Pharmacology- Introduction

Dr. Younus.h.johan
College of pharmacy
University of anbar

Pharmacology

- **Sources**
- **Lippincott Illustrated Reviews: Pharmacology 7th Edition**
- **Katzung ; Basic & Clinical Pharmacology 14th Edition**
- **Bennett & Brown ; Clinical pharmacology 11th edition**
- **Essentials of Medical Pharmacology; Lafi 09**

Fig. 1.4 The origins of pharmacology: religion, animals, and plants. Frieze from the palace of King Sargon II, in Kharasabad. Musée du Louvre, Paris, Antiquités Orientales. (Courtesy of Service de Documentation Photographique de la Réunion des Musées Nationaux, Chateau de Versailles.)

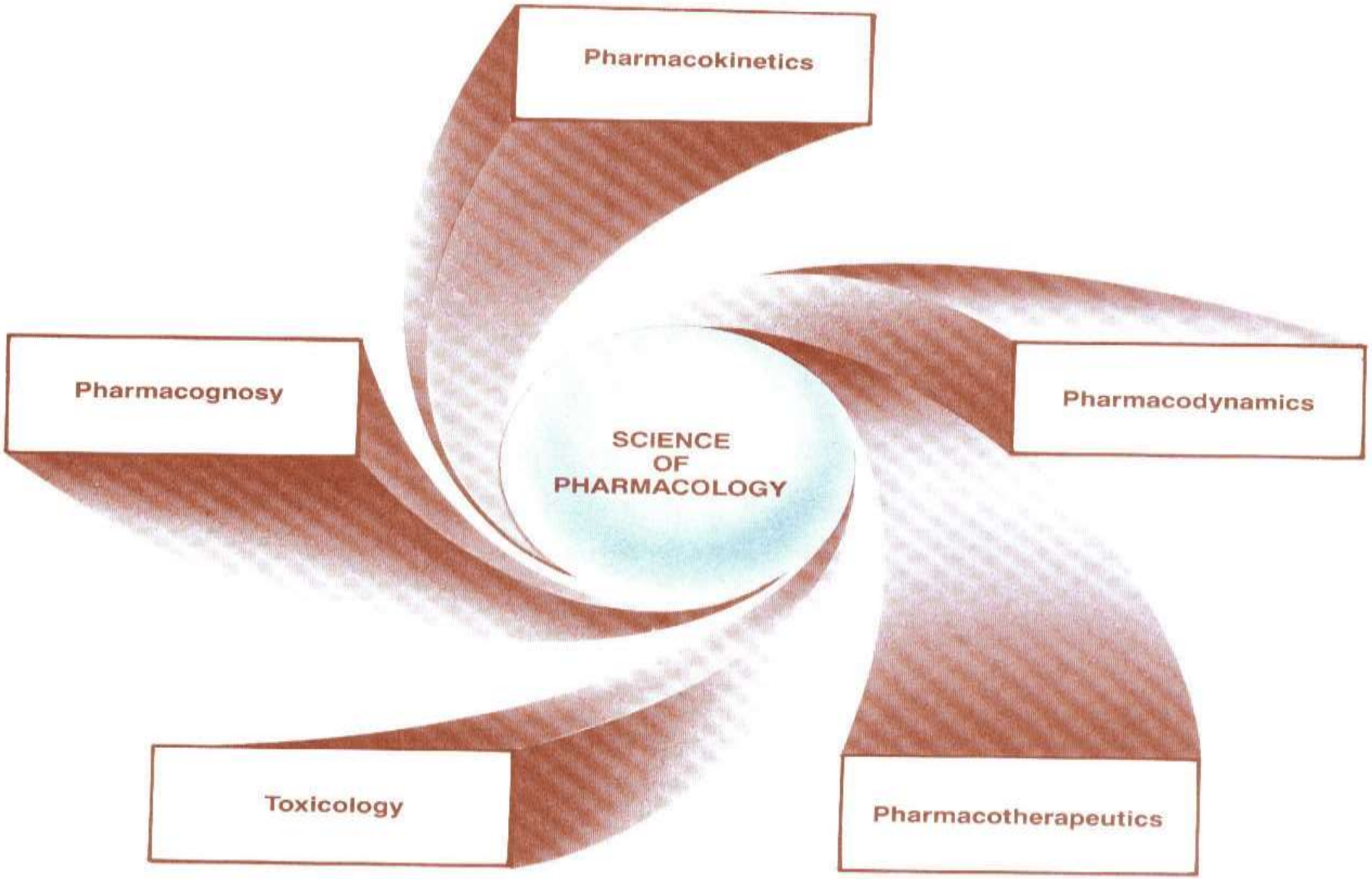
Page et al (1997) Integrated Pharmacology, p6

Sources of Drugs

Plants
Animal
Religion (spell)
Harry potter
Mandrake

Five branches of pharmacology

An extensive science, pharmacology includes absorption, distribution, metabolism, and excretion (pharmacokinetics); biochemical and physical effects, and mechanism of action (pharmacodynamics); clinical indications or uses (pharmacotherapeutics); toxicity and adverse reactions (toxicology); and natural sources of drugs (pharmacognosy).



