



Microbiology/ 3rd Year M.B.CH.B. Students
Part V: Basic & Clinical Immunology (17 hours)
Lecture 1
Duration: 1 hour

Introduction to basic Immunology: Basis of body defense

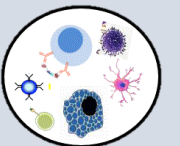
Assist. Prof. Dr. Nibras Saleam Al-Ammar



Reference: Roitt's Essential Immunology 13th Edition



For more detailed instruction, any question, cases need help please post to the group of session.





Learning objectives (LOs)

Immune system

LO.1

Immune system – Lines of defense

LO.2

Role of immune system

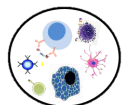
LO.3

Phagocytosis (Neutrophils/ Macrophages)

LO.4

Antigenicity & Immunogenicity

LO.5





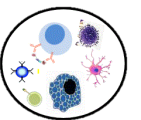
Immune system

Immune system: cells, tissues, and molecules that mediate resistance to infections.

Immunology: Study of structure and function of the immune system

Immunity: resistance of a host to pathogens and their toxic effects

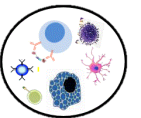
Immune response: collective and coordinated response to the introduction of foreign substances in an individual mediated by the cells and molecules of the immune system





Immune system - Organs

- Tonsils
- Thymus
- Lymph nodes
- Spleen
- Payer's patches
- Appendix
- Lymphatic vessels
- Bone marrow

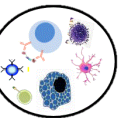


Immune system - Cells

LO.1



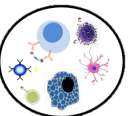
- 1. Lymphocytes; T-cells, B-cells, Natural Killer cells**
- 2. Monocytes, Macrophages**
- 3. Granulocytes; neutrophils, eosinophils, basophils**





Immune system - Molecules

- **Antibodies**
- **Complement**
- **Cytokines**
- **Interleukins**
- **Interferons**





Immune system – Lines of defense

1st line of defense

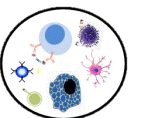
- cilia
- Skin
- Antimicrobial proteins
- Gastric juice
- Symbiotic bacteria

2nd line of defense

- Interferon
- Inflammatory response
- Complement
- NK cells
- Phagocytes (neutrophils & monocytes)

