

Mark the correct statement

- (A) MALT constitutes less than 25 percent of the Lymphoid tissue in the human body
- (B) In case of snake bites, the injection which is given to the victim contains preformed antibodies against the snake venom
- (C) Autoimmune diseases like insulin-dependent diabetes, Addison's disease, ulcerative colitis and rheumatoid can be treated by immuno potentiation therapy
- (D) Passive immunity provides relief only after long period and is long-lasting.

Artificial  
Passive  
 Immunity  
 (Acquired)

Select the correct statement with respect to disease and immunisation:

- (A) Injection of snake antivenom against snake bite is an example of active immunisation.
- ~~(B)~~ If due to some reason (B-) and (T-) lymphocytes are damaged, the body will not produce antibodies against a pathogen.
- (C) Injection of dead/inactivated pathogens causes passive immunity
- (D) Certain protozoans have been used to mass produce hepatitis B vaccine

B-cells ⇒ AN Libby  
 ↙  
 T-cells

→ Yeast (R-DNA tech)

Recombinant DNA technology has allowed the production of A of pathogen in bacteria or yeast.

- (A) Pro-toxin
- (B) Anti-bodies.
- (C) Antigenic polypeptide
- (D) Antigenic polysaccharide

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→ Nature/Artificial

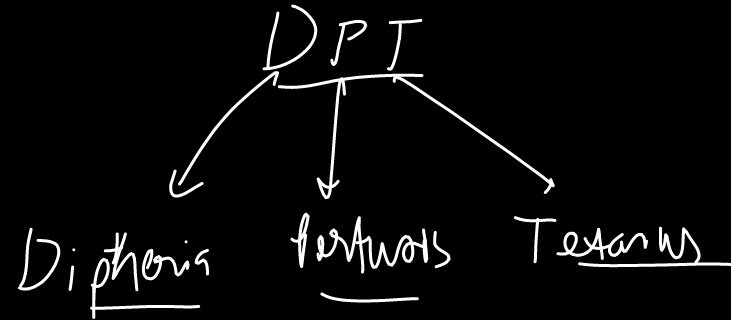
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Vaccine  
↓  
Antigenicity

Vaccines are available for the disease like

- I. Polio.
- II. Diphtheria.
- III. Pneumonia
- IV. Tetanus.



- ~~(A)~~ I, II, III & IV
- (B) I and IV only
- (C) I only
- (D) I, II & IV only

Antitoxin consists of

- (A) ~~Antibodies~~
- (B) Toxoid (toxic substance)
- (C) Antibiotics
- (D) Live attenuated pathogen

Pre-formed antibody.  
(Anti-venom)

Which of the following statement is not true regarding active acquired immunity :-

- ~~(A)~~ It is species non specific
- (B) It is antigen specific ✓
- (C) It shows slow but long lasting effect
- (D) It is used in prophylaxis (prevention)-



Which of the following is used in the production of the recombinant Hepatitis B vaccine?

- (A) Yeast (*Sacromyces verivace*)
- (B) Microsporium
- (C) E coli
- (D) Streptococcus

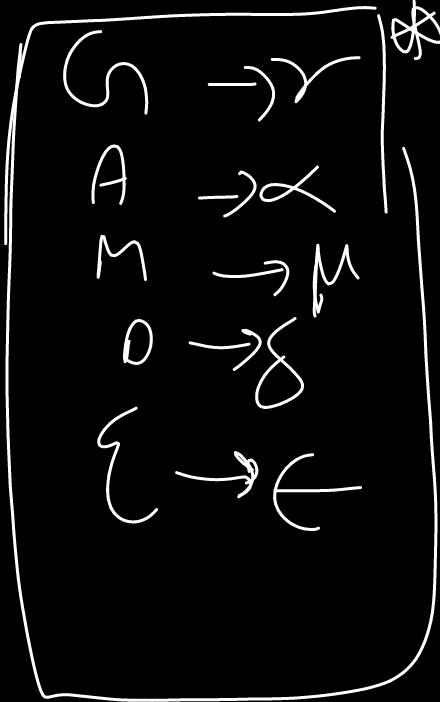
The yellowish fluid colostrum secreted by mother during the initial days of lactation has abundant antibodies which provides infant with

→ IgA (A.C)\*

- (A) Naturally acquired active immunity
- (B) Artificially acquired active immunity
- ~~(C) Naturally acquired passive immunity~~
- (D) Artificially acquired passive immunity

A person is injected with gamma-globulin ( Ig-G )  
 against Snake venom. This is

- (A) Artificially acquired active immunity
- ~~(B)~~ Artificially acquired passive immunity
- (C) Naturally acquired active immunity
- (D) Naturally acquired passive immunity



Which one of the following statement is correct with respect to immunity?