WHAT IS PHARMACOLOGY?

The pharmacology course is your first confrontation with medicine and the response of patients to drugs.

A drug in the widest sense is a substance used in prevention, cure and diagnosis of disease.

The name pharmacon is Greek and means drug. The word drug comes from the French word 'drogue' which means dry herb.

Pharmacology can be divided into two parts:

Pharmacokinetics means "what the body does to the drug".

Pharmacodynamics means "what the drug does to the body".

In addition, we also teach:

Toxicology which deals with adverse effects, drug interaction, drug abuse, poisons, antidotes, industrial and environmental pollution, and therapeutic drug monitoring.

Pharmacogenetics which deals with inter-individal differences

Pharmaceutics (drug delivery, formulation)

Pharmacognosy (Plant medicine)

Prescription writing

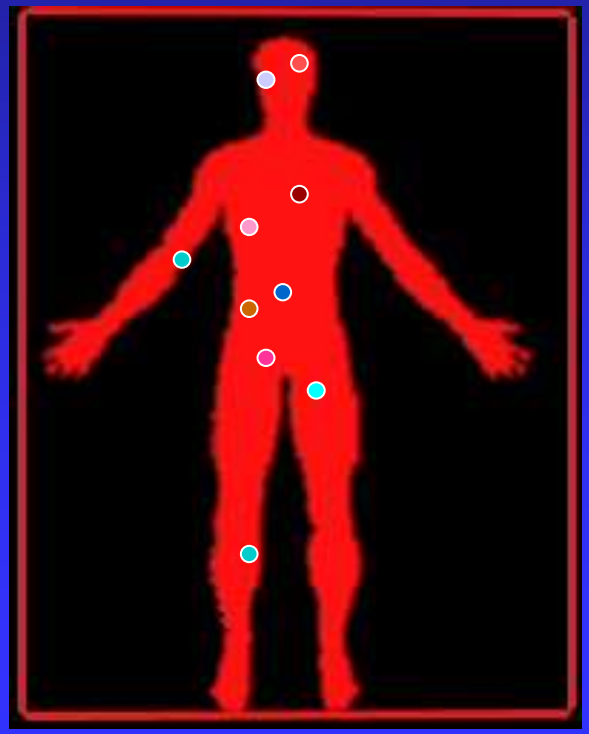
(emphasising on drug names and dosage regimen)

Drugs

Drugs can be defined as chemical agents that uniquely interact with specific target molecules in the body, thereby producing a biological effect.

Drugs can be

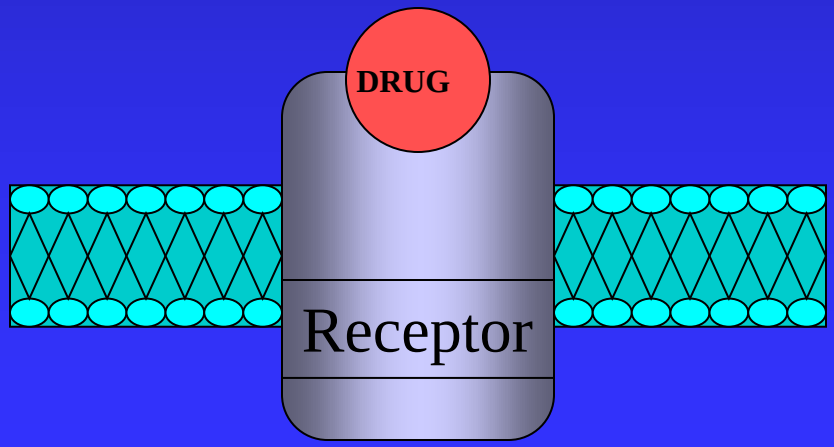
- stimulatory
- inhibitory



Drugs

- Drugs, as well as hormones, neurotransmitter, autocoids and toxins can make possible the transfer of information to cells by interaction with specific receptive molecules called

“receptors”.



- Drugs interact with biological systems in ways that mimic, resemble or otherwise affect the natural chemicals of the body.

Journey of drug development

1-pharmacognosy

2-pharmacutical preparation

3- kinetic and dynamics

4-theraputic trial and proven

5-toxicology

6-Pharmacogenetics

7-prescription writing

Understanding Pharmacology requires a good knowledge in

Human physiology

Pathophysiology

Biochemistry

Microbiology

All integrated together to enable a rational use of drugs

Conventional Modes of Curriculum Delivery

Theory (traditional didactic lecture-style)

Tutorials

Types:

Free discussions

Pharmacological key issues

Medical problems

Practicals

Students stimulated learning issues

Assessment

Continuous Formal

Meaningful Feedback

Improvement in Instructional Strategies

The best way to learn is to teach.

