Pharmacognosy

(Pharmacy Technician)

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CHAPTER 1

PHARMACOGNOSY

Pharmacognosy is the study of crude drugs of plant and animal origin. The **American Society of Pharmacognosy** defines Pharmacognosy as;

> "The study of the physical, biochemical and biological properties of natural drugs and their chemical constituents. As well as the search for new drugs from natural sources."

Introduction of Pharmacognosy `

The word "Pharmacognosy" is derived from the Greek words **pharmakon** “drug”, and **gnosis** "knowledge”. The term Pharmacognosy was used for the first time by the Austrian physician Schmidt in 1811 and 1815 by Seydler in a work.

Originally - during the 19th century and the beginning of the 20th century - "Pharmacognosy" was used to define the branch of medicine which deals with drugs in their crude, or unprepared, form.

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John Adam Schmidt Schmidt Cognosy

Scope of Pharmacognosy

Pharmacognosy is the branch of science which deals with the biological, biochemical and economic features of natural drugs and their constituents. It also deals with the study of;

- Classification of Crude Drugs to know about the class of the Drug
- Cultivation, Collection, Drying, Storage, Preservation, Packing, Evaluation and adulteration of Crude Drugs.
- Plant growth hormones, for rapid & better growth of plants.
- Allergens & allergic preparations, to overcome the problems of Allergy.
- Enzymes, to cure & manage the diseases caused by Enzymatic Deficiency.
- Poisonous Plants to prevent poison.
- Herbal drugs, used in traditional practice.

Chapter 2

CRUDE DRUGS

A crude drug is any naturally occurring, unrefined substance derived from organic or inorganic sources such as plant, animal, bacteria, organs or whole organisms intended for use in the diagnosis, cure, treatment, or prevention of disease in man or other animals.

Classification of Crude Drugs

Crude Drugs can be classified in following ways.

1. Morphological Method
2. Taxonomical Method
3. Pharmacological Method
4. Chemical Method

1- Morphological Method

In this method, drugs are classified according to their part used. e.g.

- **Organized Drugs**

These are the drugs obtained from direct parts of the plant and containing cellular tissues are called as organized drugs. For exampleflowers, seeds, leaves, rhizome, bark etc.

- **Unorganized Drugs**

The drugs which are prepared from plants by physical process such as incision, drying or extraction with a solvent and not containing any cellular plant tissues are called unorganized drugs. Forexample Latex, Tragacanth, Gum acacia.

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Table 1. Morphological Classification of Drugs

1.Organized Drugs	
Plant Part	Example of drugs
• Leaves	Digitallis, Pudina, Senna, Squill Hyoscyamus, Belladona
• Barks	Cinchona, Cinnamon, Cascara
• Flowering Parts	Clove, Saffron
• Fruits	Cardamom, Caraway, Fennel, Colocynth, Capsicum
• Seeds	Bitter Almond, Cardamom, Nux vomica, Strophanthus
• Roots & Rhizomes	Ginger, Glycyrrhiza, Ipecac, Rauwolfia, Rhubarb
2.Unorganized Drugs	
• Dried Latex	Opium, Papain
• Dried Juice	Aloe
• Gums	Acacia, Tragacanth
• Resins	Asafeotida, Benzoin, Tolu Balsam
• Fixed oils	Castor, Almond
• Waxes	Bees wax, Carnauba wax
• Animal Products	Gelatin, Cod liver oil, Cantharides
• Minerals	Kaolin, Talc

Book follows this method;

- Pharmacognosy by Wallis

2- Taxonomical Method ;

In this method, drugs are classified according to their natural relationship and distinguishing characteristics. They are grouped in phylum, order, family, genus and species.

Table 2. Taxonomical Classification of Drugs

Phyllum	**Order**	**Family**	**Genus**	**Species**	**Drugs**
Angiosperms	Rosales	Rosaceae	Prunus	amygdalus	Almond
Rhodophyta	Gelidiales	Gelidiaceae	Gelidium	cartilagineum	Agar
Gymnosperms	Genetales	Ephedraceae	Ephedra	sinica	Ephedra

Taxonomical Classification

3- Pharmacological Method ;

In this method drugs are classified according to their therapeutic effects.

Pharmacological Class	Drugs
Anticancer	Cinnamon bark,
Purgative	Aloe, Senna, Castor oil
Antispasmodic	Belladona, Hyoscyamus
Astringent	Catechu, Tannic acid
Expectorant	Glycyrrhiza, Tolu balsam
Cardio tonic	Digitallis, Strophanthus

Pharmacological Classification

4- Chemical Method ;

In this method drugs are classified according to their principle constituents.

Sr.No.	Chemical Constituents	Drugs
1.	Carbohydrates	Agar, Acacia, Tragacanth, Starch
2.	Glycosides	Aloe, Senna, Glycyrrhiza, Digitalis
3.	Volatile oils	Cinnamon, Fennel, Clove, Caraway
4.	Alkaloids	Belladona, Hyoscyamus
5.	Resins	Ginger, Asafeotida, Benzoin,
6.	Tannins	Black catechu
7.	Proteins	Papain, Bromelain, Gelatin

CHAPTER 3

TERMINOLOGIES IN PHARMACOGNOSY

Following are the most frequent terminologies used in Pharmacognosy.

Acaulescent: stem less

Acerose: needle-shaped

Acicular: needle-shaped, as applied to some kinds of foliage

Acute: tapering to a sharp-pointed apex with more or less straight sides along the tip

Angular: having sharp angles or corners, generally used in reference to structures such as stems to contrast them with rounded stems

Axis: the main stem

Basal: at or near the base, often describing leaves and where they attach

Basifixed: attached by the base (compare dorsifixed, versatile)

Capillary: very slender and hair like

Deltoid: broadly triangular in shape

Dense: congested, describing the disposition of flowers.

Dentate: with sharp, outward-pointing teeth on the margin

Exudate: a substance exuded or secreted from a plant

Gall: an abnormal growth on a plant that is caused by insects

Glabrous: smooth, without hairs

Gland: a depression or protuberance that exists for the purpose of secreting

Glandular: producing tiny globules of sticky or oily substance

Glans: a dry dehiscent fruit born in a cupule, such as aco n

Habit: the overall appearance of a plant

Leaflet: one segment of a compound leaf

Ovary: the basal portion of a pistil where female germ cells develop into seeds after germination

Poly-: prefix meaning many

Rhizome: an underground stem capable of producing new stems or plants at itsnodes

Vaginate: provided with or surrounded by a sheath

Xylem: the water-conducting tissue of vascular plants

Leaves : Flattened structures of a higher plant, typically green and blade-like, that are attached to a stem are called leaves.

Stems : Stems do many things. Support the upper parts of plants, They act like the plant's plumbing system, conducting water and nutrients from the roots and food in the form of glucose from the leaves to other plant parts. All plants have stems. Stems grow up into the air and towards the light. The leaves and flowers are on the stems.

Flowers:A flower is the reproductive structure found in plants. The flowers of

plants have always been popular in traditional medicine. Examples include cloveand chamomile flowers.

Fruit: A "fruit" is the seed-bearing part of a plant; Fruits have been heavily used for medicinal purposes. Dried whole fruits or portions of fruits can be used. Many members of the carrot family have fruits that are used in medicine including fennel fruit and anise.

Pulp: The soft, juicy, edible part of a fruit is called pulp.

Seeds: A seed is a small embryonic plant enclosed in a covering called the seed coat, usually with some stored food. The seeds of many plants are used for their medicinal properties. Seeds may be contained within a fruit or are sometimes used on their own.

Roots: The part of a plant which attaches it to the ground or to a support, typically underground, conveying water and nourishment to the rest of the plant via numerous branches and fibers. The fleshy or woody roots are used for medicinal purposes. Roots may be solid (ginseng), fibrous (stinging nettle), or fleshy (devil's claw).

Bark: The protective outer layer of a tree trunk that is formed by layers of living cells above the wood. Active ingredients are often found in higher concentrations in the bark. Examples of bark used for medicinal properties are quinine bark, oak bark.

Wood: The hard fibrous material that forms the main substance of the plant is called wood. Thick stems or the wood of trees or shrubs are used for medicinal properties.

Bulb:A bulb is defined as a fleshy structure comprised of numerous layers of leaf bases otherwise known as bulb scales. Onion species and garlic bulbs are popular for medicinal uses.

Rhizomes: A rhizome is defined as a fleshy or woody elongated stem that usually grows horizontally below the ground. Rhizomes often produce leaves above the ground and roots into the ground. Several medicinal plants are used primarily for their rhizomes including: ginger, wild columbine, and bloodroot.

Herb: Herb, in botany, is a plant that does not form a woody stem, and in temperate climates usually dies, either completely (annual herb) or back to the roots (perennial herb) by the end of the growing season.

Gum: Gums are solids that are mixtures of polysaccharides (sugars). They are water-soluble and are in part digestible by humans.

Resins: Resins are a mixture of essential oils and terpenes that are usually not soluble in water. They are excreted by specialized cells or in ducts of plants. Examples include frankincense, myrrh, and mastic.

Chapter 4

EVALUATION OF CRUDE DRUGS

Identification of a drug and determination of its quality & purity is called Evaluation of Drug. Following methods are frequently employed for the determination of quality & purity of Crude Drugs.

- Organoleptic Evaluation
- Physical Evaluation
- Chemical Evaluation
- Biological Evaluation.

1- Organoleptic Evaluation

Organoleptic Evaluation refers to evaluate the crude drug by using organ's senses which include its external features & morphology.

- **Study of Morphological Characters ;**

To study morphology of drug, its shape & size, color, external marking, fracture, odour and taste are examined. The organized drugs are classified into;

- Barks e.g. Cinnamon
- Leaves e.g. Senna & Tulsi
- Flowers e.g. Clove
- Seeds e.g. Nux-Vomica
- Herbs e.g. Pudina

Morphology of plants

The external marking can be studied on the following mentioned terms;

- Annulations.
- Nodules.
- Projections
- Wrinkles.

.

Annulations (Ipecac) Wrinkles (Cinchona)

The drugs like Ginger & capsicum have pungent taste while glycyrrhizin & honey are sweet in taste. Crude drugs belong to class fixed oils have bland taste

- **Study of Microscopic Characters**

Microscope is also used for a quantitative evaluation of drugs and adulterated powders. This is done by counting specific features such as stomatal number.

- **Stomatal Number;**

The average number of stomata per square millimeterof epidermis is known as stomatal number.

Microscope **Stomata**

2- Physical Evaluation

Physical constants are frequently applied to Alkaloids, Glycosides, Volatile Oils, Fixed oils, Tannins & Sugar drugs to check their quality & purity.

Physical Constants such as;

- Elasticity in fibers
- Viscosity of drugs containing gums
- Swelling factor of mucilage
- Melting & Boiling point of crude drugs

Spectroscopic Analysis (UV, IR, NMR, and MASS) and radioimmuno assays are applied frequently to check the Physical constants of herbal drugs. **Chromatographic techniques** such as Paper Chromatography, Thin Layer chromatography, HPLC & Gas liquid Chromatography provide information about the chemical constituents present in the Crude Drug.

Spectrophotometer

Chemical Evaluation involves the determination of quality; quantity & purity of Crude Drugs through **Chemical Test**. Chemical test for Alkaloids, Amino Acids, Carbohydrates, Glycosides, Tannins, Volatile Oils and Fixed oils are performed to ensure their quality.

Titrimmetric Assay, Ester Value, Saponification Value, Acid Value and Ash Value are determined in chemical evaluation.

4- Biological Evaluation

Biological Evaluation (biological assay) is a type of scientific experiment carried out on intact animals, animal preparation, isolated living tissues or micro-organisms.
Since living organisms are used the assays are called **"biological assay".**

Techniques of Biological assay:

There are basically two types of Biological evaluations, Quantal & Graded. Following are the Techniques which are used in Biological evaluation of Crude Drugs;

- Matching Biological Assay
- Interpolation Biological Assay
- Bracketing Biological Assay
- Multiple Biological Assay

ENZYMES

Enzymes

The enzymes can be defined as "These are the catalysts of biological system that are produced by the living cell which are capable of catalyzing the biological reaction.

OR

The enzymes are the organic catalysts produced by the living organisms that's why called as Biological Catalysts.

Catalysts

Catalyst is a chemical which is inorganic in nature used to boost up chemical reaction but it is not utilized itself in the chemical reaction.
All enzymes are catalyst but all catalysts are not enzymes.

Organic substances

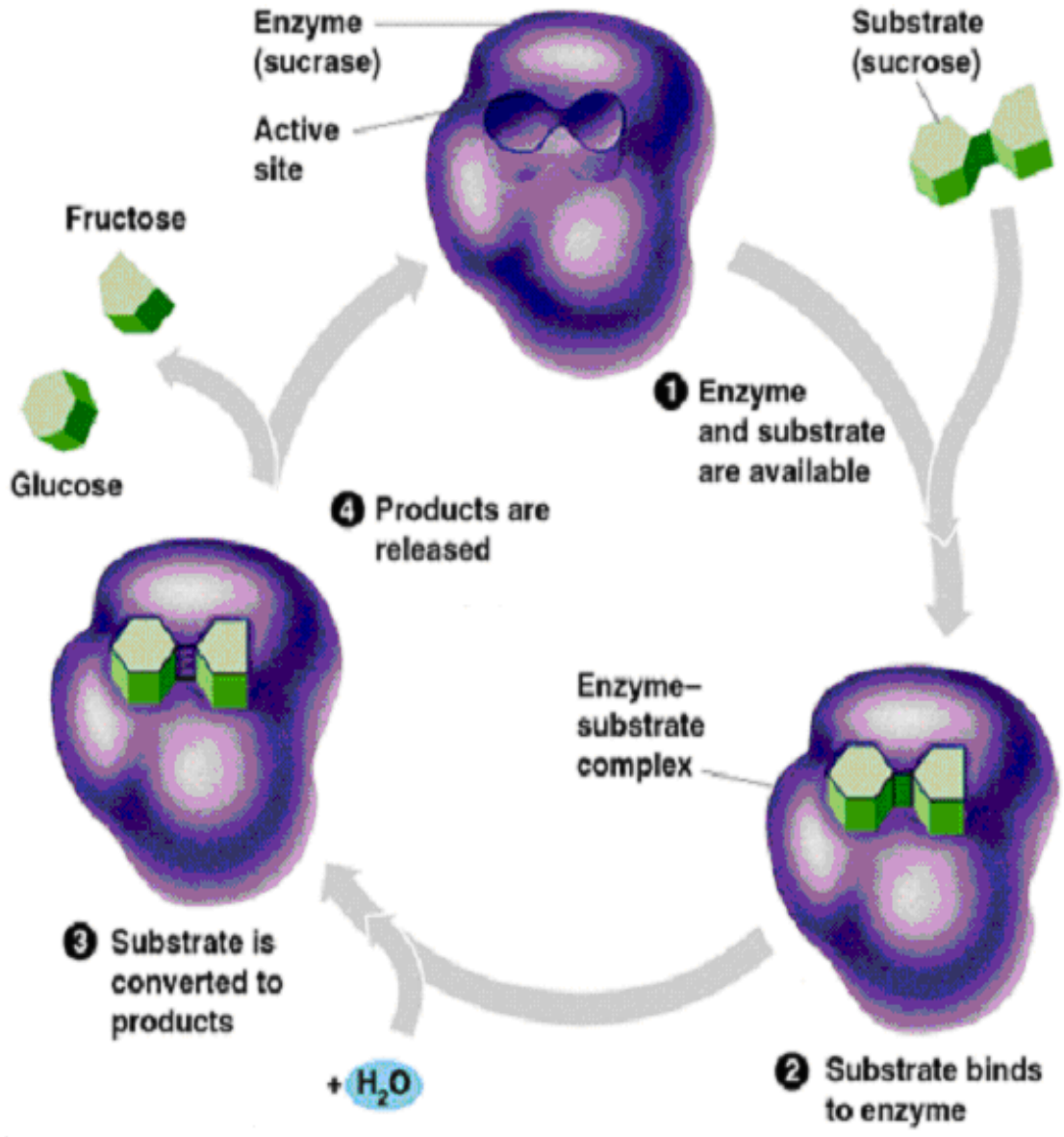
All the chemicals that contain mainly carbon are called organic substances.

