

### Introduction

Founded by German Professor Rudolf Buchheim (1820 - 1879)

He introduced 2 important principles:

- The natural system of drug classification based on their mode of action
- experimental pharmacology

#### Milestones

- 1806: Morphine
- 1908: Sulfanilamide (first-antibacterial)
- 1912: Phenobarbital (first ant-epileptic)
- 1921: Insulin
- 1956: Tolbutamide (first oral anti-hyperglycemic)
- 1957: Propanolol (first Beta blocker)
- 1961: L-DOPA (Parkinson's disease)
- 1975: ACE inhibitors (first-line for HTN)

**Pharmacology before 19<sup>th</sup> Century**

- Made at home, by apothecary, by unregulated commercial interests
- marketed w/o evidence or understanding
- Spiritual-based healing was popular and successful

**Pharmacology in the 21<sup>st</sup> Century**

- Emphasis on molecules and cells as targets vs tissues, organs, and whole animals
- Human Genome Project (individualized medicine)
- Drugs designed around a disease specific target
- Examines interactions b/w drugs & living organisms

### Introduction (cont)

#### Definitions

- *Pharmacology*: Scientific discipline that investigates the interactions b/w living organisms and 'drugs'
- *Drug*: Chemical substance used in the treatment, cure, prevention, or diagnosis of disease.
- *Pharmacokinetics*: what the body does to drugs
- *Pharmacodynamics*: what the drugs do to the body
- *Molecular Pharmacology*: experimental pharmacology
- *Clinical Pharmacology*: science of using drugs in humans (clinical research), based on lab studies, seeks to understand how a drug should be used in practice
- *Pharmacogenetics*: why people respond to drugs differently

#### Drug Classification

- Anatomical
- Therapeutic use
- Pharmacological mechanism
- Chemical group
- Chemical substance

#### Drug

- Nomenclature**
- Chemical name
  - Generic name
  - Brand name

#### Physical Nature of Drugs

- Pills are mainly inactive ingredients which help with the admin. of active ingredients
- When molecules are very big they cannot be absorbed very well orally bc they cannot pass through the lipid bilayers
- There may be different isotopes of drugs. Not all isotopes will be effective (D- form vs. L- form)

### Pharmacodynamics

#### Drug Targets

- Receptors
- Enzymes
- Carrier Molecules
- Voltage-gated ion channels

### Pharmacodynamics (cont)

#### Receptors

- **Ionotropic**: ion channel receptors, ions flow into the neuron, **mediates fast transmission**
  - Eg: cholinergic (nicotinic), GABA<sub>A</sub>
- **Metabotropic**: G protein coupled (secondary messengers), **mediates slow transmission**, change enzyme activity, protein expression, open slow ion channels
  - Eg: adrenergic, cholinergic (muscarinic), GABA<sub>B</sub>

#### Secondary Messengers:

- intracellular compounds that help to transduce ligand-binding to a physiological or pharmacological effect (cAMP, cGMP, PKA, PDE, Ca<sup>2+</sup>)
- Ligands or agonists are considered 'first messengers'

