Biomedicine

Lecture 19:

Pharmacology
Pharmacology

• The science which deals with the effects and uses of drugs in the treatment of disease.

• A drug may be defined as: “A medicine or other substance which has a physiological effect when ingested or otherwise introduced into the body”. OXFORD DICTIONARY

• Foods, water & supplements also change human physiology – does this make them a drug??
<table>
<thead>
<tr>
<th>Allopathy</th>
<th>Natural medicine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treat symptom</td>
<td>Treat whole person</td>
</tr>
<tr>
<td>Symptom care</td>
<td>Patient care</td>
</tr>
<tr>
<td>Suppress symptoms</td>
<td>Correct vital force of body</td>
</tr>
<tr>
<td>Toxic</td>
<td>None toxic</td>
</tr>
<tr>
<td>Invasive</td>
<td>None-invasive</td>
</tr>
<tr>
<td>Side-effects/aggravations can be severe &amp; permanent</td>
<td>Aggravations, healing crisis (not serious or life threatening)</td>
</tr>
<tr>
<td>Drugs, surgery, x-rays, radiation, chemicals</td>
<td>Herbs, nutrition, essences, oils, physical therapies</td>
</tr>
<tr>
<td>Suppress the body</td>
<td>Stimulate vital force</td>
</tr>
</tbody>
</table>
Suppression

• Suppression: the disappearance of the manifestation of an illness without having healed the illness.

• It causes the dis-ease to go deeper in the body and will reappear in another form.

• Suppression is not treatment – it is harmful.

• Treating the cause of the dis-ease is essential for healing to occur.

• Examples: steroids for ski, pain killers, antifungal creams, hypotensive medication, antibiotics, chemotherapy, radiation
Medicines and Healthcare Products Regulatory Agency (MHRA)

• Responsible for regulating all medicines and medical devices in the UK by ensuring they work and are acceptably safe.

• Supplements fall outside this definition provided they don’t make medicinal claims!

• Herbs may soon to be considered medicines and will have to be registered…
The Medicines Act 1968 (UK)

Medicines are divided into 3 categories:

- **General Sale List (GSL) medication**
  - Able to be sold anywhere

- **Pharmacy Only Medication (PO)**
  - Only able to be sold in pharmacy

- **Prescription Only Medication (POM)**
  - Only able to be sold on prescription
Classification and Naming

Classification: Drugs are classified by their primary pharmacological action and effect:

- Anti-microbial
- Anti-inflammatory
- Analgesic
- Anti-convulsants
- Anti-cancer

All drugs have three names:

a) Proprietary, brand or trade name e.g. Panadol
b) Generic name: Simple official name for a specific drug e.g. Paracetamol
c) Chemical name e.g. Acetyl-para-aminophenol
BNF: British National Formulary

• Necessary for every therapist
• Used by NHS
• Lists drug actions, dosages interventions, etc
• Often obtainable second hand (from Pharmacy, Amazon etc)
Drug Effects

**Indication**
- The approved uses or diseases for which the drug has been proved effective.

**Side Effects**
Additional effect on the body even at the recommended dose.
E.g. Anti-histamines: Drowsiness and dry mouth, suppression

**Contraindication**
- Circumstances under which the drug should usually not be taken.
Adverse/Toxic Effects of drugs

- **All drugs** have some level of toxic/side effects.
- Can be dangerous or life threatening.
- Patient must be referred back to treating practitioner!
- Toxic effects may be accepted/expected (e.g. cancer)
- Signs may not appear until a long period of time has elapsed
  - E.g. Anti-emetic/sedative Thalidomide used in pregnancy until 1960s

- Adverse effects can be classified as:
  - **Predictable**:
    - Exaggerated physiological effect
    - Toxicity
  - **Unpredictable**:
    - Allergy
    - Idiosyncratic reaction

Copyright CNM – College of Naturopathic Medicine
Adverse Effects of drugs

Statistics in 2011/12 in the UK:

- 57,733 hospital admissions
- 6,173 admissions to hospital with a primary diagnosis of a drug-related mental health and behavioural disorder.
- 12,344 admissions to hospitals with a primary diagnosis of poisoning by drugs.