Inorganic substances

All the chemicals that are not containing carbon are called inorganic substances.

SUBSTRATES

These are the molecules on which enzymes can act.



(Enzyme Substrate Complex)

Difference between Enzymes & Catalyst

Enzymes	Catalysts
❖ All the enzymes are organic substances. ❖ Enzymes mostly destroyedduring the reaction. ❖ Enzymes are more specific in Nature. ❖ Enzymes are very complex in nature. ❖ Speed of the enzyme reaction does not depend on the concentration of enzyme.	❖ All the catalysts are inorganic substances. ❖ Catalysts are not destroyed inthe chemical reaction. ❖ Catalysts are non-specific in Nature. ❖ Catalysts are very simple compounds or substances. ❖ Speed of catalyst reaction will depends upon the concentrationof catalyst.

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PROPERTIES OF ENZYMES

1. Catalytic Property

Small amount of enzymes can catalyzed the large amount of substrate in aBiological reaction.

Example

Sucrose enzyme in its small amount easily catalyzed the hydrolytic reaction of the **sucrose**.

2. Solubility

Enzymes are mostly soluble in water and dilute alcohol solution. The Enzymes can precipitate in the following solvents.

1- Concentrated Alcohol
2- Ammonium Sulphate
3- Tricholro Acetic Acid.

3. Enzymatic Property

The velocity of the enzymatic reaction increases as the concentration of the substrates increases up to certain maximum. But after certain period of timeit decreases.

4. pH

Acids:

Acids deactivate those enzymes that act at alkaline PH e.g. Trypsin act at alkaline PH 8.57. At acidic PH it will destroy. Trypsin is an enzyme that secreted by Pancreas and very important for proper digestion of food.

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Bases:

Bases deactivate the enzymes that act at acidic PH e.g. pepsin actat acidic PH 1-2. At alkaline PH, it will destroy.

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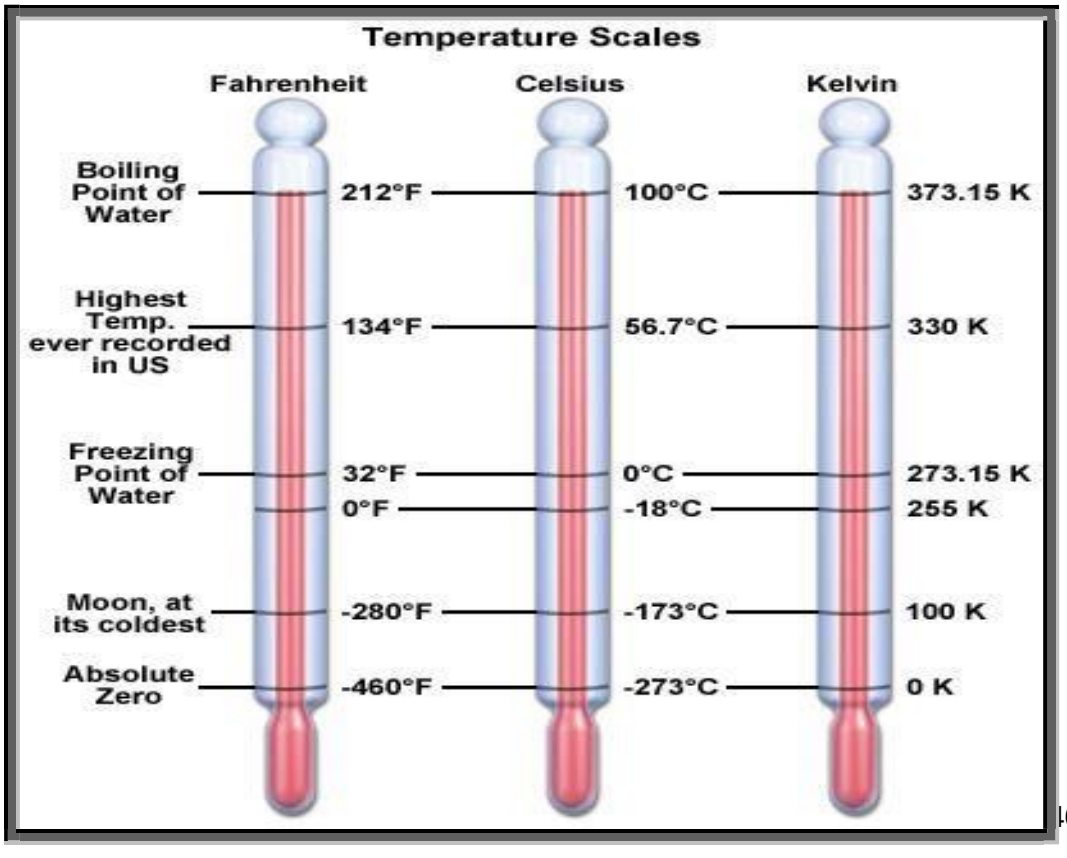
5. Temperature

Optimum temperature is 96 F-to-99F

The optimum temperature for enzymatic activity is regard between35 centigrade to 40 centigrade.

- At 0 °c---------- Inactive
- 10° c to 20° c ---------- Very little active
- 35° c to 40° c ---------- Maximum active
- 50° c----------Inactive
- 60° c---------- Destroy
- In solid Condition it may be stable up to 100 ° c.



Bromelain

It is a protolytic and milk clotting enzyme.

→ **Biological Source**
→ **Molecular weight**
→ **Color**
→ **Solubility**
→ **Uses**

(Pineapple)

1. **Sources of Bromelein**

It is obtained from juice and stem of "**Ananas comosus"**.

Family;

Bromeliaceae

2. **Molecular weight:**

2800 mmol

3. **Color:**

Light yellow color Or Buff Color.

4. **Solubility:**

It is very much soluble in;

- Water.
- Alcohol
- Chloroform

5. **Uses:**

- It is used as a Supporting agent in the treatment of inflammationand edema.
- It is widely used in leather factory.
- It is used in the production of protein.
- It is very effective agent that can easily tenderize the meat.

Papain

It is a protolytic enzyme.

→ **Source**
→ **Color**
→ **Solubility**
→ **Molecular weight**
→ **Uses**

1. Source

Papain is dried latex obtained from green fruits and leaves of "Carica papaya"

Family: Caricaceae

Preparation

The latex is obtained by making 2-4 longitudinal incisions, on the surface of nearly mature but green fruits while still on the tree. The incisions are made early in the morning, at intervals of 3-7 days. The exudate is collected in non-metallic container.

Papain Powder

2 Color

It has amorphous light whitish color powder.

3. Solubility

It is incompletely soluble in water But insoluble in alcohol, ether and acetone.

4. Molecular weight

25710 moles

5. Uses

- Tenderizing of meat.
- Used as protein digestant, as Antihelmintic (nematode)
- Clarification of beverages. (Soft & Hard drinks)
- It is used to remove the protein molecules from contact lenses.

Classification of Enzymes

- Old Method
- New Method

Old Method

By using this method, the Enzymes are named by adding Suffix “Ase” to the name of the substrate.
e.g.

Lipase_____Hydrolyzing the Fats

Cellulase_____ Hydrolyzing the Cellulose.

1- Esterases

It is the group of enzymes that hydrolyzed the lipids.

e.g.

Lipase: It is present in pancreatic juice of animals and human body and oily seeds. Lipase hydrolyses the fat Molecules to fatty acids & Glycerin.

2- Amindases

These are the enzymes that are present in liver and intestinal mucosa. They will be catalyses the ammonia related break down reaction.

e.g.

Arginases: It converts Arginine to Urea.

Ureases: It is found in liver cells and soyabean seeds. It converts urea into ammonia and carbon dioxide.

3- Nucleases

These are the group of enzymes that act on the nucleotides. e.g.

Ribonucleases → RNA
Deoxyribonucleases → DNA

4- Carbohydrases

This class is named after those enzymes that can catalyses breakdown ofsugar molecules in a biological reaction.
e.g.

Sucrase: It is present in yeast and intestinal juice. It causes hydrolyses of sucrose into glucose and fructose.

Maltase: It is also present in Intestinal Juice. It converts maltose to glucose.

5- Proteolytic Enzymes

Proteolytic enzymes are the protein digestive enzymes. These enzymes catalyses the protein breakdown

reactions.e.g.

Pepsin: It is found in gastric juice of animals. It digests the protein by converting then into proteases and peptone.

Rennin: It is a milk coagulating enzyme found in the mucous membrane of fresh stomach of mammals. It curdles protein of Milk.

❖ New Method

This method is also known as IEC Method (International Enzymes Commission).In new method, the fundamental principals of giving the names to the enzymes are their basic function in addition of "Ase".

1. Dehydrogenase

It is an enzyme that acts on the substrates and remove their hydrogenmolecule.

2. Oxidases

It is an enzyme that catalyses the oxidation reaction without any regard ofthe substrate.

3. Hydrolases

These are the enzymes that boost up the speed of the hydrolysis reactionwithout any regard of the substrate.

4. Ligase or Synthetase

It is an enzyme that promotes or boost up the speed of the reactions in which new bonds are formed with the cleavage of ATP (Adenosine Tri Phosphate.)

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Chapter 6

Hypersensitivity

Hypersensitivity (also called hypersensitivity reaction) refers to undesirable (damaging, discomfort-producing and sometimes fatal) reactions produced bythe normal immune system.

Introduction

The term allergy was first defined by Von Pirquet in 1906. He described that a change or altered reaction in the body is called allergy.

Allergy

Definition

According to British Immunological society. The allergy can be defined as;

"Allergy is a specific hypersensitivity of an individual to foreign particlesusually a protein to which a specific individual is exposed."

OR

Allergy is a hypersensitivity disorder of the immune system.Allergic reactions occur to normally harmless environmental substances known as allergens. Strictly, allergy is one of four forms of hypersensitivity and is called type I (or immediate) hypersensitivity.

Antibody:

An antibody is a type of protein. The body's immune system produces antibodies when it detects harmful substances, called antigens.

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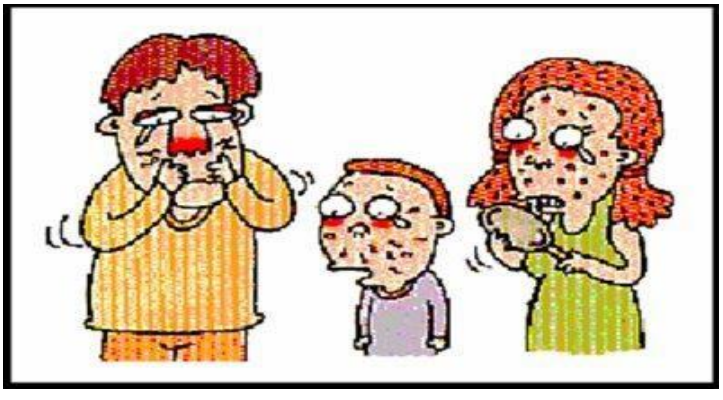
Sings & Symptoms of Allergy

Common symptoms of allergy

Affected organ	Symptom
Nose	swelling of the nasal mucosa (allergic rhinitis)
Sinuses	allergic sinusitis
Eyes	redness and itching of the conjunctiva (allergic conjunctivitis)
Airways	Sneezing, coughing, bronchoconstriction, wheezing and dyspnea (shortness of breath) , sometimes attacks of asthma,
Ears	Feeling of fullness, possibly pain, and impaired hearing.
Skin	rashes, such as eczema and hives (urticaria)
Gastrointestinal tract	abdominal pain, bloating, vomiting, Diarrhoea



Allergen

The allergen (the foreign substance that provokes a reaction), it is a substancethat can cause an allergic reaction. Allergens are particle that, in some people,the immune system recognizes as "foreign" or "dangerous" but cause no response for most people.

Common allergens include:

- Pollen
- Dust
- Chemicals
- Drugs (such as antibiotics or medications you put on your skin)
- Foods (such as milk, chocolate, strawberries, wheat)
- Perfumes
- Plants
- Smoke

Types Of Allergen:

Inhalant Allergens

These allergens are dispersed in air .when we inhaled air theseallergen are also enter in our Respiratory tract and cause of allergy.

- Pollens
- Dust
- Smoke
- Perfumes

Pollen:

What is pollen?

Pollen is the cells of flowering plants, including trees, grasses, and weeds. Pollen is microscopic in size.

Pollen is the most common cause of seasonal allergic rhinitis, sometimes known as "hay fever."

Dust Mites:

Dust mites are microscopic organisms that can live and thrive throughout homesand schools. The mites and their waste products present in the following:

- bedding and pillows
- upholstered furniture
- carpets
- clothes

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Symptoms

Sneezing, swelling of nasal cavities & eyes lacrimation

Smoke:

The allergic attack due to bad environment is termed as Environmental Allergy. If a person lives in a smoky, or in an industrial area we can easily examine that he is allergic from smoke.

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Ingested allergens

These allergens are present in our food stuff. When we eat that contaminated food these allergen are also ingested with food particles

What is food allergy?

- A food allergy is an abnormal response of the body to a certainfood. It is important to know that this is different than a food intolerance, which does not affect the immune system,

What foods most often cause food allergy? Approximately 90 percent of all food allergies are caused by thefollowing eight foods:

- Milk
- Eggs
- Wheat
- Soya beans
- Tree nuts
- Peanuts
- Fish
- Shellfish

Symptoms

Allergic symptoms may begin within minutes to an hour after ingesting the food. The following are the most common symptoms of food allergy.

- vomiting
- diarrhea
- cramps
- hives
- swelling
- eczema
- itching or swelling of the lips, tongue, or mouth
- itching or tightness in the throat
- difficulty breathing
- wheezing
- lowered blood pressure

Injectable Allergen

- Injections of medication
- Insect sting

Symptoms

- itching and hives over most of the body
- Swelling of the throat and tongue
- Difficulty in breathing and tightness in the chest
- Dizziness
- Shock
- Loss of consciousness
- Hoarse voice or swelling of the tongue

Contact Allergen

- **Jewelry**
- **Cosmetics**
- **Pets**

Allergy by Jewelry **Allergy by Cosmetic**

What is an animal allergen?

