13 Aids to Health

Syllabus : *Aids to health : an understanding of the use and action of the following – vaccination; immunisation; antitoxin; serum; antiseptics; disinfectants; penicillin; sulphonamide drugs; First Aid.*

Scope of Syllabus : An idea of local defence system and their merits, active and passive immunity, difference between antiseptics and disinfectants to be discussed. Basic principles of first aid to be taught.

To be healthy, we need personal care as well as community involvement. This chapter on Aids to Health is intended to familiarise you with various (natural and artificial) ways of protection from diseases. Apart from the importance of the topic for examination, the information given here is very helpful for leading a healthy life.

13.1 NEED TO KEEP HEALTHY

Every individual wishes to keep healthy and disease-free. This requires several things — some at personal level and some at community level. At **personal level**, one has to keep his body clean by washing, bathing, brushing teeth, regular physical exercise, and proper diet and proper rest and sleep. At **community level**, our surroundings should be kept clean with no accumulation of garbage or stagnant water, *etc.*, so that the disease-spreading insects and pests do not thrive.

WORLD HEALTH DAY
APRIL, 7

This day is celebrated to create consciousness about keeping healthy and disseminate the message at all levels.

13.2 IMMUNITY

Immunity means **body's defence against disease**. Our body is all the time invaded by various harmful substances like pollutants (poisonous chemicals) and germs. They may enter our body in the following four ways :

1. Directly through the **skin**,
2. Through **mucous membranes** of eyes, nose, urinary or genital tracts,
3. Through **food** or **water** intake,
4. Through the **air we breathe in**.

Our body system first tends to **prevent their entry** into the body. Secondly, if somehow they do enter, the body fights with them, so that they cause no harm **(rendered harmless)**.

The defence system in our body works at two levels:

A. **Local defence system (Prevention of entry of germs).** This is a kind of barrier system which tackles the germs at their possible entry points. It includes :
   (1) protective mechanical **barriers**
   (2) **thrown out**, if entered by sneezing etc.
   (3) germ-killing **secretions**, and
   (4) germ-fighting **WBCs**.

B. **Immune system.** It deals with the germs after they have entered into the body tissues.

13.2.1 Local Defence System

1. **Protective mechanical barriers**. These include the skin, hair, mucus, etc.
   (i) **Skin** – Skin has an outer tough layer made of a protein **keratin** and it is **almost impermeable to germs**. At any given time, there are lots of germs settled on the outer surface of the skin, which have come through the air or through **direct contact** with contaminated objects. *Even a handshake or a kiss on the cheeks of a baby transfers germs from one individual to another*. Washing with

soap and water removes the germs. Any **scratch** or **cut** in the skin opens the way for germs to get in. Should there be any cut in the skin, the **clotting of blood plugs the cut ends of blood vessels** at the wound to prevent entry of germs.

(ii) **Hairs** – Hairs intercept the germ's journey inwards or upto the skin. Hairs inside the nostrils trap dust containing the germs.

(iii) **Mucus** – Mucus is a slimy secretion of the epithelial lining of various organs. For example:

- the mucus secreted in the nasal passage and the wind pipe, **traps many bacteria** and prevents their entry into the body tissues.
- Cilia of the wind-pipe throw out the bacteria trapped in the mucus.

2. **Thrown out, if entered**

Coughing, sneezing and **vomiting** are direct methods to throw out the germs or any foreign unwanted objects which get into the respiratory and digestive systems. Even diarrhoea (loose motions) helps in throwing out the germs if the infection persists in the digestive tract.

3. **Germ-killing secretions**

(i) **Saliva, sweat, tears** and **nasal secretions** contain germ-killing substances.

(ii) **Hydrochloric acid** secreted by the stomach kills germs that gain entry along with the food.

4. **Germ-fighting white blood cells (WBCs).**

Should any microbe enter the body systems, the white blood cells (phagocytes) are ready to fight them. They squeeze out of the walls of the blood capillaries (by **diapedesis**) and engulf the bacteria or the germs and destroy them **(phagocytosis)** (Figs. 13.1 and 13.2). Pus in a wound, for example, is a mixture of destroyed germs, killed WBCs and damaged tissue cells.

MERITS OF LOCAL DEFENCE SYSTEMS

1. They start working **instantaneously**.
2. They are **not dependent on previous exposure** to infections.
3. They are effective against **a wide range** of potentially infectious agents.

