Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 1

Name of topic/lesson – Drug metabolism.

Subtopic: Study of drug metabolizing enzymes.

Objective: To study the Drug metabolism and their enzymes.

Topic Outcomes: At the end of topic you should be

1. Able to study the enzymes involved in drug metabolism.
2. Different functions of drug metabolism.

Drug metabolism is the metabolic breakdown of drugs by living organisms, usually through specialized enzymatic systems. More generally, xenobiotic metabolism (from the Greek xenos "stranger" and biotic "related to living beings") is the set of metabolic pathways that modify the chemical structure of xenobiotics, which are compounds foreign to an organism's normal biochemistry, such as any drug or poison. These pathways are a form of biotransformation present in all major groups of organisms, and are considered to be of ancient origin. These reactions often act to detoxify poisonous compounds (although in some cases the intermediates in xenobiotic metabolism can themselves cause toxic effects). The study of drug metabolism is called pharmacokinetics.

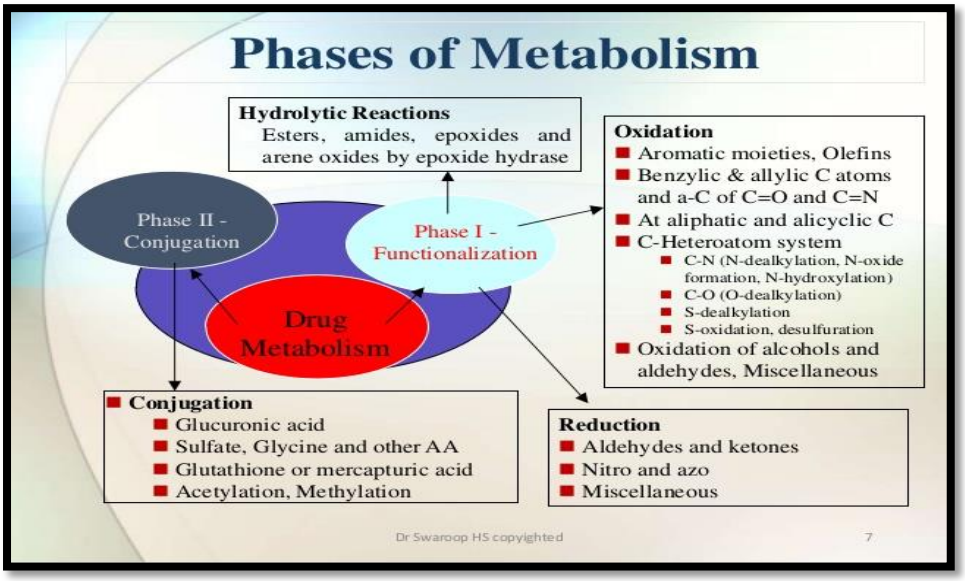

Fig.Phase I and II metabolism.

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

2. Foye's Principles of Medicinal Chemistry by Lemke, 6th edition, Lippincott William Wilkins.

3. Burger's Medicinal Chemistry by Wolff ME, John Wiley & Sons, New York

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 2

Name of topic/lesson – Drug metabolism.

Subtopic: Phase I and Phase II reactions.

Objective: To study the Drug metabolism and their enzymes.

Topic Outcomes: At the end of topic you should be

1. Able to draw the structure of Phase I and phaseII reactions in drug metabolism.

2. Different functions of drug metabolism reactions.

Phase I – modification:

In phase I, a variety of enzymes act to introduce reactive and polar groups into their substrates. One of the most common modifications is hydroxylation catalysed by the cytochrome P-450-dependent mixed-function oxidase system. These enzyme complexes act to incorporate an atom of oxygen into nonactivated hydrocarbons, which can result in either the introduction of hydroxyl groups or N-, O- and S-dealkylation of substrates. The reaction mechanism of the P-450 oxidases proceeds through the reduction of cytochrome-bound oxygen and the generation of a highly-reactive oxyferryl species, according to the following scheme:

$O_2 + NADPH + H^+ + RH \rightarrow NADP^+ + H_2O + ROH$

Oxidation

Cytochrome P450 monooxygenase system

Flavin-containing monooxygenase system

Alcohol dehydrogenase and aldehyde dehydrogenase

Monoamine oxidase

Co-oxidation by peroxidases

Reduction

NADPH-cytochrome P450 reductase

Hydrolysis

Esterases and amidase

Epoxide hydrolase

Phase II – conjugation :

phase II reactions, these activated xenobiotic metabolites are conjugated with charged species such as glutathione (GSH), sulfate, glycine, or glucuronic acid. Sites on drugs where conjugation reactions occur include carboxyl (-COOH), hydroxyl (-OH), amino (NH_2), and sulfhydryl (-SH) groups. Products of conjugation reactions have increased molecular weight and tend to be less active than their substrates, unlike Phase I reactions which often produce active metabolites. The addition of large anionic groups (such as GSH) detoxifies reactive electrophiles and produces more polar metabolites that cannot diffuse across membranes, and may, therefore, be actively transported.

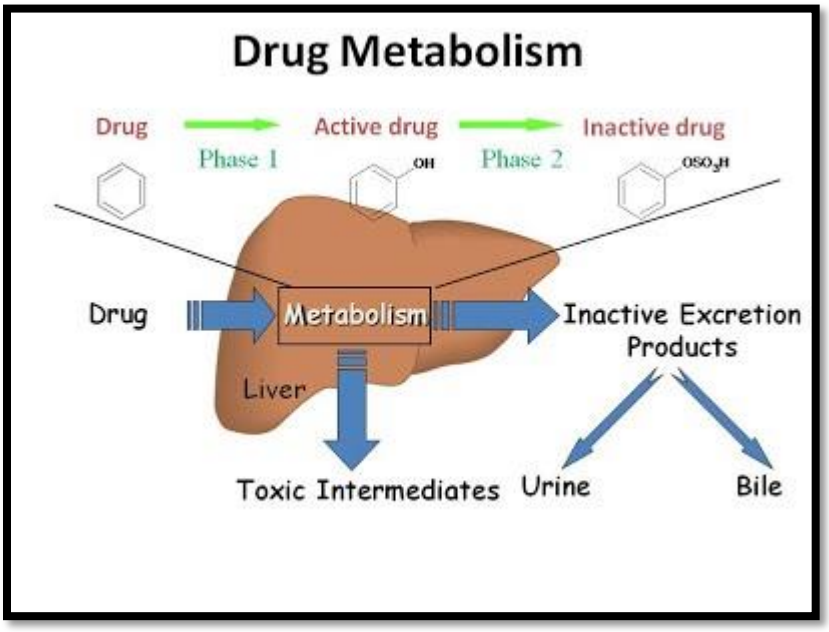

Fig .Drug metabolism.

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 3

Name of topic/lesson – Drug metabolism.

Subtopic: Study of drug metabolizing enzymes.

Objective: To study the Drug metabolism and their enzymes.

Topic Outcomes: At the end of topic you should be

1. To understand role of drug metabolism enzyme.

Drug-metabolizing enzymes are called mixed-function oxidase or monooxygenase and containing many enzymes including cytochrome P450, cytochrome b5, and NADPH-cytochrome P450 reductase and other components. The hepatic cytochrome P450s (Cyp) are a multigene family of enzymes that play a critical role in the metabolism of many drugs and xenobiotics with each cytochrome isozyme responding differently to exogenous chemicals in terms of its induction and inhibition. For example, Cyp 1A1 is particularly active towards polycyclic aromatic hydrocarbons (PAHs), activating them into reactive intermediates those covalently bind to DNA, a key event in the initiation of carcinogenesis. Likewise, Cyp 1A2 activates a variety of bladder carcinogens, such as aromatic amines and amides. Also, some forms of cytochrome P450 isozymes such as Cyp 3A and 2E1 activate the naturally occurring carcinogens (e.g. aflatoxin B1) and N-nitrosamines respectively into highly mutagenic and carcinogenic agents. The carcinogenic potency of PAHs, and other carcinogens and the extent of binding of their ultimate metabolites to DNA and proteins are correlated with the induction of cytochrome P450 isozymes. Phase II drug-metabolizing enzymes such as glutathione S-transferase, aryl sulfatase and UDP-glucuronyl transferase inactivate chemical carcinogens into less toxic or inactive metabolites.

Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 4

Name of topic/lesson – Drug metabolism.

Subtopic: Study of drug metabolizing enzymes.

Objective: To study the Drug metabolism and their enzymes.

Topic Outcomes: At the end of topic you should be

1. To understand role of drug metabolism enzyme.

Many drugs change the rate of activation or detoxification of carcinogens by changing the activities of phases I and II drug-metabolizing enzymes. The balance of detoxification and activation reactions depends on the chemical structure of the agents, and is subjected to many variables that are a function of this structure, or genetic background, sex, endocrine status, age, diet, and the presence of other chemicals. It is important to realize that the enzymes involved in carcinogen metabolism are also involved in the metabolism of a variety of substrates, and thus the introduction of specific xenobiotics may change the operating level and the existence of other chemicals. The mechanisms of modification of drug-metabolizing enzyme activities and their role in the activation and detoxification of xenobiotics and carcinogens

Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 5

Name of topic/lesson – Drug metabolism.

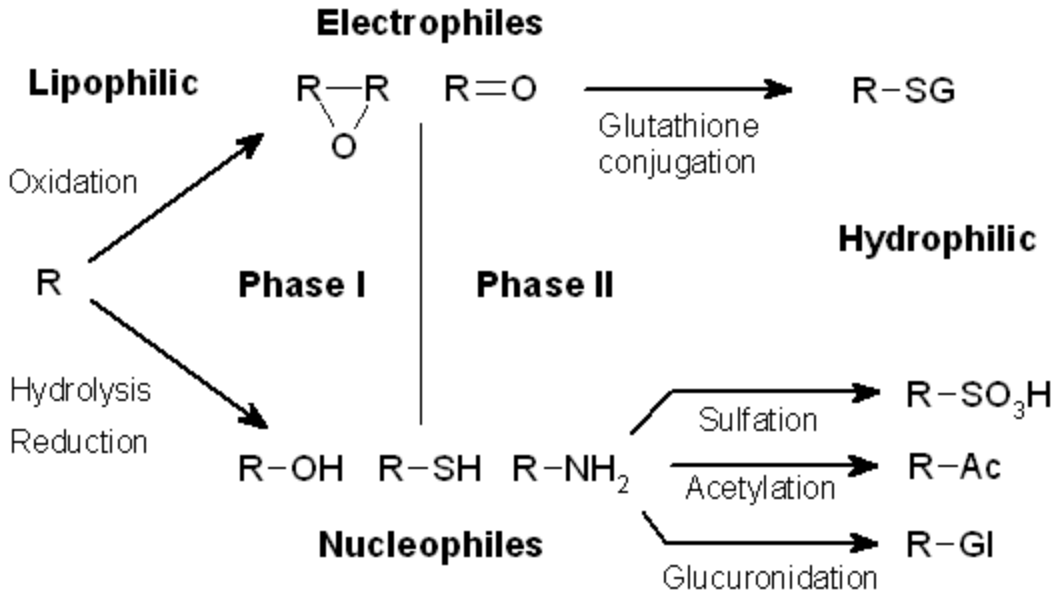
Subtopic: Phase I reaction.

Objective: To study the different Phase I reactions.

Topic Outcomes: At the end of topic you should be

1. Able to draw reactions of Phase I.

In phase I, a variety of enzymes act to introduce reactive and polar groups into their substrates. One of the most common modifications is hydroxylation catalysed by the cytochrome P-450-dependent mixed-function oxidase system.



Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 6

Name of topic/lesson – Drug metabolism.

Subtopic: Study of Phase II reaction.

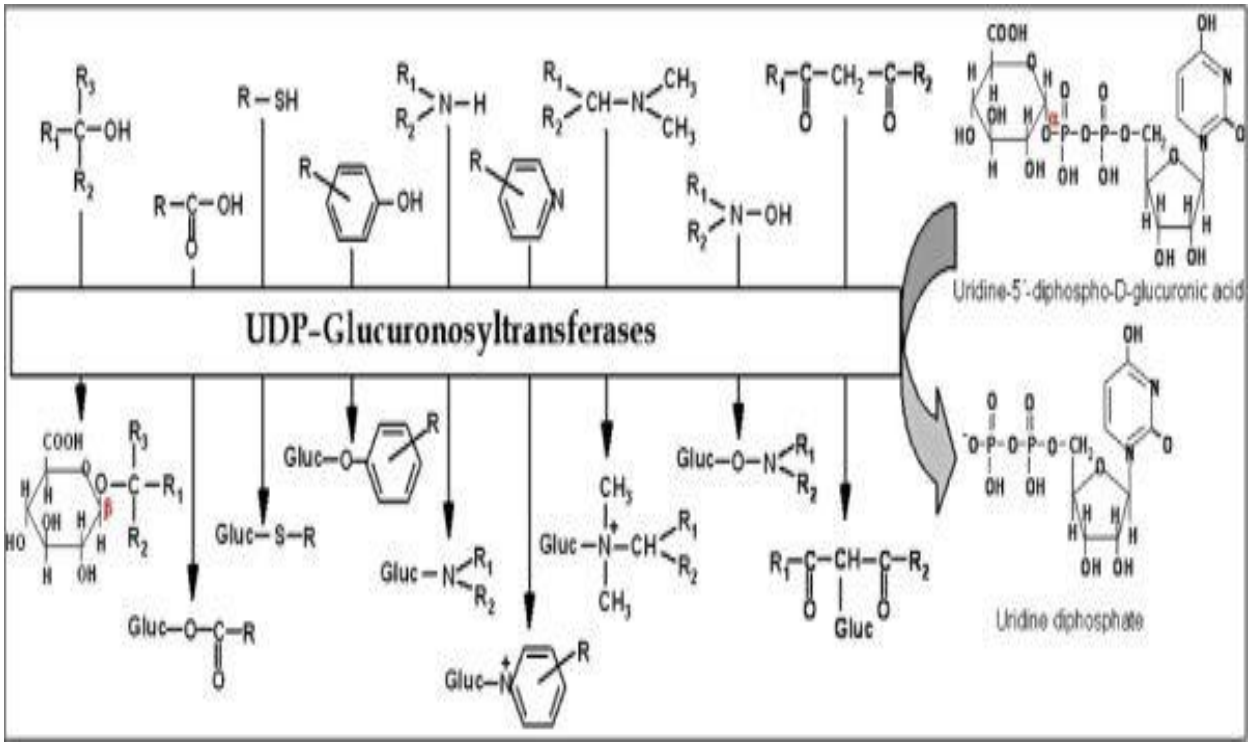
Objective: To study the different Phase II reactions.