Allergens found in animals are a common cause of allergic reactions.They are caused by the protein found in an animal's:

- Skin.
- Dander.
- Saliva.
- Urine.

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T y p e s O f H y p e r s e n s i t i v i t y

The four-group classification was expounded by P. H. G. Gell and Robin Coombs in 1963.

Coombs and Gell classification:

Comparison of hypersensitivity types

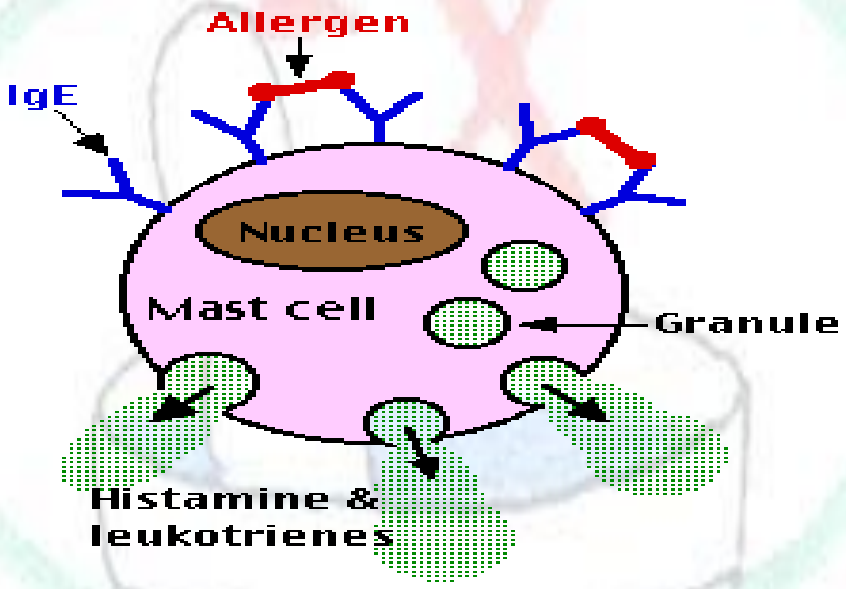
Type	Alternative names	Often mentioned disorders	Mediators
I	Allergy (immediate)	• Hay fever • Anaphylaxis • Asthma	• IgE
II	Cytotoxic, antibody-dependent	• Erythroblastosis fetalis	• IgM or IgG
III	Immune complex disease	• Serum sickness	• IgG

IV	Delayed-type hypersensitivity (DTH), cell-mediated immune response, antibody-independent	• Contact dermatitis • Chronic transplant rejection • Multiple sclerosis	• T-cells

1. Immediate Hypersensitivities.

These occur quickly after exposure to the allergen. They are usually mediated by antibodies of the IgE class.

IgE antibodies present on the surface of the basophils, these antibodies have no effect until and unless they encounter allergens, when this occur the mast cell discharge their granules. The granules contain a variety of active agentsincluding histamine etc.

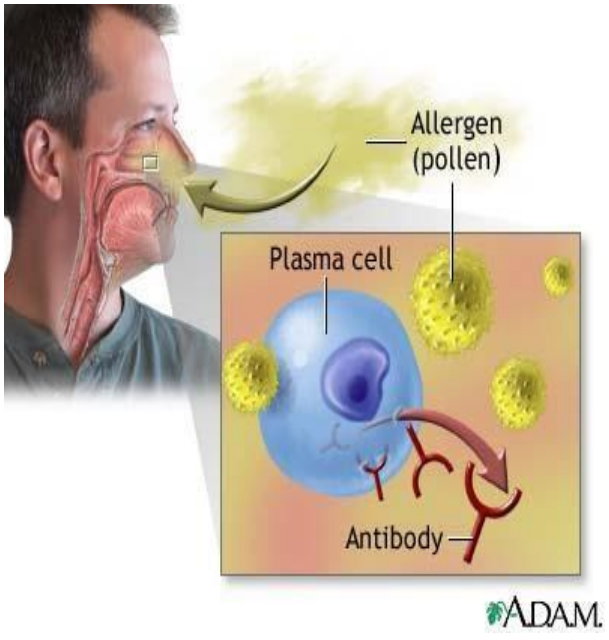


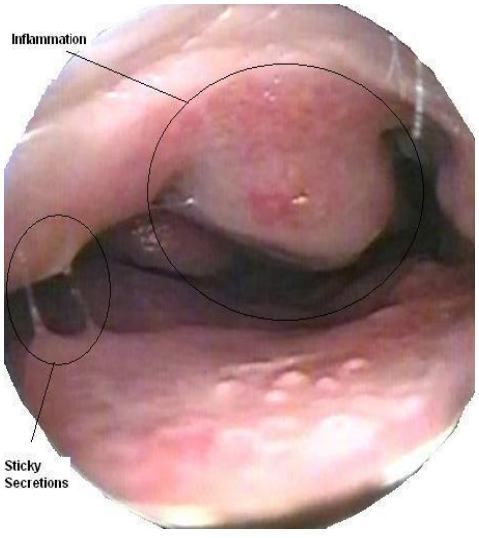
Local Anaphylaxis:

Release of these substances into the surrounding tissue causes local anaphylaxis:swelling, redness, and itching.

Examples:

- **Allergic rhinitis (hay fever)** in which airborne allergens (pollen) react with IgE-sensitized mast cells in the nasal mucosa and the tissues aroundthe eyes, causing runny nose also called “Rhinorea”





Pollen exposure

Inflammation & Secretions

- **Bronchial Asthma** in which the allergen reaches the lungs either by inhalation or in the blood; and cause bronchoconstriction.

- **Hives** (physicians call it urticaria) where the allergen usually enters thebody by food.

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Systemic Anaphylaxis

Some allergens can cause life-threatening collapse of the circulatory and respiratorysystems.

Frequent causes:

- Insect (e.g., bee) stings
- Drugs (e.g., penicillin)
- Food.

Honey Bee

Penicillin allergy

2. Antibody-Mediated Cytotoxicity:

Cell damage caused by antibodies directed against cell surface antigens. In these disorders, the person produces antibodies directed against antigens present on thesurface of his or her own cells.

Examples:

- Hemolytic disease of the newborn (Rh disease).
- Myasthenia gravis

Binding of antibodies to the surface of the cell can result in:

- Phagocytosis of the cell
- Lysis of the cell

Hemolytic Disease of the Newborn (Rh Disease)

Rh antigens are expressed at the surface of red blood cells. During pregnancy, there is often a tiny leakage of the baby's red blood cells into the mother's circulation. If the baby is Rh-positive (having inherited the trait from its father) and the mother Rh-negative, these red cells will cause her to develop antibodies against the Rh antigen. The antibodies, usually of the IgG class, may notdevelop fast enough to cause problems for that child, but can cross the placenta andattack the red cells of a subsequent Rh^+ fetus.

Myasthenia Gravis (MG):

The hallmark of this autoimmune disorder is weakness of the skeletal muscles, especially those in the upper part of the body.

3. Immune Complex Disorders:

In this type of hypersensitivity antibodies form complexes with antigens. Damagecaused by the deposition of these complexes in the tissues.

Examples:

- Serum sickness

Serum Sickness:

Serum sickness is caused by the many proteins present in the antiserum. Being foreign to the recipient, an **active immunity** develops against these proteins. Theresulting antibodies bind to them forming **immune complexes**. These are carriedby the blood and deposited in the walls of blood vessels as well as in the glomeruli of the kidneys.

- fever
- hives
- arthritis and
- Protein in the urine.

4. Cell-Mediated Hypersensitivities:

Because it takes a day or two for the T cells to stimulate following exposure to the antigen, these responses are called **delayed-type hypersensitivities** (**DTH**).

Cell-mediated hypersensitivities can occur with extrinsic antigens or with internal ("self") antigens.

Extrinsic Antigens:

The most common example of cell-mediated hypersensitivity to external antigens isthe **contact dermatitis** caused in some people when their skin is exposed to a chemical to which they are allergic. Some examples:

- The catechols found in poison ivy, poison oak
- Nickel (often used in jewelry)
- Dyes
- Organic chemicals used in industry

Intrinsic ("self") Antigens

Cell-mediated hypersensitivities to "self" cause autoimmune diseases.Examples:

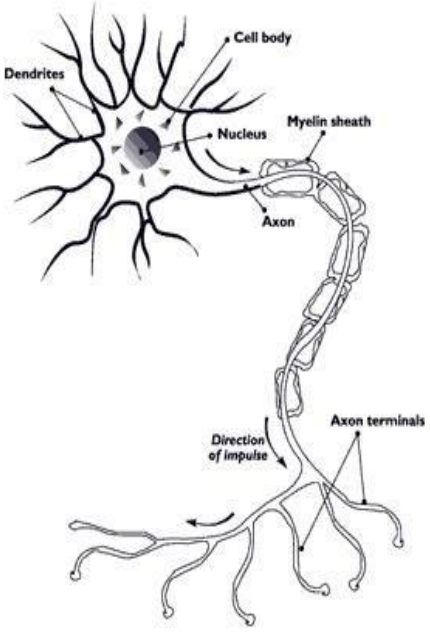
- Type 1 diabetes mellitus
- Multiple sclerosis (MS)
- Organ Transplant Rejection

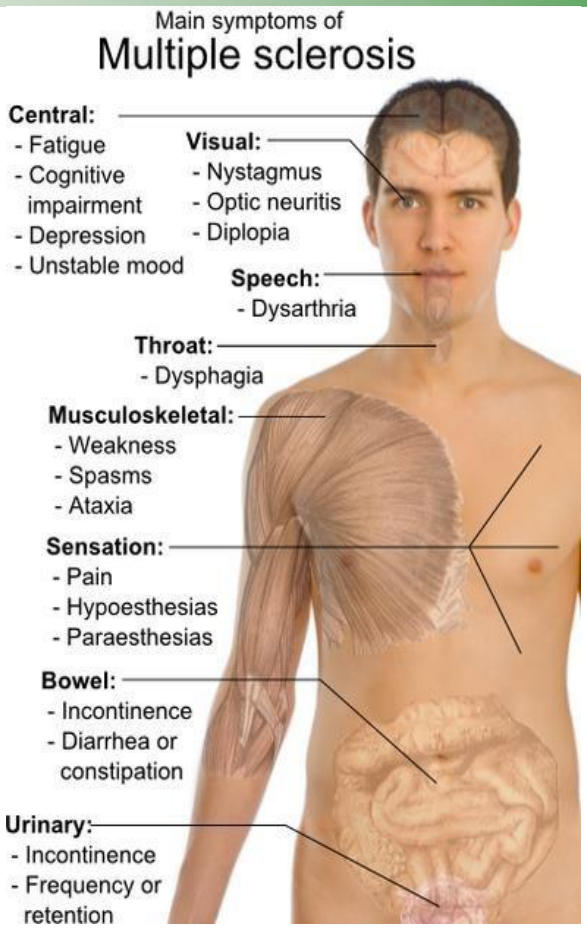
➢ **Type 1 diabetes mellitus:**

In this disease, T cells initiate the destruction of the insulin-producing beta cells of the islets of Langerhans in the pancreas. The chief culprits are $CD8^+$cytotoxicT lymphocytes (CTL) also by $CD4^+$ helper T cells of the Th1.

➢ **Multiple Sclerosis (MS)**

T cells —initiates an attack that destroys the myelin sheath of neurons.





Structure Of Neuron

Mechanism of allergy

Three players of allergy:

Allergen, Antibodies, Inflamatory mediators

First Exposure to antigen:

A. When an allergen first enters the body, the B lymphocytes produce anantibody called immunoglobulin E (IgE).

B. The IgE antibodies attach to mast cells, large cells that are found in connective tissue and contain histamines along with a number of otherchemical substances.

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Role of Immune System

IInd Exposure to Antigen:

A. The second time any given allergen enters the body, it becomes attachedto the newly-formed Y-shaped IgE antibodies.

B. These antibodies, in turn, stimulate the mast cells to discharge itshistamines and other chemical substances.

C. Mast cell will burst up, Neurotransmitters present in mast cell will enter in circulation & causes allergy.

Inflamatory Mediators

I) Histamine.
II) Bradykynin
III) Prostaglandin
IV) Interleukin I
V) Interleukin II
VI) Thromboxane.
VII) Leukotriene

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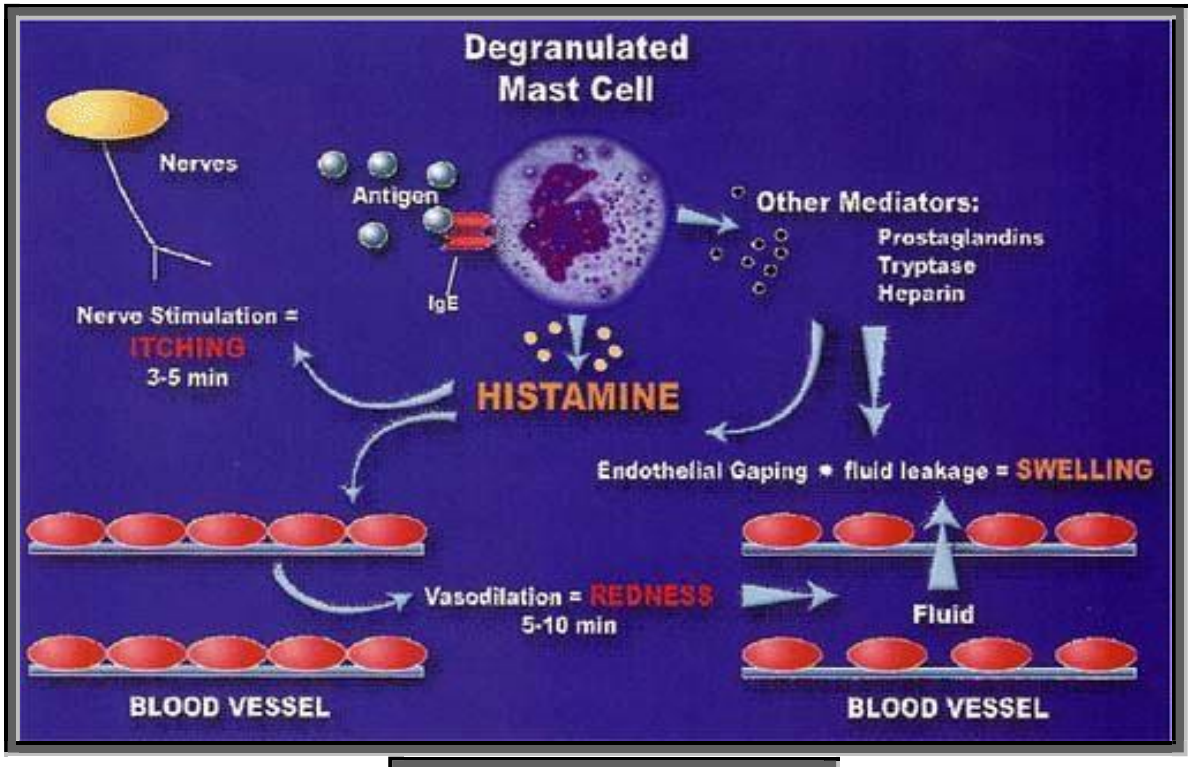
Role of Mediators:



Diagnosis of Allergy

Medical Case History

Medical Case History is the backbone of Medical Diagnosis.

