MEDICINAL CHEMISTRY-I – BP402T

UNIT: 1

CLASS: 5

TOPIC: ENANTIOMERISM

1. ENANTIOMERISM:

The potential biological activity of drug action of a targeted drug molecule is solely dependent on its physico chemical characteristics that essentially comprise of the nature and type of functional moieties present in vivo provides a substantial evidence about the most probable mechanism in the interaction existing between a specific drug substance and macromolecules.

Stereo chemistry deals with atoms in their space , relationship and the effect of such a relationship on the action and effects of the molecule.

Stereoisomers are compounds having the same number and kinds of atoms, the same configuration (arrangement) of bonds but altogether different 3D structures ie., they specifically differ in the 3D arrangements of atoms in space.

Stereoisomers may be further divided into two types

a. Enantiomers
b. Diastereoisomers

ENANTIOMERS:

Enantiomers are isomers whose 3D configuration (arrangement) of atoms gives rise to the formation of nonsuperimposible mirror images.

These are also termed as chiral compounds, enantiomorphs or antipodes.

These compounds essentially possess identical physical as well as chemical characteristic features except for their inherent ability to rotate the plane of

polarized light in just opposite directions with almost equal magnitude quantum and extent.

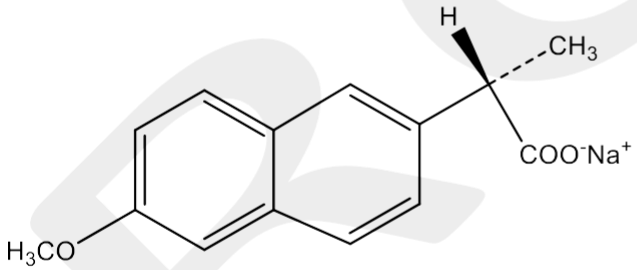
When enantiomeric features are introduced into an asymmetric environment (eg. Human body) they show marked and pronounced variant physical chemical properties, thereby exhibiting appreciable and significant differences in their respective pharmacokinetic and pharmacodynamic behavior.

Thus the presence of variant biological activities based on their diverse enantiomeric features in a drug substance may lead to

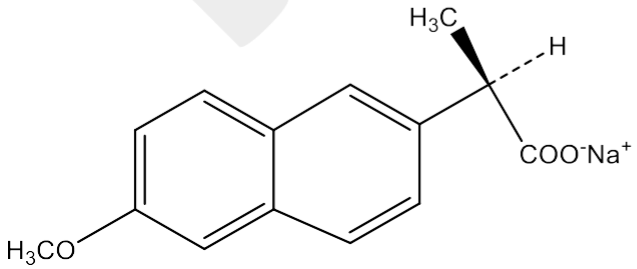
- Adverse side effects
- Toxicity caused due to one of the isomers
- Exhibit appreciable differences in absorption ie., active transport
- Show significant variations in serum protein binding.
- Extent or degree of metabolism.
- Conversion into a toxic substance (impaired metabolism).
- Influence of metabolism of an altogether another drug.

Eg:

1. S-(+) Naproxen exhibits activity as an antipyretic, analgesic and anti-inflammatory drug. In constrast, R-(-) Naproxen sodium is inactive.



S-(+)Naproxen (active)

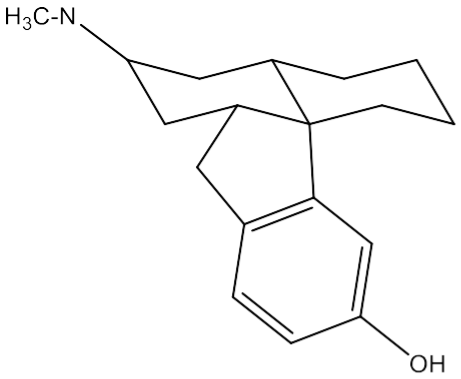


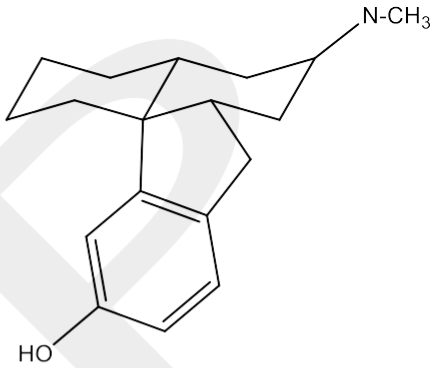
R-(-) Naproxen (inactive)

2. Levorphanol exhibits a potent analgesic activity but dextorphan shows antitussive activity.

   The differences in biological activity between the enantiomers resulted from selected reactivity of one enantiomer with its receptor.

   Eg: (-)- Asparagine is having a bland taste whereas (+)- Asparagine is having a sweet taste.





Levorphanol (analgesic) Dextorphan (antitussisive)

Differences in biological activity also can result from differences in the ability of each enantiomer to reach the receptor site.

Because the biological system encountered by the drug is asymmetric, each enantiomer may experience selective penetration of membranes, metabolism and absorption at sites of loss (eg., adipose tissue) or excretion.