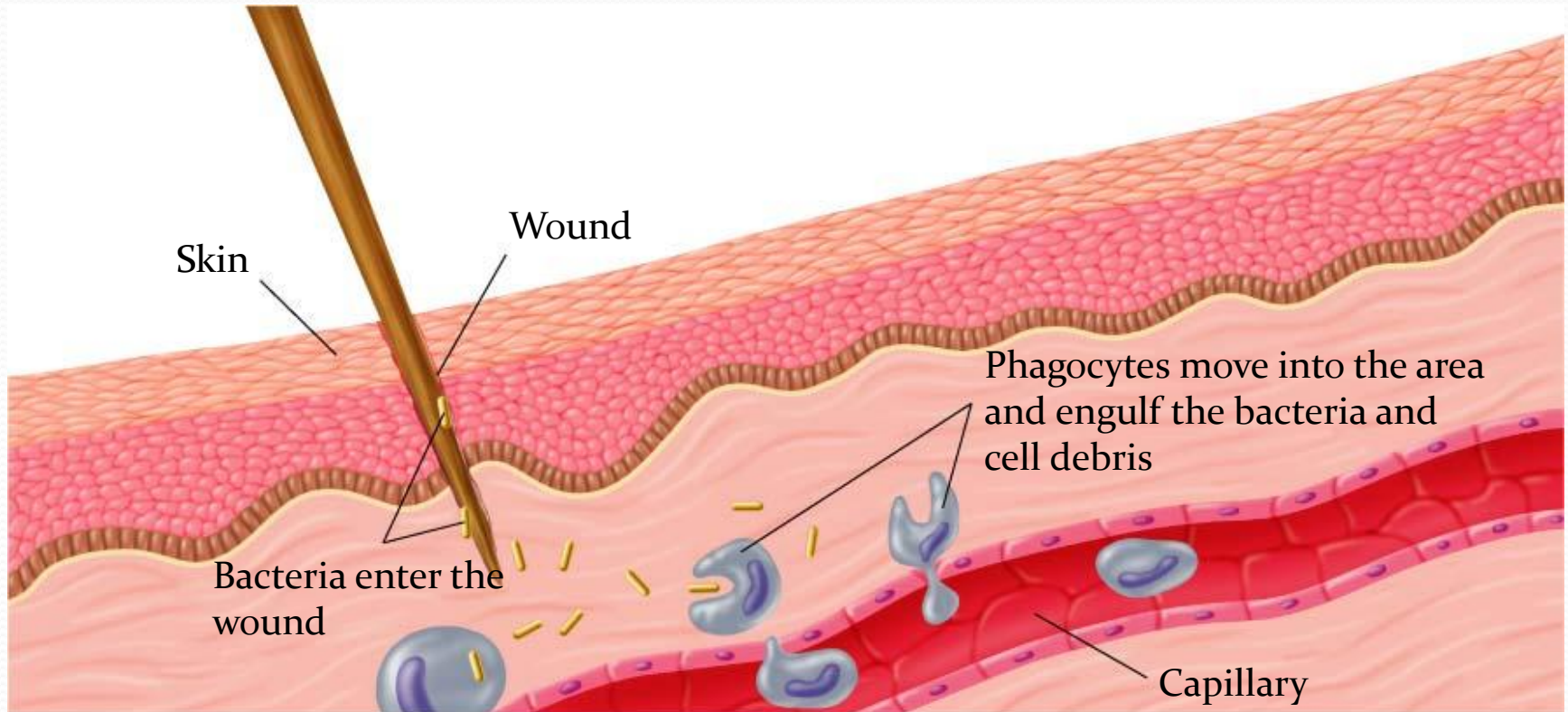
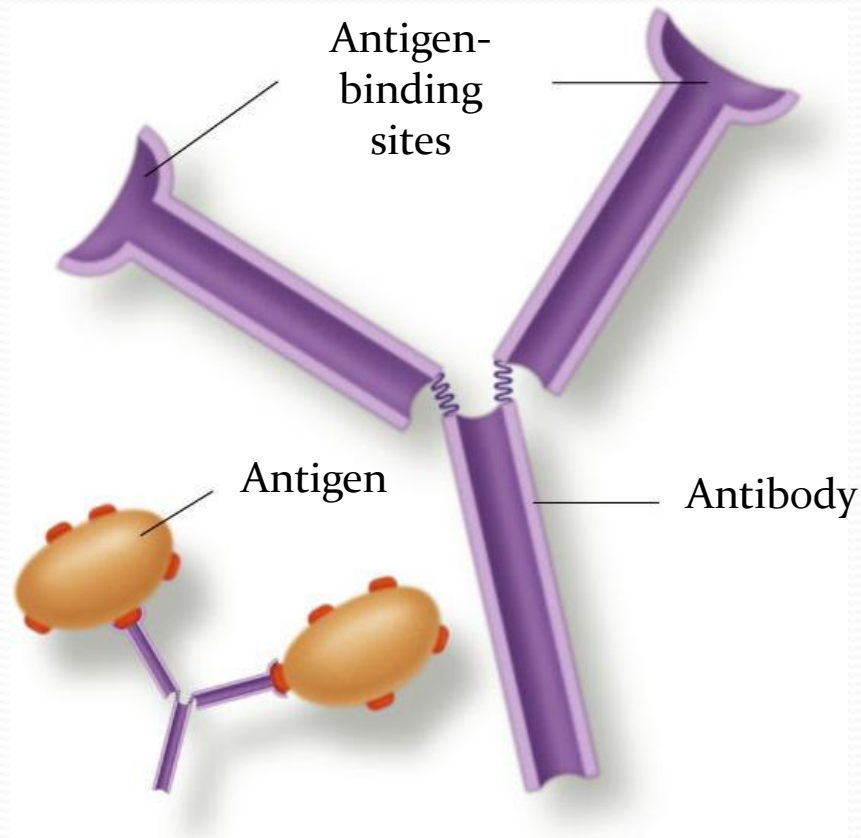