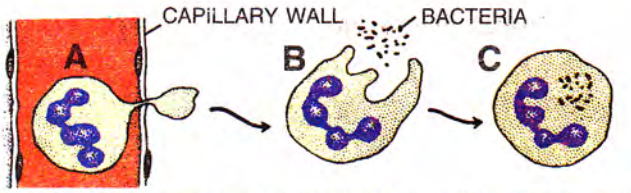


Fig. 13.1 : The engulfing of bacteria by white blood cells (phagocytosis). A-Cell forcing its way across capillary wall (diapedesis), B-White cell attracted towards bacteria, C-Bacteria are engulfed by the white cell. (The W.B.C. shown here is neutrophil with 4-lobed nucleus)

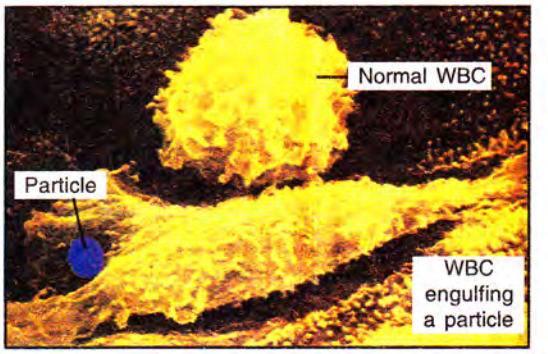
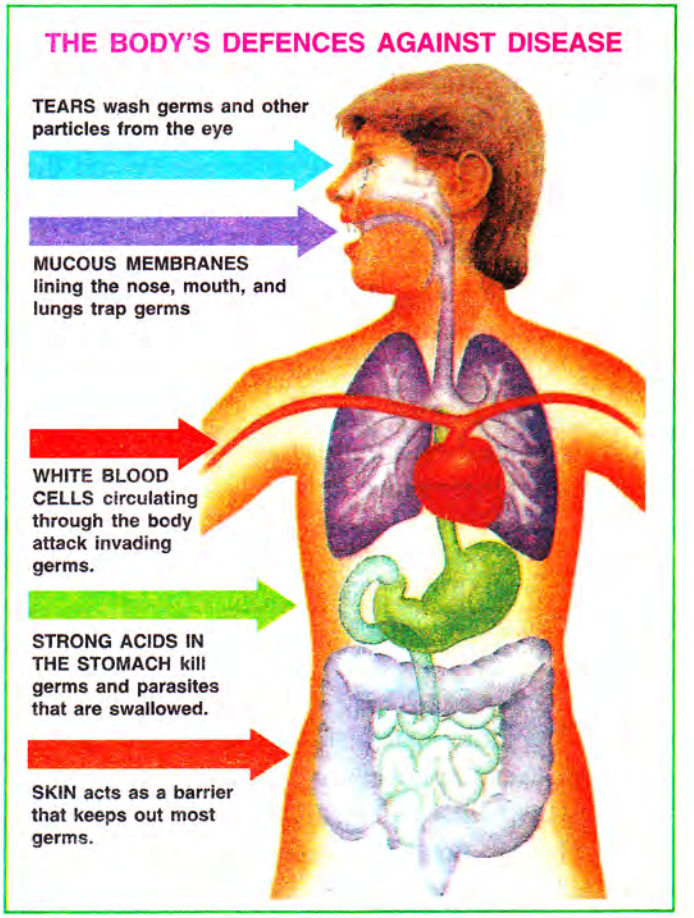


Fig. 13.2 : Two white blood cells patrolling the alveoli in a human lung. The spherical one is in its normal shape. Below it is an elongated white cell, about to engulf the round particle on the left. (Scanning electron microscopic view, highly magnified about × 5,000)



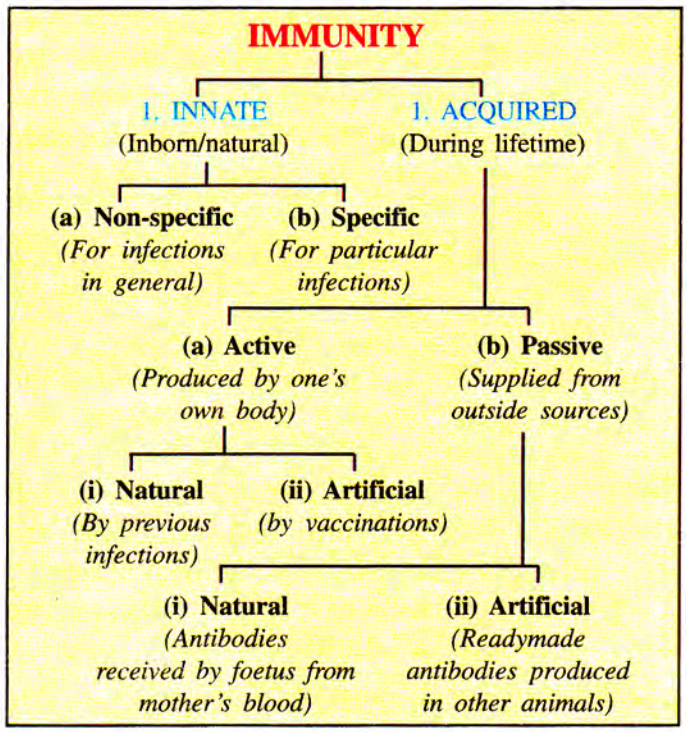
13.2.2 Immune System

The local defence systems are not effective in all cases and circumstances. Certain microbes (germs) or their poisonous secretions (**toxins**) do enter the deeper tissues and various organ-systems, by their special mechanisms of entry or through any breaches in the protective barriers.

At this stage, the blood and other body fluids start fighting against the germs or any other unacceptable foreign substance. The body fluids contain special proteins called **antibodies** which react with the invading germs, and **antitoxins** which react with their poisons (toxins) to destroy them, and thus they provide protection against disease (immunity).