"Poisons in small doses are the best medicines; and useful medicines in too large doses are poisonous"

William Withering 1789

Pharmacology

- Pharmacokinetic
- Pharmacodynamic

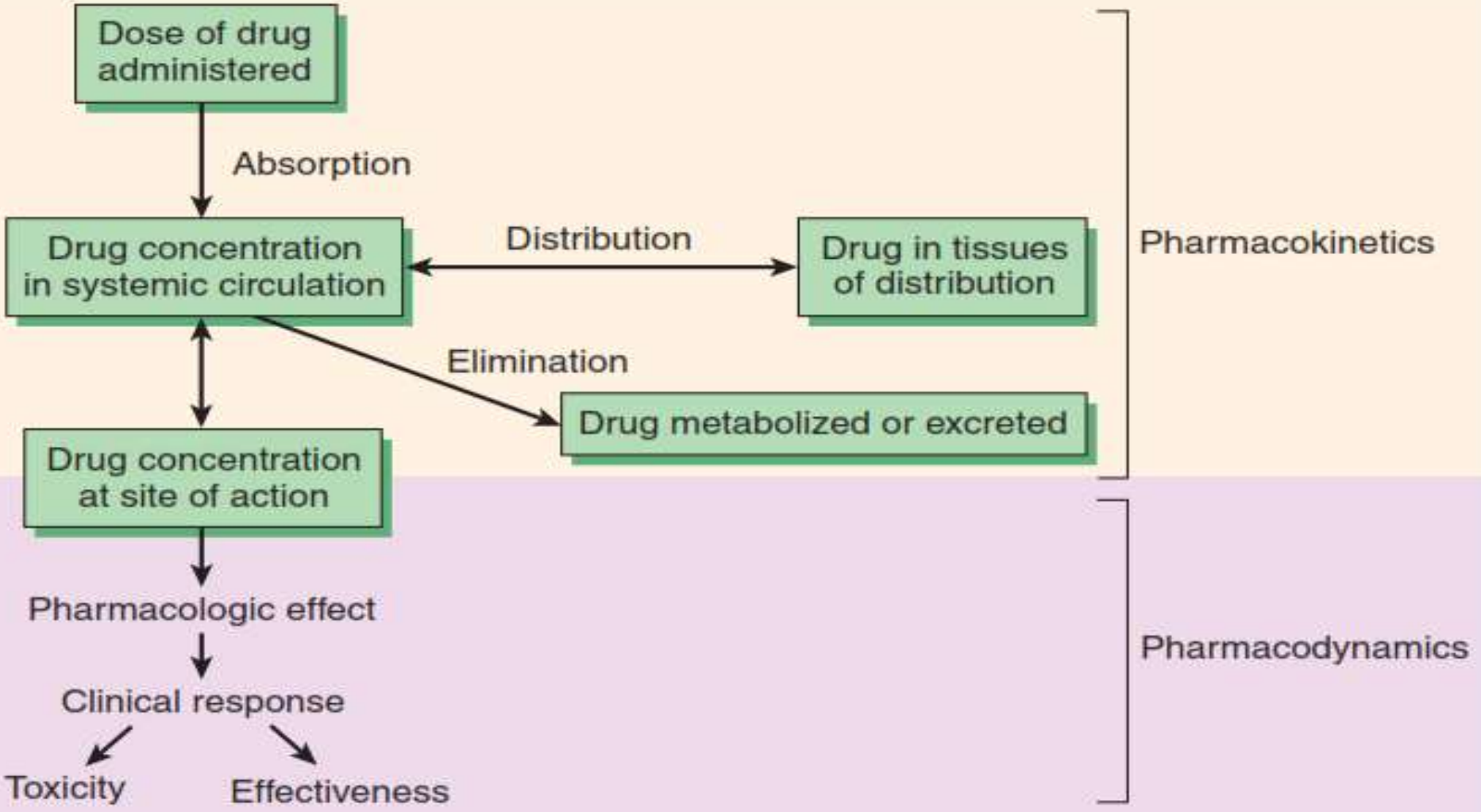
How Drugs act:

- Receptor interaction
- Enzyme inhibition
- Chemical interaction
- Physico-chemical properties