(hscic, Nov 2012)
Adverse Effects of drugs

Statistics in 2011/12 in the US:

• 100 people die from drug overdoses every day in the United States
  – most of these deaths were caused by prescription drugs.
• Nearly three out of four prescription drug overdoses are caused by prescription painkillers—also called opioid pain relievers.
• The misuse and abuse of prescription painkillers was responsible for more than 475,000 emergency department visits in 2009.
• More than 12 million people reported using prescription painkillers without a prescription.
• Kills 40 people a day in the US.
  (cdc, 2013, webmd, 2011)
Adverse Effects - Statins

• One of the most widely prescribed drugs – over 100 million prescriptions per year.
• The public are informed they are safe with few side effects. The reality is very different!
  – At least 1 in 10 will experience myopathy
  – Liver dysfunction
  – Renal failure (BMJ, 6th Nov 2008)
  – Cataracts
  – Reduced CoQ10 levels
Adverse Effects - Reye’s Syndrome

- Associated with aspirin consumption by children with viral diseases such as chickenpox
- Can cause brain damage, liver failure and possible death in children
- Symptoms are similar to viral illnesses and are often missed
- Current advice in the United Kingdom by the Committee on Safety of Medicines is that aspirin should not be given to those under the age of 16 years
Specific Adverse Effects

• **Hypersensitivity** e.g. Penicillin, local anaesthetics

• **Idiosyncratic reactions:**
  – Reaction to a substance specific to the sufferer
  – Commonly, this is caused by an enzymopathy (disturbance in enzyme function), congenital or acquired.
  – Example: Excessive excitement after taking a sedative drug – Common in children that parents have tried to sedate on long haul flights!

• **Iatrogenic effect:**
  – Induced by physician
Drug Interactions

- May be with other drugs, foods, herbs or other substances
- Common in elderly: Take many drugs and might consult several doctors/therapists

**Synergism** - effect increased:
- E.g. Painkiller combination
- Drugs can also act synergistically with some supplement
- E.g. Fish oil and blood thinning medication

**Antagonism** - effect decreased:
- E.g. Vit. K counteracts the effect of too much blood thinner

Drugs can also deplete levels of certain nutrients! Check chart on your exercise worksheet.
Drug Interactions

- Interactions between orthodox medications can be fatal.  
  - Warfarin and NSAIDs, Verapamil and Digoxin
- Some medicines block liver/intestine enzyme pathways  
  - Many drugs affect liver detoxification e.g. Mibefradil
- Liver enzymes would normally reduce drug concentration
- This facilitates an iatrogenic overdose:
- Grapefruit juice  
  - A single glass can significantly alter drugs levels in the body  
  - Grapefruit inhibits an enzyme (CYP 3A4) in the intestinal  
  - This enzyme breaks down hundreds of medications  
  - The amount of this intestinal enzyme varies from person to person, so the effect of grapefruit on a person cannot be accurately estimated
  - Drugs affected: Some calcium channel blockers, statins, anxiolytics, HRT/OCP, Anti-retrovirals, anti-epileptics (to name just a few!!!)
Drug Interactions

• Alcohol

• The majority of overdose cases and fatalities in hospital emergencies are drug/drug or drug/alcohol interactions

• Alcohol can inhibit a drug's metabolism by competing with the drug for the same set of metabolizing enzymes

• Approximately 32 percent (658,263) of all drug abuse emergency dept. visits in 2009 in the US involved the use of alcohol, either alone or in combination with another drug (NIH, 2011)
Drugs and Alcohol

• Long-term alcohol ingestion may activate drug-metabolizing enzymes, thus decreasing the drug's availability and diminishing its effects.
• Enzymes activated by chronic alcohol consumption transform some drugs into toxic chemicals that can damage the liver or other organs.
• Alcohol can magnify the inhibitory effects of sedative and narcotic drugs at their sites of action in the brain.
• Some drugs affect the metabolism of alcohol, thus altering its potential for intoxication and the adverse effects.
• Alcohol can force certain drugs out of their depot resulting in overdose – Depot slow release form of a drug.
Drug/Herb Interactions

• It is now being discovered that some herbal preparations also interact with medical drugs reducing their effectiveness

• e.g. **St John’s Wort** reduces the effectiveness of antiretroviral drugs in HIV.