Immunity is the body's resistance to the onset of a disease after infection by harmful germs.

To define more elaborately – Immunity is the **"capacity of our body to deal with foreign substances, e.g., bacteria, viruses, toxins, etc. that enter our body and to render them harmless."** or simply, "it provides resistance against disease–causing germs."



KINDS OF IMMUNITY

Immunity can be classified into two main categories-**innate** and **acquired** immunity and their different subcategories are as follows :

1. INNATE IMMUNITY, also called natural or native immunity. This immunity is by **virtue of genetic constitutional make-up**. It is there in the body without any external stimulation or a previous infection.
   (a) **Non-specific innate immunity.** A degree of natural resistance to all infections in general. *For example*, humans do not suffer from the plants' highly infectious diseases, or even certain diseases of animals.
   (b) **Specific innate immunity.** This is a natural resistance to a particular kind of germ only. Some races or some individuals do not suffer from certain infectious diseases. *For example*, human beings are immune to a highly infectious disease of dogs (known as 'Distemper'), which kills about 50% of all infested dogs.
2. ACQUIRED IMMUNITY — **Resistance to a disease which an individual acquires during his life-time**. It may be the result of :

EITHER

A previous infection **(actively acquired immunity)**, *e.g.*, a person having once suffered from "measles" will not normally suffer from it again.

OR

"Ready-made" antibodies supplied from outside **(passively acquired immunity)**, *e.g.* a person bitten by a poisonous snake is given anti-venin injection (*venom* : poison) which contains antibodies for the poison that were produced in the body of a horse.

(a) **Actively acquired immunity.** This is the resistance developed by an individual due to a previous infection or antigen (chemical found on the surface of the disease-causing germ cell) which enters his body naturally leading to **(i) naturally acquired active immunity)** or is introduced artificially, as in vaccinations leading to **(ii) artificially acquired active immunity).** In either case, the body lymphocytes react in two ways:

- They produce **antibodies** which freely circulate in the blood & lymph, and which bind to the microorganism to kill it.
- They produce **killer cells** carrying specific

receptors for foreign antigens found on invading germs.

The actively acquired immunities are usually **long-lasting** carried out through 'memory' lymphocytes.

(b) **Passively acquired immunity.** This is the immunity provided to an individual not by his own body but from an outside source in the form of "ready-made" antibodies. The passively acquired immunity again can be of two types :

(i) ***Naturally acquired passive immunity.*** In it, the readymade or the "pre-prepared" **mother's antibodies** may reach the foetus (developing embryo) through the placenta.

(ii) ***Artificially acquired passive immunity.*** In this, the antibodies are produced in the **blood of a horse or some other animal** by injecting germs into its body. **Antiserum** injections are prepared from the serum (containing antibodies) of such animals' blood and are injected into the body of the patient, e.g. in the treatment of snake-bite by **antivenin** or that of a diphtheria patient by anti-diphtheria injections. Haffkine's Institute in Bombay and another institute at Kasauli are preparing several such anti-sera. Antivenin for treating snake-bite is also based on the same principle.

For the sake of simplicity, let us just take the active and passive immunities and summarise the differences between them as given in table 13.1 given below.

13.2.3 Antibodies

These are special chemicals found in the blood which act against the **germs** or their secretions. Some of the characteristics of the antibodies are as follows :

1. The antibodies are **proteins** (they belong to the class of immunoglobulins).
2. Antibodies are produced by a type of specialised lymphocytes **on exposure** to ***antigens*** (chemical substances found on the germs' cells) (Fig. 13.3). These special lymphocytes particularly concentrate in the lymph nodes and spleen and also in the circulating blood and lymph.

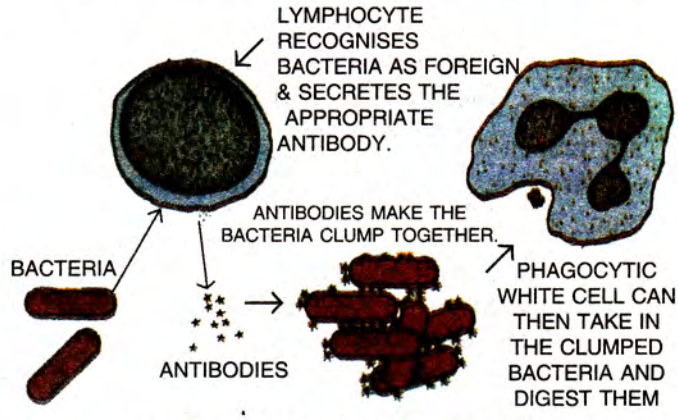


Fig. 13.3 : Antibodies attack bacteria

3. Our body can make an **unlimited variety** of different antibodies.
4. Antibodies are **specific** which means that one kind of antibody acts against only one particular type of antigen.
5. An antibody **recognises** its particular antigen and binds to it rendering it harmless, which is subsequently destroyed and eliminated by the body.
6. Some antibodies are present in the blood of some people **from the very birth.** Such people having these particular antibodies in their blood do not suffer from those particular diseases

Table 13.1 : Differences between active and passive immunity

Active Immunity	*Passive Immunity*
1. Produced by **one's own** body.	1. **Received from outside,** i.e.not developed by one's own body.
2. **Induced by infection** or by contact with immunogens (immunity-producing agents such as vaccines, allergens, etc.).	2. Provided by **readymade antibodies.**
3. Provides effective and long-lasting protection.	3. Protection is less effective and does not ensure against a subsequent infection.
4. Immunity **effective** only **after a certain time** gap (time required for production of antibodies).	4. **Immediately effective.**

even if the germs for them have crossed the barriers and escaped the phagocytes.