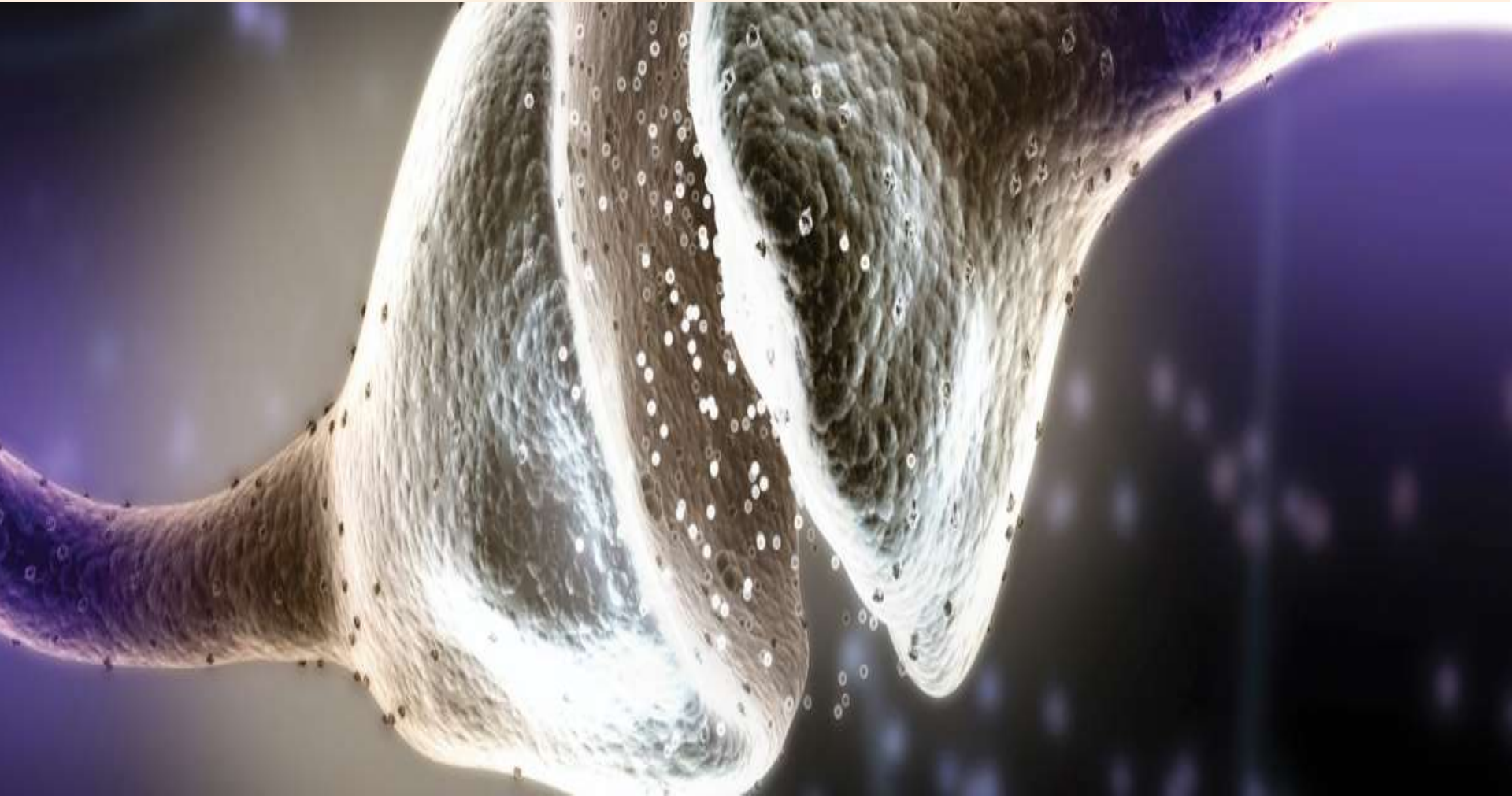
Drugs and Medicine?

Physician-induced (iatrogenic) disease? [propranolol, Lysine acetylsalicylic acid (Aspegic®), bronchospasm]

Pharmacology



Major Concept	Description
Nature of drugs	Drugs are chemicals that modify body functions. They may be ions, carbohydrates, lipids, or proteins. They vary in size from lithium (MW 7) to proteins (MW ≥ 50,000)



Major Concept	Description
Drug permeation	Most drugs are administered at a site distant from their target tissue. To reach the target, they must permeate through both lipid and aqueous pathways. Movement of drugs occurs by means of aqueous diffusion, lipid diffusion, transport by special carriers, or by exocytosis and endocytosis

