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18.1 MEDICINAL DRUGS

LONG QUESTIONS

Q.1 Describe different sources of medicinal drugs with examples. (A.B)

OR

What are the sources of drugs? Give examples. (Understanding the Concept Q.1)

Ans: MEDICINAL DRUGS

Definition:

“Any chemical substance used in the **diagnosis, cure, treatment and prevention of disease** is called **medicinal drug** or **pharmaceutical drug**”.

Example:

Antibiotics are the **examples** of medicinal drugs which are used against **bacterial diseases**.

SOURCES OF MEDICINAL DRUGS

Drugs are obtained from the following sources:

- **Synthetic drugs**
- **Drugs from plants and fungi**
- **Drugs from animals**
- **Drugs from minerals**
- **Drugs from bacteria**
- **Drugs from soil**

Synthetic Drugs:

Such drugs do **not occur naturally** but are **synthesized in laboratory**. Pharmaceutical companies produce these drugs.

Example:

- Aspirin

Drugs From Plants:

Many important **medicines** are obtained from **plants**. These medicines include:

- **Antibiotics**
- **Cardiotoincs**
- **Certain analgesics**

Examples:

Digitalis:

It is a **cardiotoincs** which is used to stimulate the heart.

Source:

It is made from the leaves of **purple flowered plant, foxglove**.

Morphine:

It is a **pain reliever**.

Source:

It is obtained from **opium**, which comes from the juice of **opium poppy plant**.

Drugs From Fungi:

Some **medicines** are obtained from **fungi**.



Example:

The **antibiotic penicillin** is obtained from a **fungus, *Penicillium notatum***.

Drugs From Animals:

Drugs obtained from animals are usually their **glandular products**.

Examples:

The following are obtained from animal sources:

- **Fish liver oils**
- **Musk**
- **Bees wax**
- **Certain hormones**
- **Antitoxins**

Drugs From Minerals:

Several common **drugs** are produced from **minerals**:

Examples:**Iodine:**

The **mineral iodine** is used in making **tincture of iodine**.

Function:

It is a **liquid** that helps to **prevent infection** when applied to cuts and **bruises**.

Silver Nitrate:

The **powder** form of **silver nitrate** is applied on **wounds** to **stop bleeding** and **prevent infections**.

Drugs From Bacteria:

Many **antibiotics** are obtained from **bacteria**:

Example:**Streptomycin****Drugs From Soil:**

Researchers of a **pharmaceutical** company spent **two years testing soil** from all parts of the **world** to find new **antibiotics**. The project **resulted** in the **development** of one **antibiotic**.

Example:

Terramycin is used to **treat** many **infections**.

Q.2 Describe principal usage of important medicinal drugs. (A.B)

(GRW 2014)

Ans: PRINCIPAL USAGE OF IMPORTANT MEDICINAL DRUG

The drugs are **classified** on the basis of:

- **Chemical properties**
- **Modes of action**

The **principal** usage of important medicinal drugs are as follow:

Analgesics:

These are the **pain killers**. These **reduce pain**.

Examples:

- **Aspirin**
- **Paracetamol**

Antibiotics:

These **inhibit** or **kill bacteria** with in or on the body and treat **bacterial infections**.

Examples:

- Tetracycline
- Cephalosporins

Sedatives:

These **induce sedation** by reducing **irritability or excitement**.

Example:

Diazepam

Vaccines:

These are used to **develop immunity** against **viral** and **bacterial infections**.

Examples:

Vaccines against:

- Smallpox
- Whooping cough
- Hepatitis B

Antiseptics:

These reduce the possibility of **infections on skin**.

Example:

- Tincture of iodine

Disinfectants:

These **destroy microorganisms** found on **non-living objects**.

Examples:

- Phenyl
- Detol

Q.3 Write precautions for the use of medicinal drugs. (U.B)

Ans: **PRECAUTIONS FOR THE USAGE OF MEDICINES**

Medicines can **help** you **feel better**. But if medicines are **taken incorrectly**, they can actually make you **feel worse**. The following **precautions** should be kept in mind:

- Dosage
- Expiry Date
- Self-Medication
- Duration
- Treatment Discontinuation
- Dosage for Children
- Darkness
- Carriage
- Children's Reach
- Tampered Medicines

Dosage:

Always **check** the **instructions** on **doctor's prescription** slip and make sure you take the **doses** of medicine **strictly** as your doctor prescribed.

Expiry Date:

Always **check** the **expiry** date printed on the medicine pack. The expired medicines may prove poisonous.

Self-Medication:

Never take medicines **prescribed** for **someone else**, even if you **think** you have the **same** medical problem.

Duration:

Some medicines - such as **antibiotics** - must be **taken** for a **specific** number of **days**. Make sure you take the **medicine** for the **stated time**. Otherwise, the **problem** may come **back** again.

Treatment Discontinuation:

Always **check** with your **doctor** before you **stop taking** a medicine or **consider** a new **treatment**.

Dosage for Children:

Some medicines are **not suitable** for **children**, and there are **special** children's **dosages** for many **medicines**.

Darkness:

Do not take **medicine** in the **dark**.

Carriage:

If your **prescription medicines** are **crucial for your health** and life, **carry medicines** and **dosage instructions** with you, whenever you are **out of home**.