7. Immunity produced by the antibodies on exposure to antigens may be *either* for a **short period** (as in common cold, cholera), *or* for a **longer period** (as in small pox, measles, *etc.*).

SUMMARY OF OUR BODY'S DEFENCE AGAINST DISEASE GERMS

A. BARRIERS (Prevent entry of germs)

A1. Prevent entry **mechanically**
- Tough outermost layer of skin
- Hairs on skin and in nose
- Blood clot plug at any cut
- Cilia in wind pipe

A2. Prevent entry by **killing**
- Sweat
- HCl in stomach
- Tears
- Nasal secretion
- Saliva
- Mucus in wind pipe and food canal

A3. **Thrown out** if entering
- Coughing
- Sneezing
- Vomiting
- Diarrhoea

B. FIGHT TO KILL GERMS ON ENTRY INTO THE BODY (Immune Response)

B1. At entry point ***(non-specific)***
Phagocytes (WBCs) engulf pathogens in general (Inflammation increases blood supply, WBCs engulf debris).

B2. In the deeper parts (***specific***, by **recognising the pathogen**)
- By antibodies (*humoral immunity humor* : body fluid)
- Killer cells invade the pathogen or even kill an infected body cell (*cell-mediated immunity*)

A CONDITION IN WHICH THE IMMUNE SYSTEM FAILS
— AIDS —
(Acquired immuno-deficiency syndrome)

This feared disease (with no cure as yet) is caused by the infection of HIV (Human Immunodeficiency Virus). It is transmitted through sexual contact, contaminated syringe needles, and through blood transfusion. The virus attacks the cells of the immune system and causes a marked reduction in T-cells of the thymus. These are the cells which activate lymphocytes that produce immunity. With the collapse of immunity in full-blown AIDS cases, other severe infections develop unchecked to ultimately cause death.

A detailed account of AIDS, its germ, mode of infection, symptoms etc. have been given in *Concise Biology Part I* of Class IX.

Dec. 1 — WORLD AIDS DAY
(Awareness for its severity and protection)

PROGRESS CHECK

1. Give one example of each of the following:
   (i) Germ killing body secretion .....
   (ii) Germ trapping body secretion .....
   (iii) Mechanical barrier that prevents entry of germs into the body .....
2. Mention if the following statements are **True (T)** or **False (F)**
   (i) Immune system deals with the germs after they have entered the body. T/F
   (ii) Antibodies eat up the germs T/F
   (iii) Human beings can suffer from all those diseases which attack dogs. T/F
   (iv) Anti-venine injection against snake bite is an example of artificially acquired passive immunity. T/F
   (v) Mother's antibodies may reach the foetus through placenta. T/F
   (vi) A person having once suffered from measles usually gets repeated attacks. T/F

13.3 VACCINATION AND IMMUNISATION

Vaccination is the practice of **artificially introducing the preparation of weakened germs or the germ substance into the body for developing resistance** to particular diseases. Scientifically, this practice is called **prophylaxis** and the material introduced into the body is called the **vaccine**.

The vaccine or germ substance is introduced into the body usually by injection and sometimes orally (e.g. polio drops). Inside the body, the vaccine stimulates the WBCs to produce antibodies against germs for that particular disease.

The terms "vaccine" and vaccination" were originally used for vaccination against small pox, but now these are used in a general sense.

FOUR CATEGORIES OF VACCINES :

(1) **Killed germs,** as **TAB vaccine** for **typhoid**, **Salk's vaccine** for **poliomyelitis,** and the vaccine for **rabies** (dog-bite).

(2) **Living weakened germs,** as the vaccine for **measles,** and the freezed-dried BCG vaccine for **tuberculosis.** Full form of BCG is "Bacillus of Calmette and Guerin" after the names of two

French workers who developed this strain for vaccination.

(3) **Living fully poisonous germs**, as for smallpox. In this vaccination, a person is inoculated with cowpox virus which is very similar to smallpox virus. Cowpox virus causes only a single pustule to develop rather than multiple pustules of smallpox all over the body. Vaccination by cowpox vaccine protects from smallpox as well. **The smallpox vaccinations are no more given, because the disease has been totally eradicated according to present-day records.**

(4) **Toxoids** (inactivated toxin secreted by bacteria), as for diphtheria and tetanus. These toxins (poisons) are **made harmless by the addition of dilute formalin**, yet retaining the capacity to produce antibodies (antitoxins). Attempts are being made to develop a vaccine against AIDS also, let us pray we succeed in it.

