2002b(2): Briefly describe the factors affecting the uptake of an orally administered drug

General: Uptake of an orally administered drug will be dependent on:
   1. Drug characteristics
   2. Pt characteristics

Drug Characteristics:
Uptake from GIT is dependent on rate of diffusion, which follows Fick’s law of diffusion

\[ F = A \times \text{sol} \times P_{1-2} \times \frac{1}{\sqrt{MW}} \]

where F=flux, A=surface area, sol=drug solubility, \( T \)=barrier thickness, \( P_{1-2} \)=conc gradient

Passive diffusion is most common method of drug absorption.
Dependent on:
- MW: Rate of diffusion inversely proportional to MW Graham’s law
  - MW<1,000 Da ↑diffusion
- pKa (sol): the degree of ionisation determines solubility across the membrane.
  - Only unionised pass readily.
  - Acidic drugs (eg aspirin) are unionised in the acid stomach, are absorbed rapidly
  - Weak bases (eg propranolol) are ionised in the stomach (↓uptake), relatively unionised in the duodenum (↑uptake).
- Formulation:
  - delay absorption → ↑size of molecule, binding agents (eg enteric coated), granulated
  - rapid absorption → liquids
- Physicochemical interaction (↓\( P_{1-2} \)):
  - gut contents/food/other drugs → bind/inactivate drug
    - eg tetracycline bound with Ca\(^{2+} \) from milk
    - eg bile salts, bacterial degradation
- Pharmacokinetics: metabolism at the gut wall (eg GTN) (↓\( P_{1-2} \))

Patient characteristics
- Compliance with medication
- Mucosal blood flow (↓\( P_{1-2} \))
- Vomiting (↓A)
  - Insufficient/inadequate exposure to GIT to allow absorption
- Malabsorption syndrome/↑transit time (↓A)
  - Acquired (eg tropical sprue) or congenital (Coeliac disease)
  - ↓effective area of absorption
- Gastric stasis (↓A)
  - Illness, trauma, drugs
  - Most drugs → ↓absorption (except aspirin, which is unionised in the stomach, and will continue to be absorbed from there in event of gastric stasis)