Children's Reach:

Always **keep** healthcare products **out** of the **reach of children**.

Tampered Medicines:

Do not use the **medicine** if there are **signs of tampering**. Inform the **pharmacist** and the manufacture of the medicine about it.

18.1 SHORT QUESTIONS

Q.1 Define pharmacology. (K.B) (LHR 2015)

Ans: PHARMACOLOGY

Definition:

"The study of drug composition, properties and medical application, is called Pharmacology. The sources of drugs are also studied in Pharmacology."

Q.2 Define drug. Also name its two groups. (K.B) (LHR 2014, GRW 2014)

Ans: Page no 257.

Q.3 What are prescription drugs? (K.B) (GRW 2017)

Ans: Page no 269.

Q.4 What are pharmaceutical drugs? (K.B)

(GRW 2013, 2014, MTN 2015)

Ans: **PHARMACEUTICAL DRUGS**

Definition:

“A pharmaceutical drug or medicinal drug is defined as any chemical substance used in the diagnosis, cure, treatment or prevention of disease.”

Example:

- Antibiotics

Q.5 What are addictive drugs? (K.B)

(GRW 2013,17, MTN 2015)

Ans: **ADDICTIVE DRUGS**

Definition:

Some drugs often make person dependent on them, or addicted. These may be called as addictive drugs.

Example:

Marijuana and heroin are examples of addictive drugs.

Q.6 What are synthetic drugs? (K.B)

(GRW 2013, 16, LHR 2014, 16, BWP 2014, DGK 2015, SWL 2015)

Ans: Page no 266.

Q.7 Write historical background of pharmacology? (U.B)

Ans: **HISTORICAL BACKGROUND OF PHARMACOLOGY**

Clinical pharmacology was present in the middle ages. Early pharmacologists focused on natural substances.

Q.8 What is the difference between prescription drugs and non-prescription drugs? (K.B)

Ans: **DIFFERENTIATION**

The differences between prescription drugs and non-prescription drugs are as follows:

Prescription Drugs	Non-Prescription Drugs
Definition	
<ul style="list-style-type: none"> • Prescription drugs are sold only on physician’s prescription. 	<ul style="list-style-type: none"> • Non-prescription drugs are sold over the counter because these are considered safe enough.
Examples	
<ul style="list-style-type: none"> • Barbiturates • Tranquillizers • Antibiotics 	<ul style="list-style-type: none"> • Aspirin • Cough medicines

Q.9 Which drugs are obtained from plants and fungi? (K.B)

(LHR 2015, GRW 2016)

Ans: Page no 267, 268.

Q.10 Which drugs are obtained from animals? (K.B)

Ans: Page no 268.

Q.11 Which drugs are obtained from minerals? (K.B)

Ans: Page no 268.

Q.12 Which antibiotic is developed from soil testing? (K.B)

Ans: Page no 268.

Q.13 What are analgesics and antiseptics? (K.B)

(LHR 2016)

OR

What are analgesics? Give examples

(GRW 2016)

Ans: Page no 268.

Q.14 What are antibiotics and vaccines? (K.B)

(GRW 2014, 2015, BWP 2014, 2015, DGK 2015, LHR 2016)

Ans: Page no 269.

Q.15 What is analgesic drug? Give an example.

(GRW 2016)

Ans: Page no 258.

Q.16 How drugs are classified on the basis of their chemical properties and modes of action? (U.B)

Ans: Page no 268.

Q.17 What are disinfectants? (K.B)

Ans: Page no 269.

Q.18 What is the contribution of Sir Alexander Fleming? (K.B)

(GRW 2016)

Ans: Page no 2.

Q.19 Who developed the idea of sterile surgery? (U.B)

(LHR 2013, GRW 2017)

Ans: Page no 2.

Q.20 What are the different sources of drugs? (K.B)

(GRW 2017)

Ans: Page no 267.

18.1 MULTIPLE CHOICE QUESTIONS

1. Pharmacology is the study of: (K.B)

(A) Drug's composition

(B) Drug's medical application

(C) Drug's sources and properties

(D) All of these

2. Early Pharmacologist focused on natural substances, mainly: (K.B)

(A) Plant extracts

(B) Animal's hormones

(C) Fungal products

(D) Antibiotics

3. Pharmacology developed into biomedical science in: (K.B)

(A) 17th century

(B) 20th century

(C) 18th century

(D) 19th century

4. Drugs are broadly classified into how many types? (K.B)

(A) Three

(B) Four

(C) Two

(D) Five

5. Medicinal drug is a chemical substance used in disease's (A.B)

(A) Diagnosis

(B) Cure or treatment

(C) Prevention

(D) All of these

6. Streptomycin is obtained from _____. (K.B)

(GRW 2013)