3rd line of defense

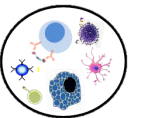
- T lymphocytes
- B lymphocytes





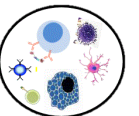
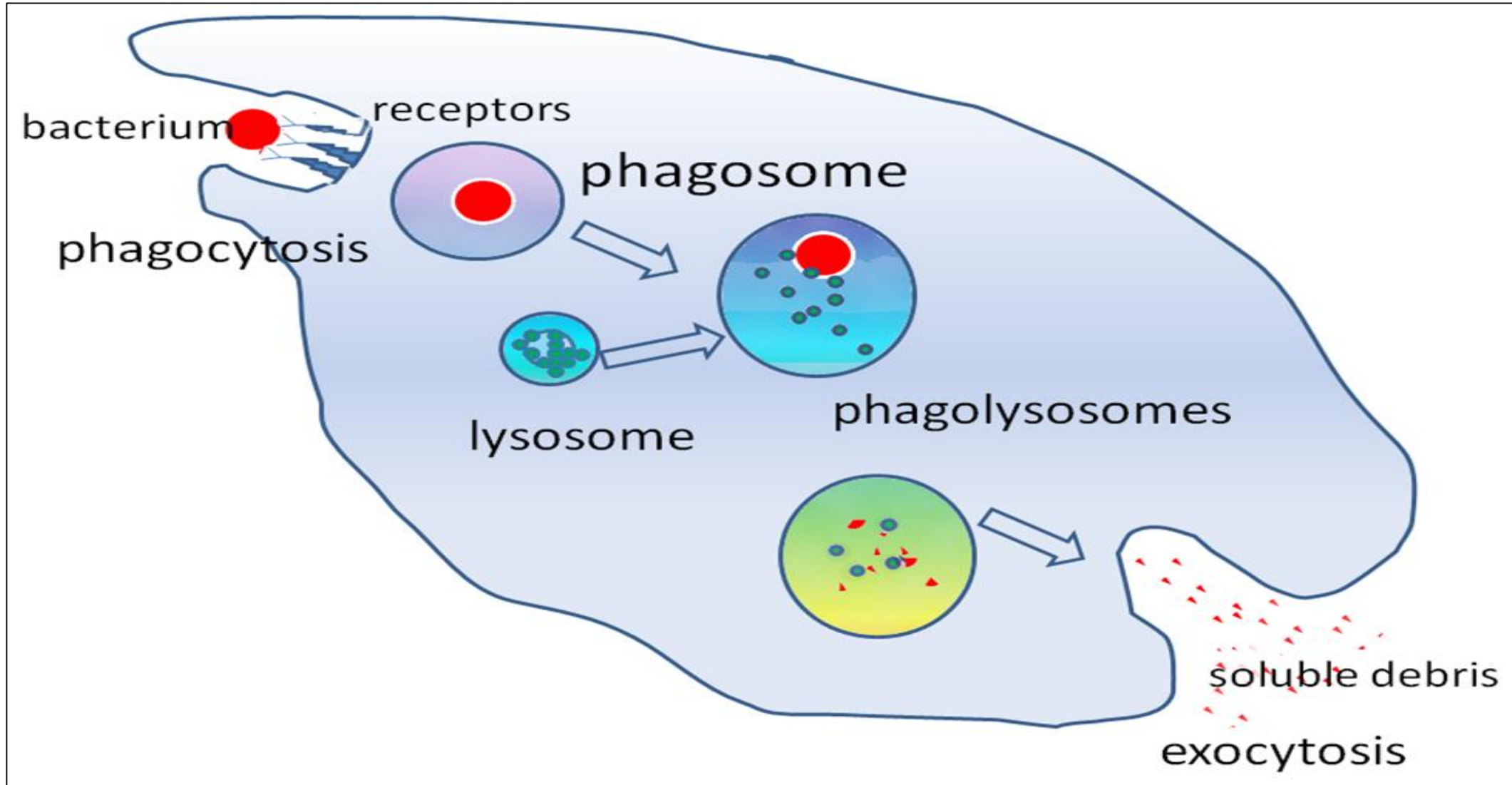
Role of immune system

- Providing a defense mechanisms against microbes
- Playing an important role against the growth of tumor cells
- Homeostasis:
(e.g. destruction of dead cell & antigen-antibody complexes).



Phagocytosis (Neutrophils/ Macrophages)

LO.4





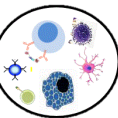
Antigenicity & Immunogenicity

LO.5

Antigen: any foreign molecule (non-self) can react with the product of the immune response.

Immunogens: molecules that can induce an immune response.

Note: not all antigens are immunogens.