• Every practitioner using herbal medicine should have a reference book of drug/herbal interactions
Drug/Herb Interactions

Liquorice

- can increase side effects of digoxin by lowering potassium levels (in high doses)
- Effects hormones so may affect oestrogen pills.
- May affect the breakdown of drugs broken down in the liver.
Drug/Herb Interactions

Senna

- A stimulating laxative which can lower potassium levels.
- Can increase side effects of digoxin
- If taken in high doses can cause diarrhoea and increase effect of warfarin
- May cause dependence if used long-term.
Drug Interaction Resources

• A-Z Guide to Drug-Herb-Vitamin Interactions by Alan R. Gaby (Editor)

• BNF

• www.nutripeople.com

• www.naturaldatabase.com
Activity: Partner Work

• Fill in the table on the handout using your BNF and nutrient depletion chart (found in the handout).
• Interactions are found in the BNF appendix. If you don’t have one you may need to research this using the web.
Chrono-Pharmacology

• The study of rhythmic, predictable-in-time differences in the effects and/or pharmacokinetics of drugs both in experimental animals and in people

• Drug metabolism changes depending on the time of day. When metabolism is slowest drugs last longer and are more effective
Pharmacokinetics & Pharmacodynamics

- PHARMACOKINETICS – Absorption, Distribution, Metabolism, Excretion
  - Absorption: Diffuses from site of application
  - Distribution: Via blood, lymph
  - Metabolism: Breakdown by liver using enzymes
  - Excretion: Via kidneys, GIT, skin, lungs

- PHARMACODYNAMICS – How drugs exert their effects
Administration

1) Oral: Tablets, capsules, liquid
2) Sublingual: e.g. Nitroglycerin, homeopathy, B12
   Avoids 1st pass effect
3) Injection e.g. insulin, B12
4) Inhalation: E.g. Bronchodilators, essential oils
5) Topical: To skin or mucous membranes
   – Have to be able to penetrate the skin – Hydrophilic fatty substances e.g. nicotine, pestrodiol (HRT patch)
   – Suppository/Enema – Bypasses liver, suitable if someone is unconscious, has nausea/vomiting or difficulty swallowing
   – Suppositories have a different rate of absorption
Dosages

• Amount of drug required to produce the desired effect.
• Usually expressed by a weight or measure and time factor
• For example: 2 BD, 3 TDS
• We use this for prescribing herbs and supplements

OD - Once daily
BD - twice daily
TDS - Three times a day
QDS - Four times a day

• Based on patient parameters:
  – Weight
  – Age
  – Sex
Dosage Regimes

• Patient **compliance** is essential!
• Unfortunately this is not often adhered to
• Taking a drug too frequently or at too higher dose can lead to toxicity:
  – CLEAR AND CONCIDE INSTRUCTION IS ESSENTIAL!!! Write everything for your patients!!

<table>
<thead>
<tr>
<th>Dosage Regime</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 times/day</td>
<td>58%</td>
</tr>
<tr>
<td>3 times/day</td>
<td>75%</td>
</tr>
<tr>
<td>2 times/day</td>
<td>76%</td>
</tr>
<tr>
<td>Once daily</td>
<td>95%</td>
</tr>
</tbody>
</table>

Copyright CNM – College of Naturopathic Medicine
Absorption

• Affected by:
  – Large vs. small molecules
  – Lipid soluble vs. water soluble
  – Acid vs. alkaline
  – Chemically reactive vs. chemically inert
  – Gut health
  – Digestive function
Distribution and Transport in the Body

• Remember: Cell membranes are phospholipid bilayer

• **Lipid-soluble substances will cross membranes very easily**

• **Water-soluble substances will not.**
Elimination (Detoxification)

• Substances may be simply excreted in a largely unaltered form via the:
  – Kidneys
  – Skin
  – Lungs
  – Bile
  – Intestines

• Or they may be metabolised (chemically changed in some way) to render them inactive/in an excretable form.
  – This is ‘detoxification’ (metabolising)
  – Carried out in the liver and kidneys
Receptors