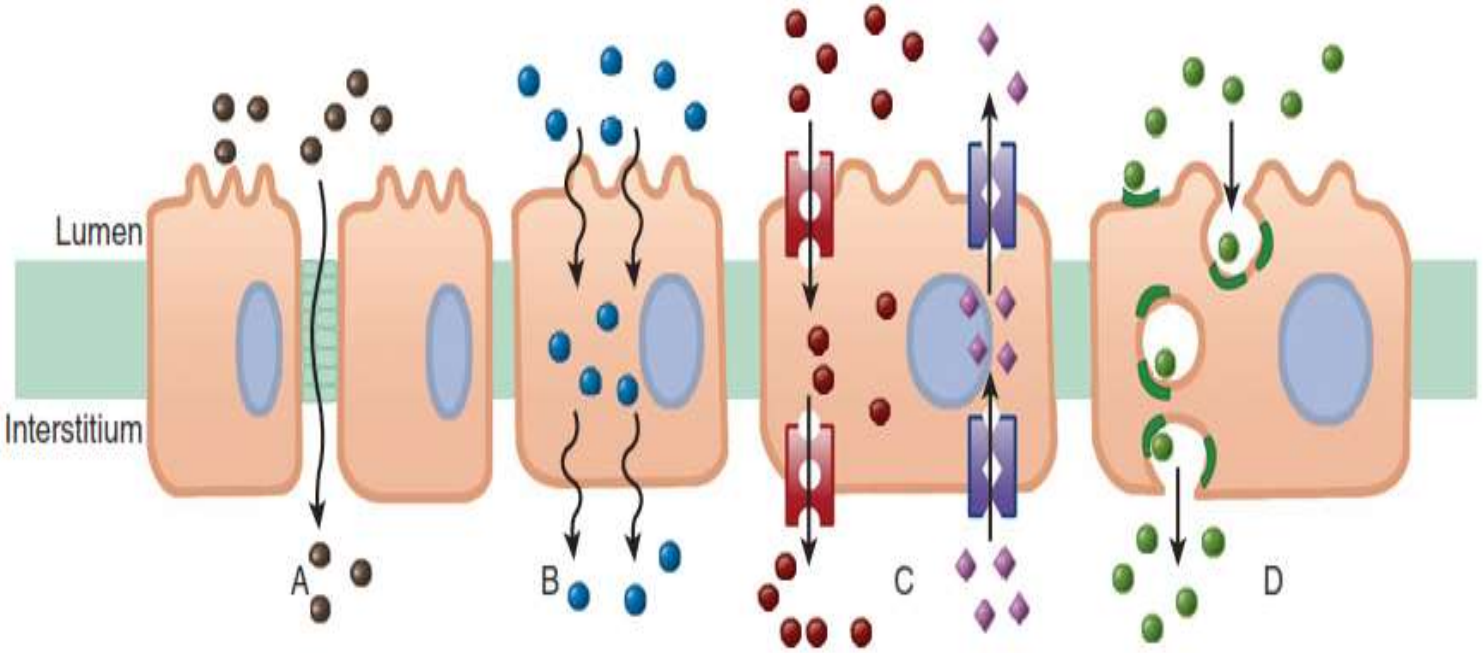
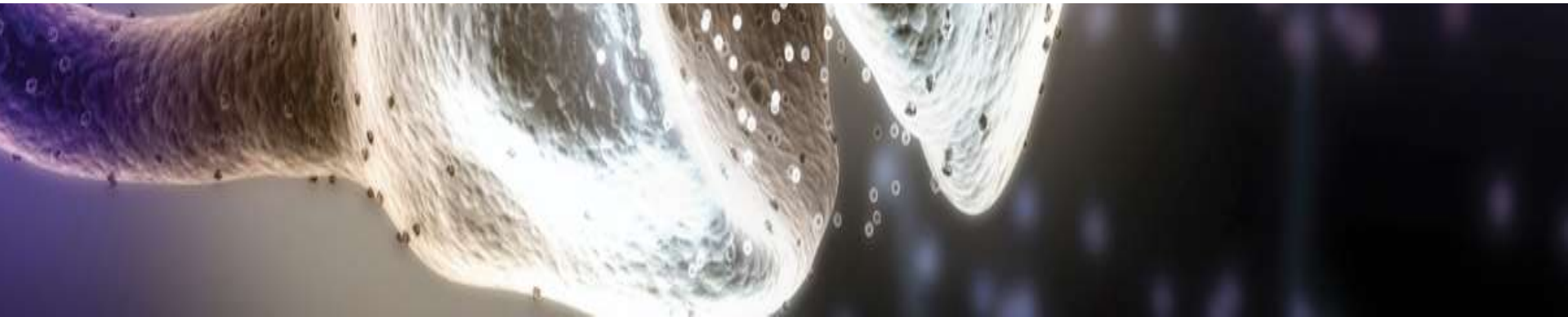


FIGURE 1–5 Mechanisms of drug permeation. Drugs may diffuse passively through aqueous channels in the intercellular junctions (eg, tight junctions, **A**), or through lipid cell membranes (**B**). Drugs with the appropriate characteristics may be transported by carriers into or out of cells (**C**). Very impermeant drugs may also bind to cell surface receptors (dark binding sites), be engulfed by the cell membrane (endocytosis), and then released inside the cell or expelled via the membrane-limited vesicles out of the cell into the extracellular space (exocytosis, **D**).