In Allergy the Medical Case History can be concluded on the following lines:

General Examination

Age, sex, type of environment where he work & live, occupation,any allergy symptoms.

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Vital Signs

Some scientific tools are applied to prove the disease. By usingfollowing tools the severity of allergy can be diagnose.

I) B.P
II) Temperature
III) Breathing Rate
IV) Pulse Rate.
V) Cardiac output.
VI) Heart Rate.

Allergy Testing

Allergy testing measures how a person reacts to specific allergens, such as tree pollen, pet dander, foods, medications or molds. A "positive" allergy test meansthat a person has a specific allergic antibody to the substance tested. This often means that the person is allergic to the substance

- Skin Test
- Blood Test
- Scratch test/ Skin Prick test
- Patch test
- Intradermal test

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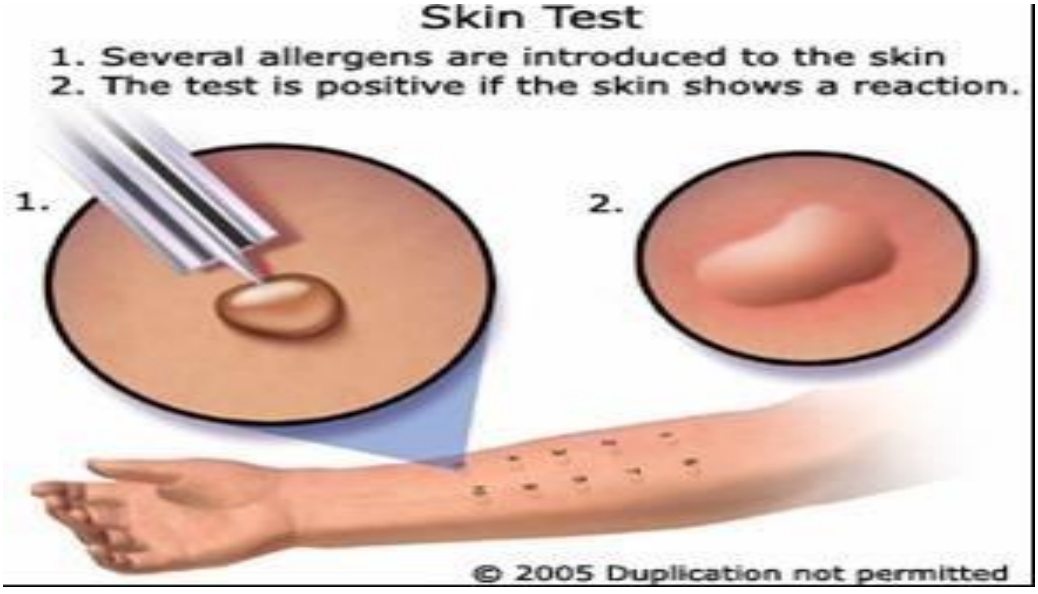
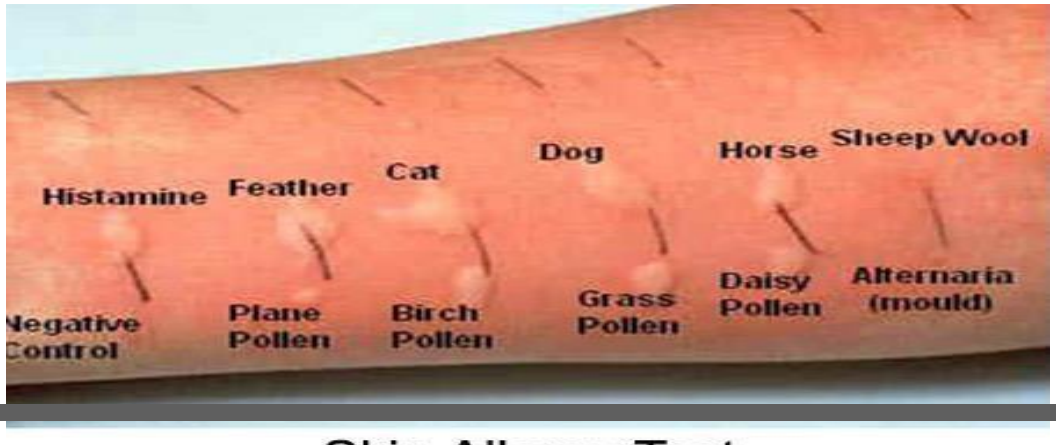
Scratch test Or Skin Prick test

Testing begins with a prick, puncture or scratch method, which involves the placing a drop of the allergen on the skin. (Usually a commercially available extract of pollens, molds, foods, pet dander,) the skin is then gently scratched through the small drop with a special sterile needle. After the skin is scratched, the tests takes about 15 minutes to develop. If the skin reddens and, more importantly, if it swells, then the test is read as positive and allergy to that substance is considered probable. This test is used to diagnose hay fever allergy (house dust mite, grass pollens).





Skin Allergy Test

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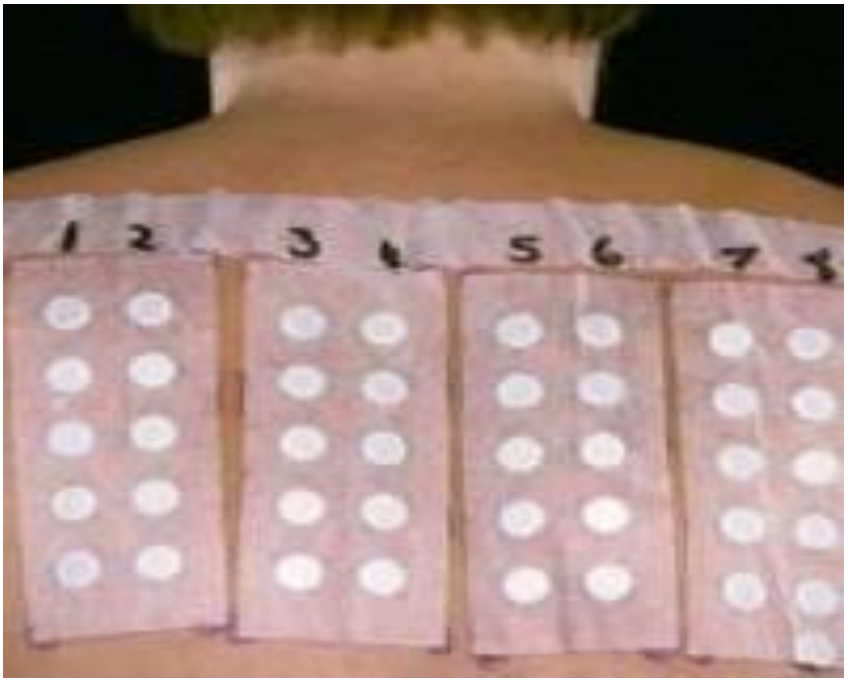
Patch tests (contact allergy testing)

Dermatologists apply patch tests in patients with dermatitis, tofind out whether their skin condition may be caused by a contact allergy.



(Patch Test)

Intradermal Test

Encapture the allergen & prepared a solution in fat solublesolvent(Ether Acetone Alcohols).Which is chemically inert & compatible with allergen. In this 0.1ml of allergen solution is injected into the dermis orepidermis, If there is any kind of allergic reaction occur than the patient is has +ve test for this particular Allergen.

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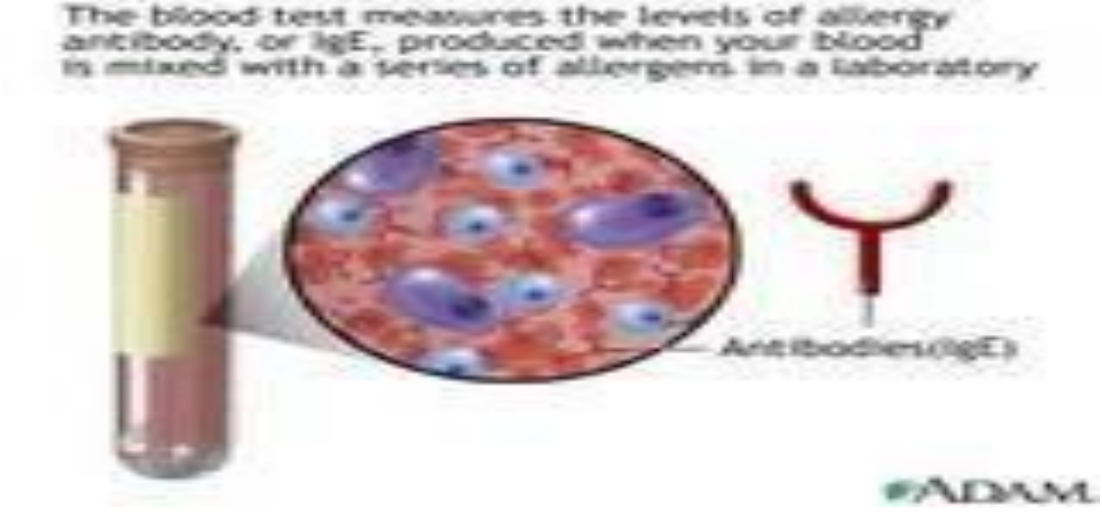
BLOOD TESTING:

- RAST
- ELISA

What Is a RAST?

Radioallergosorbent testing (RAST) involves measuring specific allergic antibodies in a person's blood. RAST has recently become more useful in the diagnosis and management of food allergies. Whether a person is truly allergic to the food, RAST actually measures the amount of allergic antibody to the food.



ELISA:

Enzyme-linked immunosorbent assay (**ELISA**), also known as an **enzyme immunoassay** (**EIA**), is a biochemical technique used mainly in immunology to detect the presence of an antibody or an antigen in a sample. An unknown amount of antigen is affixed to a surface, and then a specific antibody is applied over the surface so that it can bind to the antigen. This antibody is linked to an enzyme, and in the final step a substance is added

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Treatment Of Allergy

Once a person has allergies, the best way to treat allergies is to prevent them from occurring in the first place, by avoiding the allergic triggers.
There are three general approaches to the treatment of allergic diseases that are:

- Avoidance
- Pharmacotherapy
- Immunotherapy

Avoidance

- Wear a pollen mask when mowing the grass or house cleaning.
- Stay indoors in the morning (when the pollen count is at its highest) andon windy days.
- Read and understand food labels (for people with food allergies).
- Keep windows and doors closed during heavy pollination seasons.
- Use the air conditioner in the house and car.
- Don't allow dander-producing animals in the house.
- Change feather pillows, woolen blankets and clothing to cotton.
- Enclose mattress, and pillows in plastic barrier cloth.
- Wash sheets, mattress and blankets weekly in hot water.
- Remove carpets.

Pharmacotherapy

Medication:

When avoidance or control of an allergen isn't possible, medications may be necessary. Common allergy medications are;

1. Antihistamines:

Drugs that block the action of histamine. First-generation antihistamines include;

- Diphenhydramine (Benadryl),
- Chlorpheniramine (Piriton).

Newer antihistamines, called second-generation antihistamines, include;

- Cetirizine (Regix),
- Fexofenadine (Fexet), &
- Loratadine. New to the market and available by prescription only, isan antihistamine nasal spray called Azelastine (Astelin).

***2. Leukotrienes inhibitors*:**

Montelukast (Singulair) antileukotriene medication.
Leukotrienes are chemicals released from a variety of allergic and immune cells, and may cause allergy symptoms

Immunotherapy

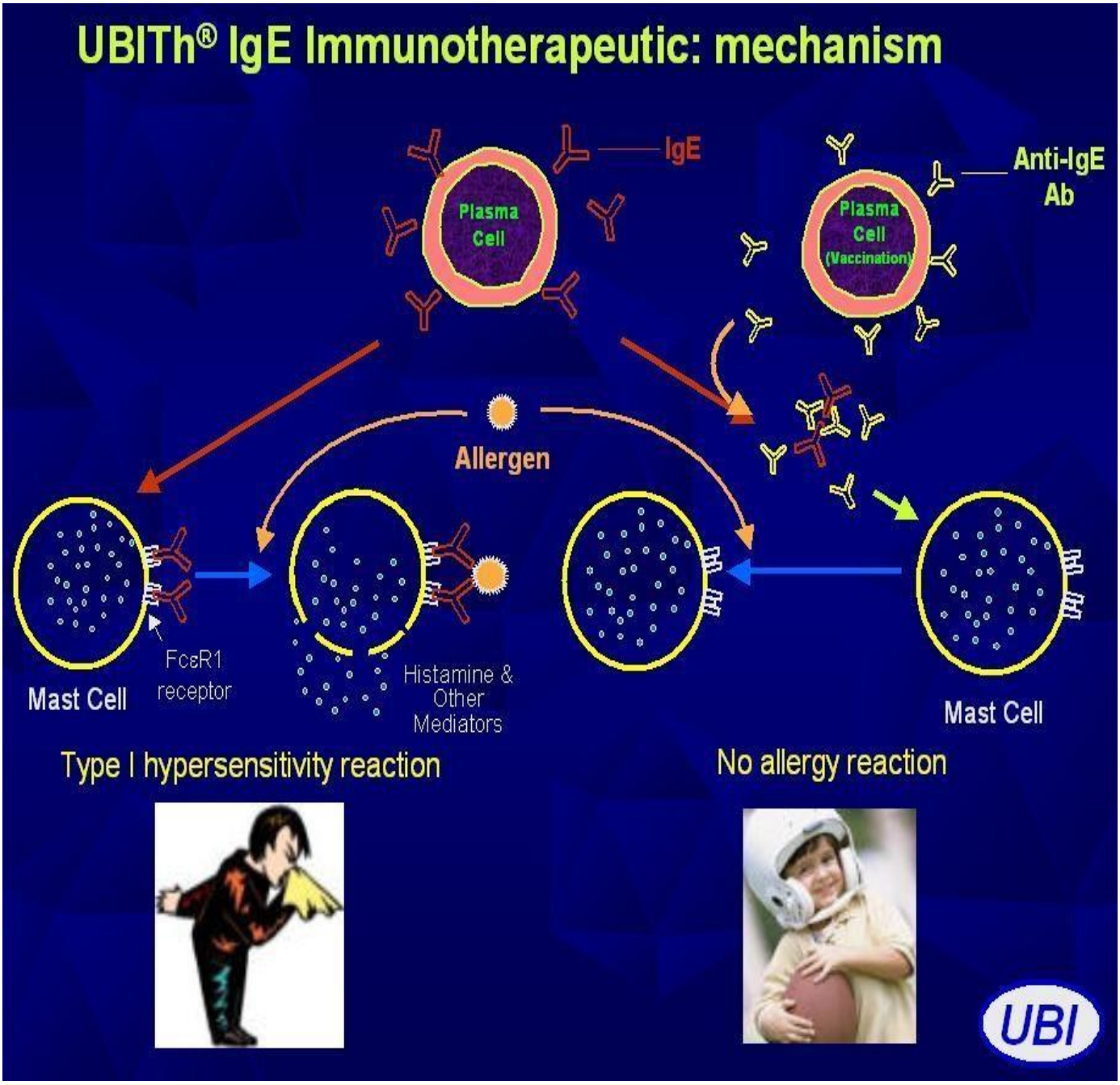
When avoidance, environmental control measures and medications fail to control allergy symptoms, the doctor may suggest allergy immunotherapy ("allergy shots").