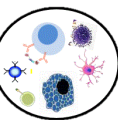
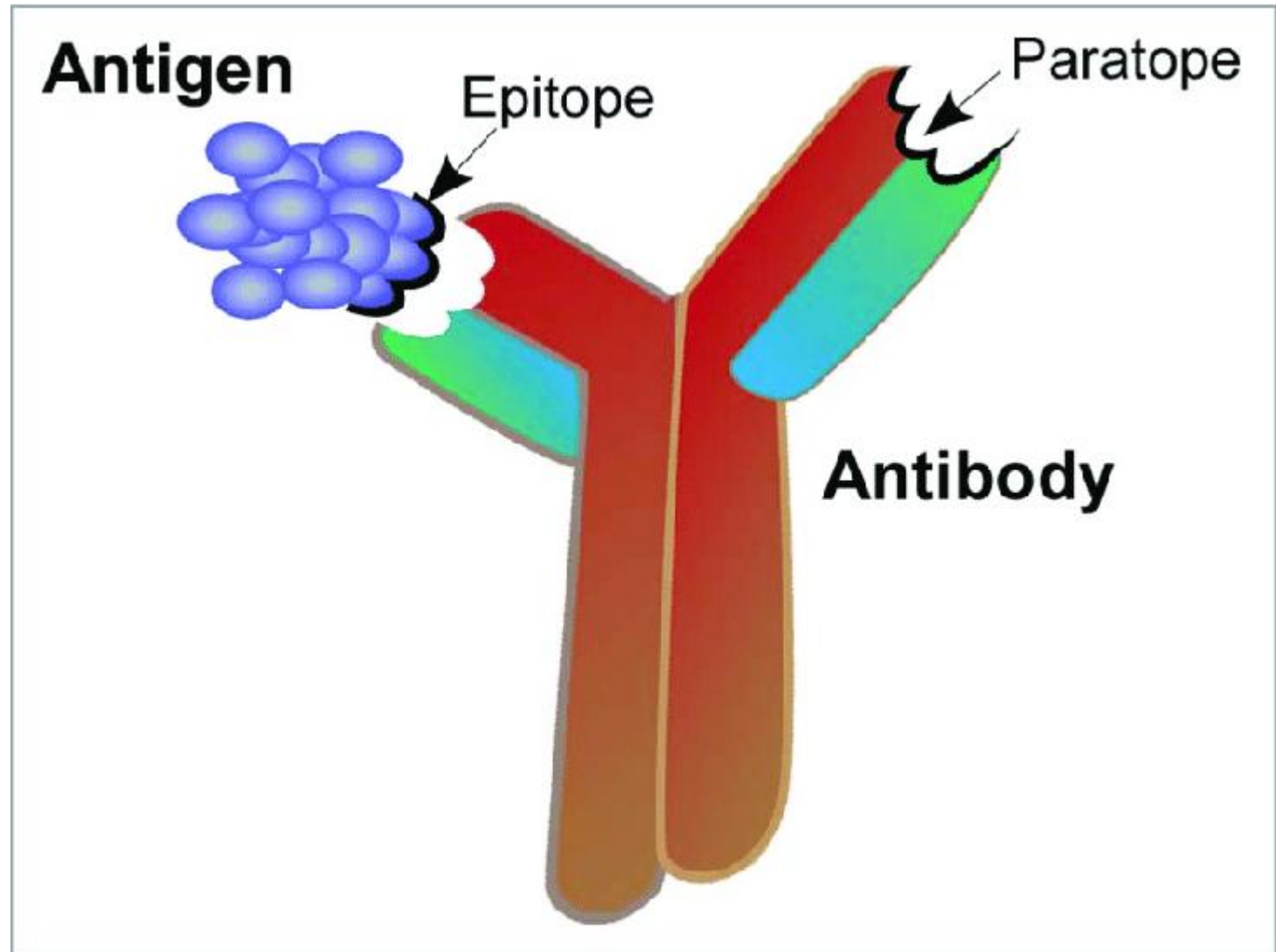


Immunological terms related to Ag

LO.5



Epitopes (antigenic determinants): are small chemical groups on the Ag molecules that elicit and react with the Ab.

