DRUG METABOLISM (BIOTRANSFORMATION) and PRODRUGS

> INTRODUCTION TO PHARMACEUTICAL CHEMISTRY

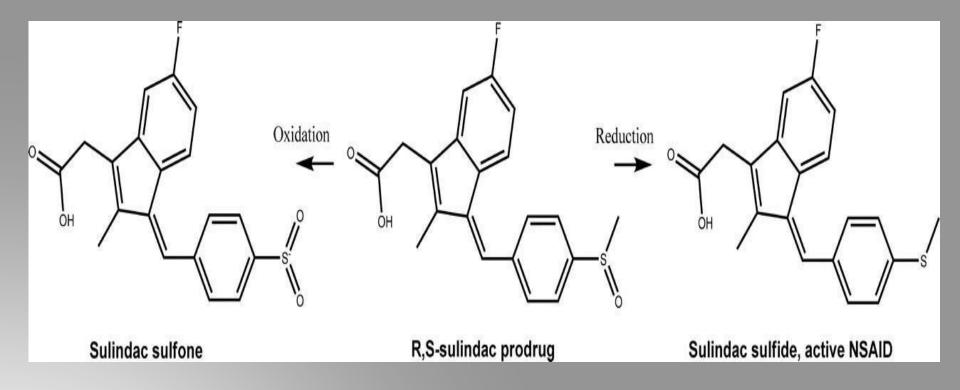
Drug metabolism is the <u>metabolic breakdown</u> / **chemical changes** of <u>drugs</u> by living <u>organisms</u>, usually through specialized <u>enzymatic</u> systems.

• Metabolite is the product of a drug after metabolic reactions.

Metabolism is a very important mechanism for the elimination of drugs from the body.

PRO DRUG

• While not exhibiting any activity in vitro, they give the active compounds metabolically in vivo. These are called **pro drugs**.



PHASES OF METABOLISM

Phase I Reactions

Functionalization reactions

1. OXIDATION REACTIONS

- Aromatic oxidation (Aromatic hydroxylation)
- Alken epoxidation
- > Oxidation of aliphatic and alicyclic carbon atoms

> Oxidation of carbons adjacent to an sp2 center (Oxidation of carbon atoms in benzyl, allylic and carbonyl or imine α - position)

Oxidation of carbon-nitrogen systems
(Oxidative N-dealkylation, oxidative deamination, N-oxide formation, N-hydroxylation)

Oxidation of carbon-oxygen systems (Oxidative O-dealkylation)

Oxidation of carbon-sulfur systems
(Oxidative S-dealkylation, S-oxidation, desulfurization)

Alcohol and aldehyde oxidation

2. REDUCTION REACTIONS

- > Carbonyl (aldehyde, ketone) reduction
- Nitro reduction
- Azo reduction

3. HYDROLYSIS REACTIONS

Hydrolysis of esters and amides

Phase II Reactions

Conjugation reactions

- glucuronic acid
- sulfate
- acetate
- an amino acid