(A) Bacteria

(B) Virus

(C) Fungi

(D) Micro organism

7. Penicillin is obtained from: (K.B)

(A) Plant

(B) Fungus

(C) Alga

(D) Animal

8. **Digitalis is used to stimulate: (K.B)**
 (A) Heart (B) Brain
 (C) Kidney (D) Lungs
9. **Morphine is derived from: (K.B)**
 (A) Iodine (B) Foxglove
 (C) Opium (D) Aspirin
10. **Which drugs are obtained from animals? (K.B) (DGK 2014)**
 (A) Fish liver oil (B) Bee's wax
 (C) Antitoxins (D) All of these
11. **The drugs used to reduce pain are known as _____. (K.B) (LHR 2013, 2015 GRW 2015, DGK 2015)**
 (A) Analgesics (B) Antiseptics
 (C) Antibiotics (D) Sedatives
12. **To which group of drugs aspirin belong? (U.B) (LHR 2014)**
 (A) Obtained from animals (B) Obtained from plants
 (C) Synthetic (D) Obtained from bacteria
13. **Which one is a sedative? (U.B) (LHR 2017)**
 (A) Tetracycline (B) Aspirin
 (C) Diazepam (D) Cephalosporin
14. **Which medicines are used to develop immunity against viral and bacterial infections? (A.B)**
 (A) Analgesics (B) Sedatives
 (C) Antibiotics (D) Vaccines
15. **Which medicines reduce the possibility of infections on skin? (K.B) (LHR 2015, BWP 2015)**
 (A) Analgesics (B) Antiseptics
 (C) Antibiotics (D) Disinfectants
16. **Sir Alexander Fleming was awarded Nobel Prize in: (A.B) (LHR 2016)**
 (A) 1940 (B) 1945
 (C) 1950 (D) 1955
17. **Who promoted the idea of sterile surgery for the first time? (A.B)**
 (A) Alexander Fleming (B) Louis Pasteur
 (C) Robert Brown (D) Joseph Lister
18. **Which drug is produced form minerals? (U.B) (GRW 2016)**
 (A) Tincture of iodine (B) Musk
 (C) Opium (D) Streptomycin
19. **Diazepam is: (K.B) (LHR 2017)**
 (A) Vaccine (B) Narcotics
 (C) Hallucinogens (D) Sedative
20. **Penicillin is discovered by: (A.B) (LHR 2017)**
 (A) Edward Jenner (B) Joseph lister
 (C) Bu-Ali Sina (D) Alexander Flemming
21. **Expired drugs can cause damage to: (K.B)**
 (A) Liver (B) Kidney
 (C) Intestine (D) Colon
22. **Until _____ the subject of Pharmacology was known as Meteria Medica. (A.B)**
 (A) 1880 (B) 1890
 (C) 1870 (D) 1815

18.2 ADDICTIVE DRUGS

LONG QUESTIONS

Q.1 Define addictive drugs. Describe different types of addictive drugs. (K.B) (LHR 2014)

OR

What are addictive drugs? Describe three types of addictive drugs. (K.B) (GRW 2016)

OR

Write a note on sedatives, narcotics and hallucinogens. (K.B)(Understanding the Concept

Q.2

Ans:

ADDICTIVE DRUGS

Definition:

“The drugs that make person **dependent** on them or **addicted** are called **addictive drugs**.”

Examples:

- Narcotics
- Marijuana

Effect:

By **using** addictive drug, the person's **body** becomes **familiar** to it and the user **cannot function well** without it.

TYPES OF ADDICTIVE DRUGS

The following are **major categories** of addictive drugs:

- Sedatives
- Narcotics
- Hallucinogens

Sedatives:

These **drugs induce sedation** by **reducing irritability** or **excitement**.

Mode of Action:

These drugs **interact** with **central nervous system** to **depress its activities**.

Effects:

Sedative drugs **induce:**

- Dizziness
- Lethargy
- Slow brain function
- Depression

Long Term Use:

Long term use of sedative drugs **induces suicidal thoughts**.

Narcotics:

Narcotics are **strong pain killers**.

Prescription:

These drugs are often **prescribed** in **conjunction** with other **less potent pain killers** like paracetamol or aspirin.

Usage:

These are **used to relieve pain** for patients with **chronic diseases** such as **cancer**. These are also **used to relieve acute pain** after **operations**.

Drug Abuse:

Some people may **abuse** narcotics for **ecstatic effects**.

Examples:**Morphine:**

Morphine is derived from **opium** (poppy). It acts **directly on central nervous system** to **relieve pain**. Morphine has a **high potential** for **addiction**.

Codine:

It is also derived from **opium**.

Heroin:

It is the **most commonly abused narcotic**. It is **semi-synthetic drug** from **morphine**. It **affects on central nervous system** and causes **drowsiness**.

Usage in Western Countries:

In many **western countries**, **heroin** is **prescribed** as a **strong analgesic** under the name **diamorphine**. Its use includes **treatment** for **acute pain**, such as:

- Severe physical trauma
- Myocardial infarction
- Post-surgical pain

Hallucinogens:

Hallucinogens are the **drugs** that **cause changes** in:

- Perception
- Thought
- Emotion
- Consciousness

Mode of Action:

Physiologically, hallucinogens **effect** on the **sympathetic nervous system** causing:

- Dilation of pupils
- Constriction of some arteries
- Rise in blood pressure

Examples:**Mescaline:**

Mescaline is derived from **cactus**.

Psilocin:

Psilocin is derived from a **mushroom**.

Marijuana (Hashish):

Marijuana is a **hallucinogen**, which is **smoked**.

Sources:

It is obtained from the **flowers, stems** and **leaves** of the **marijuana plant**.

Cannabis sativa

Cannabis indica

Effect of Less Dosage:

Small doses of marijuana result in a **feeling of wellbeing** that lasts for **two to three hours**.