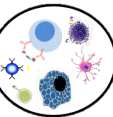
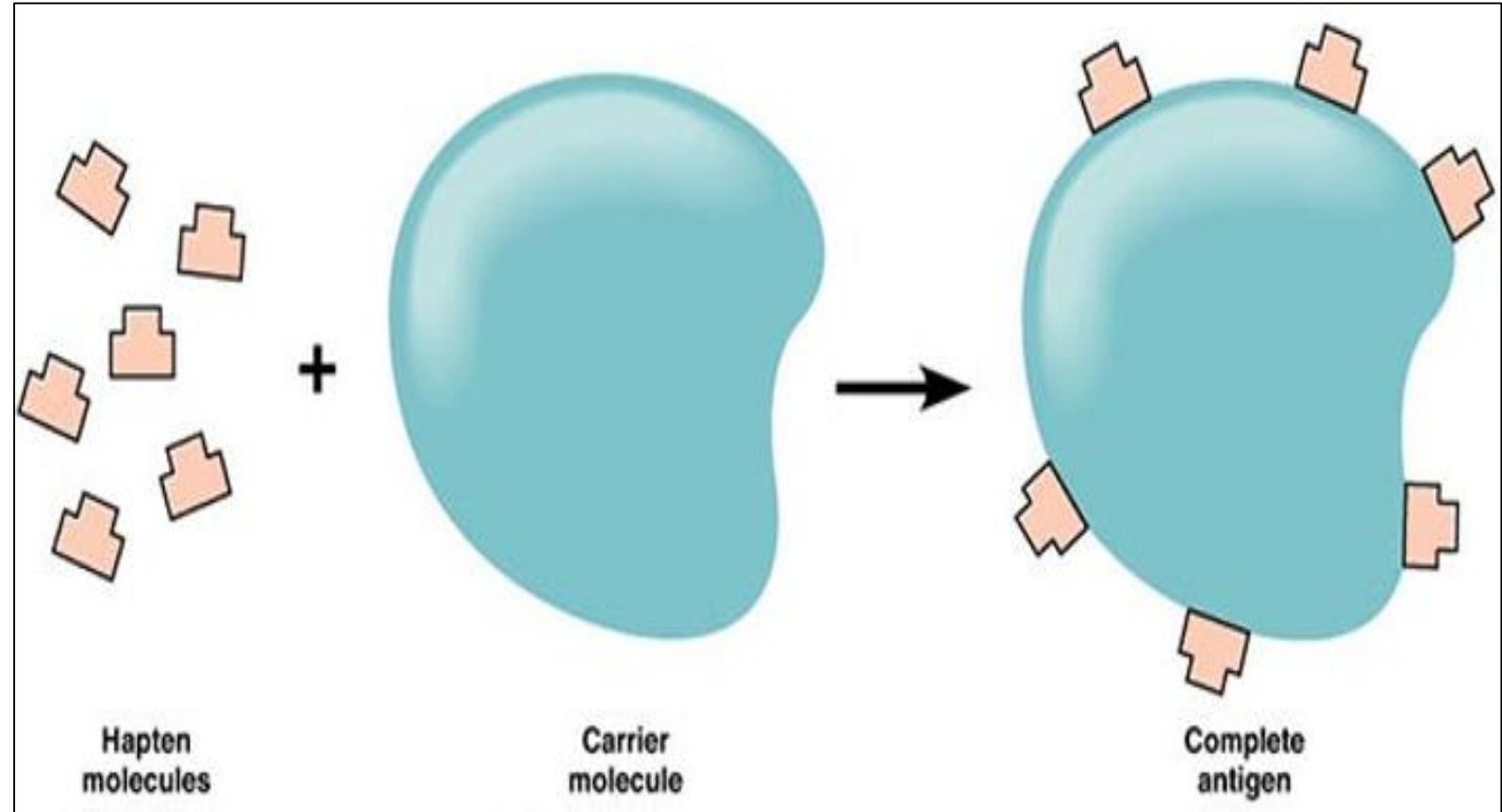


Immunological terms related to Ag



LO.5

Hapten: small molecule that is not immunogenic until it binds with larger carrier such as a protein.



