Biology Grade 8

CHAPTER 2 : IMMUNE THERAPEUTICS

Activity 1: Vaccination and Serotherapy

INSTRUCTOR: SUHAIB AUDI

❖ Introduction:

- Not all times, our immune system can kill easily the foreign substances, especially the fatal toxins.
- For this reasons, scientists prepared two types of therapies to help the immune system: Vaccination and serotherapy.

❖ Prophylaxis (preventive measures):

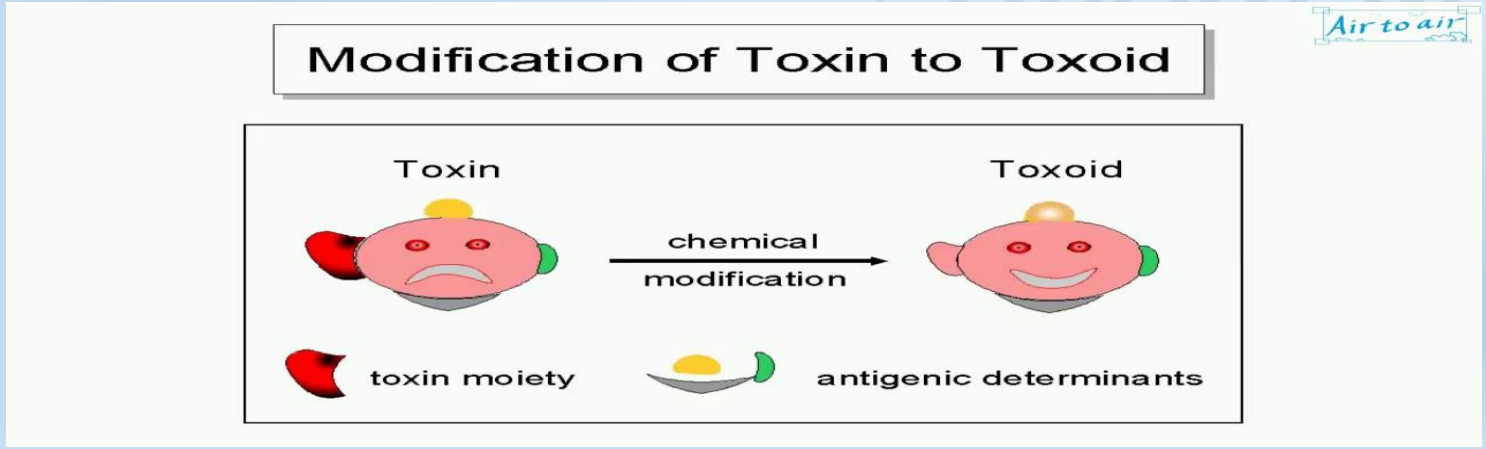
- It is a technique used to protect the body and prevent its infection by diseases.
- Vaccination is a popular example of prophylaxis.

❑ Vaccination

The act of introducing a Vaccine into the body to produce protection from a specific disease.

❑ Vaccine:

It is an **attenuated (weakened) or Killed Microbe** of microbial substances capable of inducing a Specific immune response that Protects the body against diseases.



Toxin
- Fatal (causes death)
- Virulent
- Immunogenic (Stimulate immune system)
- Pathogenic (causes disease)

Chemical modification

Toxoid
- Attenuated – Killed - Weak toxin.
- Immunogenic.
- Non Pathogenic.

