

PHARM20001 Pharmacology: How Drugs Work

Summary notes for lectures 1 to 23

Contents

1. Introduction to pharmacology and its principles
2. Autonomic Nervous System
3. Adrenergic Pharmacology
4. Cholinergic Pharmacology
5. Bioactive Lipids
6. Pharmacokinetics
7. Pharmacogenomics
8. Therapeutics
9. Scientific process of medical therapies
10. Drug discovery
11. Poisons and drug schedules
12. Asthma
13. Immunopharmacology
14. Drugs in the cardiovascular system (heart)
15. Drugs in the cardiovascular system (blood vessels)
16. Nootropics – smart drugs
17. Treatment of obesity
18. Drugs of dependence

Pharmacology – Branch of science concerned with drugs and their actions

- Key Principles:
 - Hippocrates – Risk vs Reward
 - Paracelsus – Dose determines effect
 - Erlich – Drugs bind to molecular targets
- Pharmacodynamics – Effect of drug on body
 - Target – Drug must:
 - Be at an effective concentration
 - Bind
 - Have an effect
 - Be selective
- Pharmacokinetics – Effect of body on drug
 - To get there, drug must be:
 - Absorbed
 - Distributed
 - Reach an effective concentration
 - To get out of there, drug is:
 - Metabolised – Commonly by liver
 - Excreted – Commonly in the forms of urine / faeces
 - Absorption and excretion happens simultaneously to produce a resulting dose in body which may or may not be effective
- Drug = chemical that affects physiological function in a specific way
 - Present in the body – Used for cellular communication
 - Hormones, neurotransmitters, second messengers
 - Antibodies, genes
 - Eg adrenaline from adrenal gland
 - Not normally found in body – Synthetic or naturally occurring
 - Can be therapeutic agent or poison depending on dose and method of absorption
 - Chemicals commonly found in plants eg atropine from Atropa Belladonna. Originally used as defense mechanisms in plants
- Drug names – Most marketed drugs have both a trade name and a generic name
 - Panadol = paracetamol
 - Ventolin = salbutamol
 - Prozac = fluoxetine
 - Where relevant, drug family names are used eg SSRIs = selective serotonin reuptake inhibitors
- Drug targets
 - Ion channels – Allow passage of ions into cells
 - Drugs block or modulate channel opening
 - Nifedipine for hypertension – Blocks Ca²⁺ channels to reduce blood vessel constriction and reduce blood pressure
 - Carrier molecules – Transport of molecules across lipid membranes
 - Drugs block or utilize carriers
 - Fluoxetine for depression – blocks serotonin reuptake into presynaptic membrane. Prolongs serotonin action
 - Enzymes – Catalyse synthesis / breakdown of molecules / neurotransmitters
 - Drugs may inhibit enzymes
 - Aspirin – inhibits cyclo-oxygenase (COX). Reduced synthesis of mediators of pain / fever / inflammation
 - Drugs may use enzymes
 - L-dopa – uses dopa decarboxylase to convert itself into dopamine. Increased synthesis of dopamine. Used for Parkinson's disease.