VACCINATION — *Vaccination is the introduction of any kind of dead or weakened germs into the body of a living being to develop immunity (resistance) against the respective disease or diseases.*

VACCINE — *A preparaton consisting of weakened germs or the germ substances to develop immunity against the germs of a particular disease.*

IMMUNISATION — *Developing resistance to disease-producing germs or their toxins by introducing killed germs or germ substance to induce the production of specific antibodies.*

Immunisation against some common infectious diseases has been taken up in India on a mass scale with an attempt to cover the entire population. The National Immunisation Schedule is as follows :-

NATIONAL IMMUNISATION SCHEDULE

Age	*Vaccinations*
3-12 months	**DTP** : 3 doses at intervals of 4-6 weeks **Polio** (oral) : 3 doses at intervals of 4-6 weeks **BCG** (Intradermal)
9-15 months	**Measles vaccine** : one dose
18-24 months	**DTP** : booster dose **Polio** (oral) booster dose
5-6 years	**DT** against diphtheria and tetanus, booster dose **Typhoid (TAB)** vaccine : 2 doses at an interval of 1-2 months
10 years	**Tetanus** toxoid — booster dose **Typhoid** vaccine — booster dose
16 years	**Tetanus** toxoid — booster dose **Typhoid** vaccine — booster dose
Mothers (during pregnancy)	(a) *Immunised previously.* One booster dose of **tetanus** toxoid, preferably 4 weeks before the expected date of delivery. (b) *Non-immunised :* **Two doses of tetanus** toxoid, the first dose between 16 and 24 weeks and the second dose between 24 and 32 weeks of pregnancy.

Abbreviations :

DTP = Diphtheria, Tetanus and Pertussis (whooping cough)

DT = Diphtheria and Tetanus;

BCG = (Bacillus of Calmette and Guerin) Tuberculosis.

PROGRESS CHECK

1. Define the term prophylaxis.
   .....
2. Name the four categories of materials for preparing vaccines.
   .....
3. Name the diseases prevented by :
   (i) Salk's vaccine .....
   (ii) BCG vaccine .....
   (iii) DTP vaccine .....

13.4 ANTITOXINS (More appropriately called ANTIBODIES)

The terms "Toxin" and "Antitoxin"

Toxin is a general term used for any poisonous substance produced by an animal or a plant or a bacterium. *Example* : Snake venom, sting poisons of scorpion, insects, etc., or even poisonous chemicals released by pathogens growing inside the body.

"Antitoxin" was the name given to any chemical substance produced inside the body in response to the entry of foreign posionous substance. **"Antivenins"** for snake bites are produced inside animals like horses. Presently, the more general term "antibody" is used instead of "antitoxin".

"Antibody" is a blood serum protein produced in response to the injected antigens.

Suppose, someone has actually got a disease such as diphtheria, in such a case, injecting pre-prepared

antibodies from some other source is helpful. For this, an antibody-containing serum (popularly called **anti-serum**) is obtained from the blood of horses, rabbits, etc., in which the disease is artificially produced in a mild form. Treatment with such antibodies is called **passive immunisation**. Haffkine's Institute in Bombay and another institute at Kasauli are preparing several such anti-sera. Antivenine for treating snake-bite is also based on the same principle.

13.5 ANTISEPTICS AND DISINFECTANTS PREVENT CATCHING DISEASES

13.5.1 Antiseptics

These are mild chemical substances which, **when applied on the body, kill germs**. These substances are in such mild concentration that they cause no harm to the skin and body. **Lysol, carbolic acid (phenol), iodine, benzoic acid, mercurochrome, boric acid,** etc., in dilute solution are good antiseptics. Certain antibiotic creams also serve the same purpose.

A CAUTION

Do not use commercial names as examples of antiseptics in your examination answers.

Names like Dettol, Savlon, Listerine, Soframycin are all commercial names. They may have one or the other active ingredient individually or in combination. It is these active ingredients which actually serve as antiseptics.

13.5.2 Disinfectants

These are strong chemical substances **that are applied on spots and places where germs thrive and multiply**. Commonly used disinfectants are cresol, phenol, lysol, 40% formalin, lime, bordeaux mixture, DDT, *etc*. *Precaution :* All disinfectants are strong and should not come in contact with the human skin.

Strong heat and boiling also destroy germs and may be called physical disinfectants.

Deodorants are neither antiseptics nor disinfectants. They only serve to mask a bad smell.

Table 13.2 : Differences between antiseptics and disinfectants

Antiseptics	Disinfectants
1. Mild germ-killing chemicals.	1. Strong germ-killing substances.
2. Cause no harm to skin and body.	2. May cause harm to skin and body.
3. Applied on body.	3. Applied on spots.
Example : Iodine tincture	*Example* : Phenol

13.6 ANTIBIOTICS – PENICILLIN AND OTHERS

Antibiotics are chemical substances produced by some microorganisms, and can kill or inhibit the growth of other microorganisms.

The term ANTIBIOTICS

The first antibiotic Penicillin was discovered in 1929, but its first use for treating any human disease was tried in the 1940s. The term "Antibiotics" for such category of drugs was coined much later, by Selman Waksman in 1942.