Topic Outcomes: At the end of topic you should be

1. Able to draw reactions of Phase II (**Glucuronidation**)

Glucuronidation reaction

UDP–glucuronosyltransferases (UGTs) belong among the key enzymes of metabolism of various exogenous as well as endogenous compounds. Conjugation reactions catalyzed by the superfamily of these enzymes serve as the most important detoxification pathway for broad spectrum of drugs, dietary chemicals, carcinogens and their oxidized metabolites, and other various environmental chemicals in all vertebrates.



Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 7

Name of topic/lesson – Drug metabolism.

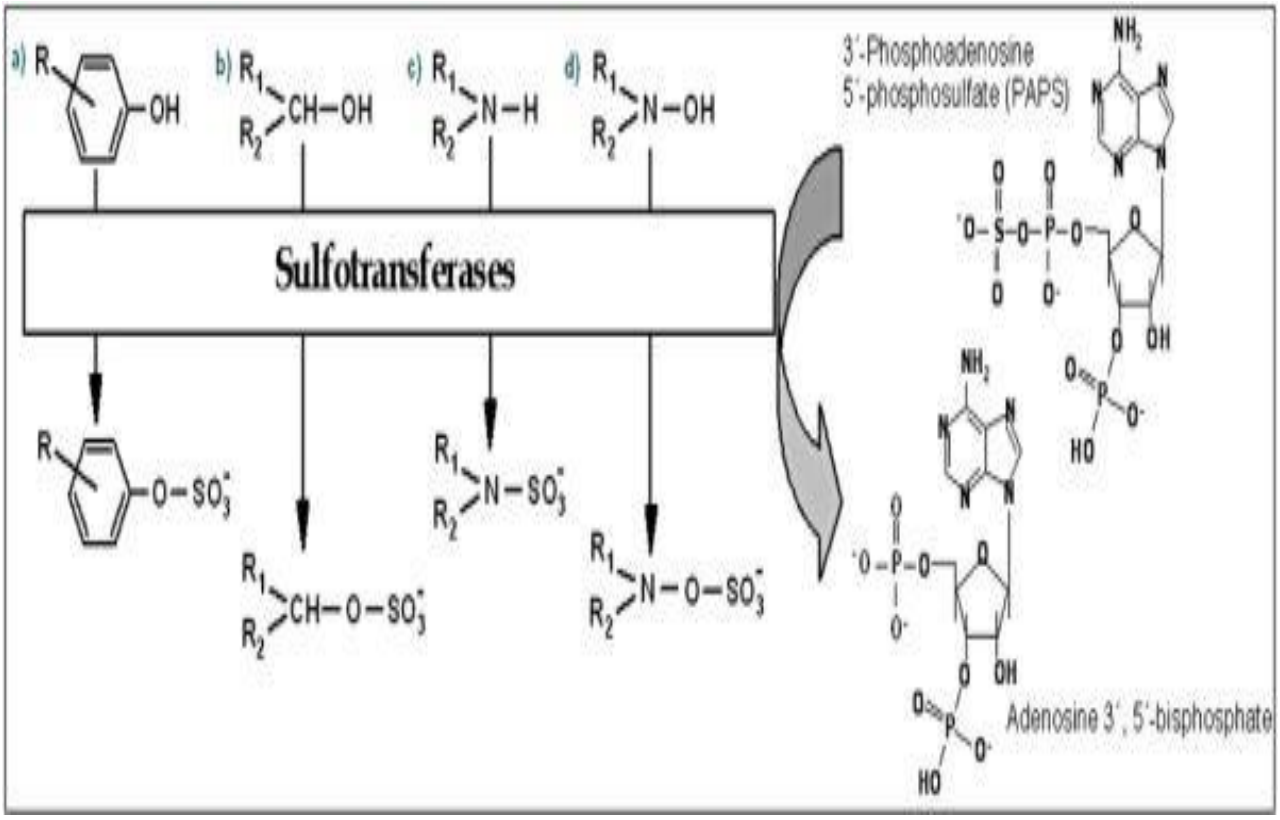
Subtopic: Study of Sulfoconjugation.

Objective: To study the Phase II Drug metabolism.

Topic Outcomes: At the end of topic you should be

1. Able to draw reactions of Phase II (**Sulfoconjugation**)

Sulfoconjugation (or sulfonation) constitutes an important pathway in the metabolism of numerous both exogenous and endogenous compounds. The sulfonation reaction was first recognized by Baumann in 1876. Baumann detected phenyl sulfate in the urine of a patient who had been administered phenol. The sulfonation reactions are mediated by a supergene family of enzymes called sulfotransferases (SULTs).



Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 8

Name of topic/lesson – Drug metabolism.

Subtopic: Application of drug metabolism.

Objective: To study the applications of Drug metabolism.

Topic Outcomes: At the end of topic you should be

1. Able to study the different application of drug metabolism..

2. Different functions of Biological membrane.

The duration and intensity of pharmacological action of most lipophilic drugs are determined by the rate they are metabolized to inactive products. The Cytochrome P450 monooxygenase system is the most important pathway in this regard. In general, anything that *increases* the rate of metabolism (*e.g.*, enzyme induction) of a pharmacologically active metabolite will *decrease* the duration and intensity of the drug action. The opposite is also true (*e.g.*, enzyme inhibition). However, in cases where an enzyme is responsible for metabolizing a pro-drug into a drug, enzyme induction can speed up this conversion and increase drug levels, potentially causing toxicity.

Various *physiological* and *pathological* factors can also affect drug metabolism. Physiological factors that can influence drug metabolism include age, individual variation (*e.g.*, pharmacogenetics), enterohepatic circulation, nutrition, intestinal flora, or sex differences.

In general, drugs are metabolized more slowly in fetal, neonatal and elderly humans and animals than in adults.

Genetic variation (polymorphism) accounts for some of the variability in the effect of drugs. With N-acetyltransferases (involved in *Phase II* reactions), individual variation creates a group of people who acetylate slowly (*slow acetylators*) and those who acetylate quickly, split roughly 50:50 in the population of Canada. This variation may have dramatic consequences, as the slow acetylators are more prone to dose-dependent toxicity.

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

2. Foye's Principles of Medicinal Chemistry by Lemke, 6th edition, Lippincott William Wilkins.

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 9

Name of topic/lesson –CNS active drugs.

Subtopic: Local anesthetics.

Objective: To study the Local anesthetics.

Topic Outcomes: At the end of topic you should be

1. Able to study local anesthetics.

2. Different functions of local anesthetics and their techniques.

A local anesthetic (LA) is a medication that causes absence of pain sensation. When it is used on specific nerve pathways (local anesthetic nerve block), paralysis (loss of muscle power) also can be achieved.

Clinical LAs belong to one of two classes: aminoamide and aminoester local anesthetics. Synthetic LAs are structurally related to cocaine. They differ from cocaine mainly in that they have a very low abuse potential and do not produce hypertension or (with few exceptions) vasoconstriction.

They are used in various techniques of local anesthesia such as:

- Topical anesthesia (surface)
- Topical administration of cream, gel, ointment, liquid, or spray of anaesthetic dissolved in DMSO or other solvents/carriers for deeper absorption
- Infiltration
- Brachial plexus block
- Epidural (extradural) block
- Spinal anesthesia (subarachnoid block)
- Iontophoresis

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

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Lecture No: 10

Name of topic/lesson –CNS active drugs.

Subtopic: Local anesthetics..

Objective: To study the Drug metabolism and their enzymes.

Topic Outcomes: At the end of topic you should be

1. Able to draw the mechanism and structure of local anasthetics.

2.Able to study the local anasthetics.

Mechanism of action:

All LAs are membrane-stabilizing drugs; they reversibly decrease the rate of depolarization and repolarization of excitable membranes (like nociceptors). Though many other drugs also have membrane-stabilizing properties, not all are used as LAs (propranolol, for example, though it has LA properties). LA drugs act mainly by inhibiting sodium influx through sodium-specific ion channels in the neuronal cell membrane, in particular the so-called voltage-gated sodium channels. When the influx of sodium is interrupted, an action potential cannot arise and signal conduction is inhibited.

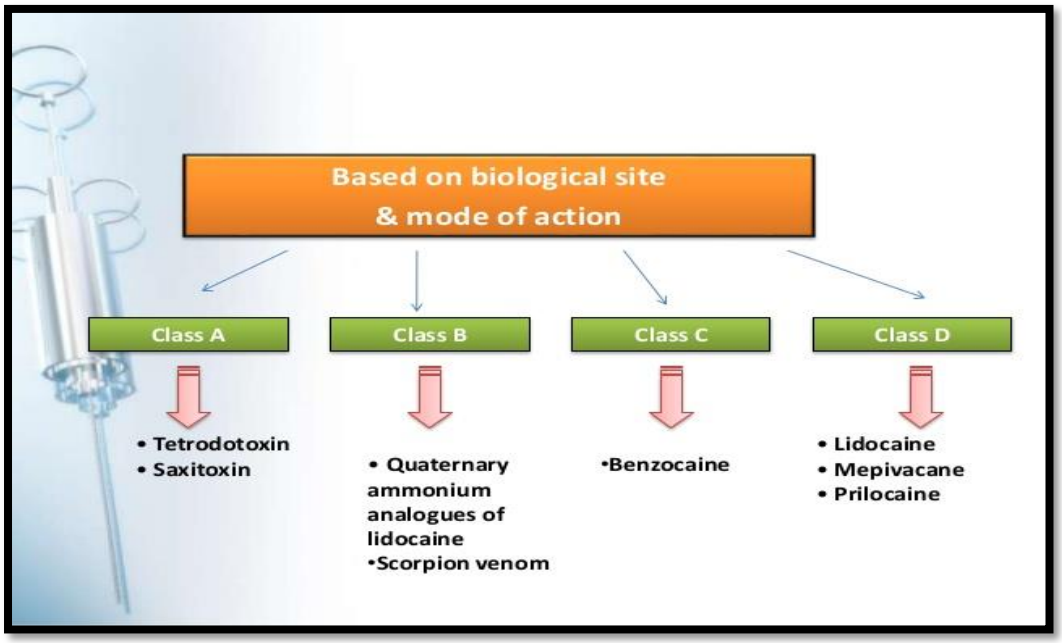

Fig. Mechanism of action of local anasthetics

References.

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

2. Foye's Principles of Medicinal Chemistry by Lemke, 6th edition, Lippincott William Wilkins.

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 11

Name of topic/lesson – CNS active drugs.

Subtopic: local anasthetics..

Objective: To study the Drug metabolism and their enzymes.

Topic Outcomes: At the end of topic you should be

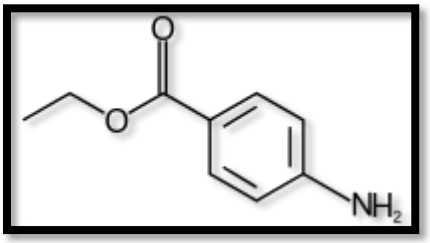
1. Able to study the classification of local anasthetics.

2. Different structures of local anasthetics.

Ester group:

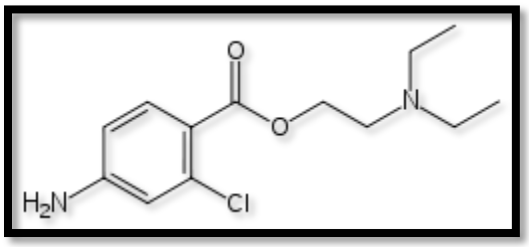
a)Benzocaine:

Sold under the brand name Orajel among others, is an esterlocal anesthetic commonly used as a topical pain reliever or in cough drops. It is the active ingredient in many over-the-counter anesthetic ointments such as products for oral ulcers.



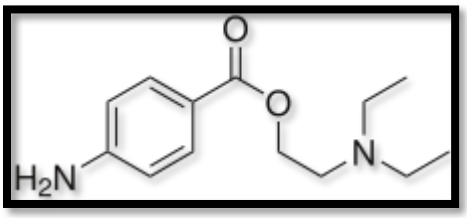
b)Chloroprocaine :

(trade name Nesacaine, Nesacaine-MPF) (often in the hydrochloride salt form as the aforementioned trade names) is a local anesthetic given by injection during surgical procedures and labor and delivery. Chloroprocaine vasodilates.



c)Procaine:

It is a local anesthetic drug of the amino ester group. It is used primarily to reduce the pain of intramuscular injection of penicillin, and it is also used in dentistry. Owing to the ubiquity of the trade name Novocain, in some regions, procaine is referred to generically as novocaine. It acts mainly as a sodium channel blocker.



References:

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 12

Name of topic/lesson – CNS active drugs.

Subtopic: Local anesthetics.

Objective: To study the local anesthetics and their classification.

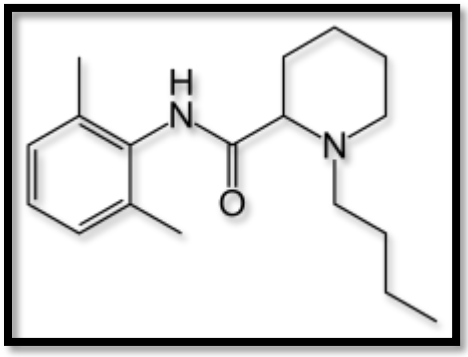
Topic Outcomes: At the end of topic you should be

1. Able to study the local anasthetics .
2. Able to draw different function of local anasthetics.

Amide group:

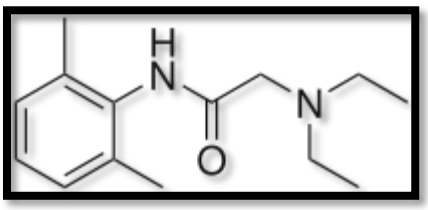
a)Bupivacaine:

marketed under the brand name Marcaine among others, is a medication used to decrease feeling in a specific area. In nerve blocks, it is injected around a nerve that supplies the area, or into the spinal canal's epidural space. It is available mixed with a small amount of epinephrine to increase the duration of its action.



