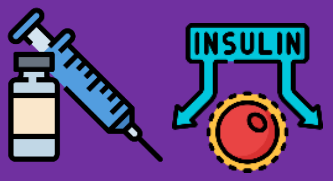


Biotechnological products

Biotechnology is a fascinating field that integrates biology with technology to develop products and processes that can improve human life.

Short questions

Q: Name at least two lifesaving products.

Insulin: It is useful for diabetes.

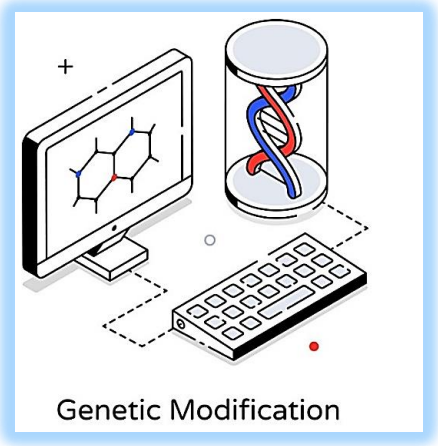
Vaccines: These are used against many infectious diseases.

Genetic modification:

"The use of biotechnological techniques to change the genes of an organism is called genetic modification".

Genetic modification involves

- Removal of genetic material
- Addition of genetic material
- Repair of genetic material



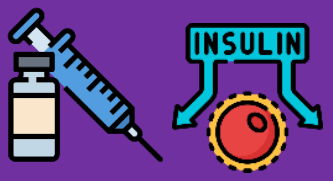
Genetically modified organisms (GMOs):

The organisms whose genetic makeup has been changed are called genetically modified organisms (GMOs).

Short questions

Define genetic modification.

What are GMOs?



GMOs and crop production:

GMOs are commonly used in food products and agriculture.

Q: Why genetic modification is important in crop production?

Genetic modification in crops is used:

- To produce resistance in plants against diseases, microorganisms, herbicides.
- Better production of yield.
- To improve nutritional quality of crop.

Insulin production:

Insulin is a "lifesaving product" of biotechnology. Insulin is a hormone produced by pancreas, which controls the sugar level in the blood. Diabetic patients do not have the ability to produce insulin. They need regular injections of insulin to control blood sugar level. In past, humans get this insulin from the pancreas of slaughtered cattle. It was expensive and in limited supply.

Short question

What is insulin?

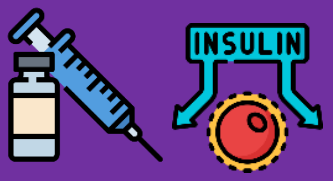
Which patients cannot make insulin?

A few years ago, scientists produced human insulin by genetically engineered bacteria. This genetically engineered insulin is cheaper and available in large c

Short question

What is diabetes mellitus?

If pancreas does not produce the required amount of insulin, the level of glucose in blood rises. This condition is called diabetes mellitus.



Vaccine:

"Vaccine is a material which contains weekend or killed pathogens (disease causing germs)."

Examples:

Some diseases for which vaccines have been developed are:

- COVID -19
- Hepatitis – B
- Typhoid
- Measles

Working of vaccine:

Short questions

Define vaccine and give examples.

Explain does how vaccine work?

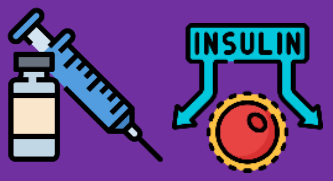
Find out in the history where pandemic was controlled by vaccines?

Name some diseases for which vaccines have been developed.

Discovery of vaccine

Edward Jenner was the first scientist who made first ever vaccine in history to control a pandemic called small pox. Discovery of this vaccine led to the discoveries of so many other vaccines.

- Vaccines stimulate the immune system to develop protection against a disease.
- When vaccinated, the immune system is trained to recognize and combat the pathogens.
- This training helps the immune system remember the disease-causing organism.
- So if it encounters the actual pathogen in the future, it can respond more efficiently and effectively, preventing the disease.



Role of biotechnology in vaccine production:

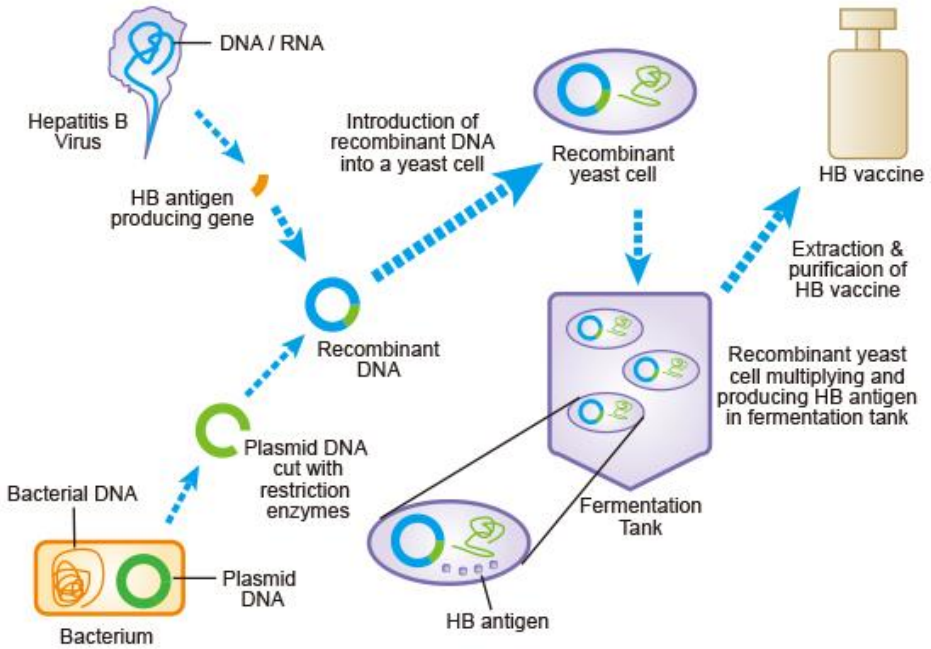
Vaccines are prepared through biotechnological methods.