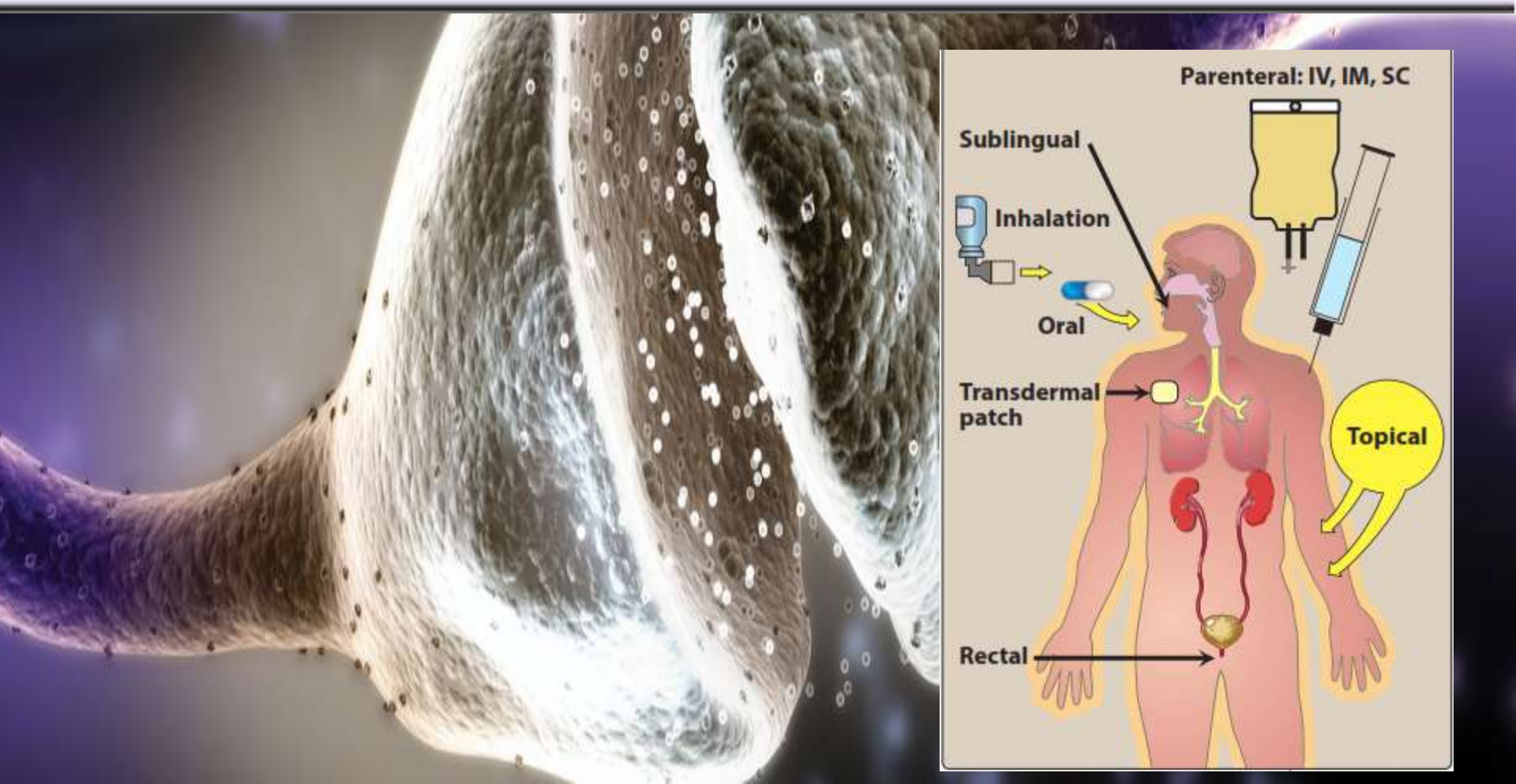
Major Concept	Description
Rate of diffusion	Aqueous diffusion and lipid diffusion are predicted by Fick's law and are directly proportional to the concentration gradient, area, and permeability coefficient and inversely proportional to the length or thickness of the diffusion path

The passive flux of molecules down a concentration gradient is given by Fick's law:

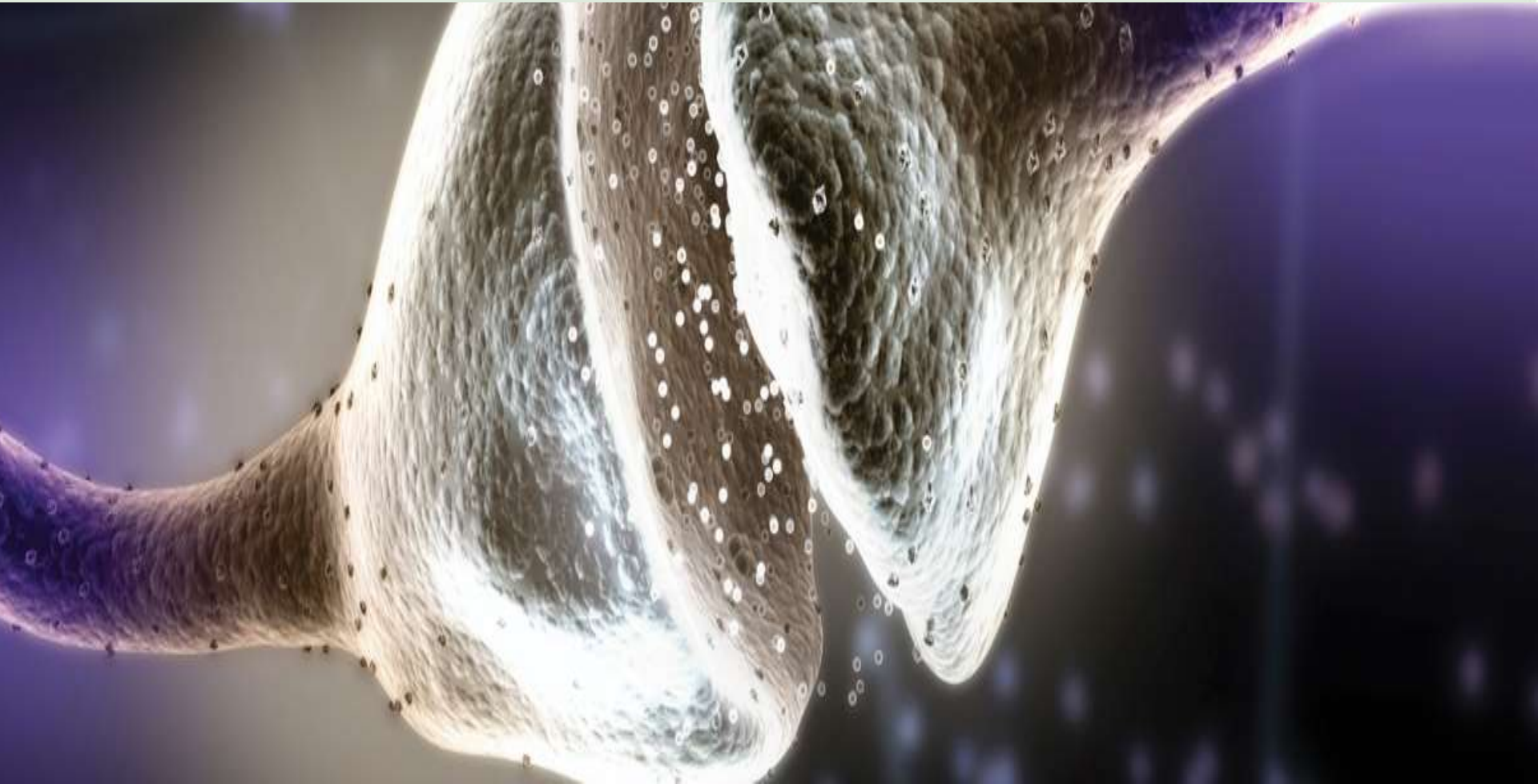
$$\text{Flux (molecules per unit time)} = (C_1 - C_2) \times \frac{\text{Area} \times \text{Permeability coefficient}}{\text{Thickness}}$$