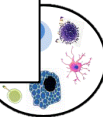
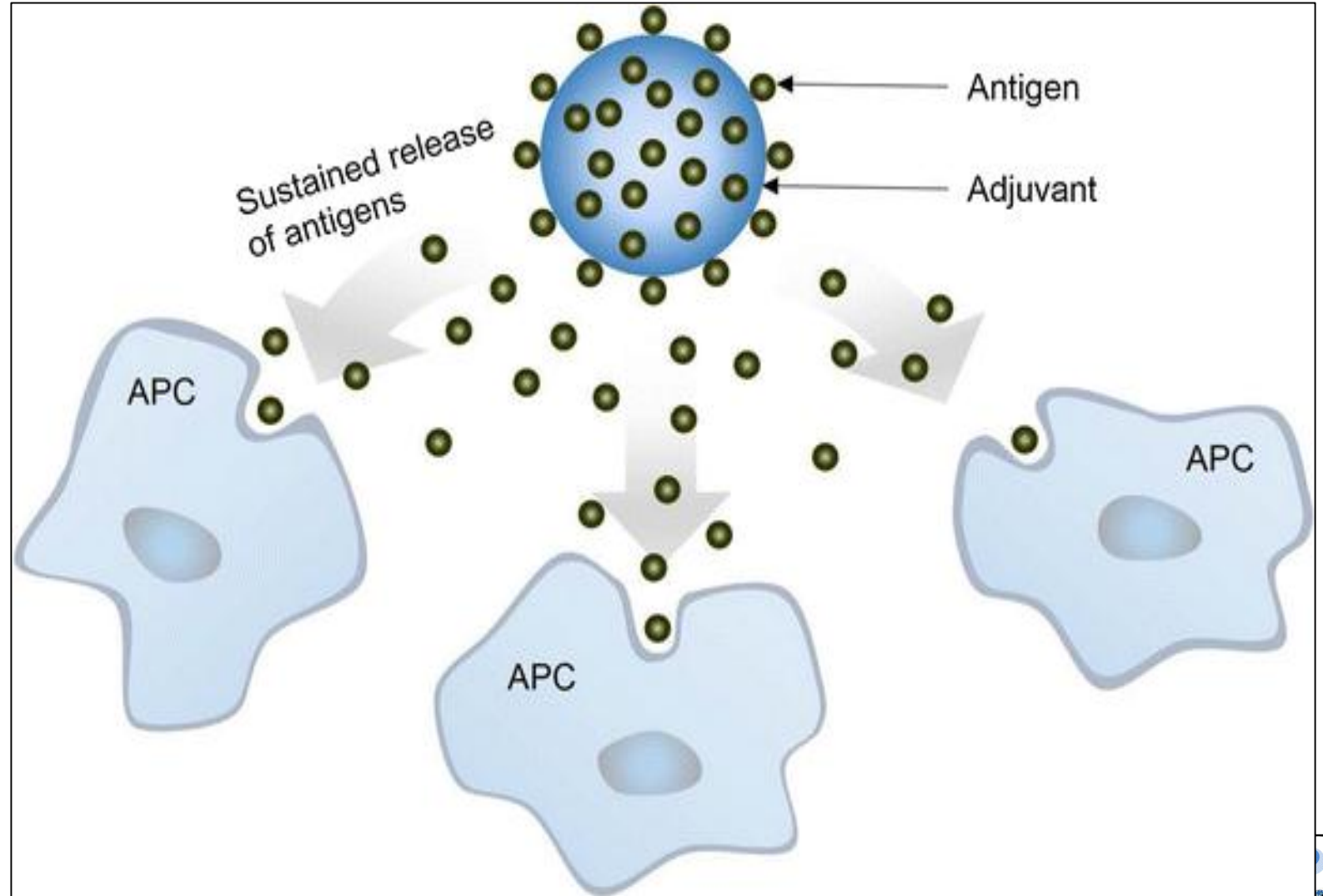
Immunological terms related to Ag



LO.5

Adjuvant:

- a substance that enhances the immune response to an immunogen.
- used to improve the effectiveness of vaccine.
- injected alongside (Ag) to help immune system generate (Abs).



