

Drugs

Drug: any substance taken into the body that modifies or affects chemical reactions in the body.

Medicinal drugs: used in medicine to help fight illness.

Antibiotics:

- Come from bacteria or fungi that live in the soil.
- Actinomycin - filamentous bacteria that resemble mould fungi.
- Streptomyces - Streptomycin
- Penicillium (mould fungus) - penicillin (important antibiotic)
- Different mutant forms produce different types of penicillin.
- Penicillin types are chemically altered for efficiency.
- How do antibiotics attack bacteria:
 - Disrupt cell wall production - prevents reproduction.
 - Causes cells to burst open.
 - Interferes with protein synthesis.
- Antibiotics do not attack human cells (no cell wall) but can cause side effects.
- Bacteria can mutate and become resistant to drugs.
- Antibiotics should not be used:
 - In dilute form.
 - For too short a period.
 - For trivial complaints.
- These cause a build up of resistant bacteria and this resistance can be passed on to pathogens.
- Antibiotics do not have any effect on viral diseases.
- Viruses do not have cell walls or membrane structures or protein synthesis.

Resistant bacteria:

- If the antibiotic course is not completed, all bacteria will not be killed.
- These remaining bacteria have been exposed to the drug and become resistant.

- Their offspring will also be resistant - drug less effective.
- MRSA - Methicillin-resistant Staphylococcus aureus.
- MRSA is a superbug - resistance to a number of widely used antibiotics.
- MRSA lives harmlessly on skin, nose, throat and sometimes causes mild infection.
- Dangerous - break in skin, infects internal organs, blood poisoning.
- Can occur in hospitals as infection during operation.
- Cautious about prescribing antibiotics.
- Completing the course is important.

Misused drugs:

Stimulants:

- Increased nervous activity, adrenaline release.
- Heart rate, pulse rate, blood flow increases causing sweating.
- Person becomes more alert. Eg. caffeine.

Depressants:

- Decrease nervous activity by acting as endorphins - body's natural pain reliever.
- Causes feelings of relaxation, suppression of pain.
- Heart rate decreases, reaction time increases, impaired judgement.
- Excessive - inhabits breathing centre in the brain - death. Eg. alcohol.
- Morphine, heroine, codeine - narcotics, extracted from opium plants.
- Relieve serious pain, produce short term feelings of wellbeing and freedom from anxiety.
- Used medically to relieve severe pain.
- Can lead to tolerance and dependency.
- Addiction/dependence leads people into crime/prostitution to buy it.

Drugs

- Morphine and heroin have the same structures as neurotransmitters and bind to the same receptor molecules at synapse.
- Reduces ability of neurotransmitters to send an impulse.
- Has a calming effect, causes feelings of euphoria due to release of dopamine.
- Withdrawal symptoms (cold turkey) - anxiety, muscle aches, sweating, abdominal cramps, diarrhoea, nausea, vomiting.
- Blood poisoning, hepatitis, aids - use of unsterilised needles to inject drugs.

Alcohol:

- Depressant.
- Creates a sense of wellbeing, release from anxiety, increased confidence.
- Decreases ability in skill based activities, impaired judgement, increased reaction time.
- Causes vasodilation - sensation of warmth but increases heat loss.
- 500 mg/100 cm³ blood - unconsciousness, more causes death.
- Stops breathing centres in the brain.
- 90% - detoxified in liver, oxidised - CO₂ + H₂O
- 10% - excreted in kidneys.
- People build up tolerance, which leads to dependence.
- Liver cirrhosis - accumulation of fat droplets, production of fibrous scar tissue.
- Pregnancy - major risk to fetus, deformed babies.
- Behaviour - reduces inhibitions, depresses shyness part of the brain - irresponsible behaviour.
- Moderate drinking - little physiological harm.
Men - 21-28 units/week
Women - 14 - 21 units/week
- Alcohol is diuretic - more urine to be produced than normal - dehydration.

Smoking:

Effects:

- Brain - drains dopamine.
- Stomach - increases acid sugars.
- Intestine - decreases nutrient assimilation.
- Lungs - closes airways, (smoke) paralyses cells, increased mucus production.
- Heart - increases heart rate and blood pressure (nicotine).
- Ears - flood with fluid.
- Sinuses - stuffs up nose (smoke).
- Tar - lung cancer.
- Carbon monoxide - reduces ability to provide oxygen to respiring cells - gets out of breath easily, reduces fitness.

Long term effects of smoking:

Lung cancer:

- At least 17 substances in cigarette smoke are known to cause cancer (carcinogenic).
- Carcinogens in cigarette smoke react with DNA in epithelial cells causing development of tumours.
- Tumours do not allow gaseous exchange.

COPD - Chronic Obstructive Pulmonary Disease:

- Covers a number of diseases (see below).
- Difficulty breathing - narrowing of airways.
- Breathlessness, frequent chest infections, persistent cough with phlegm.

Chronic bronchitis:

- Smoke paralyses the cilia and stops it from moving.
- Irritant substances in smoke cause excess mucus production.
- Bronchi and bronchioles are clogged with infectious mucus.
- Inflammation is caused.
- Epithelium is replaced by scar tissue which narrows the airway.

Drugs

Emphysema:

- Final stage of any lung condition.
- Substances in tobacco smoke weaken walls of alveoli.
- Irritant substances cause coughing which bursts the alveoli.
- Inflammation stimulates phagocytes to line the airway.
- To reach the airway, the phagocytes use elastin (an enzyme) to degenerate alveoli.
- Absorbing surface - greatly reduced.
- Less oxygen absorbed - breathlessness.

Coronary heart disease:

- ¼ of deaths due to coronary heart disease - smoking.
- Nicotine and carbon monoxide - increase tendency for blood to clot.
- Carbon monoxide increases the rate at which fatty material is deposited.

Other diseases:

- Disease of leg arteries - amputations.
- Strokes due to arterial disease in the brain.
- Cancer of bladder.
- Stomach ulcers, duodenum.
- Tooth decay, gum disease.
- Tuberculosis.
- Babies born to smokers are smaller than average.
- Miscarriages, still birth, death rate of babies is highest in smokers.

Passive smoking:

- Non-smokers in the same room are also affected.
- Increased risk of lung cancer.

Performance enhancing steroids:

- Used by sports persons to boost performance.
- Banned by most sports organisations.

- Can be detected in urine.

Testosterone:

- Increased muscle and bone mass - enhances performance.

Anabolic steroids:

- Synthetic derivatives of testosterone.
- Affects protein metabolism - increasing muscle development, reducing body fat.
- Long term effects -
 - High blood pressure.
 - Bone, tendon, ligament weakness.
 - Liver, kidney malfunction.
 - Sterility.
 - Masculinisation in women.