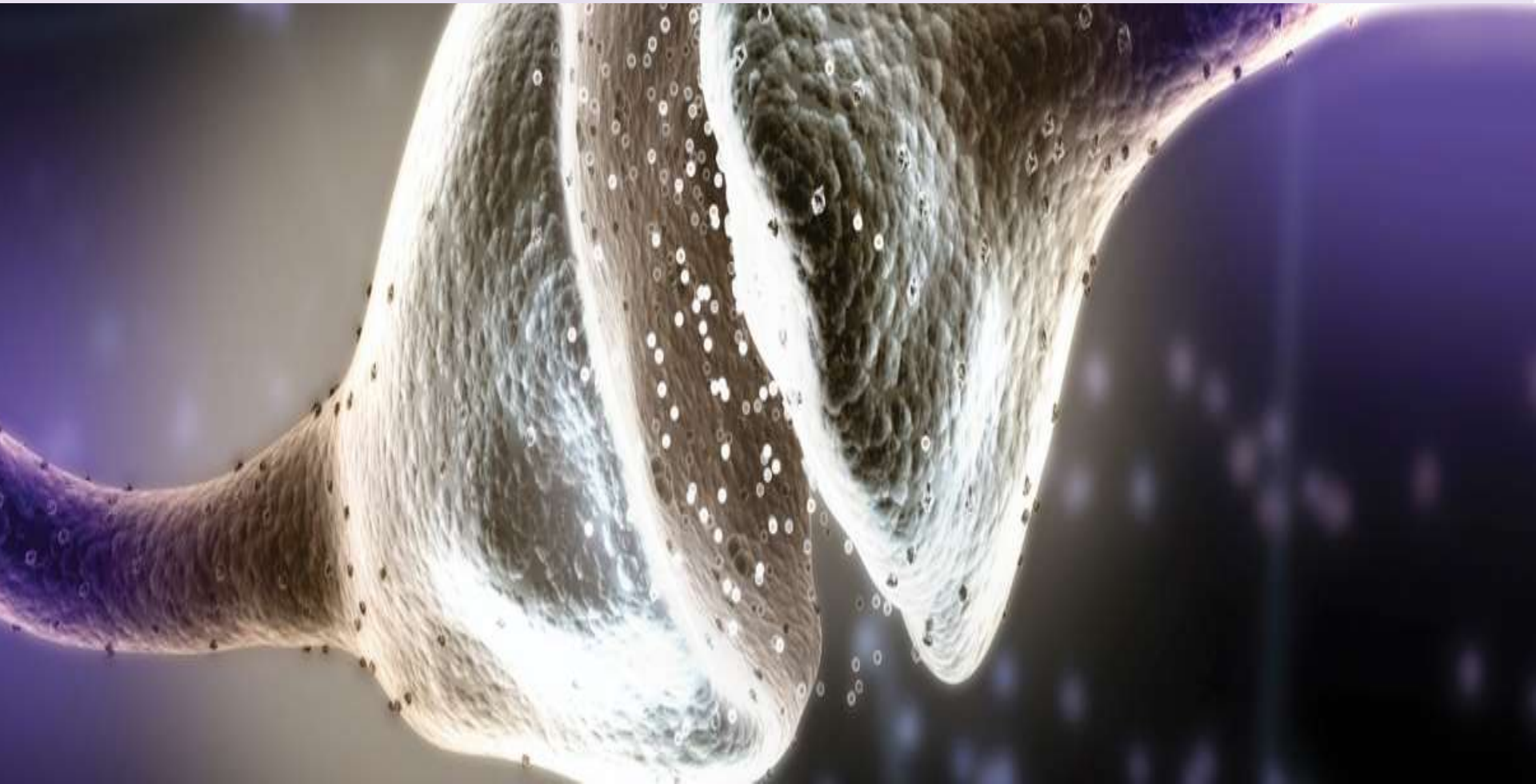
Major Concept	Description
Routes of administration	Drugs are usually administered by one of the following routes of administration: oral, buccal, sublingual, topical, transdermal, intravenous, subcutaneous, intramuscular, or rectal, or by inhalation