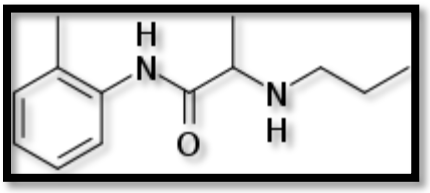
b)Lidocaine,:

Also known as lignocaine, is a medication used to numb tissue in a specific area (local anesthetic). It is also used to treat ventricular tachycardia and to perform nerve blocks. Lidocaine mixed with a small amount of adrenaline (epinephrine) is available to allow larger doses for numbing, to decrease bleeding, and to make the numbing effect last longer.



c)Prilocaine:

Is a local anesthetic of the amino amide type first prepared by Claes Tegner and Nils Löfgren. In its injectable form (trade name Citanest), it is often used in dentistry. It is also often combined with lidocaine as a topical preparation for dermal anesthesia (lidocaine/prilocaineor EMLA), for treatment of conditions like paresthesia.



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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 13

Name of topic/lesson – CNS active drugs.

Subtopic:General anasthetics.

Objective: To study the General anasthetics.

Topic Outcomes: At the end of topic you should be

1. Able to study the general anasthetics .
2. Different classification of general ansthetics.

General anaesthetics (or anesthetics, see spelling differences) are often defined as compounds that induce a loss of consciousness in humans or loss of righting reflex in animals. Clinical definitions are also extended to include the lack of awareness to painful stimuli, sufficient to facilitate surgical applications in clinical and veterinary practice. General anaesthetics do not act as analgesics and should also not be confused with sedatives. General anaesthetics are a structurally diverse group of compounds whose mechanisms encompasses multiple biological targets involved in the control of neuronal pathways. The precise workings are the subject of some debate and ongoing research.

General anesthetics elicit a state of general anesthesia. It remains somewhat controversial regarding how this state should be defined. General anesthetics, however, typically elicit several key reversible effects: immobility, analgesia, amnesia, unconsciousness, and reduced autonomic responsiveness to noxious stimuli.

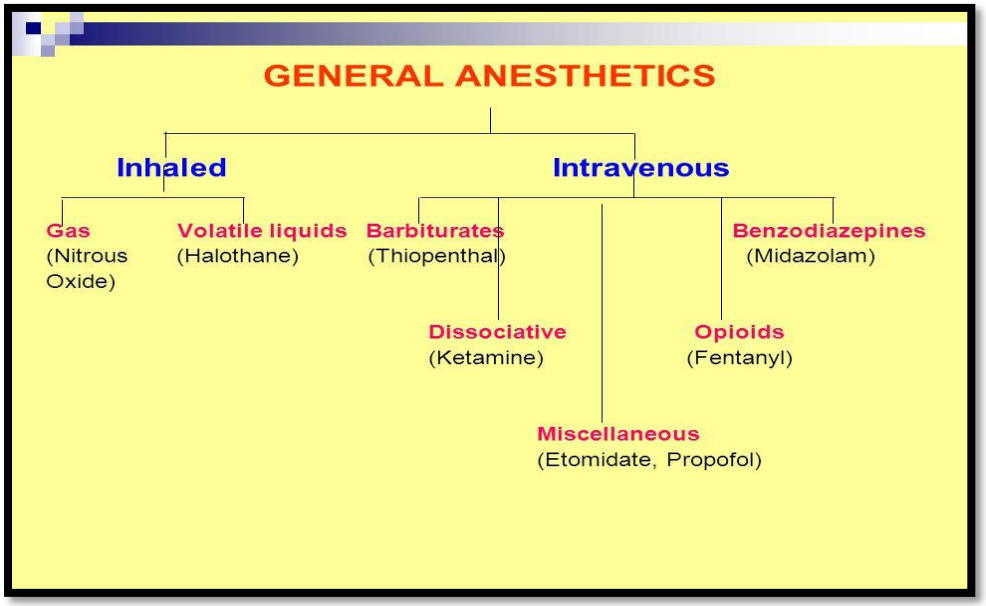

Fig. Classification of general anasthetics.

References:

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 14

Name of topic/lesson –CNS active drugs.

Subtopic: General anasthetics.

Objective: To study the General anasthetics and structures.

Topic Outcomes: At the end of topic you should be

1. Able to draw the mechanism of general anasthetics.

2.Able to study mechanism of action of general anasthetics.

Induction and maintenance of general anesthesia, and the control of the various physiological side effects is typically achieved through a combinatorial drug approach. Individual general anesthetics vary with respect to their specific physiological and cognitive effects. While general anesthesia induction may be facilitated by one general anesthetic, others may be used in parallel or subsequently to achieve and maintain the desired anesthetic state. The drug approach utilized is dependent upon the procedure and the needs of the healthcare providers.

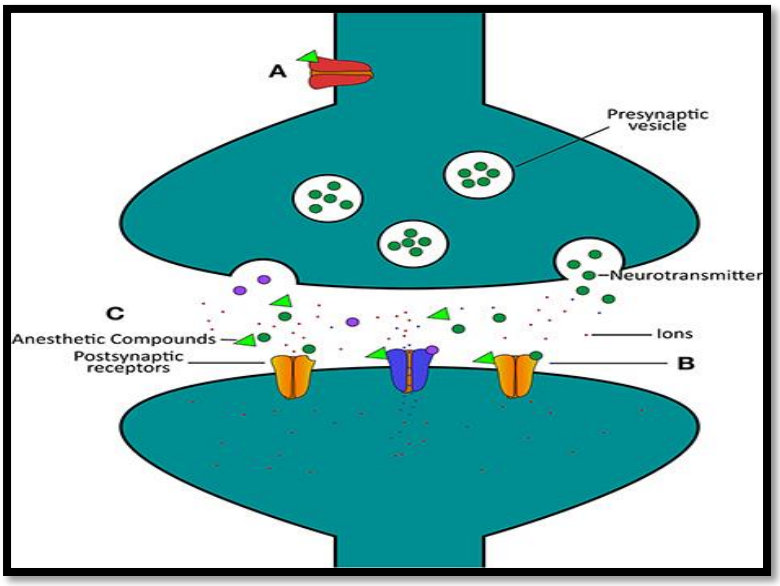

Fig .Mechanism of action.

Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 15

Name of topic/lesson – CNS active drugs.

Subtopic: General anasthetics.

Objective: To study the types and examples of general anasthetics.

Topic Outcomes: At the end of topic you should be

1. Able to draw the structure of general anasthetics.
2. Different functions of general anasthetics.

Drugs given to induce general anaesthesia can be either as gases or vapours (inhalational anaesthetics), or as injections (intravenous anaesthetics or even intramuscular). All of these agents share the property of being quite hydrophobic (i.e., as liquids, they are not freely miscible—or mixable—in water, and as gases they dissolve in oils better than in water). It is possible to deliver anaesthesia solely by inhalation or injection, but most commonly the two forms are combined, with an injection given to induce anaesthesia and a gas used to maintain it.

a)Inhalational:

Inhalational anaesthetic substances are either volatile liquids or gases, and are usually delivered using an anaesthesia machine. An anaesthesia machine allows composing a mixture of oxygen, anaesthetics and ambient air, delivering it to the patient and monitoring patient and machine parameters. Liquid anaesthetics are vapourised in the machine.

Many compounds have been used for inhalation anaesthesia, but only a few are still in widespread use. Desflurane, isoflurane and sevoflurane are the most widely used volatile anaesthetics today.

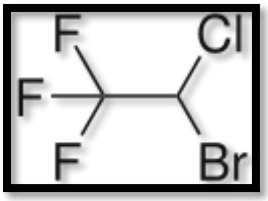

Fig .Halothane.

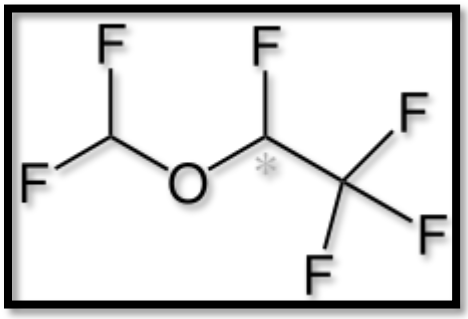

Fig. ***Desflurane.***

b)Injectable:

Injectable anaesthetics are used for the induction and maintenance of a state of unconsciousness. Anaesthetists prefer to use intravenous injections, as they are faster, generally less painful and more reliable than intramuscular or subcutaneous injections.

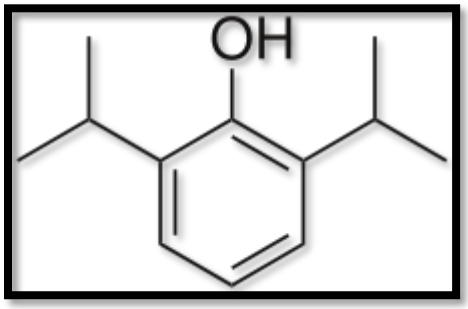

Fig. ***Propofol.***

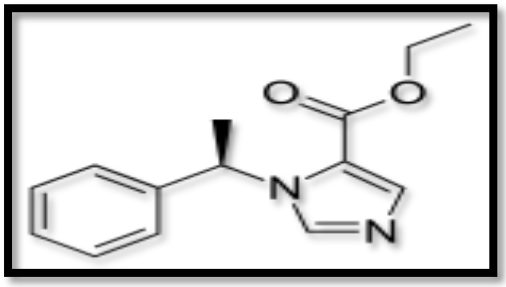

Fig. ***Etomidate.***

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

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3. Burger's Medicinal Chemistry by Wolff ME, John Wiley & Sons, New York

4. Principles of Medicinal Chemistry by Kadam SS, Mahadik KR, Bothara KG, Vol. I & II, 10th Edition, Nirali Prakashan.

Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 16

Name of topic/lesson –CNS active drugs.

Subtopic: Sedative and hypnotics.

Objective: To study the Sedative and hypnotics.

Topic Outcomes: At the end of topic you should be

1. Able to study the sedative and hyponotics.
2. Different classification of sedative and hypontics.

A sedative or tranquilliseris a substance that induces sedation by reducing irritability or excitement. They are central nervous depressants and interact with brain activity causing its deceleration. Various kinds of sedatives can be distinguished, but the majority of them affect the neurotransmitter gamma-aminobutyric acid (GABA), which are brain chemicals performing communication between brain cells. In spite of the fact that each sedative acts in its own way, they produce beneficial relaxing effect by increasing GABA activity.

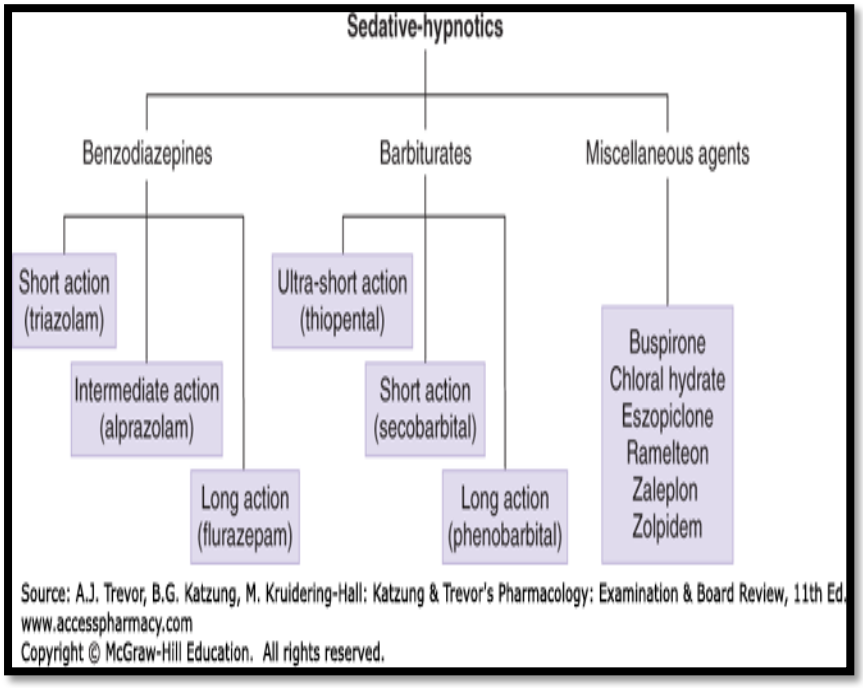

Fig .Classification of sedative and hypnotics.

Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 17

Name of topic/lesson –CNS active drugs.

Subtopic: Sedative and hypnotics.

Objective: To study Sedative and hypnotics.

Topic Outcomes: At the end of topic you should be

1. Able to study the sedative and hypnotics.
2. Different classification of sedative and hypnotics.

Hypnotic (from Greek *Hypnos,* sleep) or soporific drugs, commonly known as sleeping pills, are a class of psychoactive drugs whose primary function is to induce sleep and to be used in the treatment of insomnia (sleeplessness), or for surgical anesthesia. the term *hypnotic* generally describes drugs whose main purpose is to initiate, sustain, or lengthen sleep. Because these two functions frequently overlap, and because drugs in this class generally produce dose-dependent effects (ranging from anxiolysis to loss of consciousness) they are often referred to collectively as sedative-hypnotic drugs.