- Receptors can respond to:
  - Hormones (e.g. phyto-oestrogens)
  - Neurotransmitters (e.g. acetylcholine, serotonin)
  - Electrolytes (e.g. calcium)
- Some receptors are very specific, others more general (For example beta receptor blockers mostly in the heart)
- Drugs are either stimulatory or inhibitory
Mode of Action

• In many cases the detail of the mode of action is not known
• Hence a lot of side effects (short or long term) are not known
• 3 common types of action are:
  – Specific - chemical structure is of paramount importance in its action
  – General - physical and chemical properties important
  – Placebo - dependent on the practitioner and the consultation.
    • Faith or belief in the remedy/practitioner
    • 30% of all medications prescribed have a placebo effect.
    • E.g. scientists tricked runners into thinking that they were drinking oxygenated water when they were drinking tap water – performance increased!
Activity: Practice Quiz and Exercises

• Teams of 3-4
• Choose a team name and write neatly so the other teams can read your answers!
• 18 Questions
• 26 Marks available
Gastrointestinal Drugs

Antacids

- E.g. Mucogel, Maalox
- Usually contain aluminium or magnesium compounds
- Indication: Dyspepsia, esp. Ulcer-based – Neutralise stomach acid
- Overuse of antacids – Acid rebound

- **Alternatives:** Diet and lifestyle changes, water, potato juice, aloe vera, liquorice, slippery elm, baking soda (shot-term) avoid caffeine, manage stress, rolling therapy, herbs, non-acidic forms of supplements e.g. vitamin C.
Gastrointestinal Drugs

Antispasmodics

• These compounds act directly on the gut muscles at the cellular level to relax them
• Antimuscarinics – block acetylcholine receptors – commonly used for treating vomiting and diarrhoea
• E.g. Mebeverine, Buscopan

• **Side effects**: Constipation, palpitations, reduced bronchial secretions, urinary retention

• **Alternatives**: Magnesium, herbs – antispasmodics, homeopathy, acupuncture, tissue salts
Gastrointestinal Drugs

Antispasmodics

Peppermint oil
- E.g. Colpermin, Mintec
- Indications: Relief of colic and distension
- Relaxes smooth muscle (alternative to above)
- Caution: Do not chew (may irritate mouth/oesophagus)
- Supplement: Biocare IBS

Chamomile for children
Gastrointestinal Drugs

H2-Receptor Antagonists

• Ulcer-healing
• E.g. Zantac, Ranitidine, Tagamet, Pepsid
• Used to block the action of histamine on parietal cells in the stomach, decreasing the production of acid by these cells
• Mostly replaced by helicobacter eradicating drugs and PPIs (more effective)

• **Side effects**: Liver and/or kidney-impaired patients as these drugs can compromise detoxification pathways

• **Alternatives**: Herbs e.g. liquorice, homeopathy, acupuncure
Gastrointestinal Drugs

Proton Pump Inhibitors (PPIs)

- E.g. Zoton, Nexium, Losec
- Block the ‘proton pumps’ of gastric cells
- Short term treatment of gastric/duodenal ulcers
- Often used with 2 antibiotics to eradicate helicobacter
- Used to prevent NSAID-associated ulcers

- **Side effects**: Liver disease, pregnancy, breast-feeding, gastric cancer (masking Sx), constipation, abdominal pain, headache, dizziness

- **Alternatives**: Water, no caffeine, less stress, rolling therapy, diet changes, herbs, non-acidic forms of supplements e.g. vitamin C.
Gastrointestinal Drugs

Anti-motility Drugs

• E.g. Codeine phosphate, Imodium, Lomotil, Loperamide
• Example: Loperamide acts on opioid receptors in the muscles lining the walls of the intestines. This reduces peristalsis allowing more time for water and electrolytes to be reabsorbed
• Indication: Uncomplicated acute diarrhoea in adults
• Contraindication: Young children
• Caution: In dehydration, fluid/electrolyte replacement are the primary concern
• **Alternatives**: Probiotics, tannin, charcoal, clay, apple pectin to bind the stool
• **Note**: It is important to address the underlying cause in diarrhoea – allergy, intolerance etc.
Gastrointestinal Drugs