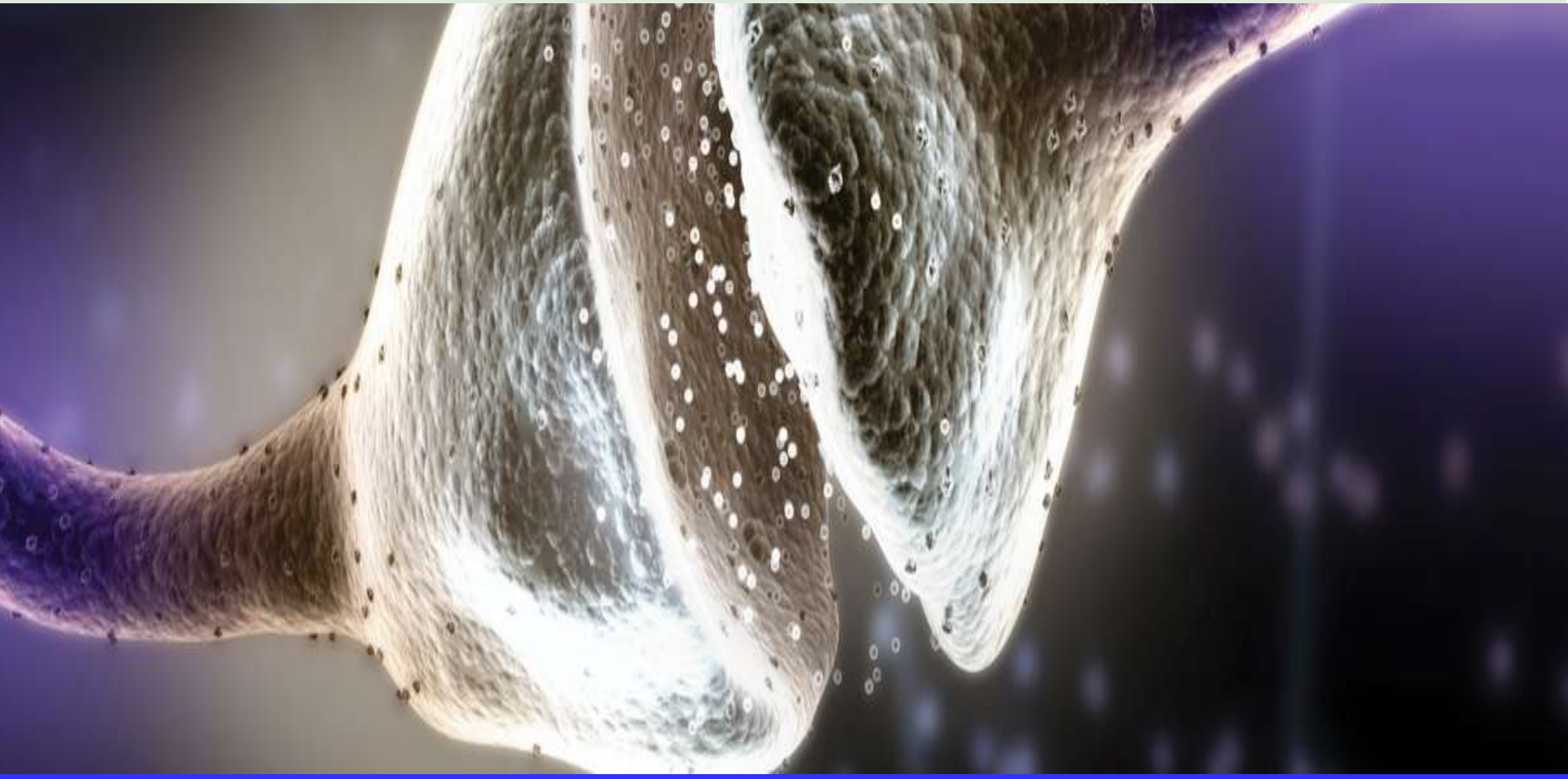
Major Concept	Description
Drug distribution	After absorption, drugs are distributed to different parts of the body depending on concentration gradient, blood flow, solubility, and binding in the tissue



Major Concept	Description
Drug elimination	Drugs are eliminated by reducing their concentration or amount in the body. This occurs when the drug is inactivated by metabolism or excreted from the body



Major Concept	Description
Elimination kinetics	The rate of elimination of drugs may be zero order (ie, constant regardless of concentration) or first order (ie, proportional to the concentration)



Pharmacology is not just

memorizing

indications and adverse effects

rather understanding

how drugs work to alter the disease state to norm or near norm, and how they bring about adverse effects.