**FACULTY OF PHARMACY**

**ASSIGNMENT COVER PAGE**

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**INTRODUCTION TO PHARMACOLOGY**

Pharmacology is the science that deals with the study of drugs and their interaction with the living system.

**Two categories of pharmacology**

* PHARMACOKINECTICS
* PHARMACODYNAMICS

**PHARMACOKINECTICS**

Pharmacokinetics is the study of what the body does the drug. Is the study of absorption, distribution, metabolism, and excretion of drug.

**PHARMACODYNAMICS**

Pharmacodynamics is the study of what the Drug does the body.is the study of the effect of the drugs on the body and their mechanism of action.

**Importance of studying pharmacology as a pharmacist in the future**

Having studied pharmacology, the pharmacist has a better grasp of which drugs are usually taken by mouth, which drugs are injected, and which ones are applied directly to the part of the body where they should have an effect, and thus the pharmacist can assist the pharmacist more efficiently.

The purpose of pharmacology is to determine the effectiveness and safety of drugs designed to treat, prevent, or diagnose diseases. This includes the drug dosages, frequency of dosages, adverse effects, and how the drugs effect different populations of people.

Being a pharmacist means taking on the responsibility to provide the best care to every patient. To accomplish that task, it is important to develop a unique set of skills. These include knowing the different brands and generics, understanding the basics of prescription insurance, and calculating doses based upon what is prescribed. To perform these duties professionally, it is important to have knowledge of pharmacology. **Pharmacology** is the study of drugs, and includes where medications originate, how they are developed, and their effects in the body. Having a basic understanding of pharmacology provides the pharmacist with the ability to provide great care to the patients. Without that understanding, a pharmacist is like a carpenter who doesn’t know what a hammer is.

In a community pharmacy, during a typical work shift pharmacist will be responsible for numerous prescriptions or orders. In a retail pharmacy, prescriptions will be sent electronically or handed over in person. Upon receipt, the pharmacist reviews each prescription to ensure it is complete before updating a patient’s profile with the medication and directions for use and processing it through any insurance. Then the pharmacist will count the correct amount to dispense, prepare the prescription with the correct package information. The pharmacist will also prepare the prescription for shipping, delivery, or for pick up by the patient. Once the patient comes to pick up the prescription, the pharmacist will verify what the patient is receiving and confirm the patient understands the prescription directions. If a patient needs counseling, it is the responsibility of the pharmacist explains particulars of the prescription, its directions, administration technique, and even side effects.

In a hospital setting, the process for handling a medication order starts after it has been verified by the pharmacist. When the medication label is printed the technician will review it and begin preparing the order for the patient. This means selecting the correct medication from stock, performing dose calculations, and, for oral medication, preparing a unit dose at the processing counter. For sterile intravenous solutions, the technician will mix the solution in a clean room, and finally, making sure it is delivered to the correct nursing unit medication room and placed in the proper area for the nurses to retrieve. In almost every pharmacy, the technician plays a vital role in preparing medications. Proper performance of each of the steps to prepare a medication is enhanced by knowledge of pharmacology.

**The procedure is follow giving a name to newly invent drug**

Naming a newly invented drug is a carefully considered process that involves several steps and considerations. Here's a general outline of the process:

**Chemical and Biological Properties**: The drug's chemical structure, mode of action, and therapeutic target are considered. These properties may inspire elements of the drug's name.

**Brand vs. Generic Name**: Drugs typically have both a generic name (the official, scientific name) and a brand name (a trademarked name by which the drug is marketed). The generic name is often derived from the drug's chemical structure, while the brand name is usually more catchy and marketable.

**International Nonproprietary Name (INN)**: For generic names, the World Health Organization assigns INNs. These names are intended to be globally recognized and standardized, making communication about drugs easier.

**Brand Naming Process**: For brand names, pharmaceutical companies often employ specialized naming agencies to create a name that is memorable, easy to pronounce, and free from negative connotations. The name should also be distinct from existing drug names to avoid confusion.

**Regulatory Approval**: Once potential names are selected, they must undergo regulatory approval to ensure they meet legal and safety standards. Regulatory agencies have guidelines for drug naming to prevent confusion and ensure patient safety.

**Trademark Search**: Before finalizing a brand name, pharmaceutical companies conduct extensive trademark searches to ensure the name is available and not already trademarked by another entity.

**Testing and Feedback**: Names may be tested with focus groups or healthcare professionals to gauge perceptions and potential confusion.