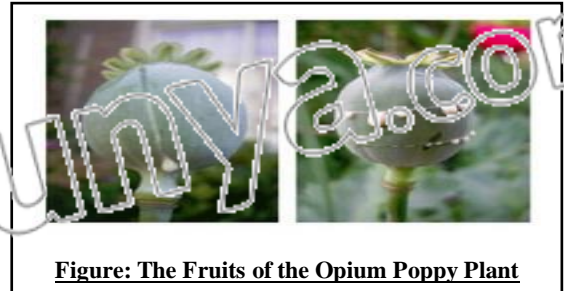
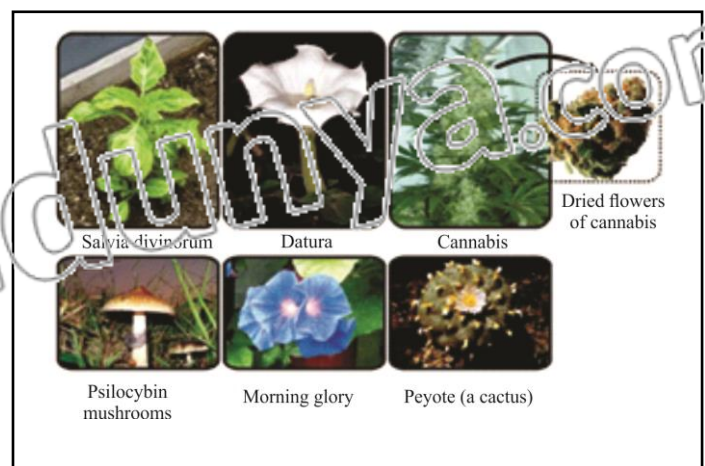
Effect of High Dosage:

Figure: The Fruits of the Opium Poppy Plant



High doses **increase heart rate.**

Adverse Effects:

It also **effects** the production of **sperms in men** and also **weakens** the **short-term memory.**

Usage:

Marijuana is one of the **most commonly used** drugs in the **world**, followed by **caffeine, nicotine** and **alcoholic beverages** in popularity.

Q.2 What are the problems related to drug addiction? (U.B)

OR

Describe drugs addiction.

(LHR 2016)

Ans:

PROBLEMS WITH DRUG ADDICTION

There is a long list of drugs associated problems, some of them are as follow:

Withdrawal of Social Contact:

Drug abusers go through **withdrawal** of **social contact** or communication. The addicts are very **weak** in their **social behavior**. They face **social stigma** i.e. the **society dislikes** them because of their **unpredictable behaviors**.

Problems for Government:

The **jails and prisons** of our country are **full** of such **people** who have **committed** no other crime than the **illegal possession of narcotics**.

Increase in Crime Rate:

Many studies by the experts of social sciences **prove** that there exists a **close relationship** between **drug addiction and crime**. The compulsion for narcotic drug makes every drug **addict a criminal**.

Law Violator:

The drug addicts are **law violators**. Mere possession of a narcotic drug is violation of the law. Thus, every drug addict is **subject** to **arrest** by the police.

Psychic Patients:

Drug addicts may commit **violent crimes** since so many become **psychic patients**.

Other Crimes:

Most narcotic addicts get involved in various **types of crimes**, like:

- **Robbery**
- **Shop lifting**
- **Burglary**
- **Embezzlement**

18.2 SHORT QUESTIONS

Q.1 Define Vaccine. Give its working briefly. (K.B)

LHR 2015

Ans: Page no 269.

Q.2 Sulpha drugs are used against which disease? (K.B)

GRW 2017

Ans: Page no 298.

Q.3 What are narcotics? (K.B)

Ans: Page no 275.

Q.4 Who was Joseph Lister? What was his contribution?

GRW 2017

Ans:

Q.5 What are morphine and codeine? (K.B)

Ans: Page no 275.

Q.6 What is diamorphine? Write its uses. (K.B+A.B)

(DGK 2015)

Ans: Page no 275.

Q.7 What are hallucinogens? Write its effects? (K.B)

(LHR 2016)

OR

Define hallucinogens. (K.B)

(LHR 2016)

Ans: Page no 298.

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Q.8 What is marijuana? And what are its sources? (A.B) (GRW 2014, LHR 2015, BWP 2015)

Ans: Page no 299.

Q.9 Name the plants from where hallucinogens are obtained. (K.B)

Ans: Page no 275.

Q.10 Name some crimes which are related to drug addiction. (A.B)

Ans: Page no 299.

Q.11 What is social stigma? (K.B)

Ans: Page no 276.