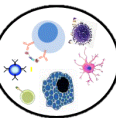
The features of immunogenicity

LO.5



1. Foreignness: (non-self).

1. Molecular weight (MW): (molecules with high MW are good immunogens).

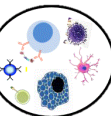
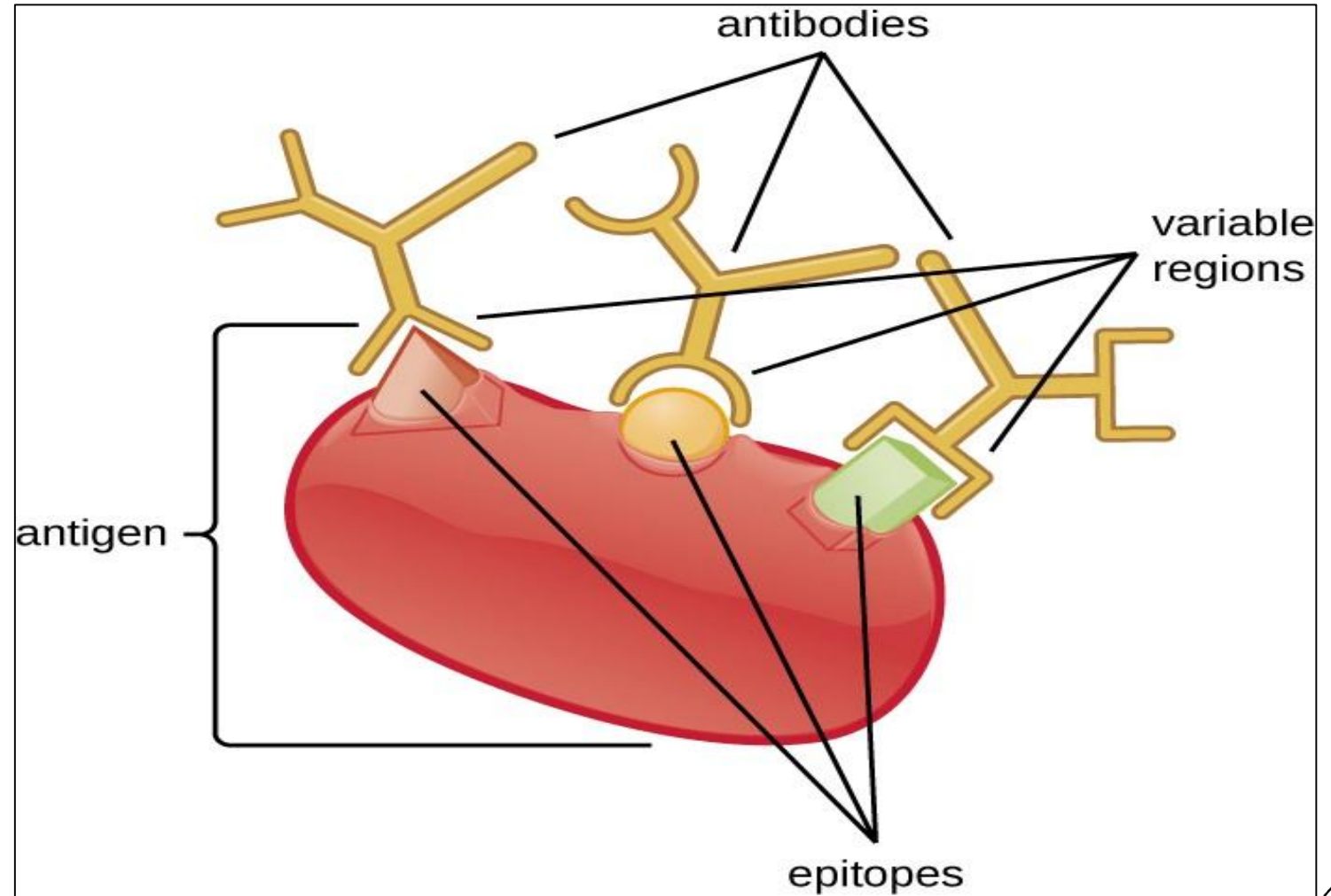


The features of immunogenicity



LO.5

3. Chemical & structural complexity:
more complex molecule (have different epitopes) is more immunogenic than simple molecule.