**Final Approval**: Once a name passes all regulatory and legal hurdles, it is officially approved for use.

Throughout this process, considerations such as linguistic and cultural factors, potential for trademark infringement, and ease of pronunciation and spelling are all taken into account. The goal is to choose a name that accurately represents the drug, is memorable, and is safe for use in the marketplace.

Top of Form

**Factors that affect the selection of route of drug administration**

* Physical and chemical properties of the drug. The physical properties are solid, liquid and gas. The chemical properties are solubility, stability, pH, irritancy etc.
* Site of desired action: the action may be localised and approachable or generalised and not approachable.
* Rate of extent of absorption of the drug from different routes.
* Effect of digestive juices and the first pass metabolism of drugs.
* Condition of the patient.

In acute situations, in [emergency medicine](https://en.wikipedia.org/wiki/Emergency_medicine) and [intensive care medicine](https://en.wikipedia.org/wiki/Intensive_care_medicine), drugs are most often given intravenously. This is the most reliable route, as in acutely ill patients the absorption of substances from the tissues and from the digestive tract can often be unpredictable due to altered blood flow or bowel motility.

**Convenience**

Enteral routes are generally the most convenient for the patient, as no punctures or [sterile](https://en.wikipedia.org/wiki/Sterile_technique) procedures are necessary. Enteral medications are therefore often preferred in the treatment of chronic disease. However, some drugs can not be used enterally because their absorption in the digestive tract is low or unpredictable. Transdermal administration is a comfortable alternative; there are, however, only a few drug preparations that are suitable for transdermal administration.

**Desired target effect**

Identical drugs can produce different results depending on the route of administration. For example, some drugs are not significantly absorbed into the bloodstream from the gastrointestinal tract and their action after enteral administration is therefore different from that after parenteral administration. This can be illustrated by the action of [naloxone](https://en.wikipedia.org/wiki/Naloxone) (Narcan), an antagonist of [opiates](https://en.wikipedia.org/wiki/Opiate) such as [morphine](https://en.wikipedia.org/wiki/Morphine). Naloxone counteracts opiate action in the [central nervous system](https://en.wikipedia.org/wiki/Central_nervous_system) when given intravenously and is therefore used in the treatment of opiate overdose. The same drug, when swallowed, acts exclusively on the bowels; it is here used to treat constipation under opiate pain therapy and does not affect the pain-reducing effect of the opiate.

**Different routes of drug administration and their Advantages and Disadvantages**

A route of administration in pharmacy is the path by which a drug is taken into the body.

(1)Classification:-

The various routes of administrations are classified into following categories:-

1. Systemic Route

a) Enteral route

1. Oral

2. Sublingual

3. Rectum

4. Inhalation

(b) Parenteral route

1. Intravascular

2. Intramuscular

3. Subcutaneous

2. Local Route

Systemic route the drug reaches to the systemic circulation (Blood). So that it is

called systemic route.

Systemic Route is again classified into two classes:-

(A) Enteral Route: -

In this route the drug is placed in the Gastrointestinal Tract and then it

absorbs to the blood.

This route is further classified into three classes.

(1) Oral Route: -

In this route the drug is placed in the mouth and Swallowed. It is also

called per oral (p.o.)

**Advantages of Oral Route**

* Convenient - Can be selfadministered,pain free, easy to take
* Absorption - Takes place along the whole length of the gastro intestinal

tract

* Cheap - Compared to most other parenteral routes

**Disadvantages of Oral Route**

• Sometimes inefficient - only part of the drug may be absorbed

• First-pass effect - drugs absorbed orally are initially transported to the

liver via the portal vein

• Irritation to gastric mucosa – nausea and vomiting

• Destruction of drugs by gastric acid and digestive juices

• Effect too slow for emergencies

• Unpleasant taste of some drugs

• Unable to use in unconscious patient

Examples:-

The example of dosage forms which are used by oral route include

1. Tablet

2. Capsules

3. Syrups etc.

**2.Sublingual/Buccal route:** -

In this route of administration the drug is placed under the tongue. And it is taken

without the use of water. When it is placed under the tongue it disintegrates there and

then absorption occurs in mouth. The tablets are small in size which is to be used

through the sublingual route.

Example of Sublingual tablet is Nitroglycerine tablets

**Buccal Route**

In this route of administration the drug is kept in the buccal cavity where it disintegrates and absorption occurs in the mouth

Advantages

Advantages of Sublingual and Buccal Route of Administration are:-

• Small Doses: - Small size is required

• Rapid absorption:- It absorbs in the mouth so that its absorption

• Drug stability: - As in this route the drug does not go to the stomach so it is

not destroyed by the enzymes and acids present in the stomach so that it is stable.

