Therapeutic Action of Drugs

Antacid

- Antacids are chemical substances which neutralise excess acid in gastric juices and give relief from acid indigestion, acidity, heart burns and gastric ulcers. Examples: Eno, gelusil, digene
- The stomach generates gastric acid to aid digestion which is mainly composed of hydrochloric acid. Excessive secretion of the acid can lead to stomach disorders such as gastritis, gastric ulcers and peptic acid disease.
- These disorders can be treated by antacids, which reduce the amount of acid in the stomach.
- Antacids perform a neutralisation reaction, i.e. they buffer gastric acid, raising the pH to reduce acidity in the stomach. When gastric hydrochloric acid reaches the nerves in the gastrointestinal mucosa, they signal pain to the central nervous system.
- This happens when these nerves are exposed, as in peptic ulcers. Gastric acid may also reach ulcers in the oesophagus or the duodenum.
- The drug cimetidine (Tagamet) was designed to prevent the interaction of histamine with the receptors present in the stomach wall.

![Cimetidine and Histamine](image)

Antihistamines

- Antihistamines are chemical substances which diminish the effect of histamine released in the body and hence prevent allergic reactions. Examples: Brompheniramine (Dimetapp), terfenadine (Seldane)
- Histamine is also involved in the inflammatory response and is a mediator of pruritus. Histamine is produced by basophils and is found in the nearby connected tissues.
- The permeability of white blood cells is increased by histamine and this allows the pathogens to get engaged with the infected tissues. Antihistamines are used in the treatment of any allergy.
- Antihistamines actually interfere in the natural action of histamines. They compete with histamines to obtain the binding sites of the receptor where histamines exert their effect.
- When our body comes in contact with components such as pollen, dust mites and pet dander, a chemical called histamine is formed which triggers an allergy. This allergy causes swelling of the nose, running of eyes, and sometimes, even itching of the mouth.
Antihistamines block the action of histamines and protect us from the allergy. Antihistamines work against the symptoms of different kinds of allergies, including hay fever and food allergy.

Tranquilisers and analgesics are neurologically active drugs. These affect the message transfer mechanism from nerve to receptor.

They are chemical compounds which are very useful in the treatment of stress and mild or severe mental diseases. They induce a sense of well-being in a person, thereby releasing him from stress, tension, anxiety or irritability.

There are many types of tranquilisers, and each has a different mode of functioning. For example, a tranquiliser which helps in uplifting mood is called noradrenaline. If the level of noradrenaline is low,
then the signal sending activity also becomes low, which makes a person feel depressed. In these situations, a tranquiliser or antidepressant drugs are used.

- Some tranquilisers, namely chlordiazepoxide and meprobamate, are relatively mild and are suitable for relieving tension. Equanil is used in controlling depression and hypertension. Some substances which are used as tranquilisers are valium and serotonin.

Chlordiazepoxide

Meprobamate

Analgesics

- Analgesics reduce the effect of pain without causing any mental confusion, paralysis or any other disturbances in the nervous system, i.e. getting rid of the pain without any imbalance in the nervous system.

- Analgesic drugs can act in many ways on the peripheral or central nervous system, but they do not eliminate the sensation of pain as in anaesthetics. Analgesics are broadly classified into two types:
  (a) Non-narcotic analgesics
  (b) Narcotic analgesics

- Non-narcotic analgesics: Aspirin and paracetamol belong to the class of non-narcotic analgesics. Aspirin inhibits the synthesis of chemicals known as prostaglandins which stimulate inflammation in the tissue and cause pain. These drugs are effective in relieving skeletal pain such as that due to arthritis. These drugs also help in reducing fever and prevent platelet coagulation. The anti-blood clotting action is the reason why aspirin is used for the prevention of heart attacks.
• Narcotic analgesics: These types of analgesic drugs are taken for medical use in prescribed doses; they act by relieving pain and producing sleep. If the dose of this analgesic drug increases, then it can lead to coma, convulsion and finally death. Morphine is the most common type of narcotic analgesic. These analgesics are mainly used for the relief of postoperative pain, cardiac pain and pains caused during terminal cancer and childbirth.

Antimicrobials

The different types of organisms such as bacteria, fungi and virus are the main reason for infection and diseases. The drug used to prevent the pathogenicity of microorganisms is called an antimicrobial agent. Examples: Antibiotics, antiseptics, disinfectants

Antibiotics

• These are substances which are derived from one microorganism to kill another microorganism. Antibiotics are useful against bacterial, fungal and parasitic infections but not against viral infections.
• The development of chemical synthesis has helped to produce synthetic components which act as an antimicrobial agent against the pathogenic bacteria. These synthetic components are also called antibiotics. Pathogenic bacteria can be killed by the synthetic components at low concentrations. Examples: Ampicillin, amoxicillin
• In 1908, the German bacteriologist Paul Ehrlich developed a synthetic component from an arsenic-based structure for the treatment of syphilis; this is called arsphenamine or salvarsan.
• In 1929, Alexander Fleming discovered Penicillin from the fungus Penicillium notatum which is used to treat different types of bacterial infections.
• Two types of antibiotics are
  Bactericidal antibiotics: These antibiotics have killing effects on bacteria.
  Examples: Penicillin, aminoglycosides, ofloxacin
  Bacteriostatic antibiotics: These antibiotics have an inhibitory effect on bacteria.
  Examples: Erythromycin, tetracycline, chloramphenicol
• Depending on the spectrum of action, antibiotics are further classified into three types:
**Broad spectrum antibiotics:** These antibiotics are widely used to kill or inhibit Gram-positive and Gram-negative bacteria.
Example: Chloramphenicol

**Narrow spectrum antibiotics:** These antibiotics are effective against specific groups of bacteria.
Example: Penicillin G

**Limited spectrum antibiotics:** These antibiotics are effective against a single organism or a single disease.
Example: Dysidazirine
Antiseptics and Disinfectants

- Antiseptics and disinfectants are chemicals which either kill or prevent the growth of microorganisms.
- Antiseptics are applied to the injured tissues, cuts and infected skin surfaces. Antiseptics are not prescribed to be taken orally. Examples: Furacin, sotramicin
- The commonly used antiseptic *Dettol* is a mixture of chloroxylenol and terpineol. Bithionol (the compound is also called bithional) is added to soaps to impart antiseptic properties. Iodine is a powerful antiseptic.
- Disinfectants are used to destroy pathogenic microorganisms on floors and in drainage systems. The same substance can act as an antiseptic and a disinfectant by varying its concentration. For example, 0.2% solution of phenol is an antiseptic, while its one percent solution is a disinfectant.

![Chemical structures of Chloroxylenol and Terpineol](image)

Antifertility Drugs

- Antifertility drugs are birth control pills which contain a mixture of synthetic oestrogen and progesterone derivatives. Both of these compounds are hormones.
- While progesterone suppresses ovulation, synthetic progesterone derivatives are more potent than progesterone. Norethindrone is an example of a synthetic progesterone derivative most widely used as an antifertility drug.
- The oestrogen derivative which is used in combination with the progesterone derivative is ethynylestradiol (*Novestrol*).
Norethindrone

Ethynylestradiol