(A) The antibodies against small pox pathogen are produced by T-lymphocytes → B-cell

(B) Antibodies are protein molecules each of which has four light chains (H<sub>2</sub>L<sub>2</sub>)

(C) Rejection of a kidney graft is the function of B-lymphocytes → T-cells (CMI)

~~(D)~~ Preformed antibodies need to be injected to treat the bite by a viper/snake

↳ Artificial Passive Acq. Immunity.

A person who met with a road accident is likely to develop tetanus, can be immunised by administering

Tetany. (caused by Clostridium tetani).

(A) Weakened germs

(B) Dead germs

~~(C) Preformed antibodies~~ (Anti-Tetanus-serum)

(D) Wide spectrum antibiotics

↓  
ATS

When a quick immune response is required,  
we can \_\_\_\_\_

- (A) Directly inject weakened pathogen at time of emergency. ✓
- (B) Directly inject preformed (antigens). ✓
- ~~(C) Directly inject preformed antibodies.~~
- (D) Directly inject immunosuppressants.

Foetus receive some antibodies from the mother through placenta during pregnancy. This is an example of

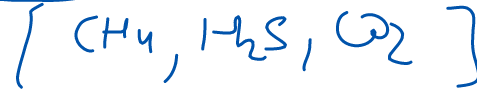
- (A) Naturally acquired active immunity
- (B) Artificially acquired passive immunity
- ~~(C) Naturally acquired passive immunity~~
- (D) Artificially acquired active immunity

↑  
Eg  
—————  
CSF

potential.

Once the BOD of sewage or waste water is reduced significantly, the **effluent** is then passed into a **settling tank** where the bacterial 'flocs' are allowed to **sediment**. This sediment is called **activated sludge**. A small part of the **activated sludge** is pumped back into the aeration tank to serve as the **inoculum**. The remaining major part of the sludge is pumped into large tanks called **anaerobic sludge digesters**. Here, other kinds of bacteria, which grow anaerobically, digest the bacteria and the fungi in the sludge. During this digestion, bacteria produce a mixture of gases such as **methane, hydrogen sulphide and carbon dioxide**. These gases form **biogas** and can be used as source of energy as it is inflammable.

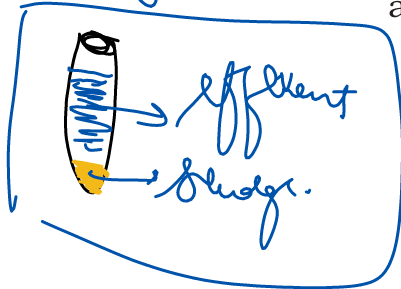
The effluent from the secondary treatment plant is generally released into natural water bodies like **rivers and streams**. An aerial view of such a plant is shown in Figure 10.7.



liq.  
water (remained)

184

Sludge.





You can appreciate how microbes play a major role in treating millions of gallons of waste water everyday across the globe. This methodology has been practiced for more than a century now, in almost all parts of the world. Till date, no man-made technology has been able to rival the microbial treatment of sewage.

You are aware that due to increasing urbanisation, sewage is being produced in much larger quantities than ever before. However the number of sewage treatment plants has not increased enough to treat such large quantities.

So the untreated sewage is often discharged directly into rivers leading to their pollution and increase in water-borne diseases.

1993 ← The Ministry of Environment and Forests has initiated Ganga Action Plan and Yamuna Action Plan to save these major rivers of our country from pollution. Under these plans, it is proposed to build a large number of sewage treatment plants so that only treated sewage may be discharged in the rivers. A visit to a sewage treatment plant situated in any place near you would be a very interesting and educating experience.



**Figure 10.7** An aerial view of a sewage plant

1985  
M.E.F.

## 10.4 MICROBES IN PRODUCTION OF BIOGAS



## 10.4 MICROBES IN PRODUCTION OF BIOGAS

→ Methanogens. (Archaea)

Biogas is a mixture of gases (containing predominantly methane) produced by the microbial activity and which may be used as fuel. You have learnt that microbes produce different types of gaseous end-products during growth and metabolism. The type of the gas produced depends upon the microbes and the organic substrates they utilise. In the examples cited in relation to fermentation of dough, cheese making and production of beverages, the main gas produced was  $\text{CO}_2$ . However, certain bacteria, which grow anaerobically on cellulosic material, produce large amount of methane along with  $\text{CO}_2$  and  $\text{H}_2$ . These bacteria are collectively called **methanogens**, and one such common bacterium is *Methanobacterium*. These bacteria are commonly found in the anaerobic sludge during sewage treatment. These bacteria are also present in the rumen (a part of stomach) of cattle. A lot of cellulosic material present in the food of cattle is also present in the rumen. In rumen, these bacteria help in the breakdown of cellulose and play an important role in the nutrition of cattle. Do you think we, human beings, are able to digest the cellulose present in our foods? Thus, the excreta (dung) of cattle, commonly called *gobar*, is rich in these bacteria. Dung can be used for generation of biogas, commonly called *gobar gas*.

The biogas plant consists of a concrete tank (10-15 feet deep) in which

- ↓
- Marshy.
  - Ruminants Stomach: Int.