• Avoid first-pass effect.

Disadvantages

Disadvantages of Sublingual and Buccal Route of Administration are:-

• Inconvenient: - In this route the drug is kept in the mouth so it is

inconvenient.

.• Unpleasant taste of some drugs: -The drugs having unpleasant taste can

cause problem because the drug is kept in the mouth.

**3.Rectal Route**

Many drugs that are administered orally can also be administered rectally as a

suppository. In this form, a drug is mixed with a waxy substance that dissolves or

liquefies after it is inserted into the rectum. Because the rectum's wall is thin and its

blood supply rich, the drug is readily absorbed. A suppository is prescribed for

people who cannot take a drug orally because they have nausea, cannot swallow,

or have restrictions on eating, as is required after many surgical operations. Drugs that

are irritating in suppository form may have

to be given by injection.

**Vaginal Route:**

Some drugs may be administered vaginally to women as a solution, tablet, cream, gel,

suppository, or ring. The drug is slowly absorbed through the vaginal wall. This

route is often used to give estrogen to women at menopause, because the drug

helps prevent thinning of the vaginal wall,an effect of menopause

**Urethral Route**

Some drugs are given through the urethra. This route is called urethral route of drug

Administration.

Advantages:-

Advantages of rectal/urethral/vaginal route are as follows:-

1. Unconscious patients and children:-If the patient is unconscious then it is

not possible to give the drug orally. So in this situation the drug can be given

through rectal/urethral/vaginal route.

2. If patient is having nauseous or vomiting

Disadvantages:-

1. May cause irritation
2. 2. Absorption may be variable

Examples:- 1. Suppositories

2. Vaginal Bogies

3. Urethral Bogies

**Parenteral Routes:-**

In this route of administration the drug does not pass through the gastrointestinal tract. It

directly reaches to the blood.

It can further be classified into two classes:-

1. With injections:- in this class the drugs are administered with the use of

injections

e.g. Intravascular,

Intramuscular,

Subcutaneous

2. Without injections: - in this class the drugs are administered without use of

injections.

e.g. Inhalations.

With Injections:-

1. Intravascular:- In this route of administration the drug is directly taken into the blood with the help of injection. Absorption phase is bypassed.

Advantages:- 

1. Precise, accurate and almost immediate onset of action

2. Large quantities can be given, fairly pain free

3. Can be given to unconscious patients.

4. Quick action

5. Drugs having unpleasant taste can be given.

Disadvantages:-

1. Pain at the site of injection.

2. Greater risk of adverse effects

A. High concentration attained rapidly

b. Risk of embolism

2. Intramuscular:-In this route of administration the drug is given into the muscles with the help of injection. Drug once reaches to the muscles,absorbs into the blood.

1. Very rapid absorption of drugs in aqueous solution

2. Depot and slow release preparations

3. Pain at injection sites for certain drugs

3. Subcutaneous:-

In this route of administration the drug is given into the subcutaneous layer with the

help of injection. Drug once reaches to the subcutaneous layer crosses the membrane

and absorbs into the blood.

Without Injections:-

In this class the drug is administered to the blood without going to the gastrointestinal

tract. In this class the drug is not administered with the help of injections.

In this administration the drug is administered in the gaseous form.

**Advantages**

1. Rapid onset of action due to rapid access to circulation.

2. Pain not occurs because injection is not used.

Examples:-

1. Inhalers

2. Aerosols

**Local/Topical Route of Drug Administration**

In this route the drug is applied on the skin and mucous membrane for the local action.

• Mucosal membranes (eye drops,antiseptic, sunscreen, callous removal,

nasal, etc.)

• Skin

• Dermal - Rubbing in of oil or ointment (local action).

• Transdermal - Absorption of drug through skin (systemic action)

i. Stable blood levels

ii. No first pass metabolism

iii. Drug must be potent

Examples: 1.creams 2.lotion 3.Gels

Onset of Action-

The length of time needed for a medicine to give its action. This time varies for different

types of routes of administrations. Onset of action of different routes is as follows:-

• Intravenous 30-60 seconds • Oral 30-90 minutes

• Topical/transdermal (topical) variable (minutes to hours)

• Intraosseous 30-60 seconds

• Inhalation 2-3 minutes • Rectal 5-30 minutes

• Sublingual 3-5 minutes

• Intramuscular 10-20 minutes

• Subcutaneous 15-30 minutes

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