Route of drug Administration

PHL-358-PHARMACOLOGY AND THERAPEUTICS-I

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Objectives

• Describe the pharmacokinetic implications of various Routes of Administration
• Understand the advantages and disadvantage of various Routes of Administration from a PK point of view
• Routes
Routes of Administration

- • Enteral
  - To do with Gastrointestinal (GI) tract
  - E.g. oral, buccal, rectal
- • Parenteral
  - Not enteral
  - E.g. IV, IM, SC
- • Other
  - E.g. topical, inhalation
- • IV ‘special’
  - No absorption step
Drug Administration

- Intramuscular
- Subcutaneous
- Intravenous
- Topical
- Oral
- Sublingual
- Rectal
- Vaginal
Oral Administration

• Advantages
  – Convenient - portable, painless, easy
  – Cheap - not sterile, compact
  – Variety - tablets capsules, fast, slow release

• Disadvantages
  – Maybe inefficient - high dose, low solubility
  – First-pass effect
  – Food Interaction
  – Local effect - GI flora
  – Unconscious patient - not able to swallow
First Pass Effect
General Circulation
Portal Circulation Liver
Small and Large Intestine
First Pass Effect

General

Circulation

Portal

Circulation

Liver

Small and

Large Intestine
Buccal/Sublingual

• Held in mouth or under tongue

• Buccal - often harder - slower absorption
  – 4 hour disintegration (USP XX p 958)

• Sublingual - softer - faster release
  – 2 min disintegration (USP XX Nitroglycerin p552)

• Examples - nitroglycerin, steroids, nicotine (chewing gum)
Buccal/Sublingual

- Advantages
  - Avoid first pass effect
  - Rapid absorption
  - Drug stability

- Disadvantages
  - Inconvenience - advantages lost if swallowed
  - Small dose limit
Rectal

- By Suppository or Enema
  - E.g. aspirin, theophylline, chlorpromazine

- Advantages
  - By pass liver
  - Useful - children, non po

- Disadvantages
  - Erratic absorption
  - Not well accepted
Intravenous
• Injection into a peripheral vein over 1 to 2 minutes (bolus) or longer as an infusion
• Advantages
  – Rapid response, Total dose
  - larger doses by infusion, Veins relatively insensitive
• Disadvantages
  – Suitable vein, Rapid response
  - toxicity, Trained personnel,
Expensive - sterility, solvent, transport
Subcutaneous

• Just under the skin

• Advantages

  – Can be given by the patient

  – Slow but generally complete absorption

• Massage or heat, Vasoconstriction

• Disadvantages

  – Painful

  – Tissue damage from irritant drugs

  – Maximum of 2 ml injection
Intramuscular

• Advantages
  – Larger volume than SC
  – Depot or sustained effect
  is possible

• Disadvantages
  – Trained personnel
  – Site effects absorption
  - deltoid
  – Absorption may be erratic or incomplete
Inhalation

• Local effect - bronchodilator
• Systemic effect
  - general anaesthesia
• Advantages
  – By pass liver
  – Absorption of gases efficient and rapid
• Solids and liquids excluded if > 20 micron
and
exhaled if < 0.5 micron
Inhalation

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  - general anaesthesia

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Other ROA's

- Intra-nasal - small dose, avoid first pass
- Intra-arterial - cancer chemotherapy, localised delivery
- Intra-thecal - into the cerebrospinal fluid, avoid BBB