Corticosteroids

- E.g. Prednisolone, hydrocortisone
- Prescribed for: Inflammatory bowel disease
- E.g. Patients with Crohn's or ulcerative colitis in acute phase – Never take off prescription drugs!!!
- Block the production of substances that trigger inflammatory actions

- **Side effects:** suppress immunity, oral thrush, indigestion, insomnia, mood changes (aggressive, irritable), thinning of skin, osteoporosis, high b.p., cataracts, glaucoma, diabetes

- **Alternatives:** Anti-inflammatory diet, EFAs, herbs
Gastrointestinal Drugs

Laxatives

• Bulk forming laxatives:
  – E.g. Bran, Fybogel, Normacol – often contain sugar and flavours!
  – Increase faecal mass to stimulate peristalsis
  – Must be taken with water
  – **Alternatives:** Fibre rich foods, water, exercise!

• Stimulant laxatives:
  – E.g. Senna, Sennacot
  – **short-term use only!** Not a long-term solution
  – Increase intestinal motility
  – Side-effects: May cause diarrhoea, hypokalaemia,
    Senna can irritate the colon and long term use has been linked to colon cancer
Gastrointestinal Drugs

Laxatives

- Osmotic laxatives:
  - E.g. Lactulose, Magnesium salts (Mg sulphate, Epsom salts)
  - Increase water in colon by drawing fluid from the body or retaining fluid
  - Caution: Mg salts are often abused. May cause dehydration

- Side effects of any laxative: Colic, “Lazy bowel”
Cardiac Glycosides

- E.g. Digoxin, Lanoxin
- Increase myocardium force of contraction by increasing Ca influx into the heart muscle.
- Need Mg and K to counteract Ca action when on digoxin
- Indications: Atrial fibrillation, heart failure
- **Side effects**: NVD, anorexia, abdominal pain, visual disturbance
- Interactions: Ca (agonistic- increases effect)
- Caution: Low Mg, Ca, K increases toxicity
- **Alternatives**: Hawthorn, Mg, K, Ca (“heart food”), homeopathy
Cardiovascular Drugs

Calcium-Channel Blocker

• Block influx of calcium to heart and vascular muscle
• Dual effect – heart contraction force is reduced and coronary artery dilate
• E.g. Plendil, Zanidip, Adalat
• Indications: Angina, hypertension

• **Side-effects:** NVD, dizziness, headache, fatigue, oedema

• **Alternatives:** Hawthorn, Mg, K, Ca ("heart food")
Cardiovascular Drugs

Diuretics

• Diuretics reduce reuptake of primary filtrate from the loop of Henle / distal tube = Decrease blood volume and therefore pressure

• E.g. Furosemide, Lasix

• Indications: Hypertension, pulmonary oedema, chronic heart failure

• **Side effects**: Mineral loss: Hypokalaemia - dangerous, associated with other side-effects

• **Alternatives**: Celery, asparagus, diuretic herbs, hydration
Cardiovascular Drugs

**Beta-Blockers**

- E.g. Atenolol, Tenormin, Lopressor
- Block the action of noradrenaline receptors in arteries and on the heart muscle.
- Noradrenaline causes arteries to narrow and the heart to beat faster. By blocking its action, beta-blockers can cause arteries to widen, slow down the heart and decrease its force of contraction.
- Indication: Hypertension, angina, arrhythmia
- **Side effects:** Fatigue, cold extremities, nightmares/sleep disruption (not water-sol types). May weaken the heart in the long term
- **Alternatives:** herbs, Mg, homeopathy, acupuncture
Cardiovascular Drugs

Anti-Hypertensives

ACE inhibitor/Angiotensin-II receptor antagonist

• ACE inhibitors stop conversion of angiotensin I to angiotensin II (Vasoconstrictor)
• Angiotensin II receptor antagonist Block receptors stopping the action of angiotensin II
• E.g. Captopril, Gopten, Tritace, Ramipril

• **Side-effects:** Hypotension, persistent dry cough, NVD, reduces glomerular filtration (esp. in renal impairment: Renal Fx requires monitoring), electrolyte imbalance

