Introduction to Pharmacology

PTA1010

Learning Objectives
following the lecture the student will:

- Be able to state the origins and history of pharmacology and medicine
- Know the classes of controlled substances
- Recognize common medical abbreviations
- Understand the differences in response to drugs
- Understand the forms and methods for medication administration
- Understand how drugs are absorbed, metabolized, distributed and excreted

Pharmacology: The study of drugs or any substance that modifies the function of an organism

HISTORY:

- Civilizations recognized the effectiveness of vegetables and plants.
- Clay tablets from 2100BC, reference the use of various medicines, and directions for compounding them for healing purposes.
- In Egypt 1500BC the Ebers Papyrus was a 22 yard long document describing 811 prescriptions and 700 drugs.

- Within the past 100 years the use of natural, semisynthetic, and synthetic chemical agents are used to **prevent or cure** diseases.

Relevance of Pharmacology in Rehabilitation

- Medication can affect patient's performance and ability to participate in therapy.
- Pain reduction
- Adverse side effects
- Motor control

- **Pharmacokinetics:** how a body absorbs, distributes, metabolizes and eliminates a drug
- **Pharmacodynamics:** analysis of what the drug does to the body or target tissues.

Generic and Brand Name:

Brand name drugs and generic drugs must have the **same active ingredients and identical strengths and dosage, same administration route.**

- **Generic Name**:

official nonproprietary name

- **Trade or Brand Name:**

assigned by pharmaceutical company

Chemical	Generic	Trade/Brand
N-acetyl-*p*-aminophenol	Acetaminophen	Tylenol, Panadol, many others
3,4-Dihydroxyphenyl-l-alanine	Levodopa	Larodopa
5,5-Phenylethylbarbituric acid	Phenobarbital	Luminal, Eskabarb
7-Chloro-1,3-dihydro-1-methyl-5-phenyl-2H-1,4-benzodiazepin-2-one	Diazepam	Valium

Methods of Administration pg. 23

- Enteral: (PO) first pass metabolism-through the liver (Except sublingual)
- Parenteral- non-oral, typically injection
- Inhalation- mists, aerosols
- Topical- patches, ointments

- Miscellaneous: otic, ophthalmic, rectal, vaginal

FDA Drug Approval

- The development of a new drug in the United States is **expensive and time-consuming**.
- The entire testing process from animal trials to the end of phase III(human testing) may be **7 to 9 yrs**.
- FDA has provisions to shorten process for drugs designed treating serious/life-threatening conditions, especially if the drug shows substantial benefits or if no drugs are currently available.

Controlled Substance Act 1970

- **Schedule I**: high potential for abuse, not acceptable for medical uses in US. (heroin)
- **Schedule II**: High affinity for abuse, but used medically (morphine)
- **Schedule III**: lower abuse potential, prescription required (Hydrocodone, Tylenol 3)
- **Schedule IV**: lower abuse potential, prescription still required (Valium, Xanax, Ambian)
- **Schedule V**: lowest potential for abuse (Robitussin AC)

OCT: Over the Counter Meds

- OTC products are considered **safe IF the directions** are correctly followed.

- 3 of the **MOST** Commonly misused/dangerous medications:
  - 1. Proton Pump Inhibitors (Prilosec, **Prevacid**, and Nexium)
  - 2. Non-Steroidal Anti-Inflammatory Drugs (Advil**, Motrin,** Aleve, etc.)
  - 3. Sedating Antihistamines (Benadryl, Tylenol PM, **diphenhydramine**, etc.)

Therapists should not directly prescribe or administer OTC products.

Therapists should provide information about the proper use and potential benefits/side effects of these medications within the scope of their State Practice Act.

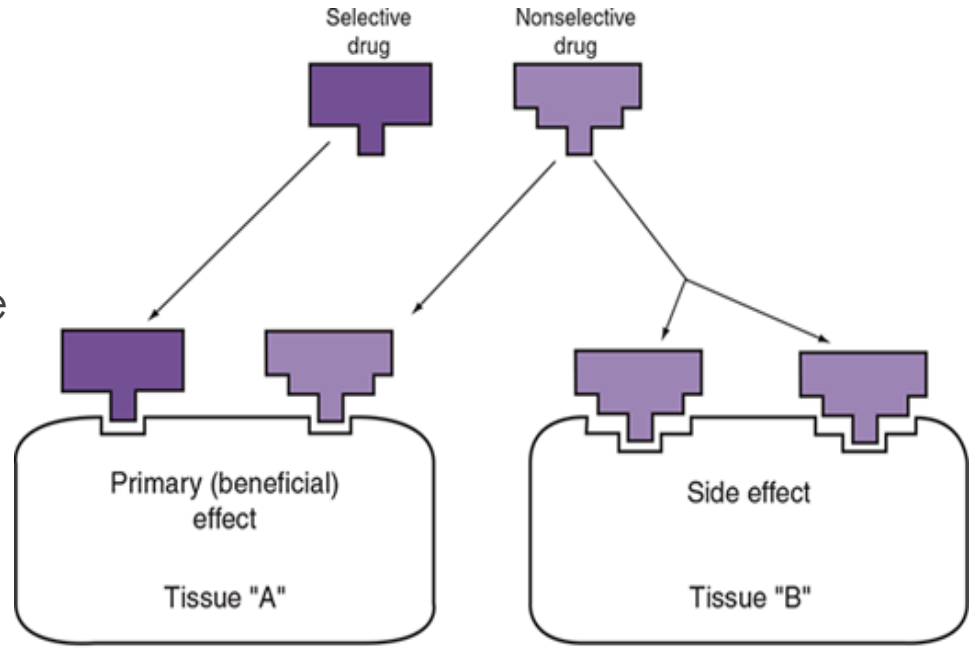
What is a Drug?

