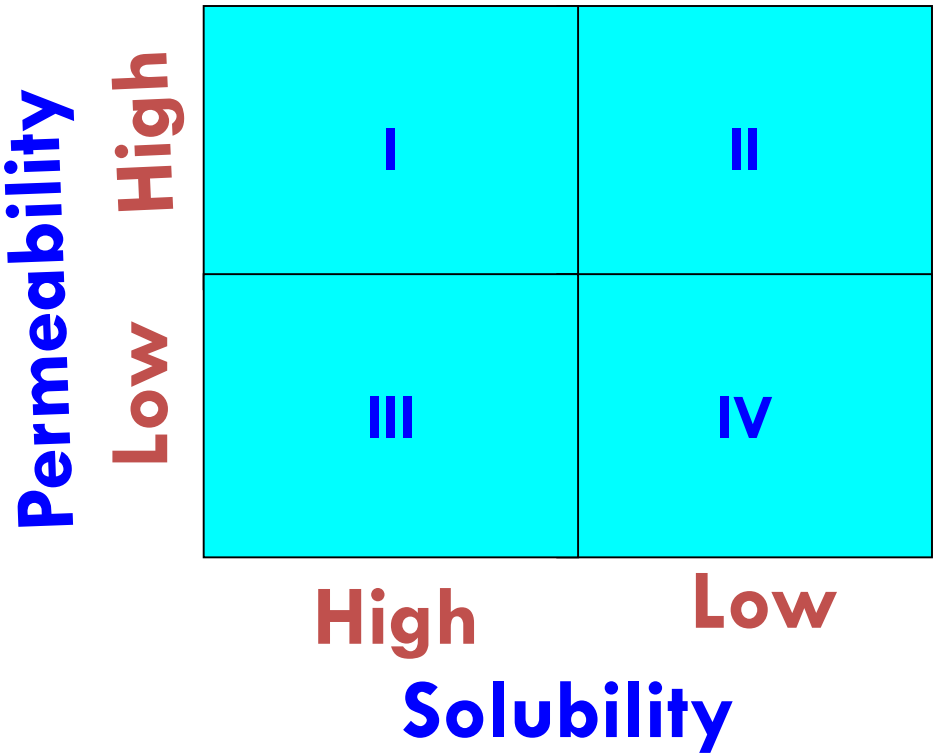
THE BIOPHARMACEUTICAL CLASSIFICATION SCHEME

- A biopharmaceutical classification scheme classifies drugs into four classes according to
  - Solubility across the GI pH range and
  - Permeability across the GI mucosa

– According to the BCS, drug substances are classified into

- **Class I** – High Permeability, High Solubility
- **Class II** - High Permeability, Low Solubility
- **Class III** – Low Permeability, High Solubility
- **Class IV** – Low Permeability, Low Solubility



- The four classes are:
  - **Class I:** high solubility/high permeability
  - **Class II:** low solubility/high permeability
  - **Class III:** high solubility/low permeability
  - **Class IV:** low solubility/low permeability.

- A drug is considered to be highly soluble where the highest dose strength is soluble in 250 mL or less of aqueous media over the pH range 1-8.
- The volume is derived from the minimum volume anticipated in the stomach when a dosage form is taken in the fasted state with a glass of water.

- If the volume of aqueous media taken to dissolve the drug in pH conditions ranging from 1 to 8 is greater than 250 mL then the drug is considered to have low solubility.
- A drug is considered to be highly permeable when the extent of absorption in humans is expected to be greater than 90% of the administered dose.

Class I drugs

- These drugs will **dissolve rapidly** when presented in immediate-release dosage forms, and are also **rapidly transported** across the gut wall.
- unless they form insoluble complexes, are unstable in gastric fluids or undergo presystemic clearance
- Examples: the b-blockers propranolol and metoprolol.
-

Class II drugs

- For drugs in class II the **dissolution rate** is liable to be the rate-limiting step in oral absorption.
- This class of drug should be amenable to formulation approaches to improve the dissolution rate and hence oral bioavailability.
- Examples: ketoprofen and carbamazepine.

Class III drugs

- These drugs are those that **dissolve rapidly** but which are poorly permeable;
- Examples: ranitidine and atenolol.

Class IV drugs

- Are poorly soluble and poorly permeable.
- These drugs are liable to have poor oral bioavailability, or the oral absorption may be so low that they cannot be given by the oral route.
- Examples: hydrochlorothiazide and frusemide
- To improve systemic absorption: Forming prodrugs finding an alternative route of delivery