Immunotherapy involves the injections of allergen extracts to "desensitize" the person.

Duration

Typically, the treatment begins with injections of solution of allergen given one to five times a week, with the strength graduallyincreasing.

It usually takes about three to four years for the patient to be free ofsymptoms.



CHAPTER 7

Chromatography

Chromatography is a process of chemistry in which mixture of different compounds is separated on the basis of their relative polarity difference.

Difference extraction or chromatography

Extraction.

The compounds are separated on the basis of relative solubility.

Chromatography.

The compounds are separated on the basis of polarity.

Different techniques of chromatography

1. **Ascending Chromatography**
2. **Descending Chromatography**
3. **Circular chromatography**
4. **Radial chromatography**

Techniques of chromatography

1. Ascending chromatography

In ascending chromatography the solvent are tends to moveupward and the components of mixture are separated in the form of spot.

2.

4. Radial chromatography

In radial chromatography the solvent or mobile phase tends to move in circular form and the compounds of mixture will separate in the form of arch.

Stationary phase

This phase is a component of chromatographic procedure that is non_mobile orfixed is known as stationary phase.
Stationary phases use is chromatography are.
1. Paper
2. Talc
3. Mg-oxide
4. Al-oxide
5. Activated charcoal.

Mobile phase

This phase is the components of chromatography procedure which has ability tomove. e.g. solvent used in paper chromatography.
The most popular mobile phase is used chromatography are.

1. Petroleum ether.
2. Propanol
3. Ethanol
4. Acetone.

Rf value

Rf value is the ratio between the distance covered by any substances to the distance covered by the Mobile Phase / Solvent.

$$Rf = \frac{\text{Distance covered by substance}}{\text{Distance covered by solvent.}}$$

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Types of Chromatography

1 Paper chromatography

2. Thin layer chromatography

3. Column chromatography

Paper chromatography

Paper chromatography is the technique of analytical chemistry in whichdifferent compounds of mixture are separated by using chromatographic technique.
In this type of chromatographic technique those mixture are easily separated thathave color pigment.

Stationary Phase

Chromatographic paper is used as stationary phase in paperchromatography.

Mobile Phase

Mostly ethanol, water, acetone or their mixture is used as mobile phase.

Procedure of paper chromatography

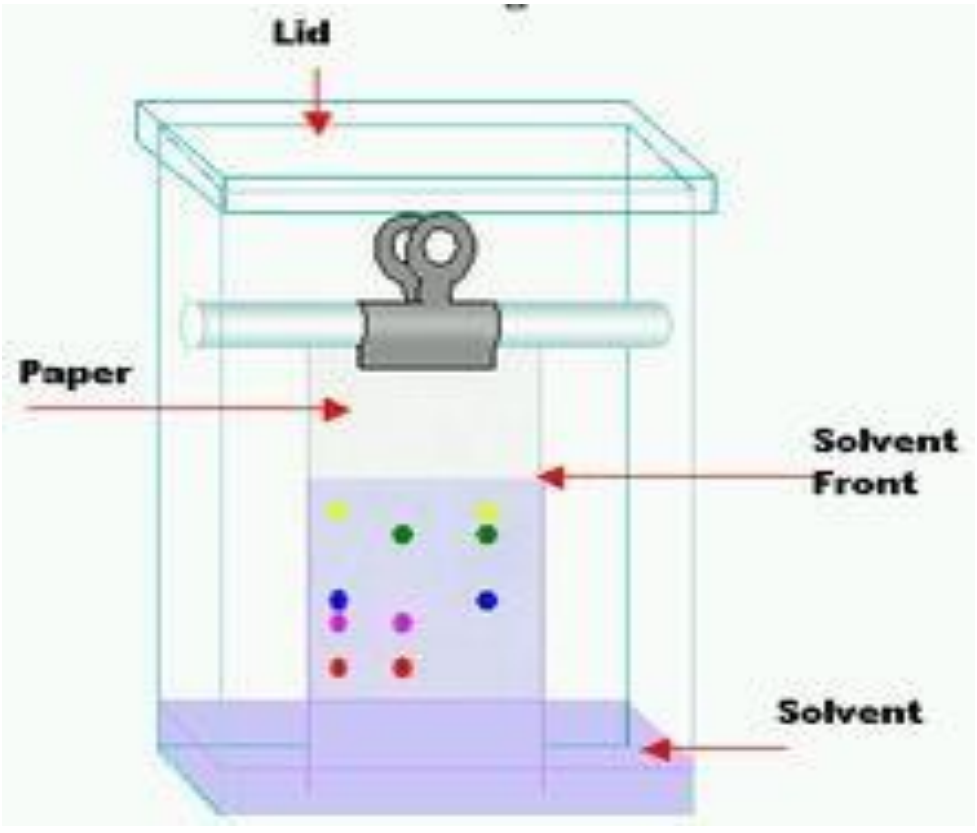
1. First of we will take chromatographic paper and cut it down according tothe style of chromatography e.g. redial , circular ascending descending
2. In case of ascending a line has been drawn on the bottom side & in the case of descending the line is drawn on upper of chromatographic paper.The line is called baseline. The distance of this baseline from the final edge is 2.5cm.

3. The sample is applied in the center of baseline and the paper is

applied into mobile phase in a chromatographic tank. After the appropriate time

the components of sample will separate and finally Rf value of eachcomponent is calculated

4. In case of circular chromatography the sample is applied in the center andthread has been passed in through the center the mobile phase will move under the capillary action and components of sample will separate in the form or rings finally Rf value of all the components is calculated .
5. In case of radial chromatography the sample is applied across the center and like wised dipped in the mobile phase and components of sample willseparate in form of arch. Finally the Rf value of the components is calculated.



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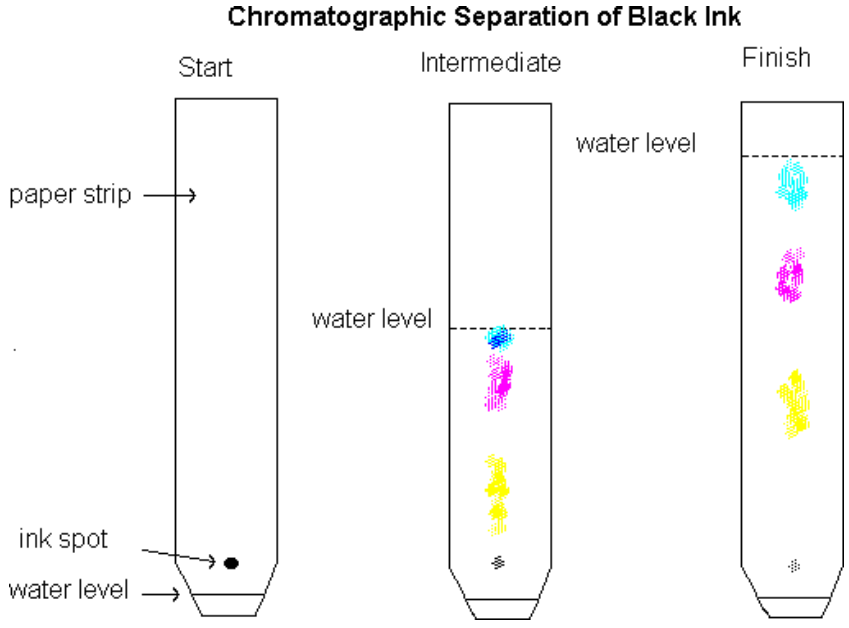
Styles of paper chromatography

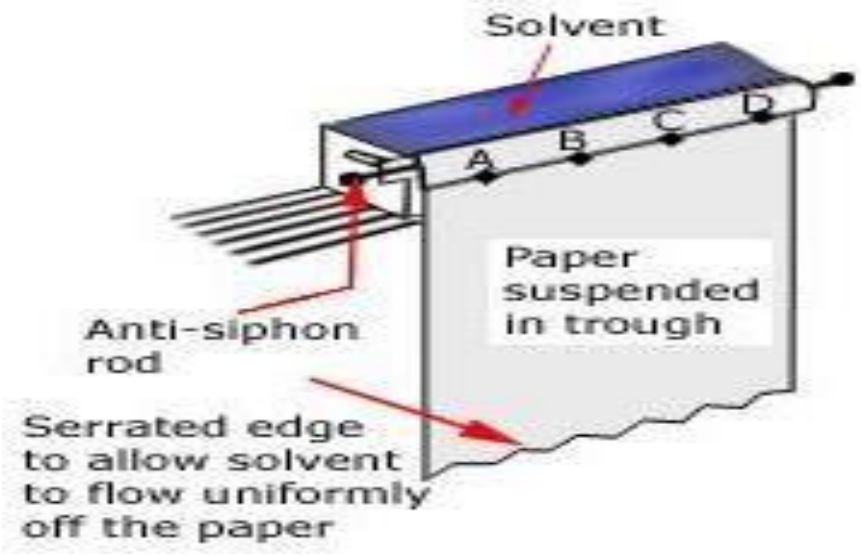
Paper chromatography can be done by following styles

.

1. **Ascending chromatography:**



2. **Descending chromatography:**



3. **Circular chromatography:**

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Radial chromatography:

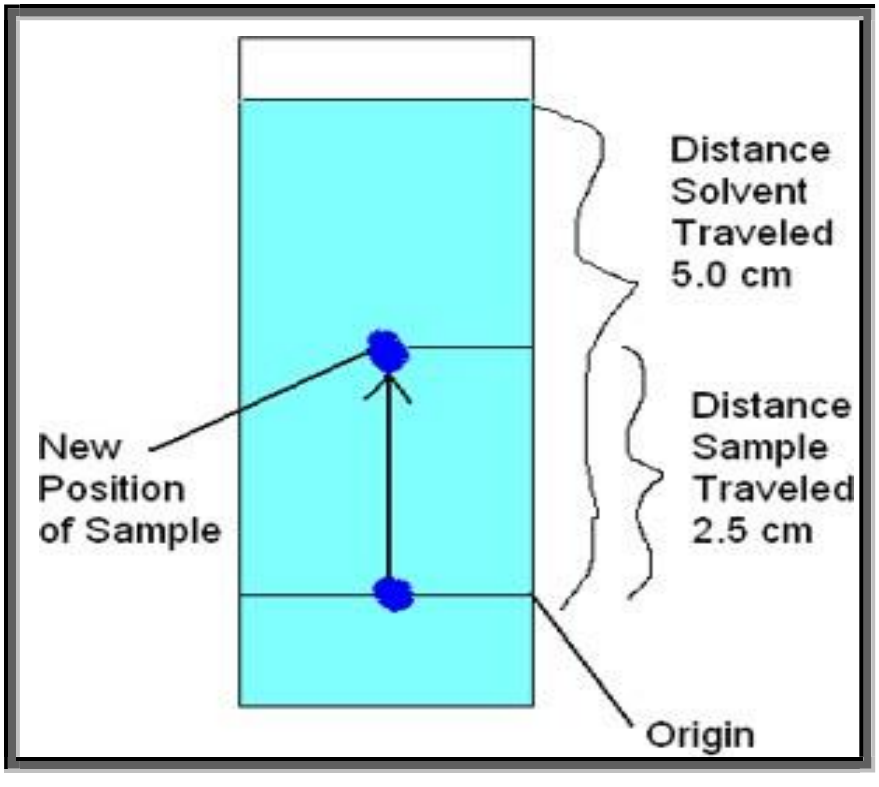
Application of paper chromatography

i. it is used in pharmaceutical industries to separate different kinds of(API)
ii. It is used to determine the polarity and evaporation power of any givencompound.
iii. It is used in the identification of poison.
iv. It is used in the analysis of different medicine
v. It is used in the separation of different body tissue.
vi. It is used in forensic medicine for investigational purpose.

Rf value

Rf value is the ratio between the distance covered by any substances to the distance covered by the Mobile Phase / Solvent.

$$Rf = \frac{\text{Distance covered by substance}}{\text{Distance covered by solvent.}}$$



Thin Layer Chromatography (TLC)

Thin layer chromatography (TLC) is a chromatography technique used to separate mixtures. Thin layer chromatography is performed ona sheet of glass, plastic, or aluminium foil, which is coated with a thin layer of adsorbent material, usually silica gel, aluminium oxide, or cellulose.

Stationary Phase

The layer of adsorbent is known as the stationary phase .

Mobile Phase

Mostly ethanol, water, acetone or their mixture is used as mobile phase.

Procedure of Thin Layer chromatography

1. First of we will take special thin layer chromatographic sheet coated with the absorbent and cut it down according to the style of chromatography e.g.redial , circular ascending descending

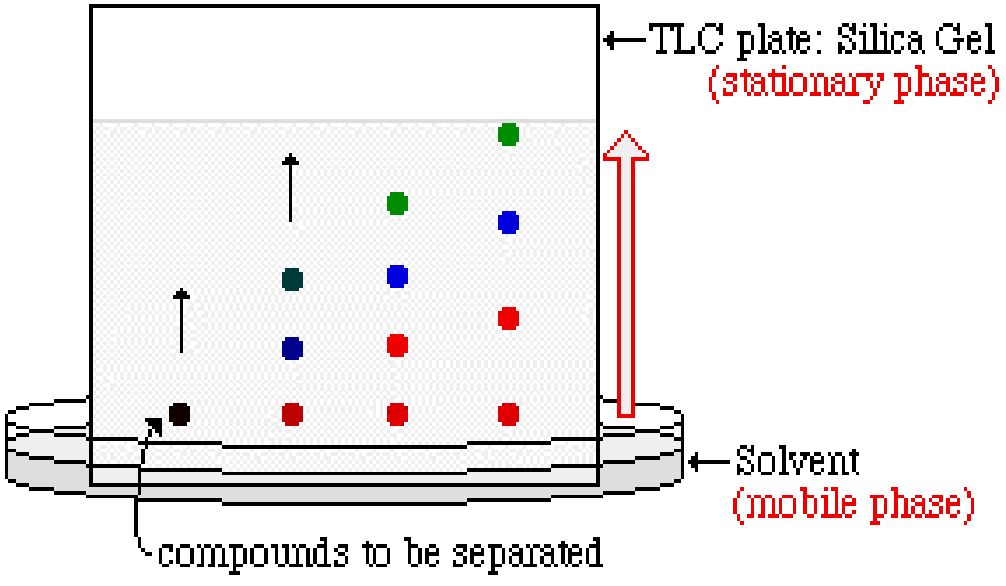
2. In case of ascending a line has been drawn on the bottom side & in the case of descending the line is drawn on upper of chromatographic paper. The line is called baseline. The distance of this baseline from the final edge is 2.5cm.

3. The sample is applied in the center of baseline and the sheet is applied intomobile phase in a chromatographic tank. After the appropriate time the components of sample will separate and finally Rf value of each componentis calculated

4. In case of circular chromatography the sample is applied in the center and

thread has been passed in through the center the mobile phase will move under the capillary action and components of sample will separate in the formor rings finally Rf value of all the components is calculated .

5. In case of radial chromatography the sample is applied across the center and like wised dipped in the mobile phase and components of sample will separate in form of arch. Finally the Rf value of the components is calculated.