• Contra-indications: Concomitant NSAIDs

• Often need diuretic use at same time
Cardiovascular Drugs

Nitrates

• E.g. Glyceryl trinitrate, Isodur
• Rapid, potent vasodilator
• Indications: Prophylaxis or Rx of angina
• Caution: Tolerance develops rapidly in continual use

Copyright CNM – College of Naturopathic Medicine
Cardiovascular Drugs

Alternatives

• **Alternatives** to any antihypertensive:
  Smoking cessation

• Weight reduction

• Reduced alcohol, salt & saturated fat intake

• Increase in exercise and fruit/veggie intake
Cardiovascular Drugs

Anti-coagulants
• Indications: DV thrombosis, pulmonary embolism, TIAs
• Interactions: Gingko, Fish oil, Vitamin E

Parenteral: e.g. Heparin
• Rapid action but short duration

Oral: e.g. Warfarin
• Must be monitored closely (also used as rat poison)
• Antagonise effects of Vit K, slow to act
• Narrow therapeutic index

• Alternatives: Support liver function, Rutin and vitamin C to help strengthen capillaries, herbs (Ginkgo), vitamin E, diet, detox, exercise
Cardiovascular Drugs

Statins

• Inhibit an enzyme involved in cholesterol synthesis, especially in the liver.
• E.g. Lipitor, Zocor, Simvastatin, Lipostat
• Indication: Hypercholesterolaemia, hypertriglyceridaemia
• Often combined with antihypertensives, aspirin, diabetes management and/or diet/lifestyle
• High insulin stimulates the action of this enzyme so diabetics often have high cholesterol
• **Side effects**: insomnia, dizziness, fatigue, headaches, liver damage, gastro-intestinal effects, muscle aches etc.
• *Prescribed when there is a 20% risk of a cardiovascular event (includes all >40yr diabetic patients)*
Cardiovascular Drugs
Cardiovascular Drugs

Statins

CoQ10

• The enzyme that makes cholesterol is the same enzyme also make CoQ10
• Statins can deplete CoQ10 levels leading to myopathies
• 100mg CoQ10 per day for people on statins

Alternatives: Red rice yeast (natural statin), artichoke, fish oil, soluble fibre, diet and lifestyle intervention essential, liver function
Activity: Which Drug Are You?

• Pick a drug name out the bag and revise it’s key features
• Choose appropriate natural therapy alterantives to your drug!
• Everyone must move around the room, when you meet someone describe your drug to them until they guess correctly which one you are
• You must then guess their drug correctly before you can move on!
• Keep a note of how many people you guess.
• The winner is the person who guesses the most other people!
Respiratory System Drugs

Corticosteroids

- E.g. Becotide, Pulmicort, Symbicort inhaler
- Indications: Asthma prophylaxis, COPD
- Onset 3-7 days, regular use required for Rx
- Reduce airway inflammation, oedema, mucus secretion
- **Side effects**: Adrenal suppression, Oral Candidiasis, Respiratory tract infection
- **Alternatives**: natural anti-inflammatories, bronchodilators, mucous membrane support
Respiratory System Drugs

Bronchodilators - Adrenoceptor Agonists

- Work by acting on receptors in the lungs called beta 2 receptors.
- Stimulation of these receptors causes the muscles in the airways to relax, allowing the airways to open.
- Salbutamol (Ventolin): Immediate action, short duration (~4hrs)
- Salmeterol: Delayed action, longer duration. Do not use in acute attack
- Indications: Symptomatic relief of bronchoconstriction (Prevention: steroids)
- **Side effects**: Tremor, anxiety, headache, palpitation, muscle cramping
- **Alternatives**: bronchodilator and anti-asthmatic herbs, identify and treat cause (allergy), avoid triggers
Respiratory System Drugs

Leukotriene Receptor Antagonists

• Latest asthma drugs
• Indication: Non-steroidal asthma prophylaxis
• Blocks a chemical reaction that can lead to inflammation
• **Side effects:** NVD (fewer than steroids)

• **Alternatives:** bronchodilator and anti-asthmatic herbs, identify and treat cause (allergy), avoid triggers