DISCOVERY OF PENICILLIN

Alexander Fleming (1881-1955) working in a hospital in London, was growing laboratory cultures of a bacterium *Staphylococcus* (round bacteria growing in clusters). In 1928 he found that a certain unwanted mould *Penicillium* had grown in one of the cultures in a petri dish and this had inhibited the growth of the bacteria for some distance. Obviously, some substance must have spread from the mould, which killed the bacteria upto that distance. Fleming named this bacteria-killing substance released from the mould as Penicillin in 1929. In the expectation of this substance to become an effective killer of disease bacteria, it was tried on laboratory animals and showed positive results without harming the animals.

On humans, the substance penicillin was first tried in the early 1940s and was found to be quite effective against several infections. In particular, it yielded very good results in treating gonorrhea, a **sexually transmitted disease** (STD). Sometimes, the physicians in those early days recommended using a combination of penicillin and sulpha drugs under the name "pentidsulph". Thereafter, a whole lot of antibiotics such as streptomycin, chloromycetin, aureomycin, ampicillin, etc. have been discovered and are being effectively used against many infectious diseases.

Antibiotics are also being used for the prevention of infections after surgical operations.

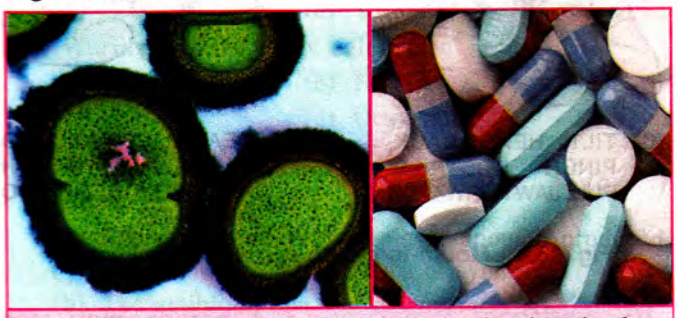
SOURCES OF ANTIBIOTICS

The mould which produced penicillin in the findings by Fleming, was found to be *Pencillium notatum*. This mould is somewhat similar to the one that often grows on oranges, lemon and other citrus fruits. The commercial production of penicillin has

been largely done from a related species *P. chrysogenum*, but it is also being produced synthetically.

Streptomycin is one of the very widely used antibiotics. This is obtained from a bacterium *Streptomyces*.

A large number of antibiotics are now made synthetically rather than from culturing micro-organisms.



Antibiotics like penicillin are made by fungi and other microbes. They play a very important part in medical treatment of illnesses.

USES OF ANTIBIOTICS

1. Primarily, the antibiotics find a wide use in medicine to **fight infections**.
2. Certain antibiotics are used as **food preservatives**, specially fresh meat and fish.
3. Some are used in **treating animal feed** to prevent internal infections.
4. Some antibiotics are used for **controlling plant pathogens**.

HOW IS IT ?

You may be curious to know how the antibiotics kill the germs. Here are two examples.
***Penicillin* interferes with the cell wall formation and hence the bacteria are unable to grow and multiply.**
***Streptomycin* binds to bacterial ribosomes which are then unable to synthesise proteins and the bacteria are unable to grow and multiply.**

13.7 SULPHONAMIDE GROUP OF MEDICINES

Since ancient times, man has been trying to discover newer and newer medicines to cure diseases. He tried a variety of plant and animal products, many of which worked well. He also tried various chemical substances, and some of these yielded good results. This is how the kind of treatment *chemotherapy* (treatment by the use of chemicals) was developed.

In 1910, a drug called *salvarson* (based on an arsenic compound) was produced. It killed the germs of syphilis as well as of sleeping sickness. But frequently, it proved poisonous to the patient as well.

In the 1930s, a group of chemicals known as ***sulphonamides*** were discovered which proved effective in many types of bacterial diseases. Sulphadiazine and sulphanilamide are two such sulpha drugs. These are synthetic drugs and they interfere with the metabolism of bacteria which are thus killed.

Sulphonamides are now rarely used, and that too, in combination with antibiotics, for certain ailments.

? PROGRESS CHECK

1. Correct the following statements if they are false (without changing the first word).
   (i) DDT is an antiseptic.
   .....
   (ii) Penicillin is a disinfectant.
   .....
   (iii) Disinfectants are applied on the body.
   .....
   (iv) Deodorants are both antiseptic as well as disinfectants.
   .....
   (v) Alexander Fleming discovered the first sulphonamide.
   .....
   (vi) Antibiotics cannot be made synthetically.
   .....
   (vii) Sulphonamides are now rarely used.
   .....
2. List any three uses of antibiotics.
   .....