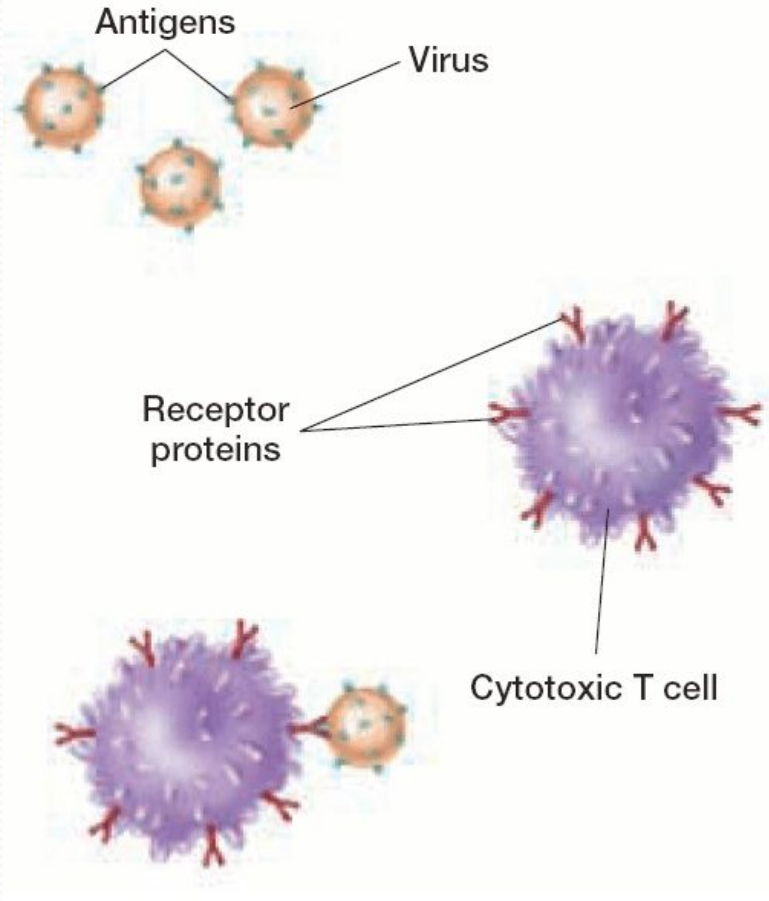