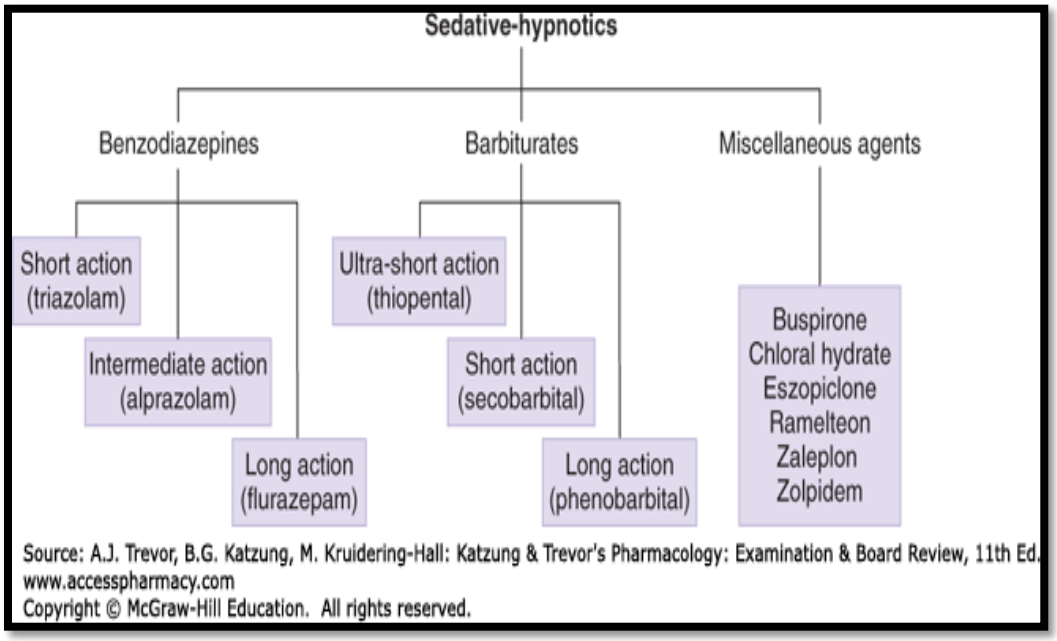

Fig .Classification of sedative and hypnotics.

Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 18

Name of topic/lesson – Drug metabolism.

Subtopic: Sedative and hypnotics.

Objective: To study the Sedative and hypnotics.

Topic Outcomes: At the end of topic you should be

1. Able to study the sedatives
2. Able to draw different structures of sedatives.

Examples of Sedatives:

a)Barbiturates:

A barbiturate is a drug that acts as a central nervous system depressant, and can therefore produce a wide spectrum of effects, from mild sedation to death. Barbiturates are effective as anxiolytics, hypnotics, and anticonvulsants, but have physical and psychological addiction potential as well as overdose potential amongst other possible adverse effects.

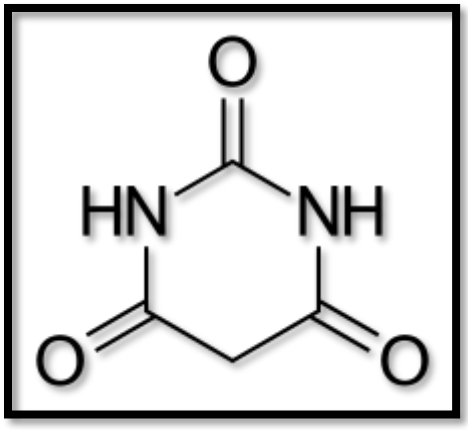

Fig. barbiturate

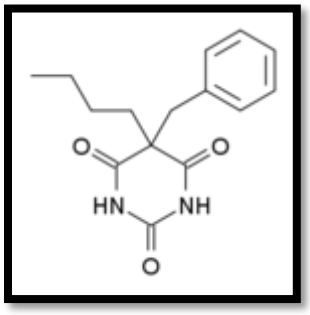

Fig. Benzylbutylbarbiturate.

b) Benzodiazepines:

Benzodiazepines (BZD, BDZ, BZs), sometimes called "benzos", are a class of psychoactive drugs whose core chemical structure is the fusion of a benzene ring and a diazepine ring. The first such drug, chlordiazepoxide(Librium), was discovered accidentally by Leo Sternbach in 1955, and made available in 1960 by Hoffmann–La Roche, which, since 1963, has also marketed the benzodiazepine diazepam (Valium). In 1977 benzodiazepines were globally the most prescribed medications.[2] They are in the family of drugs commonly known as minor tranquilizers.

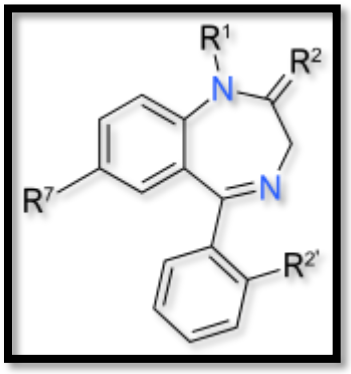

Fig. Benzodiazepines.

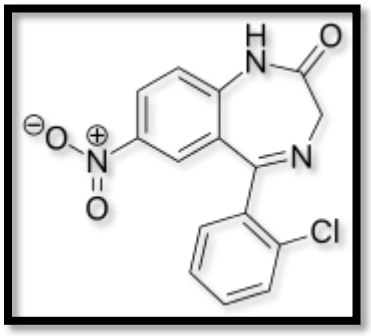

Fig. Clonazepam.

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

2. Foye's Principles of Medicinal Chemistry by Lemke, 6th edition, Lippincott William Wilkins.

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 19

Name of topic/lesson – Drug metabolism.

Subtopic: Sedative and hypnotics.

Objective: To study the Sedative and hypnotics.

Topic Outcomes: At the end of topic you should be

1. Able to study the sedative and hypontics.

2. Different structres of sedative and hyponotics.

a) Barbiturates:

Barbiturates are drugs that act as central nervous system depressants, and can therefore produce a wide spectrum of effects, from mild sedation to total anesthesia. They are also effective as anxiolytics, hypnotics, and anticonvulsalgesiceffects;

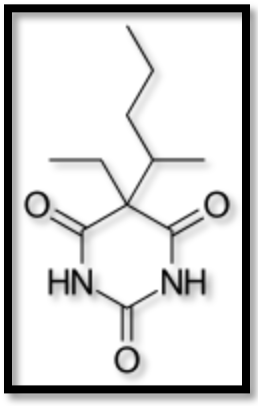

Fig. Pentobarbital.

b) Quinazolinones :

Quinazolinones are also a class of drugs which function as hypnotic/sedatives that contain a 4-quinazolinone core. Their use has also been proposed in the treatment of cancer.

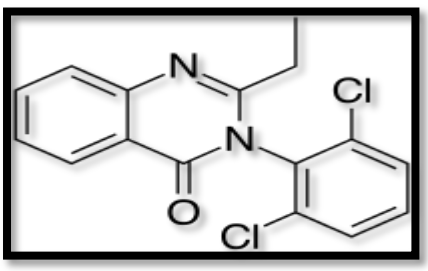

Fig. Cloroqualone

c) Benzodiazepines:

Benzodiazepines can be useful for short-term treatment of insomnia. Their use beyond 2 to 4 weeks is not recommended due to the risk of dependence. It is preferred that benzodiazepines be taken intermittently and at the lowest effective dose. They improve sleep-related problems by shortening the time spent in bed before falling asleep, prolonging the sleep time, and, in general, reducing wakefulness.

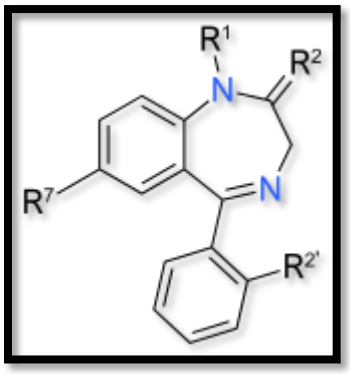

Fig.Benzodiazepines.

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 20

Name of topic/lesson –CNS active drugs..

Subtopic: Anticonvulsants.

Objective: To study the anticonvulsant and classification.

Topic Outcomes: At the end of topic you should be

1. Able to study the anticonvulsants.

2.Study different classification of anticonvulsants.

Anticonvulsants (also commonly known as antiepileptic drugs or as antiseizure drugs) are a diverse group of pharmacological agents used in the treatment of epileptic seizures. Anticonvulsants are also increasingly being used in the treatment of bipolar disorder and borderline personality disorder, since many seem to act as mood stabilizers, and for the treatment of neuropathic pain. Anticonvulsants suppress the excessive rapid firing of neurons during seizures. Anticonvulsants also prevent the spread of the seizure within the brain.

Classification of Anticonvulsants:

I)Classical

- Phenytoin
- Phenobarbital
- Primidone
- Carbamazepine
- Ethosuximide
- Valproate (valproic acid)
- Trimethadione

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 21

Name of topic/lesson -CNS active drugs.

Subtopic: Anticonvulsants.

Objective: To study the anticonvulsant and their examples.

Topic Outcomes: At the end of topic you should be

1. Able to study different examples of anticonvulsants.

2.Able to draw different structure of anticonvulsants.

a) barbiturate:

A barbiturate is a drug that acts as a central nervous system depressant, and can therefore produce a wide spectrum of effects, from mild sedation to death. Barbiturates are effective as anxiolytics, hypnotics, and anticonvulsants, but have physical and psychological addiction potential as well as overdose potential amongst other possible adverse effects. They have largely been replaced by benzodiazepines and nonbenzodiazepines ("Z-drugs") in routine medical practice, particularly in the treatment of anxiety and insomnia,

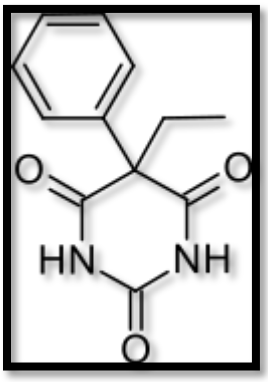

Fig. Phenobarbital.

b) benzodiazepines:

The benzodiazepines are a class of drugs with hypnotic, anxiolytic, anticonvulsive, amnestic and muscle relaxantproperties. Benzodiazepines act as a central nervous system depressant. The relative strength of each of these properties in any given benzodiazepine varies greatly and influences the indications for which it is prescribed. Long-term use can be

problematic due to the development of tolerance to the anticonvulsant effects and dependency. Of the many drugs in this class, only a few are used to treat epilepsy:

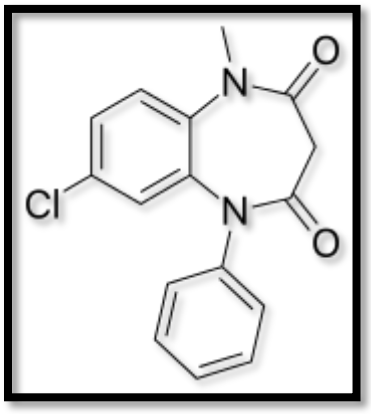

Fig. Clobazam .

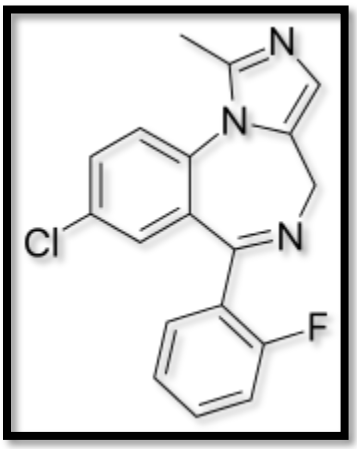

Fig. Midazolam.

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

2. Foye's Principles of Medicinal Chemistry by Lemke, 6th edition, Lippincott William Wilkins.

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 22

Name of topic/lesson –CNS active drugs.

Subtopic: Anticonvulsants.

Objective: To study the Anticonvulsants and metabolism.

Topic Outcomes: At the end of topic you should be

1. Able to draw the metabolism pathway of anticonvulsants.
2. Draw different structure of anticonvulsants.

Anticonvulsants - Phenytoin:

Phenytoin sodium (Dilantin) is one of the oldest and most widely used anticonvulsants. It is used to control certain type of seizures, and to treat and prevent seizures. It works by decreasing abnormal electrical activity in the brain. Mechanism uncertain, but probably related to effect on Na+ channels.

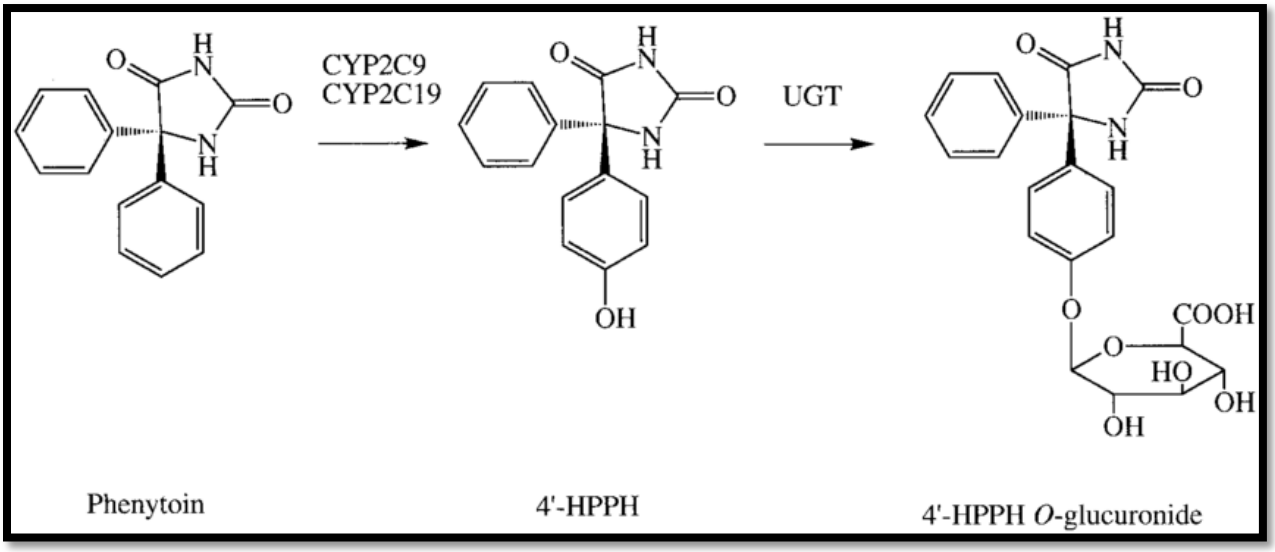

Fig.Metabolic pathway of phenytoin.