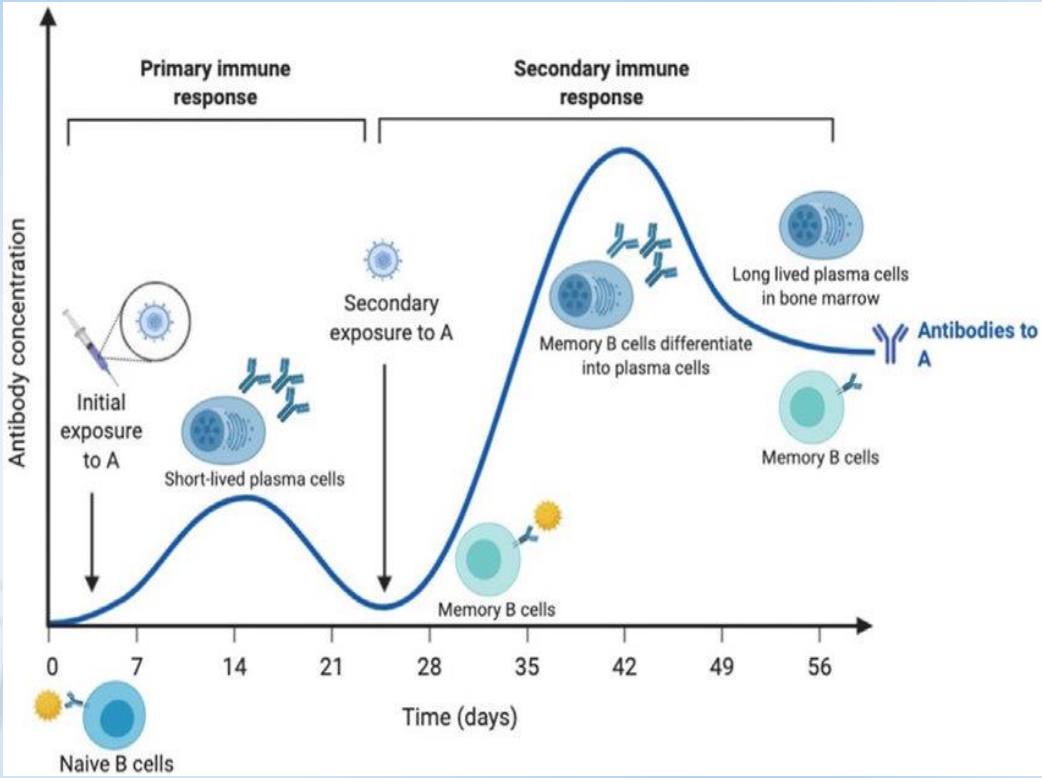
❖ The characteristics of Vaccination

1. It is **prophylactic** (protective/preventive).
2. It is given for **healthy individuals** to protect against future infection.
3. It induces **active immunity** in the body, meaning the body produces its own antibodies and activates immune cells by itself.
4. It induces into the body a specific immune response.
5. Vaccines provide **long-lasting protection** through the formation of immunological memory.

❖ Immune Response to Vaccination

- **First exposure** to the vaccine triggers the primary immune response:
  - It is slow, low in intensity, and rapidly decreases.

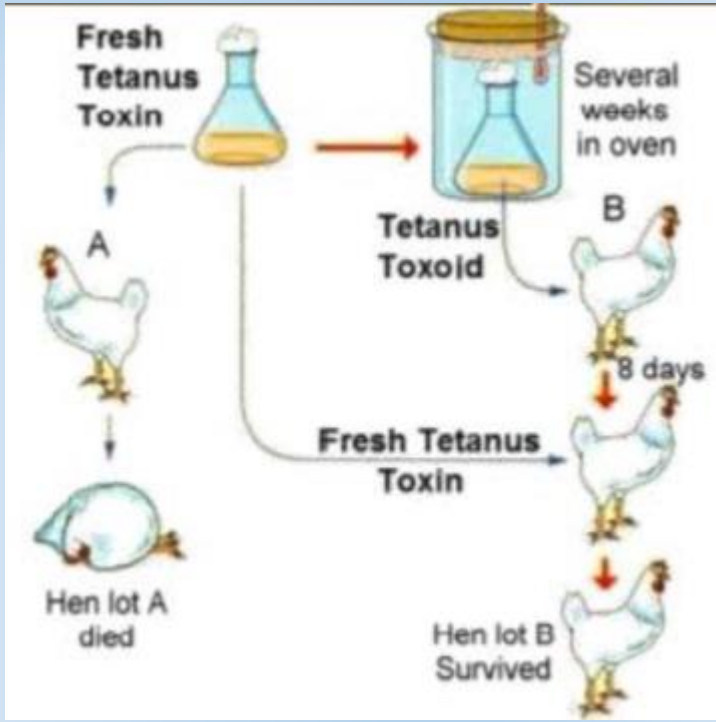
- **Second exposure** to the actual virulent pathogen triggers the secondary immune response, thanks to memory cells:
  - It is rapid, amplified, more persistent (long lasting)



- **Consider the following experiment:**

1. Analyze the two experiments.

Chicken lot A died, when we inject them with fresh tetanus toxin, while chicken lot B survived when we inject them with fresh tetanus toxin after the injection of tetanus toxoid.



2. Draw out the effect of fresh bacteria culture on hen A.

The fresh bacteria is fatal, it causes death.

3. Draw out the effect of attenuated toxins on hen B.

Tetanus toxoid immunizes the chicken against tetanus toxin.

4. Conclude concerning an important property of the immune system.

Memory Property

5. Name the immune therapy applied on hen B

Vaccination

❖ Summing Up - Vaccination

- Vaccination is a method of immune preventive therapy: should be done before the infection.
- It is done by injecting **attenuated old toxin**, which is harmless but stimulates the immune system (immunize the body) to produce memory cells by the primary immune response. Because of that, it is called **active immunity**.
- These memory cells are used to protect against fatal fresh toxin in case of future infection (secondary immune response).

❖ Serotherapy

- Serotherapy is a **therapeutic (curative) method** used to **treat infections**.
- It involves injecting the body with **specific antibodies** against a particular antigen.
- **Examples:**

✓ Snake bite 🐍

✓ Dog bite (rabies) 🐕

✓ Stepping on a rusty nail (tetanus)

characteristics of Serotherapy

1. It is a therapeutic, not preventive measure.
2. Used when rapid action is needed and vaccination would be too slow.
3. Administered to a sick individual.
4. Provides **passive immunity** (The person is given antibodies rather than producing them)
5. Offers immediate but temporary protection.
6. Since the body doesn't produce its own antibodies, the protection disappears once the injected antibodies are eliminated.
7. Triggers a specific immune response.
8. The effect is short-lasting.

❖ Summary

- We can combine both vaccination and serotherapy.
- Serotherapy provides immediate protection, and vaccination ensures long-lasting immunity.

	Serotherapy	Vaccination
Purpose	Curative (during infection)	Preventive (before infection)
Nature of Injection	Antibodies	Attenuated pathogen (antigen)
Origin of the antibodies	Outside of the body	Produced by the body
Latency (delay)	few hours	days to weeks
Protection Duration	Short	Long lasting
Memory	No	Yes
Type of Immunity	Passive	Active