18.2 MULTIPLE CHOICE QUESTIONS

- Which of the following is strong pain killer? (U.B)

(A) Sedative	(B) Hallucinogens
(C) Marijuana	(D) Narcotics
- Narcotics are prescribed with other less potent : (A.B)

(A) Antibiotics	(B) Antiseptics
(C) Analgesics	(D) Sedatives
- Which of the following addictive drugs is obtained from opium: (K.B) (LHR 2014, 16)

(A) Morphine	(B) Marijuana
(C) Mescaline	(D) Psilocin
- The medicines used to relieve acute pain after operations: (A.B) (GRW 2014)

(A) Sedatives	(B) Narcotics
(C) Hallucinogens	(D) Antibiotics
- Which one is a narcotic drug? (K.B)

(A) Codeine	(B) Mescaline
(C) Psilocin	(D) Marijuana
- Marijuana is obtained from: (A.B)

(A) Fungi	(B) Algal
(C) Bacteria	(D) Plant
- Perceptions that have no basis in reality, but that appear entirely realistic: (U.B)

(A) Hallucinogens	(B) Narcotics
(C) Emotions	(D) Hallucinations
- Which one is a hallucinogen? (K.B)

(A) Morphine	(B) Codeine
(C) Heroin	(D) Psilocin
- Medicine obtained from cactus: (A.B) (MTN 2015)

(A) Morphine	(B) Codeine
(C) Mescaline	(D) Tetracycline
- Psilocin is obtained from: (A.B) (SWL 2015, GRW 2017)

(A) Mushroom	(B) Eacterium
(C) Algae	(D) Animal
- Marijuana is: (K.B)

(A) Injected	(B) Taken orally
(C) Used topically	(D) Smoked
- Drugs addiction relates to which of the following: (U.B)

(A) Enjoyment	(B) Competition
(C) Peace	(D) Crime
- Medicines which induce sedation by reduction irritability and excitement are called: (A.B) (GRW 2016)

(A) Analgesics	(B) Antibiotics
(C) Sedatives	(D) Vaccines

14. This group includes mescaline and psilocin: (K.B) (GRW 2017)
 (A) Sedatives (B) Narcotics
 (C) Hallucinogens (D) Vaccines
15. _____ is one of the most commonly used drugs in the world, following only caffeine, nicotine
 (A) Marijuana (B) Codeine
 (C) Hashish (D) Heroin

18.3 ANTIBIOTICS AND VACCINES

LONG QUESTIONS

- Q.1. What are antibiotics? Write its major groups. (K.B) (LHR 2013)
 OR
 Describe the main groups of antibiotics. (K.B) (Understanding the Concept Q.3)

Ans:

ANTIBIOTICS

Definition:

“An **antibiotic** is a drug that **kills or retards the growth** (reproduction) of **bacteria**. They are the **chemicals** produced by or **derived** from **microorganisms** like **bacteria and fungi**”.

Antibiotics are among the **most frequently** prescribed **medications** in modern medicine.

Types of Antibiotics:

There are **two main** types of antibiotics:

- Bactericidal antibiotics
- Bacteriostatic antibiotics

Bactericidal Antibiotics:

The antibiotics that **kill the bacteria** are called bactericidal antibiotics.

Bacteriostatic Antibiotics:

The antibiotics that **work by stopping the bacterial growth** are called bacteriostatic antibiotics.

GROUPS OF ANTIBIOTICS

There are **three major groups** of antibiotics:

- Cephalosporins
- Tetracyclines
- Sulpha Drugs – Sulfonamides

Cephalosporins:

Mode of Action:

Cephalosporins interfere with the **synthesis** of **bacterial cell wall**.

Category:

These are **bactericidal antibiotics**.

Treatment:

Cephalosporins are used to **treat**.

- **Pneumonia**
- **Sore throat**
- **Tonsillitis**
- **Bronchitis**

Tetracyclines**Mode of Action:**

Tetracyclines **inhibit bacterial protein synthesis.**

Category:

These are **broad-spectrum bacteriostatic antibiotics.**

Treatment:

Tetracyclines are used in the **treatment of infections of:**

- **Respiratory tract**
- **Urinary tract**
- **Intestine**

Prohibited for Children:

Tetracyclines are **not used in children under the age of 8**, and especially during **periods of tooth development.**

Sulpha drugs – sulfonamides:**Composition:**

Sulpha drugs are **synthetic antibiotics that contain sulfonamide group.**

Category:

Sulfonamides are broad-spectrum bacteriostatic antibiotics.

Mode of Action:

They **inhibit the folic acid synthesis in bacteria.**

Treatment:

They are used to **treat:**

- **Pneumonia**
- **Urinary tract infections**

Sulfonamide Group:

The sulfonamide group is also **present in other medications** that are **not antibiotics**

Example:

- **Thiazide diuretics** (medicines for lowering blood pressure.)

Q.2 Explain how bacteria show resistance to different antibiotics. (U.B) (GRW 2014, DGK 2015)

OR

Write an note on resistance against antibiotics.

(Understanding the Concept Q.4)

Ans: ANTIBIOTIC RESISTANCE

Definition:

“The **ability of bacteria not to be affected by the particular antibiotic** is called antibiotic resistance”.

Explanation:

- When **bacteria are exposed to the same antibiotic** over and over, they can **change** and are **no longer affected by the drug.**
- Antibiotics are extremely **important in medicine**, but unfortunately **bacteria** are capable of **developing resistance** to them. Such bacteria are not affected by commonly used antibiotics.

Developing Resistance:

Bacteria have number of ways of developing resistance.

Internal Mechanism:

Sometimes, their **internal mechanism stops the working** of antibiotic.

Transfer of Genes:

Bacteria can also **transfer the genes** responsible for **antibiotic resistance** between them. So such resistance bacteria make it **possible** for other bacteria to **acquire resistance**.