13.8 FIRST AID

Health emergencies may sometimes suddenly arise in numerous ways. Some such situations could be as follows :-

1. **Serious cuts on the body**
2. **Breaking of a bone**
3. **A particle falling in the eye**
4. **Sudden unconsciousness**
5. **A heart attack**
6. **Burns of various kinds**
7. **Swallowing a poisonous substance**
8. **Drowning accident.**
9. **Bitten or stung** by poisonous animals or insects.
10. **An electric shock**

In all such cases, whatever is needed to be done **before the doctor arrives** or **the patient is taken to the nearest available hospital** or a dispensary. comes under First Aid. Some such treatments can be as follows :

1. **Bleeding :** In the case of bleeding, raise the affected part to minimise gravitational outflow of blood. Wash the cut surface with clean water, press the area with a piece of clean cotton wool, and if possible, apply some mild antiseptic.
2. **Fractures :** In the case of fractures, lay the victim comfortably, loosen or remove the clothes from the affected part. Do not move the part/parts fractured. If the fractured part is an arm, tie a sling to rest the arm in it.
3. **Eye :** Should anything fall in the eyes, do not rub. Wash gently with clean water by sprinkling it into the eye.
4. **Unconsciousness :** If someone falls unconscious, immediately lay the person comfortably on the bed. Loosen the clothes. Let fresh air come into the room.
5. **Heart attack :** In the case of heart attack, immediately lay the person straight horizontally, allow fresh air to come in and get medical help immediately.
6. **Burns :** In the case of minor burns, immediately wash the part with sufficiently cold water for a few minutes. Do not rub the part. Apply cream/ ointment specially recommended for burns, in case they are readily available.
7. **Swallowing poison :** In case some poisonous substance has been swallowed, make the patient drink as much salt water as possible, even forcibly, and try to induce vomiting.
8. **Snake bite :** In case of a snake bite, immediately squeeze out some blood from the wound, tie a tourniquet above the site to prevent spreading of venom into the body.
9. **Stinging :** In case of a sting by a bee, or a wasp, pull out the sting if still in the wound, squeeze out some blood to force out the venom. Apply some alkali, like baking soda or lime.

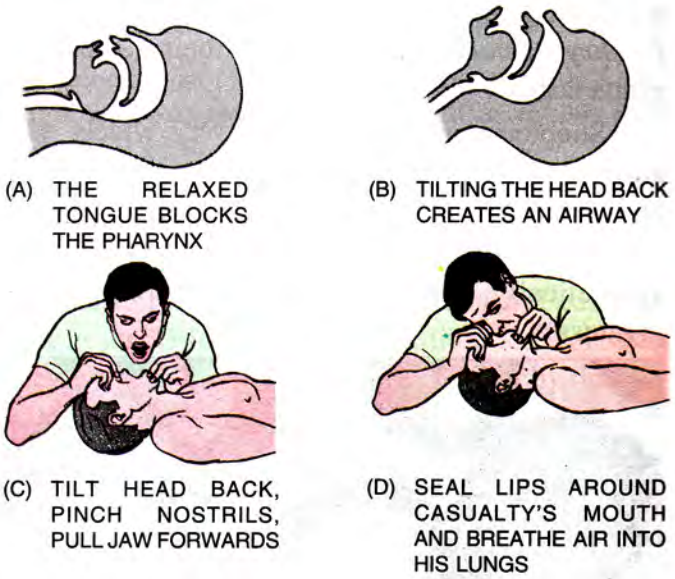


Fig. 13.4 : Mouth-to-mouth resuscitation (revival)

10. **Artificial Breathing :** A person may stop breathing in accidents such as drowning, **electric shock**, or due to head injury. Breathing must immediately be restored to save life. This is done by inducing breathing by artificial means. One such method is shown in Fig. 13.4.

In drowning, if the victim has drunk much water, some even goes into the lungs, immediately lay the victim with his back facing upward and the head tilted towards one side. Press the back repeatedly to force the water out. When all the water has gone out, start giving artificial breathing immediately.

The following steps should be followed while giving artificial breathing :

— Lay the victim flat on his back and put a pillow or folded towel under his shoulders in a way that his chest is raised and the head thrown back.

— Sit just near the victim's head and hold his arms. Draw the arms upwards and backwards. This will cause his chest to expand and draw the air.

— Next, fold the victim's arms and press them against the ribs. The air will now be expelled.

— Repeat the two steps at the rate of about 15 times per minute. Continue till the victim starts breathing without any extra help or till the doctor arrives.

REVIEW QUESTIONS

A. MULTIPLE CHOICE TYPE

(Select the most appropriate option in each case)

1. Penicillin is
   (a) an antiseptic (b) a disinfectant
   (c) an antibiotic (d) an anti-toxin
2. "T" in DTP vaccination stands for
   (a) Tuberculosis (b) Typhoid
   (c) Tetanus (d) Tonsilitis
3. World Health Day is celebrated on
   (a) January 15 (b) February 21
   (c) April 7 (d) October 10