Copyright CNM – College of Naturopathic Medicine
Respiratory System Drugs

Antihistamines

• Indications: Allergies, Hayfever, Pruritis

Non-sedating antihistamines

• E.g. Telfast, Zirtek, Terfenadin, Claritin

• **Side effects:** (Rarely) myalgia (muscle pain), drowsiness

Sedating antihistamines:

• E.g. Tavegil, Piriton, Vallergan, Phenergan

• **Side effects:** Anti-muscarinic (urinary retention, dry mouth, constipation, blurred vision)

• **Alternatives:** Identify and treat cause (allergy), avoid triggers, anti-allergy/immune herbs and supplements, homeopathy, acupuncture
Respiratory System Drugs

Adrenaline/Epinephrine

• Allergic emergencies:
• E.g. EpiPen, Anapen
• Indications: Anaphylaxis, angioedema
• Should be carried by those prone to anaphylaxis and diabetics
• **Alternatives**: Avoid triggers! Identify and treat cause (allergy), avoid triggers, anti-a supplements
CNS Drugs
CNS Drugs

Anxiolytics

• E.g. Diazepam (Valium), Xanax, Lorazepam
• Act on GABA (CNS inhibitory) receptors
• Indications: Muscle relaxant e.g. whiplash (low dose), minimising drug withdrawal, severe/disabling insomnia/anxiety (*short term only*)

• **Side effects:** Highly addictive, drowsiness/confusion, muscle weakness, paradoxical effects, dependence, tolerance/dependence, withdrawal causes anxiety, insomnia, anorexia, tremor, perspiration, tinnitus, perceptual disturbance, hallucinations, paranoia.

• **Alternatives:** Herbs, Mg, oats
CNS Drugs

Antidepressants - SSRIs

• E.g. Prozac
• Indications: Chronic and major depression (not acute depression). *Not curing!*

• **Side effects:** Suppression, feeling sick, low sex drive, blurred vision, GIT upset, feeling agitated or shaky, sleep disturbance, loss of appetite

• **Alternatives:** Herbs such as St. Johns Wort, Rhodiola, Bach flowers, homeopathy, acupuncture
CNS Drugs

Analgesics

• Painkillers prescribed for headaches/ migraines etc

• Non-opioid analgesics: Aspirin, Paracetamol, Ibuprofen

• **Side effects**: GIT bleeding, reduced stomach acidity, liver disturbance.

• Alternatives: Feverfew, peppermint oil, herbs, homeopathy, acupuncture

Diclofenac – an anti-inflammatory found in prescription and over-the-counter preparations (Cataflam and Voltaren) raises the risk of serious heart problems and stroke by 40 per cent. (PLoS Medicine, 2011).

More than half of the estimated 78,000 drug-related deaths recorded worldwide in 2010, the most recent year for which comprehensive figures are available, were caused by addiction to painkillers (Lancet).
Antimicrobial drugs

Antibacterial drugs:
• Penicillins, Tetracyclins and other antibiotics
• Major resistance problems now!! E.g. MRSA

Antifungal drugs:
• Systemic antifungals: Fluconazole, Itraconazole, Ketoconazole
• Non-systemic antifungals: Nystatin

Antiviral drugs: Aciclovir

Side effects: Many!! Quite toxic!

Alternatives: Garlic, Colloidal silver, Grapefruit seed extract, Elderberry, essential oils, herbs, nutrition/supplements

Copyright CNM – College of Naturopathic Medicine
Antimicrobial drugs

Antiprotozoal Drugs

• Antimalarial drugs: Quinine
• Use multiple drugs, different depending on type of malaria. **Resistance is common**
• Prophylaxis against malaria: Lariam
• None are 100% effective
• Watch flu like symptoms after holidays when nobody else has the flu

• **Side effects**: Renal impairment, epilepsy, pregnancy

• **Prevent mosquito bites!** – Cover up, wear dull colours, use unscented toiletries, natural mosquito repellent scents, Vitamin B1
Endocrine Drugs

Diagram showing the major endocrine glands:
- Pineal
- Hypothalamus
- Pituitary
- Thyroid
- Parathyroids
- Thymus
- Adrenals
- Pancreas
- Ovary
- Testes
Diabetes Drugs