References:

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 23

Name of topic/lesson – CNS active drugs.

Subtopic: Anticonvulsants.

Objective: To study the Drugs related to Anticonvulsants.

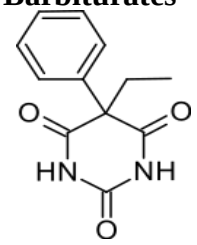
Topic Outcomes: At the end of topic you should be

1. Able to draw the structure of Anticonvulsants.

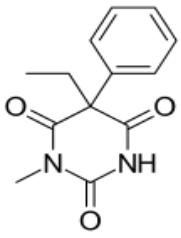
Anticonvulsants (also commonly known as antiepileptic drugs or as antiseizure drugs) are a diverse group of pharmacological agents used in the treatment of epileptic seizures. Anticonvulsants are also increasingly being used in the treatment of bipolar disorder and borderline personality disorder, since many seem to act as mood stabilizers, and for the treatment of neuropathic pain. Anticonvulsants suppress the excessive rapid firing of neurons during seizures. Anticonvulsants also prevent the spread of the seizure within the brain.

Examples of Drugs-

1. Barbiturates

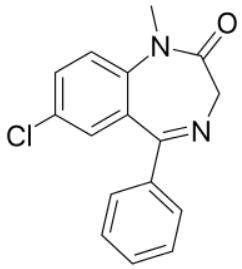


Phenobarbital

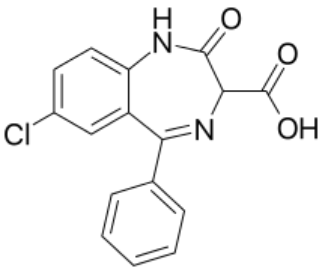


Methylphenobarbital

2. Benzodiazepines



Diazepam



Clorazepate

References:

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 24

Name of topic/lesson –CNS active drugs.

Subtopic: Anxiolytics.

Objective: To study the Anxiolytics drug.

Topic Outcomes: At the end of topic you should be

1. Able to study the anxioiytics.
2. Different functions and mechanism of anxiolytics.

An anxiolytic (also antipanic or antianxiety agent) is a medication or other intervention that inhibits anxiety. This effect is in contrast to anxiogenicagents, which increase anxiety. Together these categories of psychoactive compounds or interventions may be referred to as anxiotropic compounds or agents. Some recreational drugs such as alcohol (also known as ethanol) induce anxiolysis initially; however, studies show that many of these drugs are anxiogenic. Anxiolytic medications have been used for the treatment of anxiety disorder and its related psychological and physical symptoms. Light therapy and other interventions have also been found to have an anxiolytic effect.

Beta-receptor blockers such as propranolol and oxprenolol, although not anxiolytics, can be used to combat the somatic symptoms of anxiety such as tachycardia and palpitations.

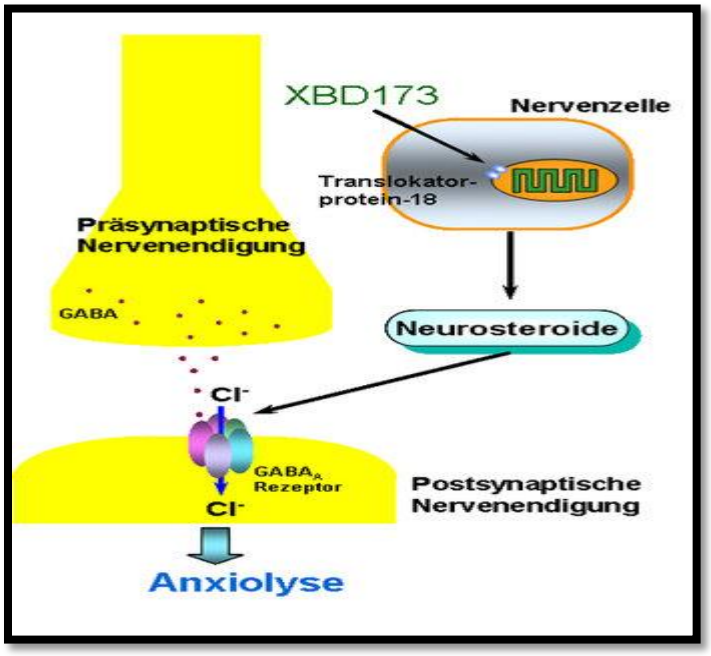

Fig. Mechanism of action.

References:

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 25

Name of topic/lesson-CNS active drugs.

Subtopic: Anxiolytics.

Objective: To study the anxiolytics and their classification.

Topic Outcomes: At the end of topic you should be

1. Able to draw the structure of Biological membrane.
2. Different functions of Biological membrane.

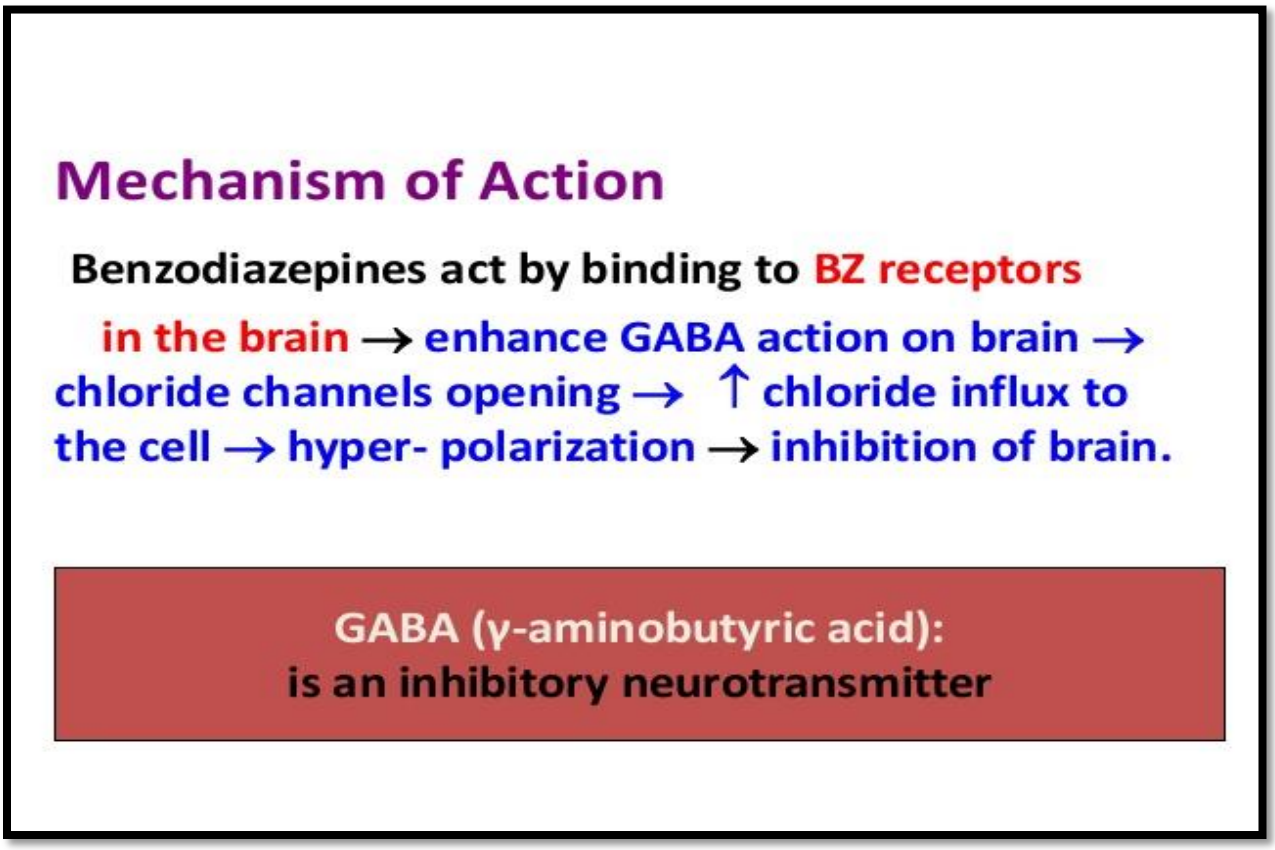

Fig .Mechanism of action of anxiolytics.

Classification of anxiolytics

- **Benzodiazepines**
  - ✓ alprazolam, chlordiazepoxide , diazepam
- **Azapirones**
  - ✓ Buspirone, Ispapirone, gepirone
- **SSRI**
  - ✓ Citalopram ,Escitalopram ,Fluoxetine
- **Beta blockers**
  - ✓ Propranalol
- **Sedative antihistaminic**
  - ✓ Hydroxyzine

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 26

Name of topic/lesson –CVS active drugs.

Subtopic: Anxiolytics.

Objective: To study the anxiolytics and their classification.

Topic Outcomes: At the end of topic you should be

1. Able to study the anxiolytic classification.

2.Able to draw structures .

Examples:

a) Benzodiazepines:

Benzodiazepines are prescribed for short-term and long-term relief of severe and disabling anxiety. Benzodiazepines may also be indicated to cover the latent periods associated with the medications prescribed to treat an underlying anxiety disorder. They are used to treat a wide variety of conditions and symptoms and are usually a first choice when short-term CNS sedation is needed.

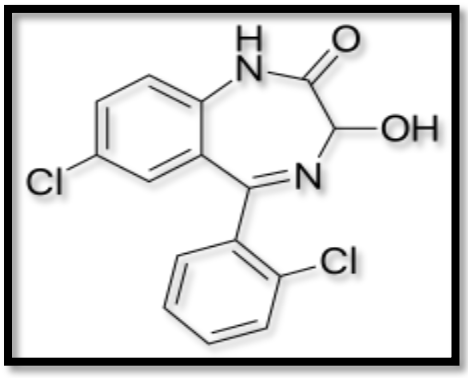

Fig. Lorazepam.

b) Carbamates:

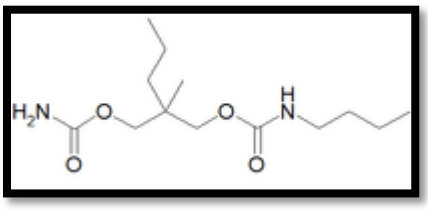

Fig. Tybamate.

c) Antihistaminis:

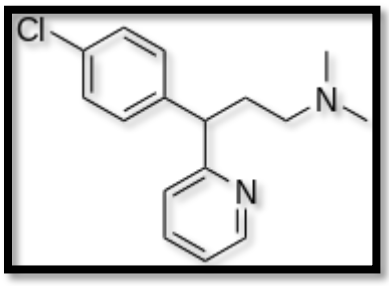

Fig. Chlorphenamine.

References:

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 27

Name of topic/lesson – CVS active drugs.

Subtopic: Anxiolytics.

Objective: To study the anxiolytics and their classification.

Topic Outcomes: At the end of topic you should be

1. Able to draw the structure of anxiolytics.

2.Able to study the anxiolytics.

Monoamine oxidase inhibitors (MAOIs) are a class of drugs that inhibit the activity of one or both monoamine oxidase enzymes: monoamine oxidase A (MAO-A) and monoamine oxidase B (MAO-B). They are best known as powerful anti-depressants, as well as effective therapeutic agents for panic disorder and social phobia. They are particularly effective in treatment-resistant depression and atypical depression. They are also used in the treatment of Parkinson's disease and several other disorders.

Mechanism of action:

MAOIs act by inhibiting the activity of monoamine oxidase, thus preventing the breakdown of monoamine neurotransmitters and thereby increasing their availability. There are two isoforms of monoamine oxidase, MAO-A and MAO-B. MAO-A preferentially deaminates serotonin, melatonin, epinephrine, and norepinephrine. MAO-B preferentially deaminates phenethylamine and certain other trace amines; in contrast, MAO-A preferentially deaminates other trace amines, like tyramine, whereas dopamine is equally deaminated by both types.

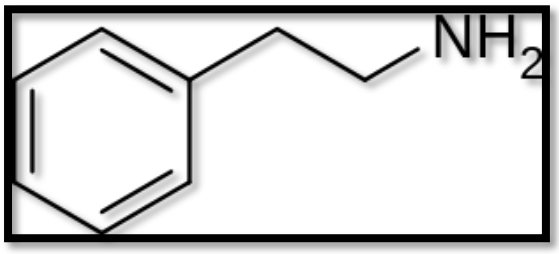

Fig. Phenethylamine

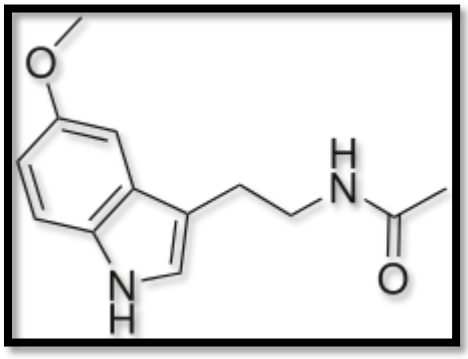

Fig. Melatonin .

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

2. Foye's Principles of Medicinal Chemistry by Lemke, 6th edition, Lippincott William Wilkins.

3. Burger's Medicinal Chemistry by Wolff ME, John Wiley & Sons, New York

4. Principles of Medicinal Chemistry by Kadam SS, Mahadik KR, Bothara KG, Vol. I & II, 10th Edition, Nirali Prakashan.

Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 28

Name of topic/lesson – CVS active drugs.

Subtopic: Antidepressants.

Objective: To study the antidepressants and their types.

Topic Outcomes: At the end of topic you should be

1. Able to study the antidepressants .
2. Different functions of antidepressants and their examples.

Antidepressants are drugs used for the treatment of major depressive disorder and of other conditions, including some anxiety disorders, some chronic pain conditions (off-label use), and to help manage some addictions. Common side-effects of antidepressants include dry mouth, weight gain, dizziness, headaches and sexual dysfunction. Most types of antidepressants are typically safe to take, but may cause increased thoughts of suicide when taken by children, adolescents, and young adults. A discontinuation syndrome can occur after stopping any antidepressant which resembles recurrent depression.