Styles of Thin Layer Chromatography (TLC):

Paper chromatography can be done by following styles

.

1. Ascending chromatography
2. Descending chromatography
3. Circular chromatography
4. Radial chromatography

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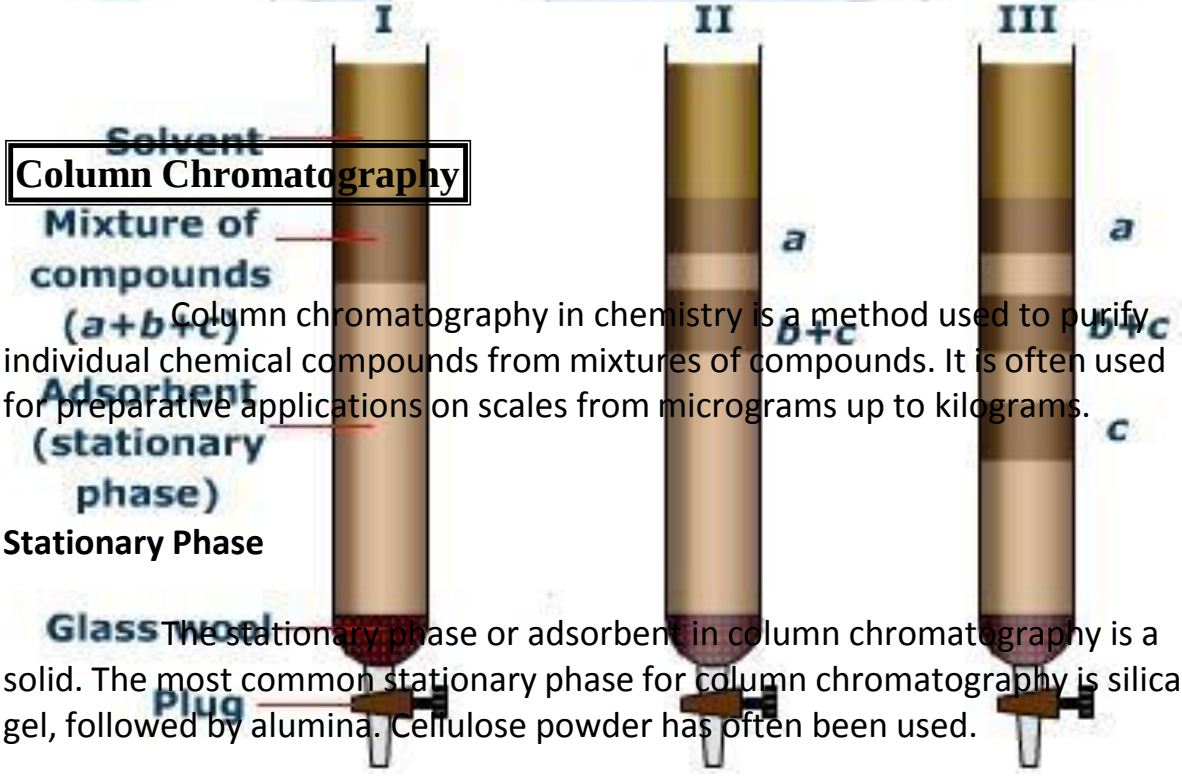
Application of Thin Layer Chromatography (TLC)

1. Determination of the components a plant contains.
2. Monitoring organic reactions.
3. Analyzing ceramides and fatty acids.
4. Detection of pesticides or insecticides in food and water.
5. Analyzing the dye composition of fibers in forensics Sciences.
6. Identifying compounds present in a given substance.
7. Assaying the radiochemical purity of radiopharmaceuticals.

Rf value

Rf value is the ratio between the distance covered by any substances to the distance covered by the Mobile Phase / Solvent.

$$Rf = \frac{\text{Distance covered by substance}}{\text{Distance covered by solvent.}}$$



Column chromatography in chemistry is a method used to purify individual chemical compounds from mixtures of compounds. It is often used for preparative applications on scales from micrograms up to kilograms.

Stationary Phase

The stationary phase or adsorbent in column chromatography is a solid. The most common stationary phase for column chromatography is silica gel, followed by alumina. Cellulose powder has often been used.

Mobile Phase

Mostly ethanol, water, acetone or their mixture is used as mobile

phase.

Procedure of Column chromatography

The classical preparative chromatography column is a glass tube with a diameterfrom 50 mm and a height of 50 cm to 1 m with a tap at the bottom.

The stationary phase is a powdered adsorbent which is placed in a vertical glasscolumn. The mixture to be analyzed is loaded on top of this column.

The mobile phase is a solvent poured on top of the loaded column. The solventflows down the column, causing the components of the mixture to distribute between the powdered adsorbent and the solvent, thus separating the components of the mixture so that as the solvent flows out of the bottom of thecolumn, some components elute with early collections and other components elute with late fractions.

Application of Column Chromatography

1. It is used in the separation of benzodiazepines.
2. It is used in the Analysis of medicine.
3. It is used for the purification of Water & other organic solvents inpharmaceutical industry.
4. It is used in the separation of different body tissue.

CHAPTER 8

EXTRACTION

It is the specialized type procedure of chemistry that involves the separation of different compounds on the basis of their relative solubility in two different immiscible solvent / liquids .

OR

The extraction is a complex pharmaceutical procedure in which the active pharmaceutical ingredient (API) is removed from crude drug (animal or plant origin) by using.

Menstrum

Any liquid that is used in the pharmacy for extractions procedure is called manstrum.

Marc

The waste material that left after extraction is called marc.

Need for extraction

With the advancement in medical treatment technologies the demand of herbal medicine diminished. But still some glycosides alkaloids, resins, fixed oils volatile oils and tannins have importance to us. So we use extraction process to purify them

Advantages of extraction

i. Potency can be controlled
ii. Deterioration can be controlled
iii. Different dosage form e.g. tablets capsules, symptoms and injectionscan easily synthesize.
iv. Dosage forms of purified compounds are more stable then the no purified ones.
v. The compounds that are none purified can cause infections.
vi. If the drugs are used in raw form ADRs (adverse drug reactions) can affect humans.

Theory of extraction

Any extraction procedure depends upon some fundamental principles and theseare very much common in all types of extraction.

i. Suitable size reduction of crude drug
ii. Selection of suitable solvent
iii. Penetration of solvent into the crude drug
iv. The cell should be at right position to collect to solution.
v. Supply of appropriate heat.
vi. Who apply pressing force?
vii. The separation of solvent from the raw crude drug the pressing Forcebecomes more important.
viii. Separation of solvent from mark
ix. Evaporation technique is applied to get purified solid drug.

Extraction process or extraction techniques

1. **Infusion**
2. **Decoction**
3. **Maceration**
4. **Percolation**
5. **Digestion**
6. **Continuous hot extraction**

Infusion

It is a method of extraction in which hot manstrum (water) is used poured oncrude drug or crushed drug and allow them for suitable time.

Decoction

It is the techniques of extraction in which the drug is used in the form of powderor coarse particles. These drug are together boiled with water for certain are given period of time.

Maceration

It is the method that require prolong time in this method drug is powdered andcover up in the porous cloth then it is dipped in the menstrum for **2** to 14 days as required.

Percolation

It is the extraction technique in which the fine powder of drugs are packed in tothe column are packed in to the column after suitable menstrum selection are allow the menstrum to percolate through the column of packed drug.

Digestion

It is the extraction technique which resemble with the maceration in fact it is amaceration procedure in the presence of gentle heat.

Continues hot extraction

It is the technique of extraction in which soxhelt apparatus is used .the drug is always used in hot condition.

Infusion

Infusion is a process or technique of extraction which is usually used for soft natured drugs. So that the menstrum (which is water) can easily diffuse into the drug b/c of these drugs easily release their active constituents inthe menstrum.

The extracts that are formulated through infusion process have shelf life of only24 hours so. It is recommended to use these kinds of extracts freshly.

Apparatus use in infusion

The main apparatus in infusion procedure is infusion pot . a simple beaker can also be used instead of infusion pot.

- Burner (heat burner)
- Filter paper
- Beaker

Procedure

- First of all the nature of the drug is checked
- If the nature of the drug is soft you would not cut it into pieces.
- Although if drug has little harder nature then we cut in to pieces.
- If the drug is the soft nature of drugs are bound with the thread and we suspend it into the infusion pot. If the drug is of harder nature then theirpieces will be place into the infusion pot.
- Now the menstrum will be warm to 200c to 250c.
- After that the hot menstrum will poured on the drug and allow is 15minutes
- Finely filter it and the extract is ready to use

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Decoction

It is the techniques of extraction in which the drug is used in the form of powder or coarse particles. These drug are together boiled with water forcertain are given period of time.

- Decoction is the technique of extraction in which water is used asmenstrum.
- The drug that have to undergo decoction should be heat stable
- The drug that are selected for decoction procedure should be hard
- The drug is cut into small pieces.
- Now put all the pieces of the drug in large beaker (1000ml) and pouredthe menstrum on the drug as mentioned in the monograph.
- The heat burner should be opened and heat the drug and menstrummixture to boil.
- After the definite period of time the burner should be closed and allowthe mixture to cool down.
- After the cooling phase filter the mixture.
- The filter mixture is now ready to use as a extract.
- Due to evaporation a certain quantity of water is lost so final adjustmentof volume is very necessary
- Decoction preparation always used freshly because their half life is only24 hours.
- There is no official example of decoction in I.P and B.P.

Maceration

It is the method that require prolong time in this method drug is powdered andcover up in the porous cloth then it is dipped in the menstrum for 2 to 14 days as required.

- It is the process in which drugs are communicated to fine powders
- Now these powders will encaptured into pouch.
- A suitable menstrum is selected.
- After this the pouch containing drug powder is suspended in to the
-
-
-

- menstrum for 2 to 14 days b/c it is the demand of the procedure to softenthe cellular structures of all drug.
- The pouch is removed after the definite the extract if required .
- Finely adjust the volume as required.

Types of maceration

1. **Maceration of organized drugs.**
2. **Maceration of unorganized drugs.**
3. **Multiple maceration**

Maceration of Organized Drugs

Simple maceration involves the following steps.

1. Communication of the crude drug. The drug is converted into coarsepowder rather then fine.
2. Take a pouch of suitable material and captured the coarse particles of druginto it.
3. Selected the suitable menstrum according to the whole menstrum of drug.
4. Take a whole menstrum in a tank.
5. Suspended the pouch with the help of thread for at least 7 day.
6. Occasionally shake the pouch.
7. After 7 days the manstrum is separated.
8. Now combine the menstrum with the pressed solution/ liquid.
9. If required filter it and finally adjust the volume according to therequirement.

Maceration of Unorganized Drug

1. First of all the unorganized drug is selected.
2. Communication the drug into fine powder .
3. If the drug in the form of gum are aloe gum resin, their should be no need forcommunication.
4. Enclosed the communicated or raw drug in a pouch.

5. The ¾ th volume of menstrum.
6. Dip the pouch in this volume of menstrum for at least 2__7 days.
7. After the specific time period the volume of menstrum is separated andfilters it if required.
8. Do not press the marc
9. Adjust the volume by using remaining ¼ th part of menstrum.

Multiple maceration (repeated maceration)

Multiple maceration is very important and effective procedure as for as its accuracy is concern. The basis aim of this procedure is to remove the remaining(API) in to menstrum
In multiple maceration we prefer the alcohol as menstrum on other menstrum like wise water.

Double maceration

- Firstly selection of drug is done. After selection the drug is communicated.
- Enclosed the communicated drug into a pouch
- According to the nature of crude drug a suitable menstrum is selected
- The menstrum is divided into two portions A and B.
- The crude drug pouch is dipped into menstrum A for specific period oftime. After that time the menstrum A is separated and preserved the Marc is pressed.
- The marc is again dipped into the menstrum B. for specific period of time.
- After that time the marc is pressed and menstrum B is separated
- The menstrum A and B is unite again and adjust the vol. to get the desireproduct.

Triple Maceration

- First of all the selection of drug is done.
- Then the drug is communicated to fine powder
- Now enclose the powder drug in a pouch
- Now suitable menstrum is selected and divide the menstrum intoThree parts A, B, C
-
-
-
-

- A for specified period of time after that time the marc is pressed andmenstrum is labeled and preserved
- The marc again dipped into menstrum B for particular time after thespecific time.
- The marc is pressed and manstrum is pressed after labeling**.**
- The marc again dipped in menstrum C for specific time after that time themarc is pressed and menstrum is preserved after labeling.
- Combine the menstrum A, B, and C and adjust their vol. to get yourdesire product.

Percolation

It is an extraction technique in which a communicated drug is enclosed in a vessel known as percolator and menstrum is allowed to pass through the communicated drug. The extract that we obtained from the percolation and procedure is called percolate. The percolation procedure can be properly explained under following heading.

Communication of the Drug

The drug is subjected to a suitable size reduction by using technique usually thedrug is crushed moderately to fine powder depending upon the nature of drug.

Advantages

The basic advantages of size reduction in percolation are.

- To enhance the surface area of drug.
- Because of size reduction uniform packing of drug in percolationbecome possible.
- Because of size reduction (powder form drug) the movement ofmenstrum become slow.

Moistening of drug (imbibitions)

The moistening of crude drug is called imbibitions. The powdered drug is place with little amount of menstrum for at least 4hours in a close container.

Advantages

The fundamental advantages of moistening the drug are as following
The dry powder may be swell up when it firstly have a contact with menstrum. This can be overcome by moistening the powder drug.
Due to imbibitions of powder drug the entrapment of air can be minimized.

Open percolator

The upper surface of this percolator is open it mainly use for mainly non-volatilesolvent.

Close percolator

The upper surface of this percolator is close and it mainly used for volatilemenstrum e.g. alcohol.

Packing

After imbibitions of powdered crude drug it would be evenly packed in suitable percolation.

Maceration

After the selection of particular or specific solvent (menstrum). The larger portion of menstrum is poured on the packed drug in a percolator when the dropsof menstrum trickle down then percolator should be preserved at soft place fro at

Continuous hot Extraction

In continuous hot extraction the drug is enclosed in a drug chamber and Menstrum is placed in lower flask. A reflex condenser place at the upper portion. When heat is applied to the Menstrum, it convert it self into vapours these vapours are condensed by reflux condenser. The drops of Menstrum tickle down on the drug chamber and purified extract is obtained from collection point.

Pharmacognosy

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Chapter 9

POISONOUS PLANTS

(With Special reference to Pakistan)

There are many plants available in northern areas & ground areas of Pakistan. Theses plants have the ability to produce some drastic effects on the human body.

These drastic plants can be classified as;

- **Plants Causing GIT Toxicity**
- **Plants Causing CNS Toxicity**
- **Plants Causing CVS Toxicity**
- **Cyanogenetic Plants**

A) Plants Causing GIT Toxicity

I) Mouth or, oral cavity Toxic Plants

Name of plants

(1) Arisaema triphyllum
(2) Colcasia esculanata
(3) Arum jacquemontii

Colcasia esculanata

Arisaema triphyllum

Family "Araceae"

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Habitat

Sindh ,Gilget ,Swat,Ayubia and Nathiagali

Toxicology The fundamental compound due to which mouthor oral cavity toxicity occour is calcium oxalate.