Unaffected Usage:

Another **reason** for increasing antibiotic resistance in bacteria is their **use in diseases** in which they have **no efficacy** (e.g. antibiotics are not effective against infections caused by viruses).

A Growing Problem:

Resistance to antibiotics poses a **serious and growing problem**, because some **infectious diseases** are becoming more **difficult to treat**. Some of the **resistant bacteria** can be **treated** with more **powerful antibiotics**, but there are **some infections** that **do not eliminate** even with new **antibiotics**.

Q.3 Define vaccine. Explain mode of action of vaccines. (A.B)

(Understanding the Concept Q.5)

(LHR 2016, DGK 2015)

Ans:

VACCINES**Definition:**

“A **material** containing **weakened** or **killed pathogens** and is used to **produce immunity** to a disease by **stimulating** the production of **antibodies** is called a vaccine”.

Example:

Future immunity against **polio** and **smallpox** diseases are the examples of vaccination.

Work of Edward Jenner:

In **1796**, a **British physician**, **Edward Jenner**, infected a **young boy** with **cowpox**, by injecting pus cells. After the boy had **recovered** from **cowpox**, Jenner **injected** the pus cells from a **smallpox** patient into him. The boy **did not** get smallpox.

Result:

So it became clear that intentional infection with cowpox protected people from smallpox.

Vaccination:

This method was named "vaccination" and the substance used to vaccinate was called a "vaccine".

MODE OF ACTION OF VACCINES**Antigens:**

Pathogens contain **special proteins** called "**antigens**".

Antibodies:

When pathogens **enter the body** (blood) of host, these proteins **stimulate** the **immune response** in host i.e. **synthesis** of "**antibodies**". Antibodies **bind** to **pathogens** and **destroy them**.

Production of Memory Cells:

In addition, "**memory cells**" are **produced**, which **remain in blood** and provide **protection** against future **infections** with the **same pathogen**.

Stimulation of White Blood Cells:

When a **vaccine** i.e. weakened or dead pathogen is **introduced** into **bloodstream**, the **white**

blood cells are stimulated.

Recognition by B-lymphocytes:

B-lymphocytes recognize the weakened or dead pathogens as enemies and start producing antibodies against them.

Protection against Pathogens:

These antibodies remain in blood and provide **protection** against pathogens. If **real pathogens** enter blood, the already present antibodies kill them.

18.3 SHORT QUESTIONS

Q.1 What are broad-spectrum and narrow spectrum antibiotics? (K.B) (DGK 2015)

Ans:

DIFFERENTIATION

The differences between broad-spectrum and narrow spectrum antibiotics are as follows:

Broad Spectrum Antibiotics	Narrow Spectrum Antibiotics
Definition	
<ul style="list-style-type: none"> Some antibiotics can be used to treat a wide range of infections and are known as “broad-spectrum” antibiotics. 	<ul style="list-style-type: none"> Some antibiotics are only effective against a few types of bacteria are called narrow spectrum antibiotics.
Example	
<ul style="list-style-type: none"> Tetracyclines 	<ul style="list-style-type: none"> Penicillin

Q.2 What are bactericidal and bacteriostatic antibiotics? (K.B) (LHR 2016, BWP 2015)

Ans:

DIFFERENTIATION

The differences between bactericidal and bacteriostatic antibiotics are as follows:

Bactericidal	Bacteriostatic
Definition	
<ul style="list-style-type: none"> Some antibiotics are bactericidal, meaning that they kill bacteria. 	<ul style="list-style-type: none"> Some antibiotics are bacteriostatic meaning that they work by stopping bacterial growth.
Examples	
<ul style="list-style-type: none"> Cephalosporins. 	<ul style="list-style-type: none"> Tetracyclines.

Q.3 What are three major group of antibiotics? (A.B)

Ans: Page no 279.

Q.4 What are the two method in which antibiotics get resistance? (U.B)

Ans: Page no 304.

Q.5 Define vaccines. (K.E)

(LHR 2014)

OR

What are vaccines?

(GRW 2016)

Ans: Page no 281.

Q.6 What is the contribution of Edward Jenner? (K.B)

Ans: Page no 281.

Q.7 What are antigen and antibodies? (K.B)

Ans: Page no 279.

Q.8 Name different diseases which are decreased by vaccination of children. (A.B)

Ans: Page no 304.

Q.9 Sulpha drugs are used for which disease? (A.B)

(GRW 2017)

Ans: Page no 304.

Q.10 What are tetracyclines? Give examples (K.B)

(LHR 2017)

Ans: Page no 280

18.3 MULTIPLE CHOICE QUESTIONS

1. **Antibiotics used to treat wide range of infections: (A.B)**

(A) Broad spectrum	(B) Narrow spectrum
(C) Vaccines	(D) Antiseptics
2. **Who first time infected a young boy with cowpox by injecting pus cells? (K.B)**

(A) Alexander Fleming	(B) Joseph Lister
(C) Robert Hooke	(D) Edward Jenner
3. **Pathogens contain special proteins called: (K.B)** **(MTN 20**

(A) Antigens	(B) Antibodies
(C) B-lymphocytes	(D) T-lymphocytes
4. **Which cells remain in blood and provide protection against future infections with the same pathogen? (K.B)**