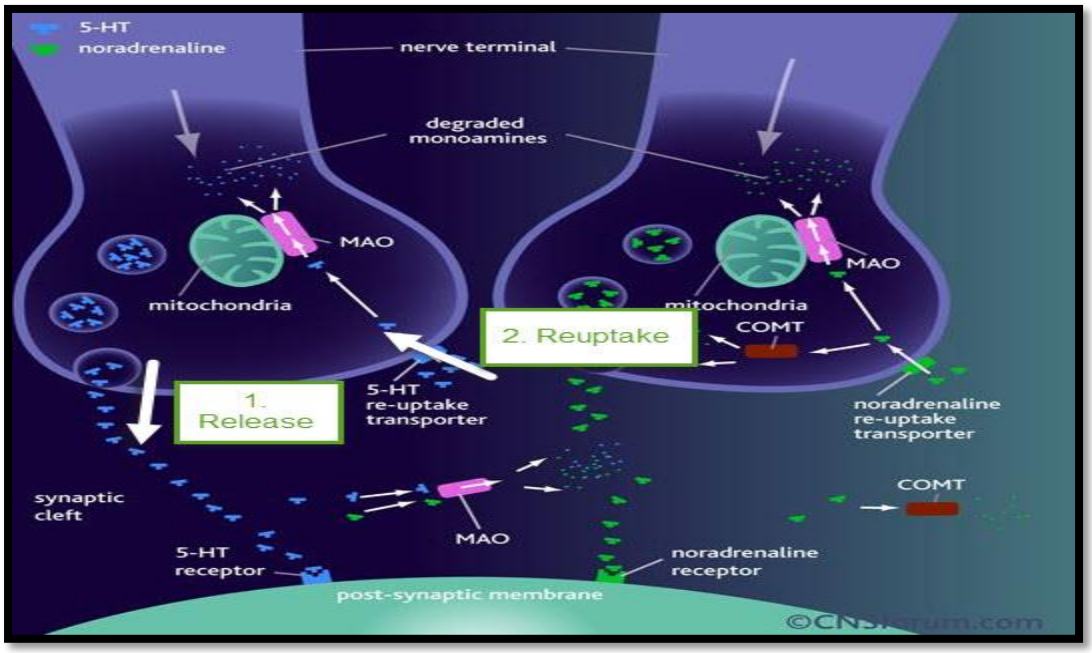

Fig. Types of antidepressants.

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

2. Foye's Principles of Medicinal Chemistry by Lemke, 6th edition, Lippincott William Wilkins.

3. Burger's Medicinal Chemistry by Wolff ME, John Wiley & Sons, New York

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 29

Name of topic/lesson – CVS active drugs.

Subtopic: Antidepressants..

Objective: To study the antidepressants and their examples.

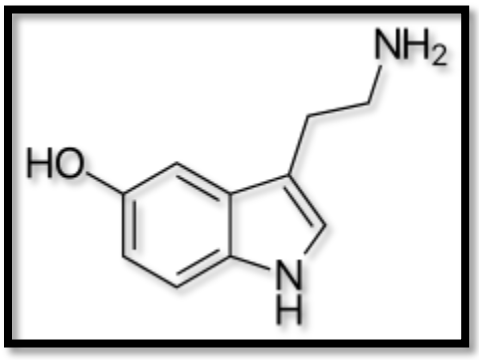
Topic Outcomes: At the end of topic you should be

1. Able to draw the structure of antidepressant classification.
2. Able to study the antidepressants and classification.

An antidepressant is a type of medication that is used to treat people with mood disorders including depression and also to treat people with anxiety disorders. Some people take antidepressants to lower their sex drive and treat premature ejaculation.

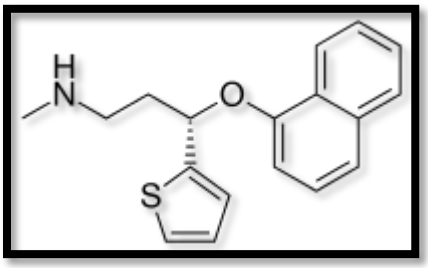
There are different types of antidepressant, such as monoamine oxidase inhibitors(MAOIs), tricyclic antidepressants (TCAs), tetracyclic antidepressants (TeCAs), selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs).

a) Selective serotonin reuptake inhibitors (SSRIs) :



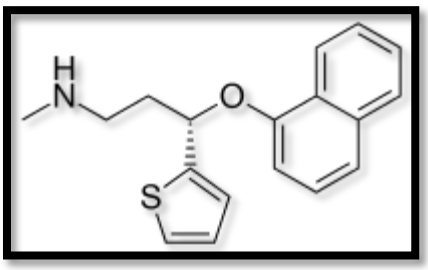
selective serotonin reuptake inhibitors (SSRIs) are a class of drugs that are typically used as antidepressants in the treatment of major depressive disorder and anxiety disorders.

b) Serotonin–norepinephrine reuptake inhibitors (SNRIs) :



Serotonin–norepinephrine reuptake inhibitors (SNRIs) are a class of antidepressant drugs that treat major depressive disorder (MDD) and can also treat anxiety disorders, obsessive–compulsive disorder (OCD), attention-deficit hyperactivity disorder (ADHD), chronic neuropathic pain, fibromyalgia syndrome (FMS), and menopausal symptoms.

c) Serotonin–norepinephrine reuptake inhibitors (SNRIs):



Serotonin–norepinephrine reuptake inhibitors (SNRIs) are a class of antidepressant drugs that treat major depressive disorder (MDD) and can also treat anxiety disorders, obsessive–compulsive disorder (OCD), attention-deficit hyperactivity disorder (ADHD), chronic neuropathic pain, fibromyalgia syndrome (FMS), and menopausal symptoms.

References:

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 30

Name of topic/lesson – CVS active drugs.

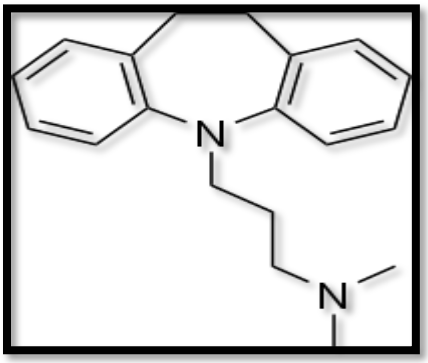
Subtopic: Antidepressants..

Objective: To study the antidepressants and their examples.

Topic Outcomes: At the end of topic you should be

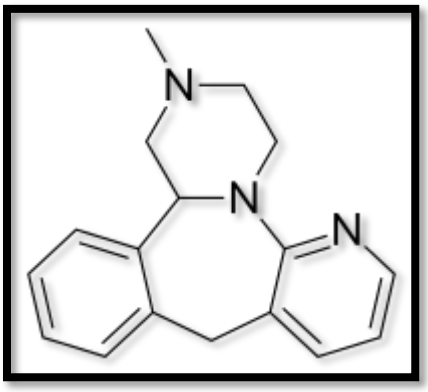
1. Able to draw the structure of antidepressant classification.
2. Able to study the antidepressants and classification.

a) Tricyclic antidepressants (TCAs):



Tricyclic antidepressants (TCAs) are a class of medications that are used primarily as antidepressants. TCAs were discovered in the early 1950s and were marketed later in the decade. They are named after their chemical structure, which contains three rings of atoms. Tetracyclic antidepressants(TeCAs), which contain four rings of atoms, are a closely related group of antidepressant compounds.

b) Tetracyclic antidepressants (TeCAs:



Tetracyclic antidepressants (TeCAs) are a class of antidepressants that were first introduced in the 1970s. They are named after their tetracyclic chemical structure, containing four rings of atoms, and are closely related to the tricyclic antidepressants(TCAs), which contain three rings of atoms.

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

2. Foye's Principles of Medicinal Chemistry by Lemke, 6th edition, Lippincott William Wilkins.

3. Burger's Medicinal Chemistry by Wolff ME, John Wiley & Sons, New York

4. Principles of Medicinal Chemistry by Kadam SS, Mahadik KR, Bothara KG, Vol. I & II, 10th Edition, Nirali Prakashan.

Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 31

Name of topic/lesson – CVS active drugs.

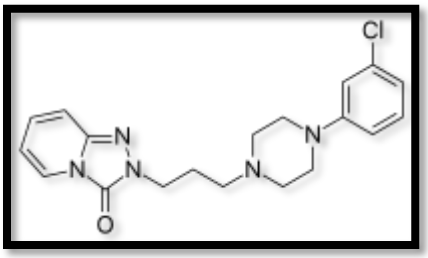
Subtopic: Antidepressants..

Objective: To study the antidepressants and their examples.

Topic Outcomes: At the end of topic you should be

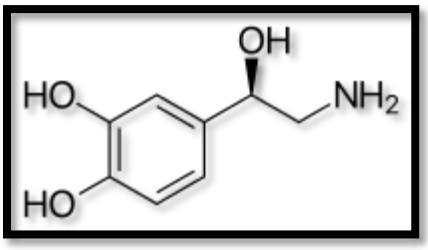
1. Able to draw the structure of antidepressant classification.
2. Able to study the antidepressants and classification.

a) Serotonin antagonist and reuptake inhibitors (SARIs):



Serotonin antagonist and reuptake inhibitors (SARIs) are a class of drugs used mainly as antidepressants, but also as anxiolytics and hypnotics. They act by antagonizing serotonin receptors such as 5-HT_{2A} and inhibiting the reuptake of serotonin, norepinephrine, and/or dopamine.

b) Norepinephrine reuptake inhibitor (NRI, NERI) :



A norepinephrine reuptake inhibitor (NRI, NERI) or Noradrenaline reuptake inhibitor or adrenergic reuptake inhibitor (ARI), is a type of drug that acts as a reuptake inhibitor for the neurotransmitters norepinephrine(noradrenaline) and epinephrine (adrenaline) by blocking the action of the norepinephrine transporter (NET).

Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

2. Foye's Principles of Medicinal Chemistry by Lemke, 6th edition, Lippincott William Wilkins.

3. Burger's Medicinal Chemistry by Wolff ME, John Wiley & Sons, New York

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 32

Name of topic/lesson-CNS active drugs.

Subtopic:. Antipsychotics.

Objective: To study the antipsychotics and their examples.

Topic Outcomes: At the end of topic you should be

1. Able to study the structure of antipsychotic drugs.

2.Able to draw structures of antipsychotics.

Antipsychotics, also known as neuroleptics or major tranquilizers, are a class of medication primarily used to manage psychosis (including delusions, hallucinations, paranoia or disordered thought), principally in schizophrenia and bipolar disorder. Antipsychotics are usually effective in relieving symptoms of psychosis in the short term.

The long-term use of antipsychotics is associated with adverse effectssuch as involuntary movement disorders, gynecomastia, impotence, weight gain and metabolic syndrome.

First-generation antipsychotics, known as typical antipsychotics, were discovered in the 1950s. Most second-generation drugs, known as atypical antipsychotics, have been developed more recently, although the first atypical antipsychotic, clozapine, was discovered in the 1960s and introduced clinically in the 1970.

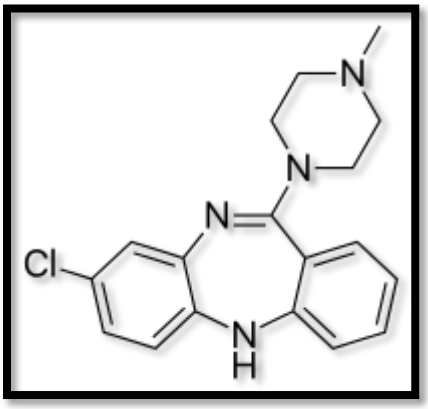

Fig. Clozapine.

Clozapine, sold under the brand name Clozaril among others, is an atypical antipsychotic medication. It is mainly used for schizophrenia that does not improve following the use of other antipsychotic medications. In those with schizophrenia and schizoaffective disorder it may decrease the rate of suicidal behavior. It is more effective than typical antipsychotics.

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

2. Foye's Principles of Medicinal Chemistry by Lemke, 6th edition, Lippincott William Wilkins.

3. Burger's Medicinal Chemistry by Wolff ME, John Wiley & Sons, New York

4. Principles of Medicinal Chemistry by Kadam SS, Mahadik KR, Bothara KG, Vol. I & II, 10th Edition, Nirali Prakashan.

Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 33

Name of topic/lesson – CNS avtive drugs.

Subtopic: Antipsychotic.

Objective: To study the antipsychotic drug.

Topic Outcomes: At the end of topic you should be

1. Able to study the antipsychotic drug.

2.Mechanism of action of antipsychotic drug.

Antipsychotic drugs such as haloperidol and chlorpromazine tend to block dopamine D_2 receptors in the dopaminergic pathways of the brain. This means that dopamine released in these pathways has less effect. Excess release of dopamine in the mesolimbic pathway has been linked to psychotic experiences. Decreased dopamine release in the prefrontal cortex, and excess dopamine release in other pathways, are associated with psychotic episodes in schizophrenia and bipolar disorder. In addition to the antagonistic effects of dopamine, antipsychotics (in particular atypical neuroleptics) also antagonize 5-HT_{2A} receptors. Different alleles of the 5-HT_{2A} receptor have been associated with schizophrenia and other psychoses, including depression. Higher concentrations of 5-HT_{2A} receptors in cortical and subcortical areas, in particular in the right caudate nucleus have been historically recorded.

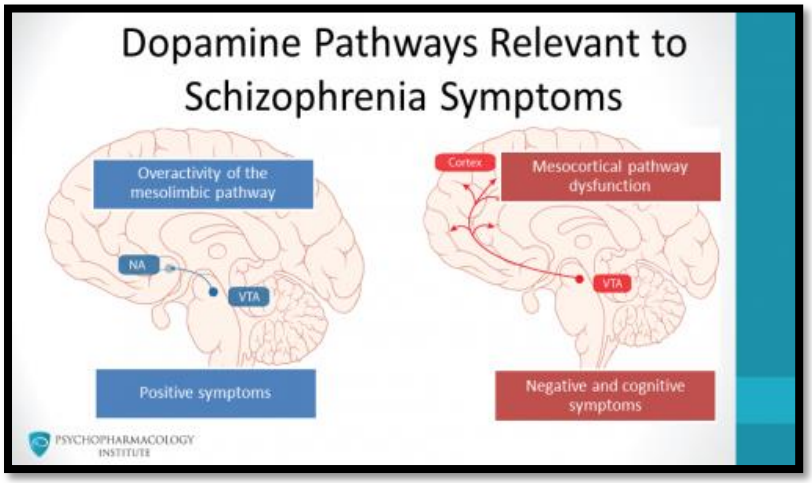

Fig. Mechanism of action.