Figure 40–8 Structure of an Antibody



Specific Defenses, *continued*



Recognizing Invaders

- Some cells of the immune system have receptor proteins that bind to specific antigens.



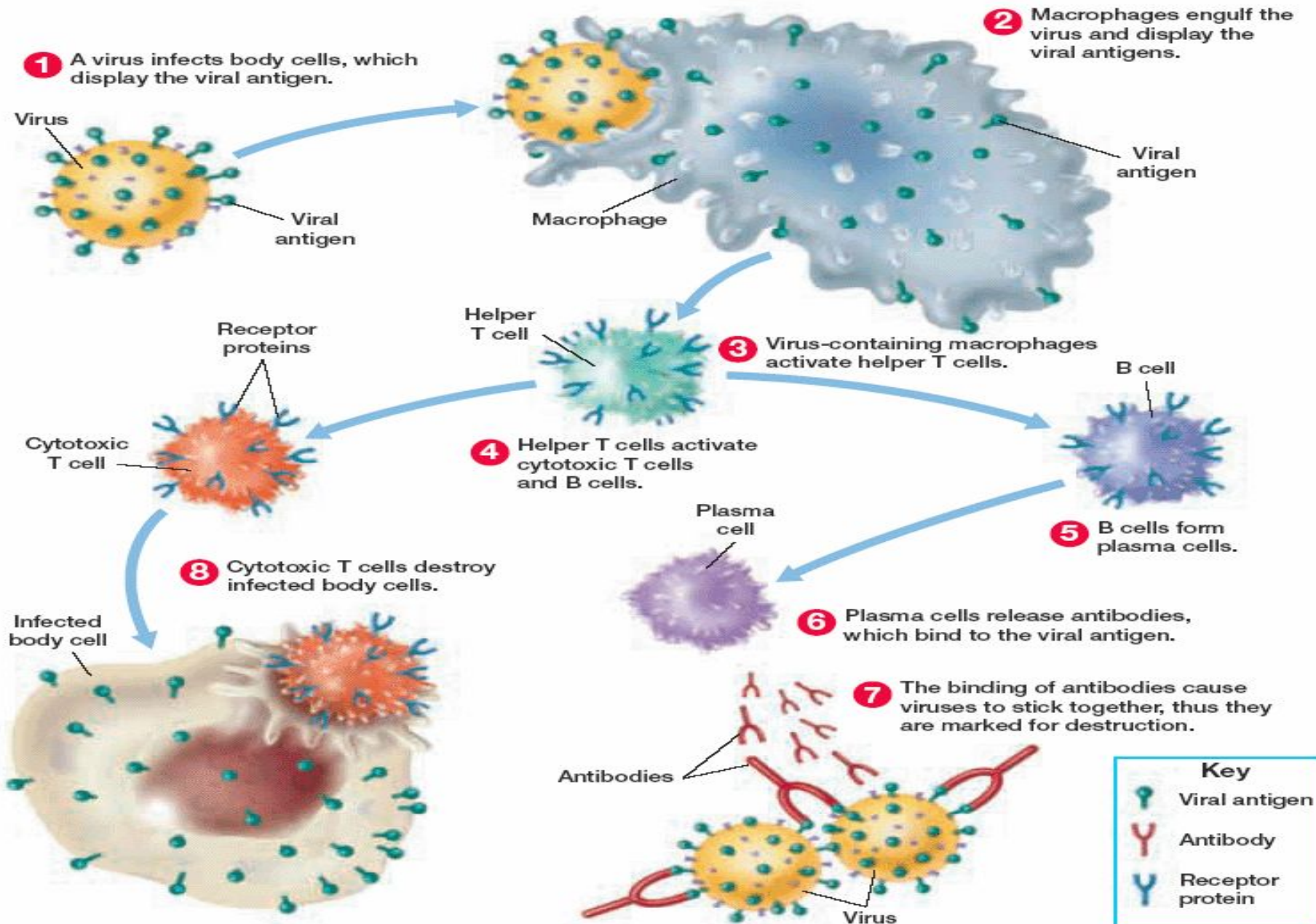
● ANTIBODIES:

- All vertebrates can synthesize antibodies.
- They are formed by stimulation by the antigen and react with them. they are also known as immugloblins.

The Immune Response Has Two Main Parts

- Two distinct processes work together in an **immune response**.
- One is the **B cell response**, a defense that aids the removal of extracellular pathogens from the body.
- The other is the **T cell response**, a defense that involves the destruction of intracellular pathogens by **cytotoxic T cells**.

The immune response involves several kinds of white blood cells.



The structure of antibodies:

- **Antibodies structurally are globular Proteins known as immunoglobulins.**
- **Antigen – Antibody reaction.**
- **Antibodies are structurally peculiar to their antigens.**
- **A compatible antibody and antigen form an antibody-antigen complex which function as a lock and key each antibody specifically with its antigen type.**



The disease causing organism is referred to as the pathogen and its ability to cause disease is called virulence.

Generally, antibodies make direct contact with antigens.

Four different results of these reactions are as follows: Agglutination, Precipitation, Neutralisation, Lysis.

TOXIN – ANTITOXIN:

- **The human immune system can produce antitoxins against these exotoxins.**
- **Antitoxin serum contains antitoxin antibodies.**

ALLERGY:

- All allergies can be described as a type of response by the immune system to infection from diseases.
- The symptoms of an allergy originate from the activity of an **antigens** and antibodies in the lymphatic system.
- A few bacteria such as tuberculosis bacillus produce an allergic response.
- These bacteria are called allergens.

VACCINES:

- **They are composed of physiological fluid and weakened or dead microbe.**
- **Thus the body recognises the microbe and produce antibodies or antitoxides to them.**
- **The vaccine for each illness is there fore unique, compound vaccines administrated to together are used againts two or more deceases.**
- **Vaccines sustain active immunity and their effect is long term.**
-

SERUM:

- **The serum includes large quantities of protein antibodies.**
- **During illness, it is injected to the body to enhance.**
- **It has a short term effect during illness.**
- **The serum can be produced in some animals that secrete their antibodies into the blood.**
- **The antigen is injected in increasing doses into a horse, sheep or similar organisms.**