Symptoms

- Intense burning sensation
- Mouth unless
- Dermatitis
- Blister on tongue
- Increase salivation
- Loss of voice is also reported

II) Plants toxic to Gastric Mucosa

Plant name

(1) Narcissus tazeeta
(2) Amaryllus vittae
(3) Crinum asiatcum

Crinum asiatcum

Amaryllus vittae

Narcissus tazeeta

Family

Amaryllideacea

Habitat

Narcissus tazette is widely found in Gilgat and Swat Wally Amarlllus vittae and crinium asiaticum both widely found in Punjab, Sindh

Toxicology

There are various alkaloids in these plants but lycorine is the most dangerous one, that cause multiple symptoms

Symptoms

- Inflammation and burning sensation o mouth
- Gastritis
- Headache
- Increase salivation nasal secretion

III) Gastro Enteric Irritant Plants

A) Plant name

Aseculus indica

Family

Hippocastanaceae

Habitat

Kasmir, Ziarat, Quetta, Muree Swat.

Aseculus indica

Toxicology

This plant contain many chemical substances from which **saponin** (glycoride) is a toxic to our GIT.

Symptoms

- Inflammation of gastric mucosa
- Peptic ulcer
- Duodenal ulcer
- Inflammation eye. (Conjunctivitis)
- Vomiting
- Fever
- Headache
- Sever sneezing

Podophyllum emodi

(B) Plant name

Podophyllum emodi

Family

Berberidiaceae

Habitat

Kashmir, muree, swat and Gilgit.

Toxicology

Podophyllum emodi contain many resinous compounds among thempodophyllin is the most toxic

Symptoms

- Abdominal or epigastric pain
- Persistent emesis
- Headache
- Dermatitis
- Fever
- Diarrhea
- Inflammation of eye

(C) Plant name

Abrus pectorius

Family

Leguminosae

Habitat

Sindh, and Kashmir .it found at 3000__5000 altitude.

Toxicology

The toxic substance of abrus pectorious is abrin.

Symptoms

- Even small amount of ingestion of seeds can cause cardiac Arrest especially in children
- Severe gastroenteritis
- Nausea
- Vomiting
- Trembling of hands
- Muscular weakness

IV) Plants Causing Dryness of Mouth

Datura stramonium

(A) Plant name

Datura stramonium

Family

Solanaceae

Habitat

It is widely available in 5000 to 9000 feet altitude mainly in Swat, Gilgat Chitral, Muree and Kashmir.

Toxicology

(1) There are different compound present in Datura stramonium mainly hyoscine and hyosyamine if Any human ingested there raw plants they can cause Toxicity. (2) If leaves and flowers of this plant eaten by Some animal and their meat is used by human can Caused toxicity.

Symptoms

- dryness of mouth
- dyspnea
- Fatigue
- Eye sight weakness
- Muscular weakness

Atropa belladona

B) Plant name

Atropa belladona

Family

Solanaceae

Habitat

It is present at 6000___1000ft altitude. The place where It is found widely hills of Muree, Hazara, Mansehra and Chitral.

Toxicology

The main chemical compound which is present in Atropa belladona is atropine.

Symptoms

- dryness of mouth
- Muscular relaxation
- Fever
- Nausea
- Vomiting

V) Plants Causing Intestinal Motility.

Plant name

Conium maculatum

Family

Umbelliferae

Habitat

Hazara, Abottabad and hills of muree and Chitral.

Toxicology There are many **alkaloids** present in conium maculatum.
But the toxins that are harmful to humans are coniine, pseudo conohydrine ,N.Methyl coniine.

Symptoms

- increase the intestinal motality
- paralysis of motor Nerve ending
- paralysis of spinal card
- respiratory Depression
- drowsiness

Nicotiana tobaccum

Plant name Nicotiana tobaccum

Family solanaceae

Habitat It is widely available in Rural Sindh , Punjab and N.W.F.P

Toxicology
- there are mainly alkaloids available in nicotiana tobaccum .But the most effective is nicotine.

Symptom
- enhance the motality of Intestine
- Diarrhea

B) Plants Causing CVS Disturbances

Plant name
- Digitalis purpura
- Digitalis lanata

Digitalis purpura

Family Scrophulariaceae

Habitat Hazara , Azad Kashmir

Toxicology these are two plants contain many glycosides. In which the most active are Digoxin, Digitoxin and Gitatoxin

Symptom

● Ventricular tachycardia ● Vomiting

●Sinus arrythemia

● SOB(shortness of breath ● drowsinss

●fatigue

Digitalis lanata

Plant name Nerium indicum

Family Apocynaceae

Habitat Chitral ,Muree and Azad Kashmir

Toxicology

Root, barks and seeds contain toxins .the most active are "nerodine" and karabin.

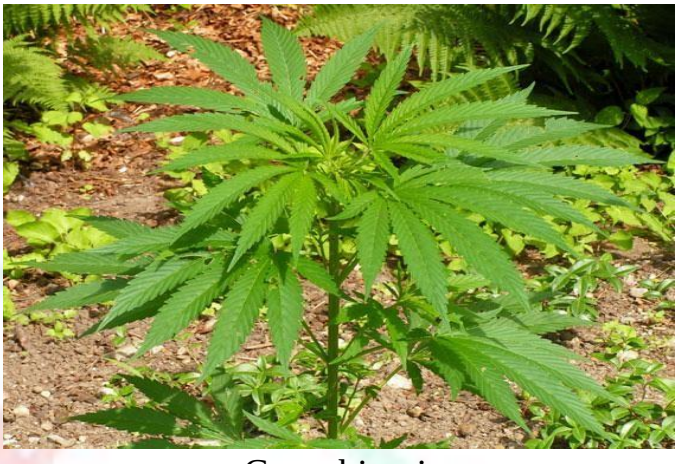
Symptom ●hypertenshion ●cardic arrtheimiya
● venticuler tacky cardia ● increase impulse rate
● nausea ●vomiting ● chest pain.

C) Plants Causing CNS Disturbances

Plant name Cannabis stiva

Family Cannabinacea

Habitat it is widely available in N.W.F.P and Punjab.



Cannabis stiva

Toxicology The glandular trichome of cannabis stiva is

secreted a Resin which usually a waste material called as Narcotic resin and also called tetra hydrocannabinol.

Symptom ● shrinkage of mouth ● dryness of mouth ● dry cough ●constipation ● depression ● the addictperson will enjoy the color of life ● vomiting ● headache ● hallucination

Plant name Cicuta virosa

Family Umblifeareae

Habitat hilly area of Azad Kashmir.

Cicuta virosa

Toxicology

In cicuta virosa there is a mixture of toxic substances called cicutoxin is a slightly alcoholic in nature the barks of the cicuta virosa is more toxic then the seeds and leaves of this plant.

symptom

●depression ● tremor ●respiratory depression which ultimately leads torespiratory failure ●increase salivation. ● nausea ●vomiting

D) Cyanogenetic Plants

plant name Manihot esulenta

family

Euphorbiaceae

habitat

it is easily available in the forests of Northen area

Pharmacognosy

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Manihot esulenta

Toxicology

there is a toxic substances name **cyanogenocyte** which can produce harmful effect on the living systems.

Systems

●convulsion ●muscular weakness ●lever damage ● vomiting

Plant name

Prunus amygdalus

Family

Rosaceae

Habitat

It is widely available in the Northren parts of Pakistan.

Prunus amgludus

Toxicology

It contain a toxic chemical name amygladin..

Symptoms

● convulsions ●vomiting ●liver damage ● headache

CHAPTER 10

Glycosides

These are organic compounds, abundantly present in plants; on hydrolysis they yield a sugar component called Glycogen and non-sugar component called A-glycogen.

Classes:

The glycosides are classified as follows;

1. **Anthra-quinone Glycosides (example:** Senna, Aloe, rhubarb**)**
2. **Cardio tonic Glycosides (Example:** Digitalis , Strophanthus**)**
3. **Saponin Glycoside**

Medically Important Glycoside Plants

1)

Drug;

Senna

Chemical Class;

Glycoside

Synonym;

Alexandrian Senna
Tinnevelly Senna

Biological Source;

It consist of dried leaflets of “Cassia acutifolia” (Alexandrian Senna) and “Cassia angustifolia” (Tinnevelly Senna).

Family;

Leguminosae

Chemical Constituent;

Sennosides A, B, C, D
Aloe-emodine glycosides

Medicinal Uses;

- Cathartic
- Laxative
- Purgative

2)

Drug;

Cassia

Botanical Name;

Cassia fistula

(Cassia fistula)

Chemical Class ;

Glycoside

Family ;

Leguminosae

Chemical Constituent;

Sennosides

Medicinal Uses;

- Cathartic
- Anti Gout.

3)

Drug;

Aloe

Synonym;

Gwar Gandal

Chemical Class;

Glycoside

Biological source;

It is dried juice obtained from leaves of "Aloe barbadensis" (Aloe vera).

Family ;

Liliaceae

Collection ;

V-shaped leaves contain spines on the margins. For collection of

juice the leaves are cut in March & April transversally and put a vessel below it and then heat the juice in copper vessel on open fire. Poured the juice in canes and tins and solidify it.

Chemical Constituent ;

Aloin, Barbaloin, Emodine

Medicinal Uses ;

- Purgative
- Skin diseases
- Burns by heat, radiation &sun
- Wound
- Hair tonic

---

4)

Drug;

Glycyrrhiza

Chemical Class;

Glycoside

Synonym;

Liquorice, Mulethi

Biological source;

It is dried root and rhizome of “Glycyrrhiza glabra”

Family ;

Leguminoseae

Collection;

For its cultivation stained seeds are sown into equal parts of clean sand are garden soil. When seedlings arise they are transferred to the fields. The leaves are collected from September to November in afternoon. The leaves are dried immediately at 60 centigrade after collection. If drying is rapid it will retain it green colour. Dried leaves are packed in air tight container having a desiccating substance that is silica gel or calcium oxide.

Chemical Constituent;

Digitoxin, Gitoxin & Gitaloxin

Medicinal Uses;

- As cardiac stimulant
- In CHF (Congestive Heart Failure)

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Drug;

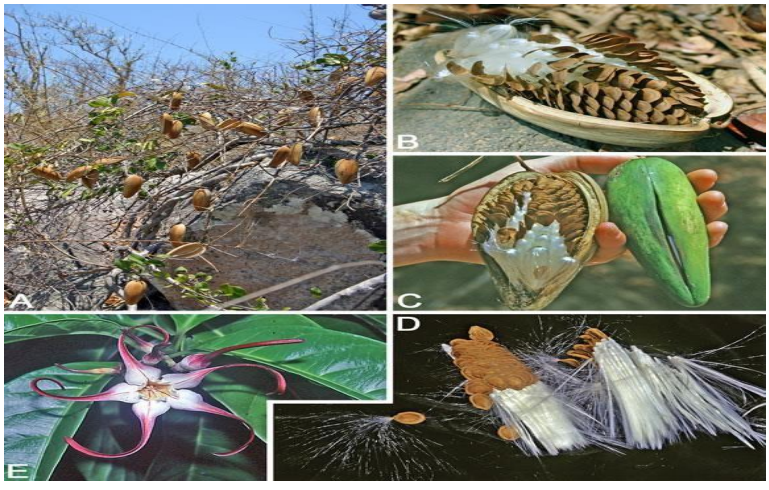
Strophanthus

Chemical Class;

Glycosides

Biological source;

It is dried ripe seeds of “Strophanthus kombe” and “Strophanthus hispidus”



Family;

Apocynaceae

Collection;

It is obtained from wild plants. Fruits are many seeded and consist of two follicles. Mature fruit are collected in June and July Epicarp and Mesocarp are separated and seeds are removed. The seeds are washed and then dried.

Chemical Constituent;

Strophanthin K, Choline, Kombic acid

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Medicinal Uses;

- Cardio tonic
- Diuretic
- Arrow poison

Alkaloids

Alkaloids are naturally occurring, nitrogen containing compound. These arebasic in nature and are physiologically active.

Groups:

1. **Pyridine-piperidine (Example:** areca nut **)**
2. **Tropane alkaloids (Example:** Hyoscyamus leafs**)**
3. **Quinoline alkaloids (Example:** Cinchona bark**)**
4. **Iso-quinoline alkaloids (Example:** Ipecac, Opium**)**
5. **Indole alkaloids (Example:** Nux-vomica**)**
6. **Alkaloidal amine (Example:** Ephedra**)**
7. **Steroidal alkaloids (Example:** veratrum**)**
8. **Purine alkaloids (Example:** Tea **,** Coffee**)**

Medically Important Alkaloid Plants;

1)

Drug;

Rauwolfia

Synonym;

Snake root, Chota chandan

Pharmacognosy

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(Rauwolfia serpentina)

Chemical Class ;

Alkaloids

Biological source;

It is dried roots of "Rauwolfia serpentine".

Family ;

Apocynaceae

Chemical Constituent;

Reserpine, Ajmaline (Rauwolfine), Ajmalicine (Yohimbine), Serpentine, Serpentinine.