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

2. Foye's Principles of Medicinal Chemistry by Lemke, 6th edition, Lippincott William Wilkins.

3. Burger's Medicinal Chemistry by Wolff ME, John Wiley & Sons, New York

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 34

Name of topic/lesson – CNS active drugs.

Subtopic: Antipsychotics.

Objective: To study the classification of antipsychotics.

Topic Outcomes: At the end of topic you should be

1. Able to study classification of antipsychotics.
2. Different examples of antipsychotics..

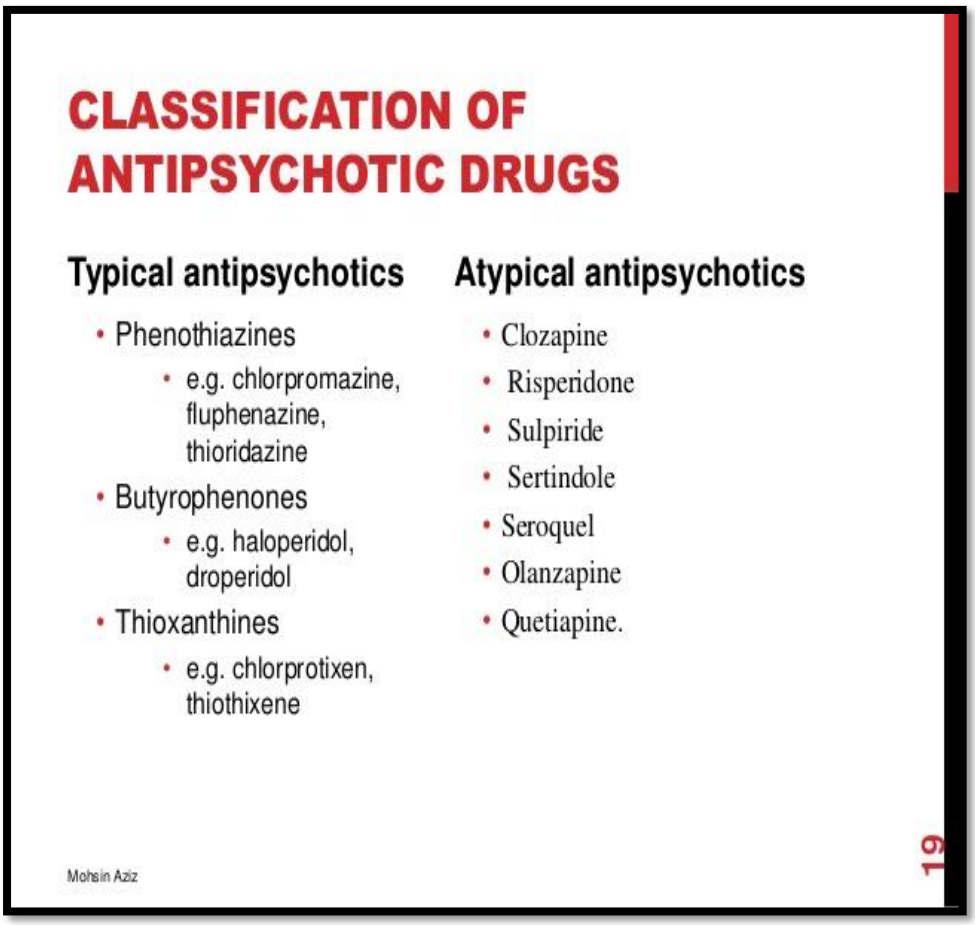

Fig. Classification of antipsychotics drugs.

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

2. Foye's Principles of Medicinal Chemistry by Lemke, 6th edition, Lippincott William Wilkins.

3. Burger's Medicinal Chemistry by Wolff ME, John Wiley & Sons, New York

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 35

Name of topic/lesson –CNS active drugs.

Subtopic: Antipsychotics.

Objective: To study the antipsychotics and their examples..

Topic Outcomes: At the end of topic you should be

1. Able to draw the structure of Biological membrane.

2. Different functions of Biological membrane.

a)First generation:

Butyrophenones.

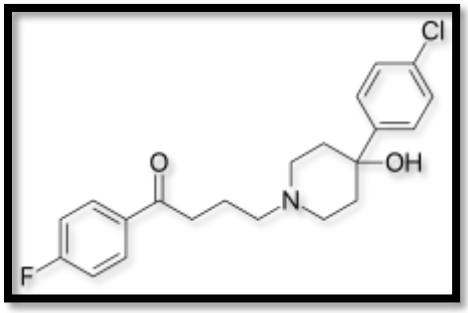

Fig. Haloperidol.

Phenothiazines.

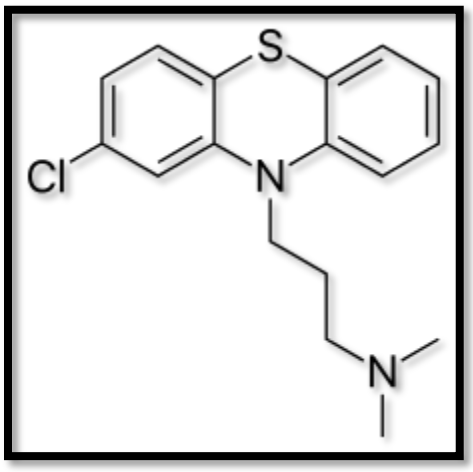

Fig. Chlorpromazine.

b)Second generation:

Benzamides.

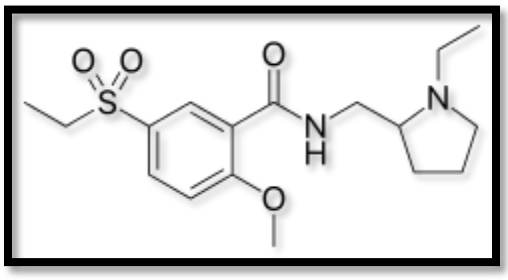

Fig. Sultopride.

c) Others:

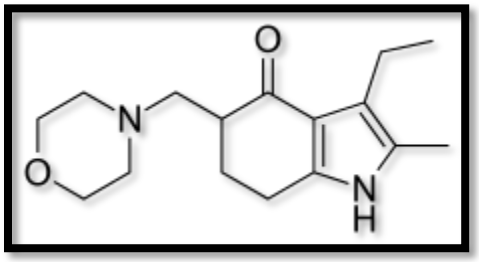

Fig. Molindone.

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 36

Name of topic/lesson – CNS active drugs.

Subtopic: – Parkinsons disease.

Objective: To study the Parkinsons disease.

Topic Outcomes: At the end of topic you should be

1. Able to draw the structure of Biological membrane.
2. Different functions of Biological membrane.

Parkinson's disease (PD) is a long-term degenerative disorder of the central nervous system that mainly affects the motor system. As the disease worsens, non-motor symptoms become more common. The symptoms usually emerge slowly. Early in the disease, the most obvious symptoms are shaking, rigidity, slowness of movement, and difficulty with walking. Thinking and behavioral problems may also occur. Dementia becomes common in the advanced stages of the disease. Depression and anxiety are also common, occurring in more than a third of people with PD. Other symptoms include sensory, sleep, and emotional problems. The main motor symptoms are collectively called "parkinsonism", or a "parkinsonian syndrome".

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

2. Foye's Principles of Medicinal Chemistry by Lemke, 6th edition, Lippincott William Wilkins.

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 37

Name of topic/lesson – CNS active drugs.

Subtopic: Parkinsons disease.

Objective: To study the parkinsons disease..

Topic Outcomes: At the end of topic you should be

1. Able to draw the drug structure used in parkinsons disease .
2. Different function of drug.

Medication used for parkinsons disease:

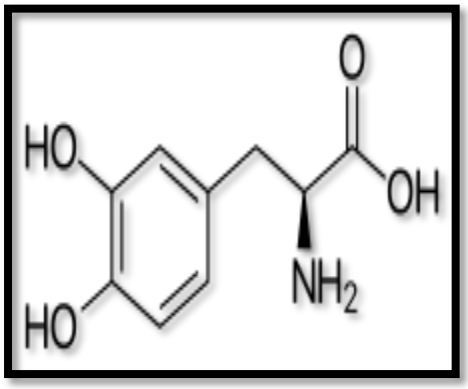

Fig. L-DOPA.

L-DOPA crosses the protective blood–brain barrier, whereas dopamine itself cannot. Thus, L-DOPA is used to increase dopamine concentrations in the treatment of Parkinson's disease and dopamine-responsive dystonia. Once L-DOPA has entered the central nervous system, it is converted into dopamine by the enzyme aromatic L-amino acid decarboxylase, also known as DOPA decarboxylase. Pyridoxal phosphate(vitamin B_6) is a required cofactor in this reaction, and may occasionally be administered along with L-DOPA, usually in the form of pyridoxine.

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

2. Foye's Principles of Medicinal Chemistry by Lemke, 6th edition, Lippincott William Wilkins.

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 38

Name of topic/lesson –CNS active drugs.

Subtopic: Alzheimers disease.

Objective: To study the Alzheimers disease.

Topic Outcomes: At the end of topic you should be

1. Able to study the Alzheimers disease.
2. Different functions of drugs.

Alzheimer's disease (AD), also referred to simply as Alzheimer's, is a chronic neurodegenerative disease that usually starts slowly and gradually worsens over time. It is the cause of 60–70% of cases of dementia. The most common early symptom is difficulty in remembering recent events. As the disease advances, symptoms can include problems with language, disorientation (including easily getting lost), mood swings, loss of motivation, not managing self care, and behavioural issues.[1]

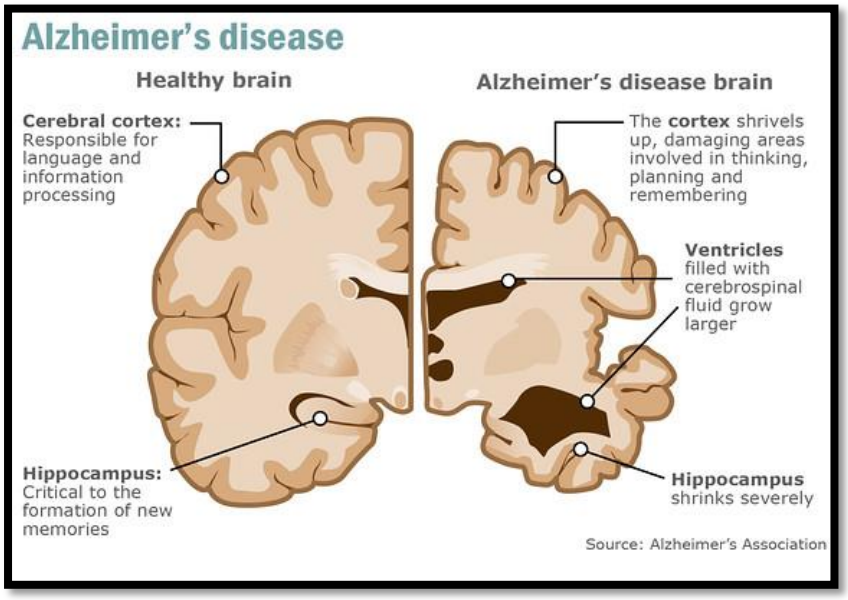

Fig. Alzheimer's disease.

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 39

Name of topic/lesson – CNS active drugs.

Subtopic: Alzheimers disease.

Objective: To study the Alzheimers disease.

Topic Outcomes: At the end of topic you should be

1. Able to draw the structure of Biological membrane.
2. Different functions of Biological membrane.

Five medications are currently used to treat the cognitive problems of AD: four are acetylcholinesterase inhibitors (tacrine, rivastigmine, galantamine and donepezil) and the other (memantine) is an NMDA receptor antagonist. The benefit from their use is small. No medication has been clearly shown to delay or halt the progression of the disease.

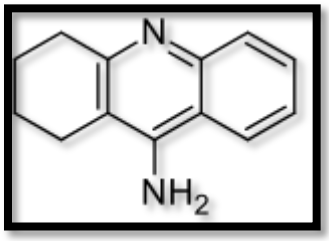

Fig. Tacrine

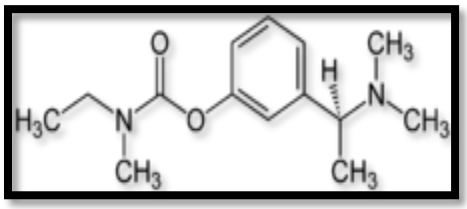

Fig. Rivastigmine

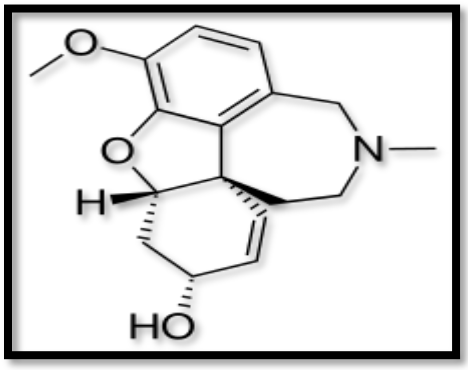

Fig. Galantamine

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

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3. Burger's Medicinal Chemistry by Wolff ME, John Wiley & Sons, New York

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 40

Name of topic/lesson – CNS active drugs.

Subtopic: CNS stimulants.

Objective: To study the CNS stimulants.

Topic Outcomes: At the end of topic you should be

1. Able to study mechanism of action of CNS stimulants.
2. Able to draw mehanism of action of CNS stimulants.

Stimulants can have a wide variety of mechanisms. Many stimulants exert their effects through manipulations of monoamine neurotransmission. Monoamines are a class of neurotransmitter relevant in reward, motivation, temperature regulation and pain sensation that include dopamine, norepinephrine, and serotonin. Stimulants usually block the reuptake or stimulate the efflux of dopamine and norepinephrine resulting in increased activity of their circuits. Some stimulants, notably those with empathogenic and hallucinogenic effects alter serotonergic neurotransmission.