**Insulin (injection)**
- Short, medium and long-acting types
- Indications: Mostly type 1 (sometimes 2)

**Oral anti-diabetic drugs**: Metformin, Euglucon
- Indications: Type 2, insulin resistance (PCOS)
- May use in combination with insulin
- Suspicion of diabetes when fasting blood glucose >11

- **Alternatives**: Whole organic diet, Chromium, zinc, magnesium, Gymnema, Alpha lipoic acid, vit. D, EXERCISE!! Avoid stress!
Thyroid Drugs

To increase thyroid function:
- E.g. Thyroxine
- Lifelong drug (replacement)
- Conversion to active form is important especially if patients need increasing doses

To suppress thyroid function: Carbimazole
- Prevents the conversion of iodine to its useable form.
- Blocks the combination of converted iodine with other components to form thyroid hormones.

**Alternatives:** (depending on whether hypo or hyper!!)
Herbs, iodine, selenium, acupuncture
Hormones

- Female sex hormones: Oestrogen and HRT, Progestogens, OCP, IVF drugs
  - E.g. Androcur
    - Used to treat masculinisation in women e.g. PCOS
    - Treatment of acne, which can be caused by excess androgens

- Male sex hormones: Testosterone
  - E.g. Viagra – used for erectile dysfunction.
  - Side effects: vision disturbance, muscle pain, vomiting, migraines, dyspepsia

- **Side effects**: nutrient depletions, cancer risk
- **Alternatives**: Herbs, homeopathy
Malignant Disease and Immune Suppression

Cytotoxic drugs – Chemotherapy

**Side effects:** EXTREMELY TOXIC!

**Alternatives:** (not allowed to treat cancer!) Herbs, diet, lifestyle, nutrients, acupuncture and homeopathy.

Hormone antagonists: (Tamoxifen)

- Oestrogen-receptor antagonist
- Indication: Breast cancer (only hormone-receptor responsive breast cancer)
- **Side effects:** Mimics menopause, uterine fibroids, visual disturbances, liver enzyme elevation
- **Alternatives:** Herbs, diet, lifestyle, nutrients

Copyright CNM – College of Naturopathic Medicine
Musculoskeletal Drugs
Rheumatic Disease

- **NSAIDS**: Ibuprofen, Diclofenac, Vioxx (now forbidden), Aspirin
- Gold injections

- **Side effects**: Suppress the immune system - Increased susceptibility to infection, liver damage, toxicity

- **Alternatives**: Nutrition/diet, Devils Claw, Boswelia, Omega 3, Turmeric, probiotics, treat cause/immune system, anti-inflammatory diet, herbs, homeopathy, acupuncture.
Gout

• Very strong anti-inflammatory drugs
  E.g. Allopurinol:
  – Inhibits the enzyme (xanthine oxidase) that turns purines into uric acid
  – Also decreases endogenous purine synthesis
• E.g. Colchicin
  – Natural product originally extracted from Autumn crocus
  – Used to treat rheumatic complaints and gout.
  – Inhibits urate crystal deposition

**Alternatives:** Dissolve uric acid crystals, hydration, diet and lifestyle changes, homeopathy, acupuncture
Skin

Drugs used to Break the Itch-Scratch Cycle

Skin problems are massively on the increase: Allergies, dry skin, eczema

- Regular use of emollients or ointments.
- Low dose topical steroids.

Side effects:
- Skin thinning in the face and on elbows after a week.
- Skin thinning on legs and arms after 2 weeks.

- Essential fatty acids help the skin.

Alternatives: Treat cause, anti-allergy, herbs, nutrition, supplements, anti-inflammatory, homeopathy, acupuncture
Anaesthesia

- Local anaesthetics: Lidocaine, Procaine, Benzocaine
- Used for example by dentists or in feminine anti-itch creams

- **Side effects**: Suppression

- **Alternatives**: Herbs, acupuncture, homeopathy, natural creams and ointments, peppermint oil
Activity

Please remember to have a look at the glossary for this topic. Understanding the words and their derivation will help you understand and memorise them!

Please also look at the prefixes & suffixes to help you understand the medical terminology used in this lecture – you may be tested on this.