Kerbala University
College of Pharmacy
Dep. of Pharmaceutical Chemistry
Organic Pharmaceutical Chemistry IV

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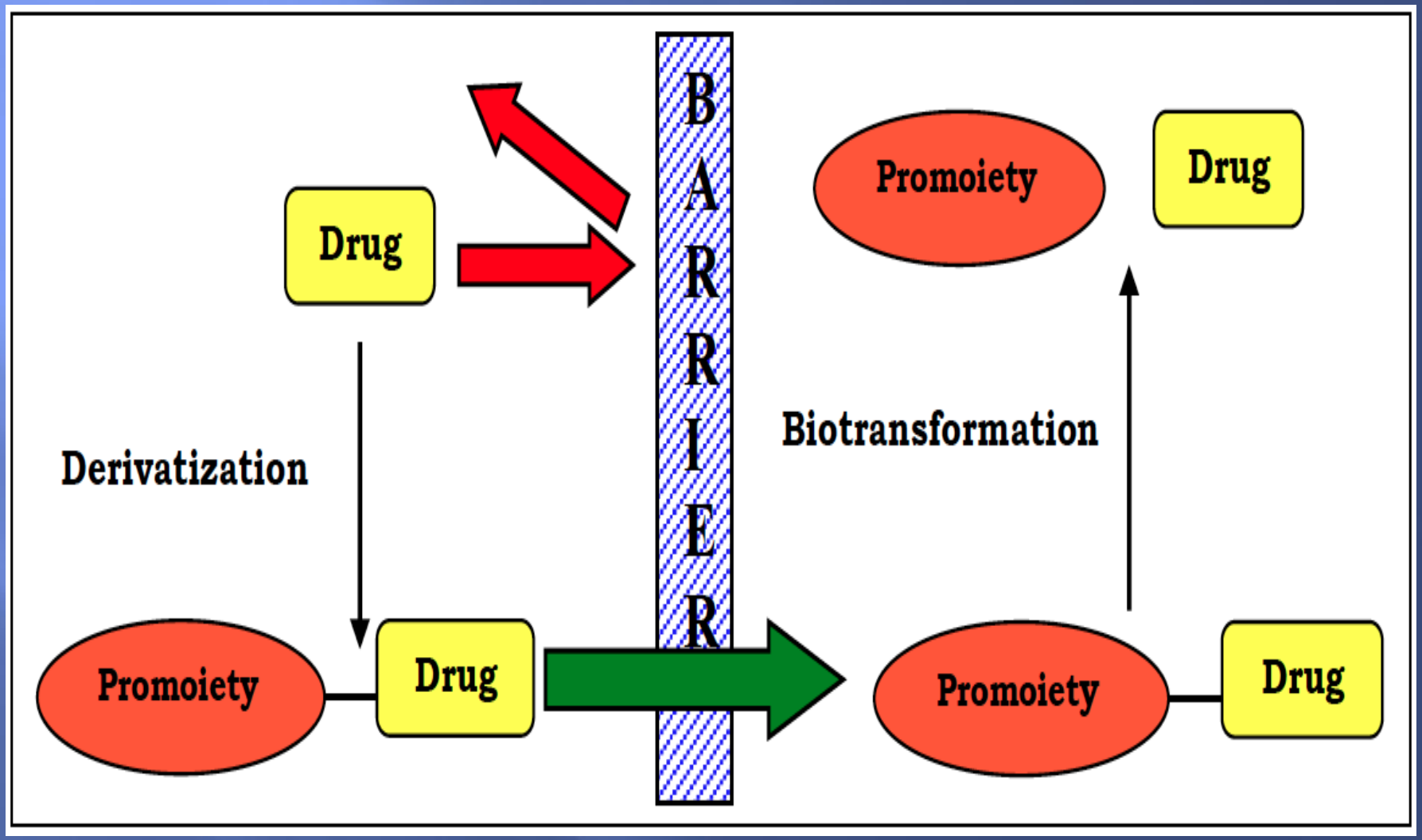
Basic concept of prodrugs:

- The term prodrug was introduced by Albert who used “prodrug” or “proagent” to refer to a pharmacologically inactive compound that is transformed by the mammalian system into an active substance by either chemical or metabolic means.

prodrug concept



Definition

- A ***prodrug*** is thus defined as a biologically inactive derivative of a parent drug molecule that usually requires a chemical or enzymatic transformation (activation) within the body to release the active drug, and possess improved delivery properties over the parent molecule.