(A) Lymphocytes	(B) Monocytes
(C) Memory cells	(D) Thrombocytes
5. **Which cells recognize the weakened or dead pathogens as enemies and start producing antibodies: (K.B)**

(A) B-lymphocytes	(B) T-lymphocytes
(C) M-lymphocytes	(D) O-lymphocytes
6. **Some vaccines do not provide lifetime immunity, for example, tetanus vaccines are only effective for a limited period of time. In such cases _____ are necessary to maintain continuous protection. (A.B)**

(A) 1 st years dose	(B) 3 years dose
(C) 5 years dose	(D) Booster dose
7. **In _____ a British physician, Edward Jenner, infected a young boy with cowpox, by injecting pus cells. (K.B)**

(A) 1796	(B) 1773
(C) 1793	(D) 1776
8. **Tetracyclines are not used in children under the age of _____ and specifically during periods of tooth development. (K.B)**

(A) Six years	(B) Eight years
(C) Ten years	(D) Five years

ANSWER KEY**MULTIPLE CHOICE QUESTIONS****18.1 MEDICINAL DRUGS**

1	D	2	A	3	D	4	C	5	D	6	A
	B	8	A	9	C	10	D	11	A	12	C
13	C	14	D	15	B	16	B	17	D	18	A
19	D	20	D	21	B	22	B				

18.2 ADDICTIVE DRUGS

1	D	2	C	3	A	4	B	5	A	6	D	7	D
8	D	9	C	10	A	11	D	12	D	13	C	14	C
15	A												

18.3 ANTIBIOTICS AND VACCINES

1	A	2	D	3	A	4	C	5	A
6	D	7	A	8	B				

REVIEW QUESTIONS

MULTIPLE CHOICE QUESTIONS

1. **Antibiotics are used for the: (A.B)**
 (a) Treatment of viral infections (b) Treatment of bacterial infections
 (c) Immunization against infections (d) Both a and b
2. **The substances used for the treatment, cure, prevention or diagnoses of diseases are called: (K.B)**
 (a) Medicinal drugs (b) Narcotics
 (c) Hallucinogens (d) Sedatives
3. **Aspirin is categorized as: (U.B)**
 (a) A drug from animals (b) A synthetic drug
 (c) A drug from plants (d) A drug from minerals
4. **The drugs used to reduce pain are known as; (A.B)**
 (a) Analgesics (b) Antiseptics
 (c) Antibiotics (d) Sedatives
5. **Which of the following drugs obtained from plants? (K.B)**
 (a) Aspirin (b) Opium
 (c) Cephalosporin (d) Insulin
6. **Which of these addictive drugs are also used as painkillers? (K.B)**
 (a) Narcotics (b) Sedatives
 (c) Hallucinogens (d) All can be used
7. **Sulfonamides affect bacteria in the following way;(A.B)**
 (a) Break the cell wall (b) Inhibit protein synthesis
 (c) Stop the synthesis of new cell wall (d) Stop the synthesis of folic acid
8. **What is true about vaccines? (U.B)**
 (a) Protect against the future viral and bacterial infections
 (b) Treat the existing bacterial infections only
 (c) Treat existing infections and also protect against future infections
 (d) Protect against viral infections only

ANSWER KEY

1	b	2	a	3	b	4	a	5	b
6	a	7	d	8	a				

SHORT QUESTIONS

Q.1 Define pharmacology and distinguish it from pharmacy. (K.B)

Ans: PHARMACOLOGY

The study of drug composition, properties, medical applications, sources of drugs is called pharmacology.

Difference from Pharmacy:

Pharmacology is not synonymous with pharmacy, which is the name used for a profession though in common usage the two terms are confused.

Q.2 Differentiate between medicinal drug and addictive drug. (K.B)

Ans: DIFFERENTIATION

The differences between medicinal drug and addictive drug are as follows:

Medicinal Drug	Addictive Drug
Definition	
<ul style="list-style-type: none"> Any chemical substance used in the diagnosis, cure, treatment and prevention of disease is called medicinal drug or pharmaceutical drug. 	<ul style="list-style-type: none"> The drugs that make person dependent on them or addicted are called addictive drugs.
Example	
<ul style="list-style-type: none"> Antibiotics are the examples of medicinal drugs which are used against bacterial diseases. 	<ul style="list-style-type: none"> Narcotics and marijuana are the common examples of addictive drugs.

Q.3 Differentiate between analgesics and antibiotics. (K.B)

(LHR 2016)

Ans: DIFFERENTIATION

The differences between analgesics and antibiotics are as follows:

Analgesics	Antibiotics
Definition	
<ul style="list-style-type: none"> These are the pain killers. These reduce pain. 	<ul style="list-style-type: none"> These inhibit or kill bacteria within or on the body and treat bacterial infections.
Examples	
<ul style="list-style-type: none"> Aspirin Paracetamol 	<ul style="list-style-type: none"> Tetracycline Cephalosporins

Q.4 What is marijuana? To which category of addictive drugs it belongs? (K.B)

Ans: MARIJUANA

Marijuana is a hallucinogen, which is smoked.

Sources:

It is obtained from the flowers, stems and leaves of the marijuana plant.

- Cannabis sativa
- Cannabis indica

Effect of Less Dosage:

Small doses of marijuana result in a feeling of wellbeing that lasts for two to three hours.

Effect of High Dosage:

High doses increase heart rate.