- A chemical that interacts with and affects a living organism to produce a biological response.
- Alters the physiological functions of cells eg. Caffeine

- **Primary effect**: desired therapeutic effect

  eg. Aspirin for a fever
- **Secondary effect**: may be desirable or undesirable

  eg. Analgesia, or stomach upset



Source: Charles D. Ciccone, Melissa L. Bednarek, Kenneth L. Miller: *Pharmacologyin Rehabilitation, 5e*

How does it Work?

- **Endogenous**: originating within the body
- **Exogenous**: originating outside the body.

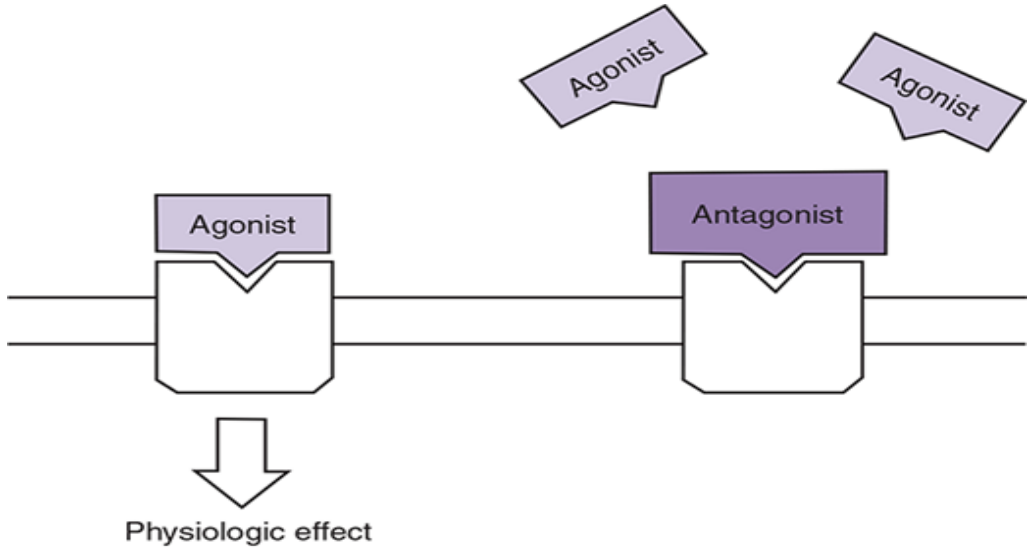
- Most drugs work at a **specific site** within the body
- To work specifically there must be a **drug-receptor interaction**
- Receptor: a component of the cell to which the drug binds
- Each drug searches for the corresponding cell receptor
- "Lock and Key"
- Affinity can be high or low

Agonist vs Antagonist

- **Agonist** drugs have affinity and efficacy

  (attraction w/ capacity to elicit a response)

- **Antagonists** have affinity, but no efficacy: acts as blocker



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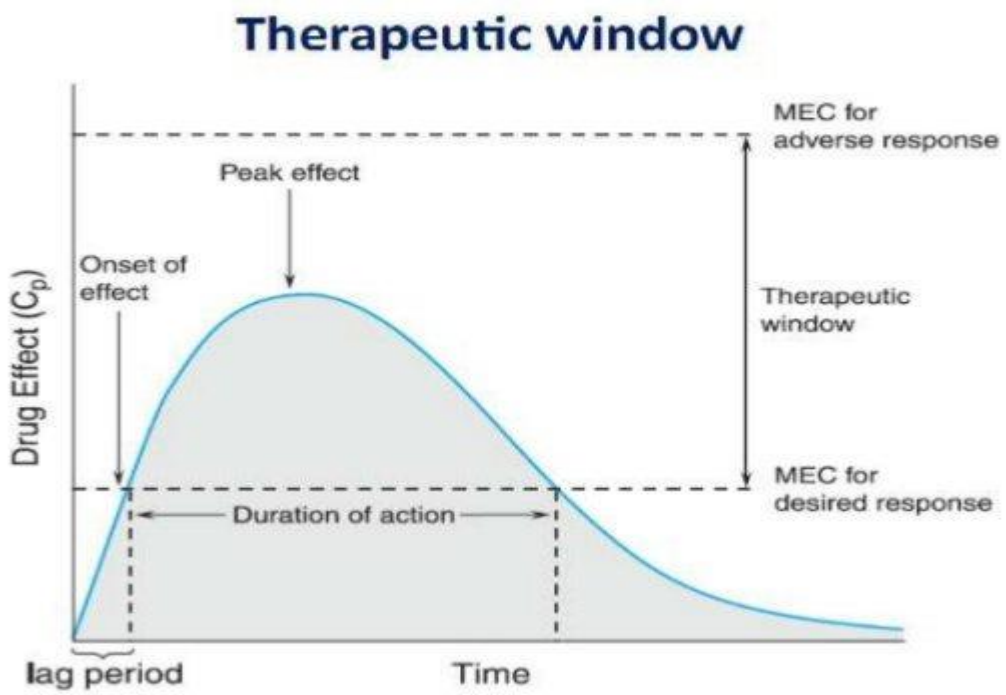
Dose Response:

- **Threshold:** lowest dose capable of producing a perceivable response
- **Maximal Effect:** greatest response regardless of dosage
- **Timed response:**



Factors Affecting Drug Response:

- Age
- Weight
- Gender
- Time of Day
- Co-Morbidities