H.W 1

What is the difference between “prodrug” and the “codrug”?

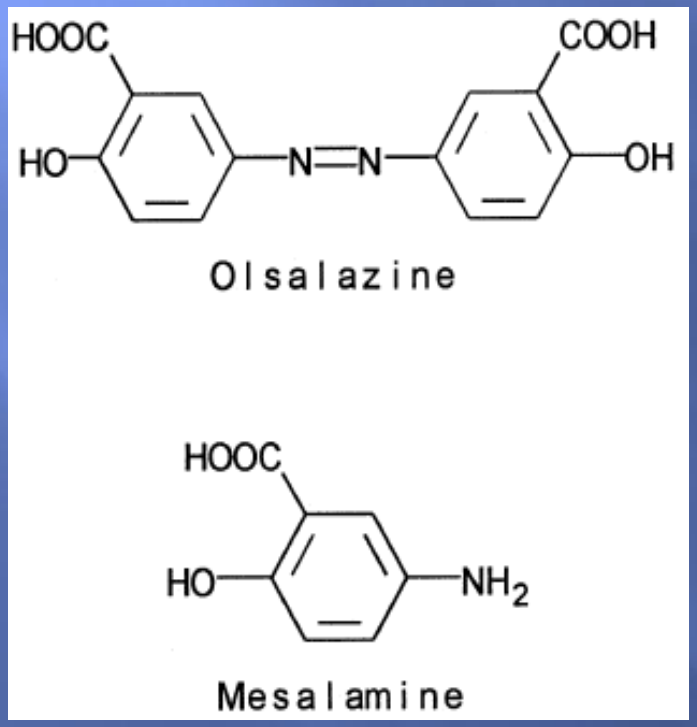
Explain briefly and give an example on each.

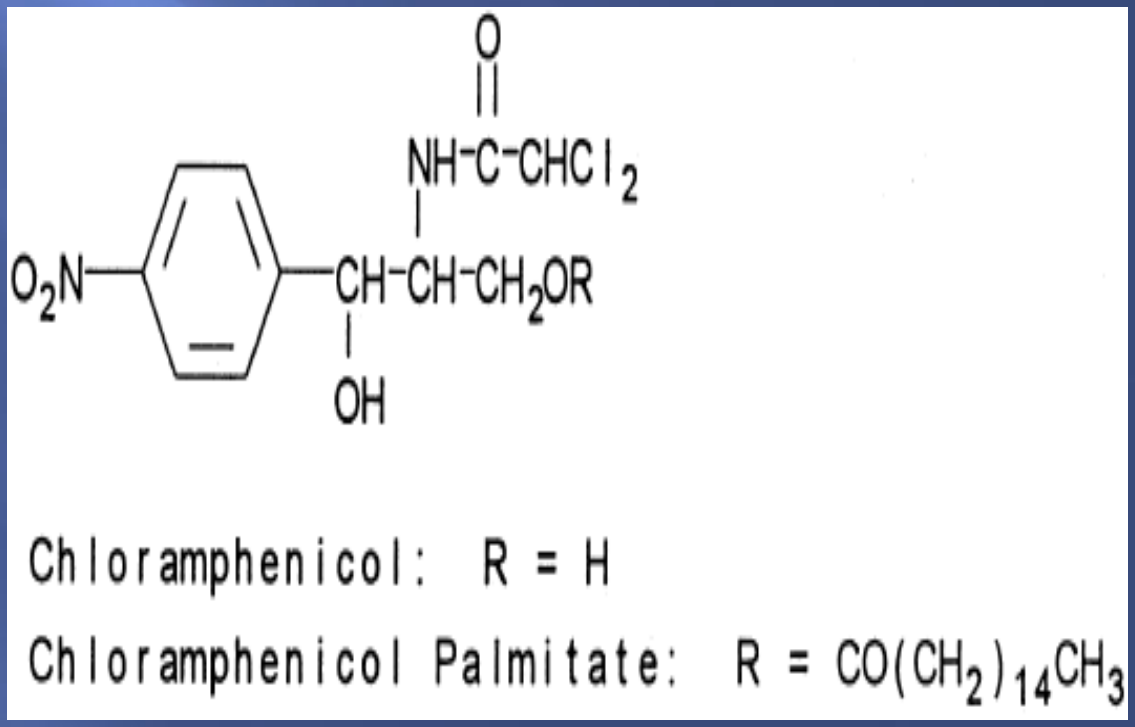
What is a prodrug used for?