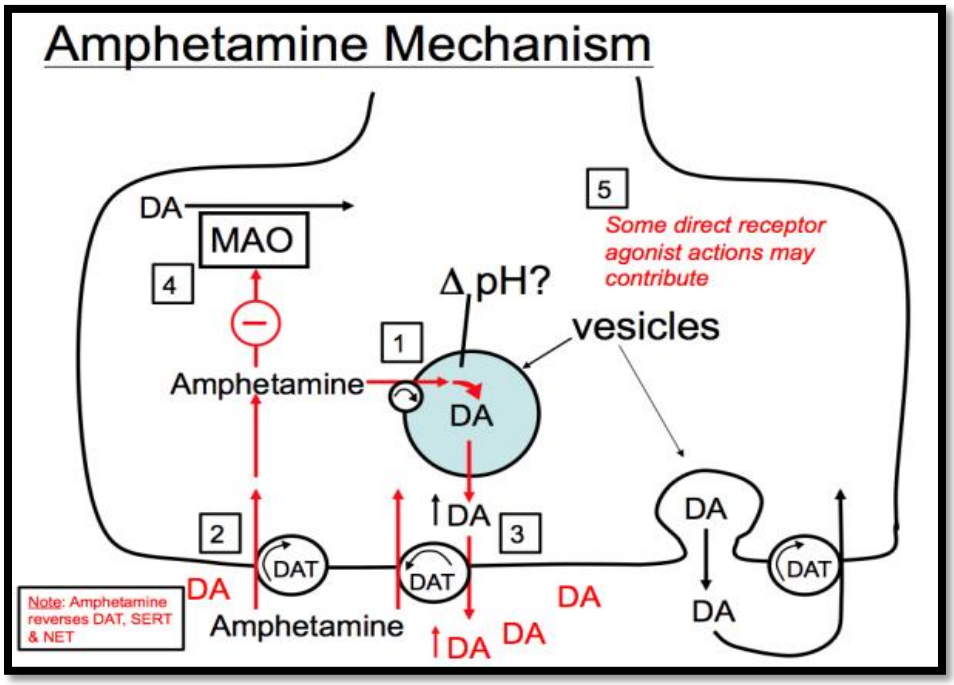

Fig. Mechanism of action of amphetamine.

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

2. Foye's Principles of Medicinal Chemistry by Lemke, 6th edition, Lippincott William Wilkins.

3. Burger's Medicinal Chemistry by Wolff ME, John Wiley & Sons, New York

4. Principles of Medicinal Chemistry by Kadam SS, Mahadik KR, Bothara KG, Vol. I & II, 10th Edition, Nirali Prakashan.

Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 41

Name of topic/lesson – CNS active drugs.

Subtopic: CNS stimulant.

Objective: To study the CNS stimulant and their examples.

Topic outcome:

1. Able to study CNS stimulant and classification.

2. Different structures of CNS stimulants.

Stimulants (also often referred to as psychostimulants or colloquially as uppers) is an overarching term that covers many drugs including those that increase activity of the central nervous system and the body, drugs that are pleasurable and invigorating, or drugs that have sympathomimetic effects. Stimulants are widely used throughout the world as prescription medicines as well as without a prescription (either legally or illicitly) as performance-enhancing or recreational drugs.

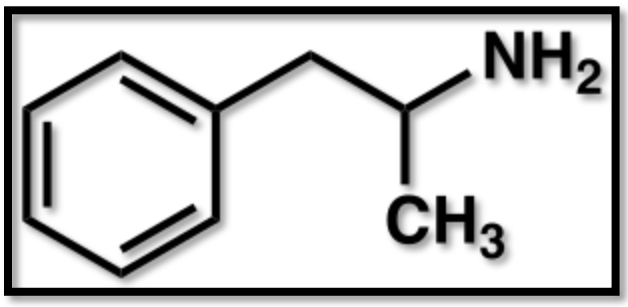

Fig. Amphetamine.

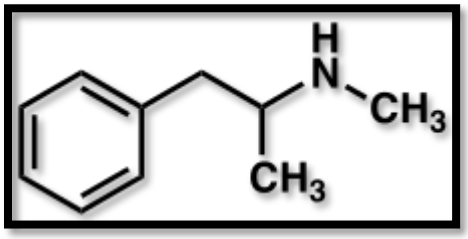

Fig. Methamphetamine.

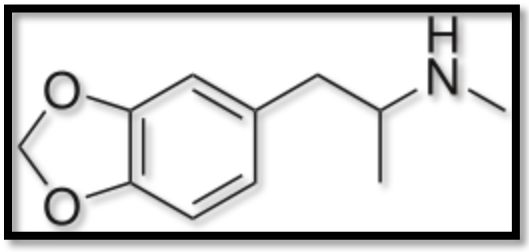

Fig. MDMA.

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 42

Name of topic/lesson-Drugs acting on blood.

Subtopic: Coagulation.

Objective: To study the drugs acting on blood.

Topic Outcomes: At the end of topic you should be

1. Able to study the coagulation.

2. Able to study different functions of drug and blood coagulation pathway.

Coagulation, also known as clotting, is the process by which blood changes from a liquid to a gel, forming a blood clot. It potentially results in hemostasis, the cessation of blood loss from a damaged vessel, followed by repair. The mechanism of coagulation involves activation, adhesion and aggregation of platelets, as well as deposition and maturation of fibrin.

Coagulation begins almost instantly after an injury to the blood vessel has damaged the endothelium lining the blood vessel. Exposure of blood to the subendothelial space initiates two processes: changes in platelets, and the exposure of subendothelial tissue factor to plasma Factor VII, which ultimately leads to cross-linked fibrin formation. Platelets immediately form a plug at the site of injury; this is called *primary hemostasis*.

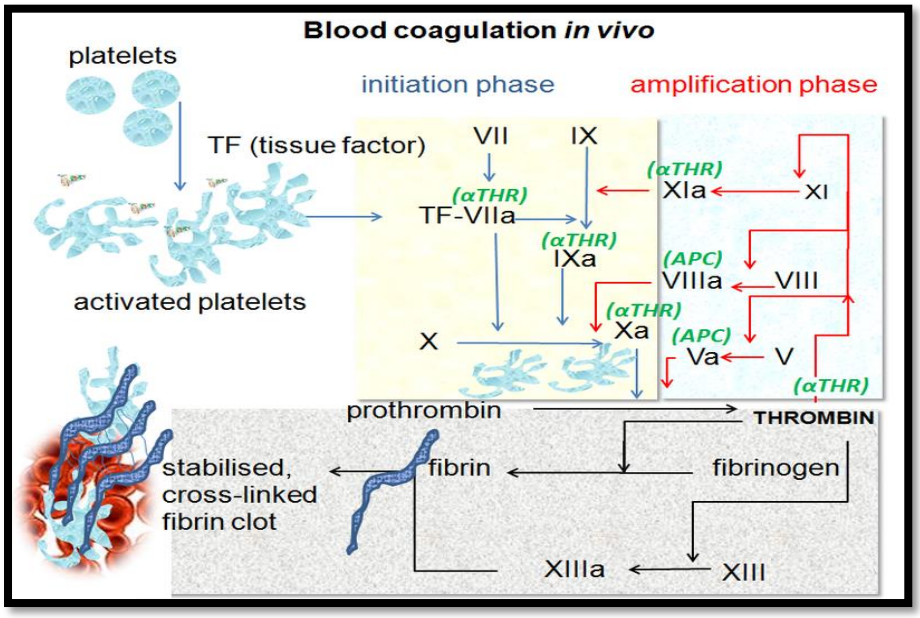

Fig .Blood coagulation pathway.

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2. Foye's Principles of Medicinal Chemistry by Lemke, 6th edition, Lippincott William Wilkins.

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 43

Name of topic/lesson – Drug acting on blood

Subtopic: Coagulation.

Objective: To study the coagulation and their examples.

Topic Outcomes: At the end of topic you should be

1. Able to study and draw the structure of coagulants.

2. Different action of coagulants.

Heparin, also known as unfractionated heparin (UFH), is a medication and naturally occurring glycosaminoglycan. As a medication it is used as an anticoagulant (blood thinner). Specifically it is also used in the treatment of heart attacks and unstable angina. It is given by injection into a vein or under the skin. Other uses include inside test tubes and kidney dialysis machines.

Common side effects include bleeding, pain at the injection site, and low blood platelets. Serious side effects include heparin-induced thrombocytopenia. Greater care is needed in those with poor kidney function. Heparin appears to be relatively safe for use during pregnancyand breastfeeding. Heparin is produced by basophils and mast cells in all mammals.

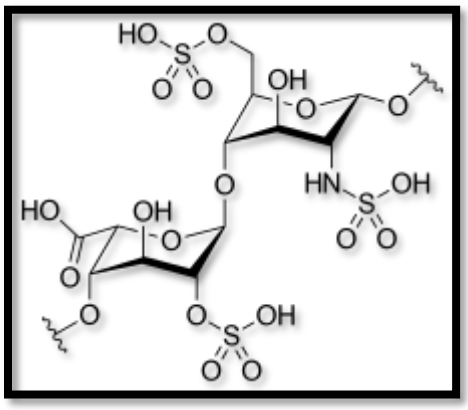

Fig.Heparin.

Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

References:

1. Wilson and Griswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Co. Philadelphia.

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 44

Name of topic/lesson – Drug acting on blood.

Subtopic: Anti-coagulants.

Objective: To study the anti-coagulants and their mechanism.

Topic Outcomes: At the end of topic you should be

1. Able to study the anti-coagulants.

2.Mechanism of action of anti-coagulants.

Anticoagulants, commonly referred to as blood thinners, are chemical substances that prevent or reduce coagulation of blood, prolonging the clotting time. Some of them occur naturally in blood-eating animals such as leeches and mosquitoes, where they help keep the bite area unclotted long enough for the animal to obtain some blood. As a class of medications, anticoagulants are used in therapy for thrombotic disorders. Oralanticoagulants (OACs) are taken by many people in pill or tablet form, and various intravenous anticoagulant dosage forms are used in hospitals. Some anticoagulants are used in medical equipment, such as test tubes, blood transfusion bags, and dialysis equipment.

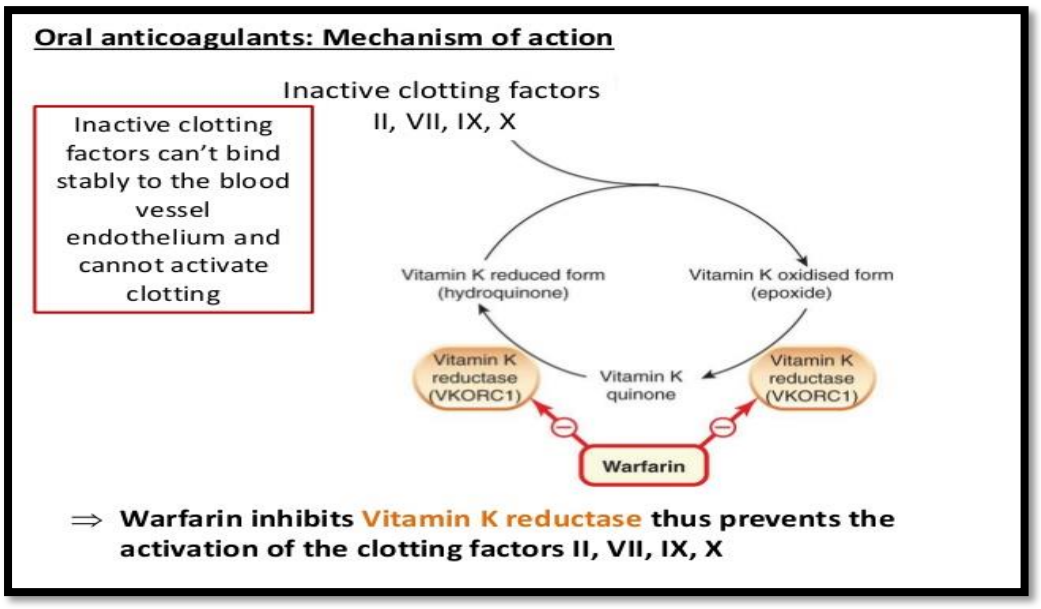

Fig .Mechanism of action of anticoagulants

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Lecture synopsis Sub: Medicinal Chemistry-II

Subject I/C: M.K. Munde

Lecture No: 45

Name of topic/lesson – Drug acting on blood.

Subtopic: Anti-coagulants.

Objective: To study the anti-coagulant and their examples.

Topic Outcomes: At the end of topic you should be

1. Able to study the different examples of anti-coagulants.

2.Able to draw structures of anticoagulants.

Warfarin, sold under the brand name Coumadin among others, is a medication that is used as an anticoagulant (blood thinner). It is commonly used to treat blood clots such as deep vein thrombosis and pulmonary embolism and to prevent stroke in people who have atrial fibrillation, valvular heart disease or artificial heart valves. Less commonly it is used following ST-segment elevation myocardial infarction (STEMI) and orthopedic surgery.[4] It is generally taken by mouth but may also be used by injection into a vein.

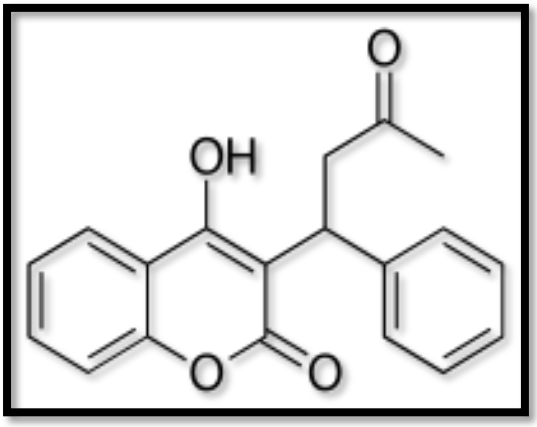

Fig .Warfarin.

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