B. VERY SHORT ANSWER TYPE

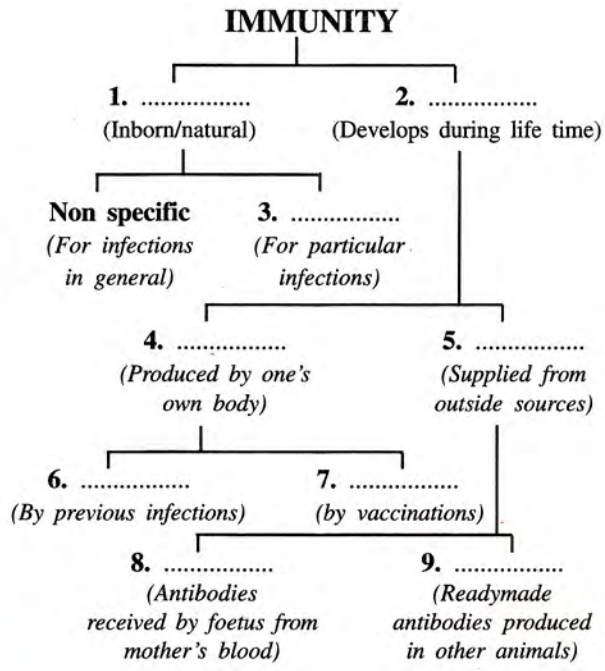
1. **Name** the following :
   (a) The drug based on arsenic compound, produced in 1910 which killed germs of syphilis.
   (b) The antibiotic that was discovered first.
   (c) The category of immunity required in the treatment of snake-bite.
   (d) Any four antiseptics, any two disinfectants and any two antibiotics.
   (e) The vaccine that helps to produce immunity against Polio.
2. **Write** the full forms of : (i) AIDS (ii) BCG (iii) DPT vaccine (iv) WHO
3. Give the **technical term** for the kind of proteins produced in the blood to fight and destroy harmful microbes.
4. **Name** the following :
   (a) Device used to check bleeding.
   (b) Support tied to arm in case of fracture.
   (c) A substance to neutralise the effect of poison.
   (d) Chemical substance which destroy microorganisms and prevent their further growth.
   (e) The treatment given to a person who has stopped breathing.

C. SHORT ANSWER TYPE

1. **Mention** if the following statements are ***true*** (T) or ***false*** (F).
   (a) Lysol is an antibiotic. (T/F)
   (b) Sweat and tears contain germs-killing substances. (T/F)
   (c) Our body can make only a limited variety of different antibodies. (T/F)
   (d) Salk vaccine is used against tuberculosis. (T/F)
   (e) Treatment by the use of chemicals is known as allopathy. (T/F)
   (f) Alexander Fleming coined the term "antibiotic" for substances like penicillin. (T/F)
2. **Differentiate** between :
   (a) Antiseptic and antibiotic,
   (b) Antiseptic and disinfectant,
   (c) Disinfectant and deodorant,
   (d) Vaccination and sterilisation
   (e) Active immunity and passive immunity,
   (f) Innate immunity and acquired immunity.
3. **Name** any three vaccines and the diseases for which they provide immunity.
4. **Given** below is a table of certain vaccines, the diseases against which they are used and the nature of vaccine. Fill up the gaps 1 - 10.

Vaccine	Disease(s)	The nature of vaccine
TAB	1.	2. .....
Salk's vaccine	3	4. .....
BCG	5.	Living weakend germs
Vaccine for measles	Measles	6. .....
Cowpox virus	7.	8. .....
Toxoids	9.	Extracts of toxins
	10.	secreted by bacteria

5. **Given** below is a scheme of classifying immunity against human diseases. Fill up the **types of immunity** in the blanks 1 - 9.



6. **Given** below are the groups of certain substances of particular categories. Mention the category of each group and identify the one **wrong** example in it giving reason.
   (a) Lysol, benzoic acid, DDT, mercurochrome.
   (b) Formalin, iodine, lysol, phenol.
   (c) BCG, DTP, ATP.
   (d) Tears, skin, nasal secretion, HCl (in stomach).
7. **List** any four ways in which antibiotics are being used.
8. **List** the merits of local defence systems.
9. Suppose a person develops the disease diphtheria. **Comment** upon the principle of the treatment he should receive.
10. **What** first aid steps would you take in the following cases of accident?
    (a) Bleeding from a cut in the skin.
    (b) A fractured arm.
    (c) Stoppage of breathing due to electrical shock.

D. LONG ANSWER TYPE

1. The principle of vaccination is to produce immunity against a disease. **Explain**.
2. "Abnormally, large number of WBCs in the blood are usually an indication of some infection in our body." **Comment** on the statement.
3. **Explain briefly**, the role of the following health aids:
   (a) Antiseptics (b) Disinfectants (c) Vaccines
4. Define first aid.
5. Describe briefly the first aid treatment you would carry out in the following cases:
   (a) Little toe in the foot is pierced by a thorn and is bleeding.
   (b) An elderly woman walking on the footpath during a hot mid-day has fallen unconscious.
   (c) A young boy has burnt his finger tip while firing crackers.
   (d) Your gardener has been bitten by a snake while digging soil in the flower bed.
   (e) Your friend has received an electric shock.
   (f) Your little brother has swallowed a poisonous liquid.
6. Name any **five** antibiotics. State their source and the disease against which they are used.

AN EXAMPLE OF SCIENTIFIC REASONING

An idea : Hello little brother! Can you hear me ?
A lovely ice cream waiting for you!

?

Science : Can a baby in the mother's womb hear what we speak??
&
Does the unborn baby understand the language one speaks English, Hindi, Tamil, Chinese or any other language ?