- The prodrug approach has emerged as a tool in overcoming various obstacles to drug formulation and targeting such as chemical instability, poor aqueous solubility, inadequate brain penetration, insufficient oral absorption, local irritation and toxicity.

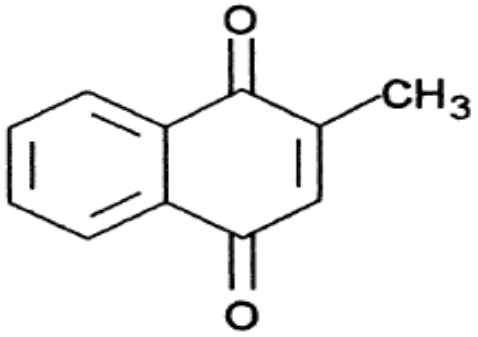
Covalent bonds (cleavable):

- Olsalazine and chloramphenicol palmitate are examples of prodrugs that are *cleaved* to smaller compounds

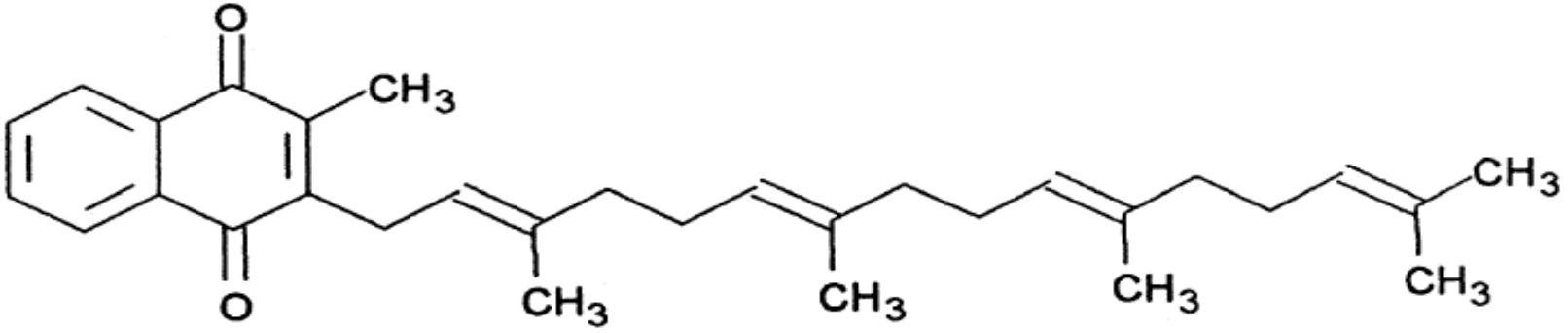




Metabolic precursors



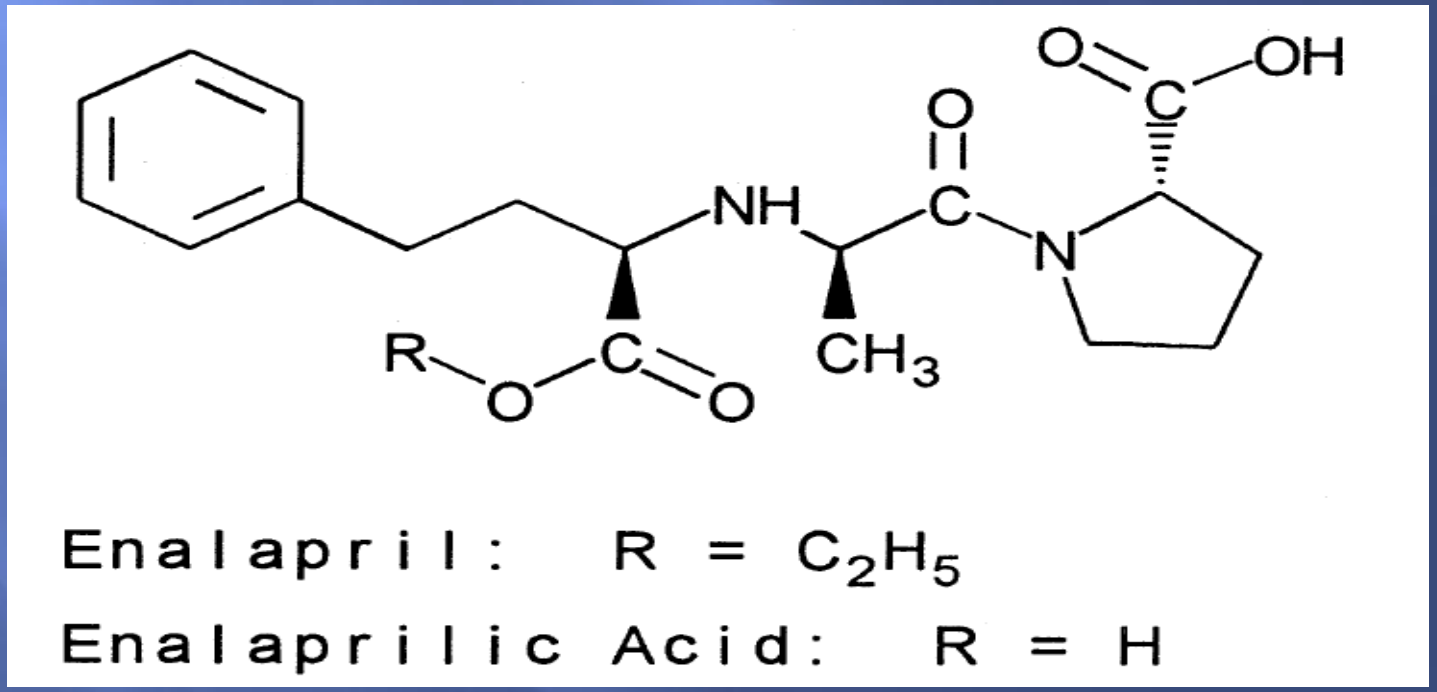
Menadione



Phytonadione (Vitamin $K_{2(20)}$)

Prodrugs of functional groups:

- The ester prodrug is much more readily absorbed orally than the pharmacologically active carboxylic acid



Types of prodrugs:

- *Bio reversible derivatives for various functional groups:*

  - Various types of functional groups are present in different therapeutic agents. These functional groups react with other functional groups of nontoxic promoiety to form prodrugs.

Types of prodrugs:

- Various prodrugs for compounds containing different functional groups are listed below:

1. **Esters.**
2. **Prodrug for Amides, Imides and Other Acidic Compounds.**
3. **Prodrugs for Amines, and.**
4. **Prodrugs with Carbonyl Groups.**

H. W 2

How could you compare between **Amides, Imides and Amines functional groups containing prodrugs?**

Is it possible to you to predict their reaction i.e. acidic or basic?