Adverse Effects:

It also effects the production of sperms in men and also weakens the short term memory

Usage:

Marijuana is one of the most commonly used drugs in the world, followed by caffeine, nicotine and alcoholic beverages in popularity.

Q.5 Differentiate between narcotics and hallucinogens. (K.B)

Ans:

DIFFERENTIATION

The differences between narcotics and hallucinogens are as follows:

Narcotics	Hallucinogens
<ul style="list-style-type: none"> • Narcotics are strong pain killers. • These drugs are often prescribed in conjunction with other less potent pain killers like paracetamol or aspirin. • These are used to relieve pain for patients with chronic diseases like cancer. These are also used to relieve acute pain after operations. 	<ul style="list-style-type: none"> • Hallucinogens are the drugs that cause changes in perception thought emotion and consciousness. • Physiologically, hallucinogens effect on the sympathetic nervous system causing: <ul style="list-style-type: none"> • Dilation of pupils • Constriction of some arteries • Rise in blood pressure
Examples	
<ul style="list-style-type: none"> • Morphine • Codeine • Heroin 	<ul style="list-style-type: none"> • Mescaline • Psilocin

UNDERSTANDING THE CONCEPT

Q.1 What are the sources of drugs? Give examples. (A.B)

Ans: See the LQ.1 of (Topic 18.1)

Q.2 Write a note on sedatives, narcotics and hallucinogens. (K.R)

Ans: See the LQ.1 of (Topic 18.2)

Q.3 Describe the main groups of antibiotics. (K.B)

Ans: See the LO.1 of (Topic 18.3)

Q.4 Write a note on resistance against antibiotics. (U.B)

Ans: See the LQ.2 of (Topic 18.3)

Q.5 Describe the mode of action of vaccines. (A.B)

Ans: See the LQ.3 of (Topic 18.3)

THE TERMS TO KNOW

Terms	Definitions
Addictive drug	The drug which makes the person dependent on it or addicted
Analgesic	The medicines that reduce pain
Antibiotics	The medicines that inhibit or kill bacteria
Aspirin	Acetaminophen; A pain killer medicine
Bactericidal	The antibiotics that work by killing bacteria
Bacteriostatic	The antibiotics that work by stopping bacteria to multiply.
Cardiotonics	Medicines for giving stimulate heartbeat.
Cephalosporins	A group of antibiotics; interfere with synthesis of bacterial cell wall
Hallucinogen	Drug that causes changes in perception, thought, emotion and consciousness
Heroin	A commonly abused narcotic; derived from morphine; affects the central nervous system and causes drowsiness, disorientation, hypotension etc.
Marijuana	A hallucinogen and addictive drug; obtained from the flowers, stems and leaves of the marijuana plant
Medicinal drug	Any chemical substance intended for use in the medical diagnosis, cure, treatment or prevention of disease
Morphine	A commonly used narcotic; derived from the juice of opium; acts directly on the CNS to relieve pain; has a high potential for addiction
Narcotics	Strong painkiller drugs; also used as addictive drugs; commonly abused narcotics include heroin, morphine, methadone etc
Pharmacology	The study of drug composition, properties and medical applications
Sedatives	Types of drugs that interact with the central nervous system to depress its activities; make a person calm or drowsy
Sulfonamides	Sulpha drugs; synthetic antibiotics that contain the sulfonamide group; bacteriostatic in action
Tetracyclines	Broad spectrum bacteriostatic antibiotics; inhibit bacterial protein synthesis

Vaccines

The material used to produce immunity against a disease by stimulating the production of antibodies.

SELF TEST

Time: 40 min

Marks: 25

Q.1 Four possible answers A, B, C and D to each question are given, mark the correct answer. (6×1=6)

1. **Digitalis is used to stimulate: (K.B)**

(A) Heart (B) Brain
(C) Kidney (D) Lungs
2. **Morphine is derived from: (K.B)**

(A) Iodine (B) Foxglove
(C) Opium (D) Aspirin
3. **The medicines used to relieve acute pain after operations: (K.B)**

(A) Sedatives (B) Narcotics
(C) Hallucinogens (D) Antibiotics
4. **Which one is a narcotic drug? (U.B)**

(A) Codeine (B) Mescaline
(C) Psilocin (D) Marijuana
5. **Which cells recognize the weakened or dead pathogens as enemies and start producing antibodies: (A.B)**

(A) B-lymphocytes (B) T-lymphocytes
(C) M-lymphocytes (D) O-lymphocytes
6. **Which of the following drugs obtained from plants? (K.B)**

(A) Aspirin (B) Opium
(C) Cephalosporin (D) Insulin

Q.2 Give short answers to following questions. (5×2=10)

- (i) Define pharmacology and distinguish it from pharmacy.
- (ii) What are broad-spectrum and narrow spectrum antibiotics?
- (iii) What are hallucinogens and its effects?
- (iv) What is the contribution of Sir Alexander Fleming?
- (v) How many drugs are classified on the basis of their chemical properties and modes of action?

Q.3 Answer the following questions in detail. (5+4=9)

- (a) Write a note on addictive drugs.
- (b) Explain major groups of antibiotics and mode of action of vaccine.

NOTE: Parents or guardians can conduct this test in their supervision in order to check the skill of students.

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