Short question

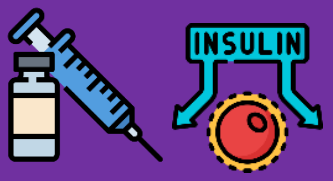
How do pathogen proteins act?

Steps:

1. Identification of proteins of pathogens that have the ability to stimulate blood cells to make antibody.
2. Gene of such proteins are isolated from pathogen and inserted into bacteria or other host cell.
3. These genetically modified bacteria make colonies and form pathogen proteins.
4. These pathogen proteins act as vaccines and are injected into human body.
5. When they enter human body, blood cells produce the antibodies.
6. These antibodies can kill pathogens.



Multiple choice questions



1. **Insulin is produced by:**

a. Liver b. Stomach c. Pancreas d. Lungs

Explanation: Insulin is a hormone that regulates blood glucose levels and is produced by the beta cells of the pancreas.

2. **What does GMO stand for?**

Genetically Modified Organism	General Modified Object	Genetically Manufactured Organism	General Managed Object

Explanation: GMO stands for Genetically Modified Organism.

3. **If a scientist introduces a gene from a bacterium into a plant to make it resistant to herbicides, which process are they using?**

a. Crossbreeding	Genetic modification	b. Selective breeding	c. Cloning

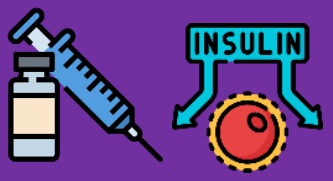
Explanation: Introducing a gene from a bacterium into a plant to confer herbicide resistance is a form of genetic modification.

4. **What may be the objective of genetic modifications of plants?**

Production of disease resistant plants	Improvement in nutritional quality of plants.	Production of herbicide resistant plants	All of these

Explanation: Genetic modifications in plants have all these objectives mentioned in the options.

5. **Which statement best describes the purpose of using insulin produced by biotechnology?**



a. To treat bacterial infections | To help regulate blood sugar levels in diabetic patients | To improve muscle growth in athletes | a. To enhance plant growth

Explanation: Insulin produced by biotechnology is primarily used to regulate blood sugar levels in diabetic patients.

6. Who developed the first successful vaccine?

a. Louis Pasteur **b.** Edward Jenner c. Alexander Fleming d. Jonas Salk

Explanation: Edward Jenner is credited with developing the first successful smallpox vaccine in 1796.

7. The condition in which the glucose level in blood is increased, called:

a. Diabetes mellitus b. Cancer c. Hepatitis d. Arthritis

Explanation: Diabetes mellitus is a metabolic disorder characterized by high blood sugar levels over a prolonged period. It occurs either when the pancreas does not produce enough insulin or when the body's cells do not respond properly to insulin.

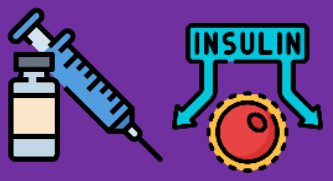
8. Insulin is an _____ protein.

a. Plant b. Animal c. Insect d. None of these

Explanation: Insulin is a protein hormone found in animals, including humans. It is crucial for regulating carbohydrate and fat metabolism in the body. It is not found in plants or insects.

9. Which of the following contains weakened germ or killed pathogens?

a. Insulin b. Protein c. Vaccine d. Bacteria



Explanation: Vaccines typically contain weakened or killed forms of the pathogen, or parts of the pathogen, which stimulate the body's immune system to recognize and fight the disease in future encounters.

10. When vaccines are injected into human body, they produce:

a. Antigens b. Anti-bodies c. Germs d. Cells

Explanation: When a vaccine is introduced into the body, it stimulates the immune system to produce antibodies.

11. Which of the following is not product of biotechnology:

a. Insulin b. Vaccine c. Growth hormones d. Quinine

Explanation: Quinine is not a product of biotechnology. It is obtained from the bark of Cinchona.

12. What is the primary purpose of a vaccine?

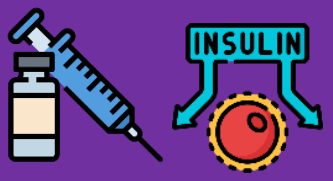
a. To cure an existing disease
b. To stimulate the immune system to prevent future infections
c. To enhance muscle strength
d. To increase appetite

Explanation: The primary purpose of a vaccine is to stimulate the immune system to recognize and fight specific pathogens, thereby providing immunity and preventing future infections.

13.Insulin is a biotechnological product used for the treatment of:

a. typhoid b. Hepatitis c. Cholera d. Diabetes

Explanation: Insulin is a hormone used in the treatment of diabetes


INSULIN