The features of immunogenicity

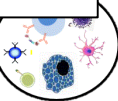
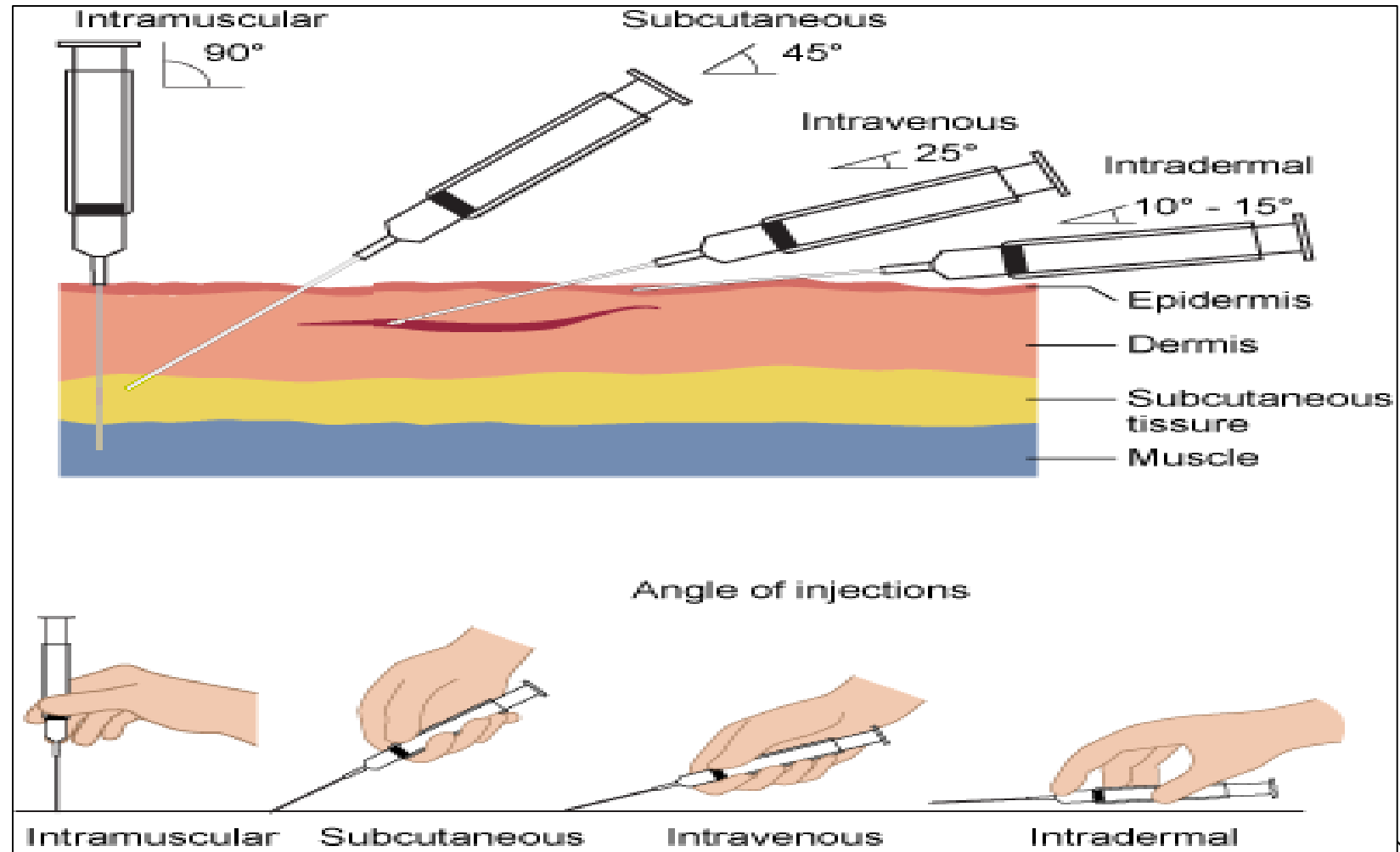


LO.5

4. Dosage, route & time of administration:

small & large dosages impair immune response while intermediate is better.

Subcutaneous or intramuscular routes of Ag are best for inducing immune response.

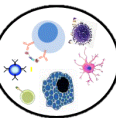


Factors contribute to immunogenicity

LO.5



- 1. Genetic**
- 2. Age**
- 3. Immunosuppressed patients**
- 4. Life style**
- 5. Type of diet**
- 6. Environmental factors**





Thank You