Medicinal Uses;

- Sedative
- Hypnotic
- As hypertensive

Pharmacognosy

2)

Drug;

Catharanthus

Synonym;

Rattanjot

Chemical Class;

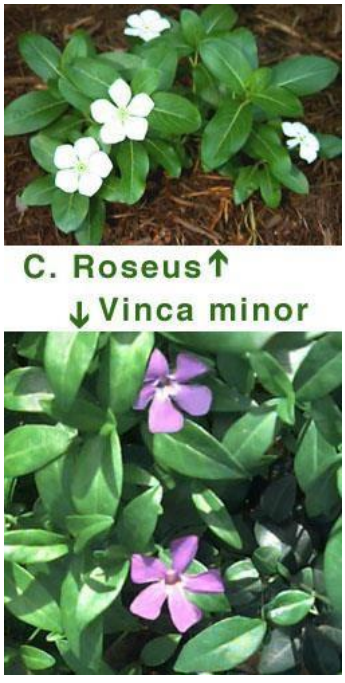
Alkaloids

Botanical Name;

It is dried whole plant of "Catharanthus

Family;

roseus"Apocynaceae



Chemical Constituent;

Vinblastine, Vincristine, Vindoline & Catharanthine

Medicinal Uses;

- Anti Neoplastic
- Used in Leukemia

3)

Drug;

Ephedra

Chemical Class;

Alkaloids

Biological source;

It consist of whole aerial parts of "Ephedra sinica"

Family;

Ephederacae

Chemical Constituent;

Ephedrine, Pseudo-ephedrine

Medicinal Uses;

- Anti asthmatic
- Bronchodilator
- Vasodilator
- Used in flu, fever and allergic conditions
- CNS stimulant

Pharmacognosy

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4) Drug;

Opium Synonym;

Post, Afim, Heroin, Poppy plant

Chemical Class;

Alkaloids

Biological source;

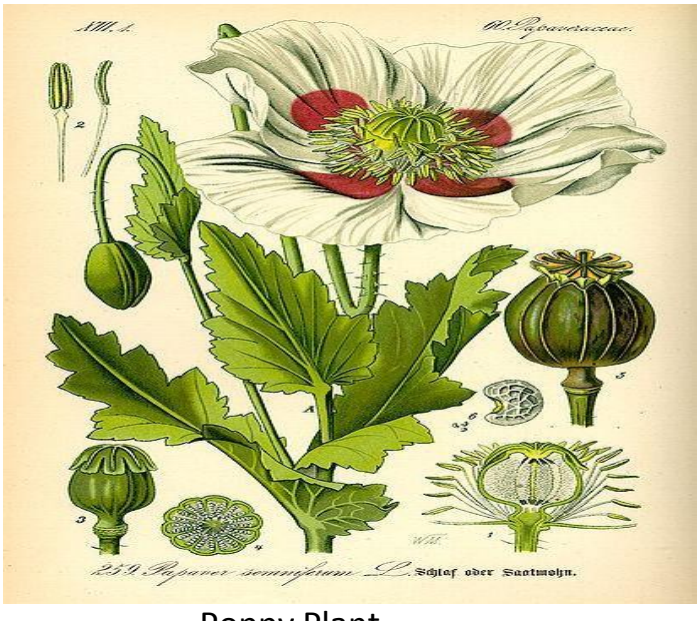
It is the air dried milky latex obtained by incision from the unripe capsules of “Papaver somniferum”

Family;

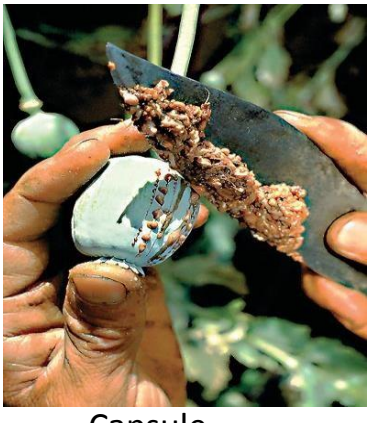
Papaveraceae

Chemical Constituent;

Morphine, Codeine, Narcotine, Thebaine, noscapine, Papaverine



Poppy Plant



Capsule

Medicinal Uses;

- Narcotic
- Analgesic
- Sedative
- Antispasmodic
- Codeine is used as anti tussive
- Papaverine is smooth muscle relaxant

5)

Drug;

Nux-Vomica

Synonym;

Kuchla, Poison nut, Vomit nut

Biological source;

It is the dried ripe seeds of “Strychnus nux-vomica”

Pharmacognosy

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PLATE XII.—*Strychnos nux-vomica* (Nux Vomica). (From Jackson: *Experimental Pharmacology and Materia Medica.*)

Family;

Loganiaceae

Chemical Constituent;

Strychnine, Brucine, Vomicine, Novacine, Colubrine

Medicinal Uses;

- Circulatory stimulant
- Bitter tonic
- Increase tone of intestine
- Used in alcohol poisoning
- Improve appetite and digestion

6)

Drug;

Cinchona bark

Biological source;

It is dried bark of stem and roots of “Cinchona succirubra”

Family ;

Rubiaceae

Chemical Constituent;

Quinine, Quinidine, Cinchonine, Cinchonidine.

Medicinal Uses;

- Antimalarial
- Anti pyretic
- Analgesic
- Arrythmia
- Dyspepsia
- Hay fever
- Tonsillitis

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7)

Drug;

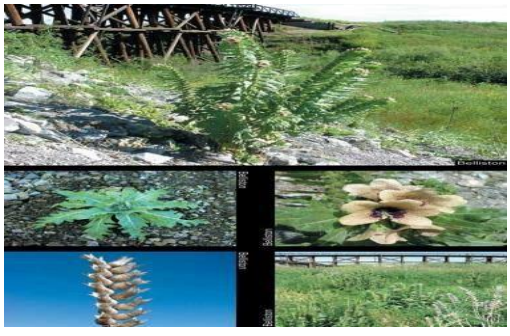
Hyoscyamus leaf

Synonym;

Khurasani-ajvayan

Biological source;

It consist of dried leaves and flowering tops of "Hyoscyamus niger"



Hyoscyamus

Family;

Solanaceae

Chemical Constituent;

Hyoscyamine (Atropine)
Hyoscine (Scopolamine)

Medicinal Uses;

- Smooth muscle relaxant
- Sedative
- Narcotic
- Mydriatic
- Used in Asthma
- CNS stimulant

8)

Drug;

Belladonna

Synonym;

Death herb

Biological source;

It consist of dried leaves and flowering tops of "Atropa belladonna"

Family;

Solanaceae

Chemical Constituent ;

Atropine, Hyoscyamine, Asparagaline

Medicinal Uses;

- Muscle relaxant of respiratory tract
- Narcotic
- Sedative
- Antispasmodic

Pharmacognosy

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Volatile Oil

Rapidly evaporating oil, especially an essential oil that does not leave astain.

OR

Any organic oil present in plants, usually containing terpenes and esters and having the odour or flavour of the plant from which they are extracted.

Medically Important Volatile Oil Plants

Pharmacognosy

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1)

Drug;

Fennel

Synonym;

(Saunf)

Chemical Class ;

Volatile oil

Biological source;

It is obtain from ripe fruit of “Foeniculum vulgare”

Family ;

Umbelliferae

Chemical Constituent ;

Anethol, Fenchone, Phellandrene, Chavicol

Medicinal Uses

- Flavoring agent
- Carminative
- Stomachic
- Expectorant
- Stimulant

2)

Drug;

Caraway

Synonym;

(Zira)

Chemical Class;

Volatile oil

Biological source;

It is obtain from dried ripe food of “Carum carvi”

Family;

Umbelliferae

Chemical Constituent ;

Carvone, Carveol, Limonene

Medicinal Uses;

- Flavoring
- Carminative
- Expectorant

3)

Drug:

Peppermint

Synonym;

Pudina

Biological source;

It is obtain from dried leaves & flowering tops of "Mentha piperita"

Family;

Labiateae

Chemical Constituent;

Menthol, Menthone, Jasmine, Limonene, Phellandrene

Medicinal Uses;

- Flavoring agent
- Carminative
- Stomachic
- Expectorant
- vomiting

4)

Drug;

Cinnamon

Synonym;

Darchini

Chemical Class;

Volatile oil

Biological source;

It is obtained from dried bark of"Cinnamomum zeylanicum"

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PUNJB PHARMACY COUNCIL, LAHORE

Family;

Lauraceae

Chemical Constituent;

Eugenol, Phellandrene, Pinene

Medicinal Uses ;

- vomiting
- Flavoring
- Carminative
- Stimulant
- Astringent

5)

Drug;

Cardamom

Synonym;

Ilayachi

Chemical Class;

Volatile oil

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Biological source;

It is dried ripe seed of “Elettaria cardamomum”

Family ;

Zingiberaceae

Chemical Constituent ;

Cineol, Borneol, Limonene

Medicinal Uses;

- Flavoring
- Stomachic
- Stimulant
- Diuretic

6)

Drug;

Clove

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Synonym;

Long

Chemical Class;

Volatile oil

Biological source;

It is dried flower buds of “Eugenia caryophyllus”

Family;

Myrtaceae

Chemical Constituent;

Eugenin, Chromone, Vanillin

Medicinal Uses;

- Flavoring
- Carminative
- Anti-septic
- Dental preparation

Pharmacognosy

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7)

Drug;

Curcuma

Botanical Name;

Curcuma longa

Chemical Class;

Volatile Oil

Pharmacognosy

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Family ;

Zingiberaceae **(Curcuma longa)**

Chemical Constituent;

Curcumin

Medicinal Uses;

- Anti Inflammatory
- Use in Jaundice
- Use in Gall Stones

(Turmeric)

Resins

Resins are solid or semisolid plant exudates formed in schizogenous cavities.They are complex mixtures of compounds like resin alcohols (resinols), resin acids, resinophenols.

Natural resins are usually transparent yellow to brown and can melt and burn. Most are exuded from trees, especially pines.

Classification of Resins:

Resins are classified on the basis of their occurrence in combination with othercompounds as:

Balsams:

Balsams are resinous substances which contain large proportion of benzoic acid or cinnamic acid either free or in combination with their esters. Examples are Tolu balsam, Benzoin and Peru balsam.

Oleoresin:

When resin occurs with volatile oils the mixture is called Oleoresin. Examples are; Ginger, Capsicum etc.

Gum Resins:

When resins are found in combination with gums then such resinsare known as gum resins. Examples include; Asafeotida.

Oleo-gum Resins:

These are associated with gums and volatile oils both. The volatile oil is removed by steam distillation and gum is separated by dissolving in water. Examples are; Myrrh, Ipomoea

1)

Drug;

Tolu balsam

Chemical Class;

Resins

Biological source;

balsamum"

Family;

It is obtain from by incision of stem of "Myroxylon

Leguminoseae**119**

Chemical Constituent;

Ferulic acid, Styrene, Vanillin

Medicinal Uses;

- Expectorant
- Anti-septic
- Flavouring in Pharmaceuticals

2)Drug;

Sumatra Benzoin

Synonym;

Benjamin, Luban (Hindi)

Chemical Class;

Resins

Biological source;

It is obtain from by incision of stem of "Styrax benzoin"

Family;

Styraceae

Chemical Constituent;

Balsamic acid, Benzoin acid, Cinnamic acid

Medicinal Uses;

- Expectorant
- Anti-septic
- Carminative
- Diuretic
- In cosmetic
- compound benzoin tincture

3)

Drug;

Colocynth

Synonym;

Bitter apple, Bitter cucumber, Bitter gourd, Korh tuma (Punjabi)

Chemical Class;

Resins

Biological source;

It is obtain from dried pulp of unripe but fully grown fruit of "Citrullus colocynthis"

Family;

Cucurbitaceae

Chemical Constituent;

Cucurbitacin-E

Medicinal Uses;

- In Cathartic
- Anti-cancer

4)

Drug;

Asafeotida

Synonym;

Food of god, Hing

Chemical Class;

Resins

Biological source;

Pharmacognosy

Dr.Shahzad A.Daula, MID,M.Phil Public Health(PU)

It is obtain from Oleo-gum-resin from exudation by incision on roots & rhizome “Ferula Asafeotida”

Family;

Umbellifereae

Chemical Constituent;

Ferulic acid, Umbelliferone

Medicinal Uses;

- Carminative
- Expectorant
- Anti-spasmodic***(muscle relaxant)***
- Laxative
- Hysteria & epilepsy ***(mental disorder)***

Hing

5) Drug; Synonym;

Ginger

Zingiber, Saunth (Hindi), Adrak (Urdu)

Chemical Class;

Resins

Biological source;

It is obtain from dried rhizomes of "Zingiber officinale"

Family;

Zingiberaceae

(Fresh Ginger) **(Dry ginger)**

Chemical Constituent;

Resins constituents are;

Gingerol, Shogaols, Gingediols

Volatile oils are;

Zingerone, Zingiberene

The pungency of ginger is due to Gingerol. Dehydration of Gingerol produces shogaol which is not present in fresh rhizome.

Medicinal Uses;

- Stimulant
- Carminative
- Condiment
- Used in Cold & Cough
- Used in Asthma

Carbohydrates

Carbohydrates are pollyhydroxy aldehyde or ketone, with at least three carbon atoms. These compounds are produced by photosynthetic plants and contain only carbon, hydrogen, and oxygen, usually in the ratio 1:2:1.

Example:

Glucose, sucrose and starch.

Source:

The source of carbohydrates is plants. They are widely distributed in plants.

Classification:

Carbohydrates are classified into 3 main classes.

1. Monosaccharides or simple sugars
2. Oligosaccharides
3. Polysaccharides

1. Monosaccharides:

These are the simple sugars and can not be hydrolyzed. Chemical formula is

$(C.H_2O)_n$.

For example:

Glucose ($C_6H_{12}O_6$) Blood Sugar
Fructose ($C_6H_{12}O_6$) Fruit Sugar
Pentose ($C_5H_{10}O_5$)

2. Oligosaccharide:

They contain the carbohydrates which formed by the combination of 2 or 3 monosaccharide units. And the range is (C_1 to C_{10})
Such as;

- Disaccharides
- Tri-saccharides and so on….

Disaccharide:

In which 2 monosaccharide combine to form disaccharide witha linkage called Glycosidic linkage

For example;

Sucrose (Table Sugar) it forms by the combination of D-glucoseand D-fructose

3. Polysaccharides:

In which large no. of monosaccharide combine to form polysaccharide andthey are very complex in structure and these are called non-sugar
For example starch, Agar, pectin etc.

Pharmacognosy

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Drug:

Acacia

Synonym;

Gum Acacia, Gum Arabica

Chemical Class;

Carbohydrates

Biological source;

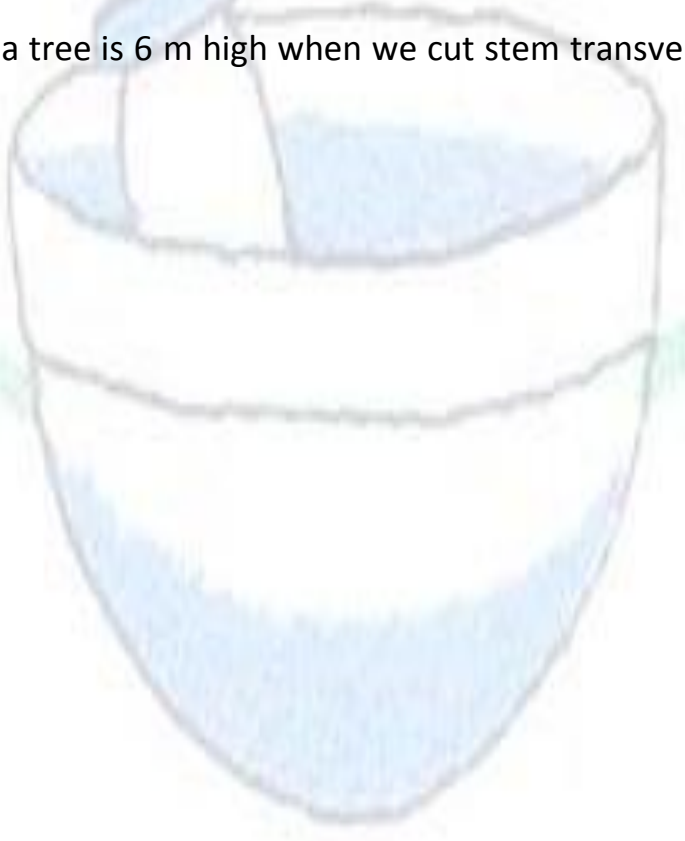
It is dried gum obtain from the stem and branches of "Acacia senegal" and "Acacia arabica"

Family;

Leguminoseae

Collection;

Acacia tree is 6 m high when we cut stem transversely phloem



cells come out and by bacterial attack (Bacterium acaciae) the flume cells convert into gum and then it is stored in lathery bags for 2-3 months.

Character:

Colour: Dark brown

Shape: 1-3 in diameter and round

Odour: odourless

Chemical Constituent;

Arabin (Magnesium, Potassium, Calcium salts of Arabic acid

Medicinal Uses ;

- As emulsifying agent
- As binder
- As demulcent
- As thickner in juices

2)

Drug;

Tragacanth

Synonym;

Gondkatera

Chemical Class;

Carbohydrate

Biological source;

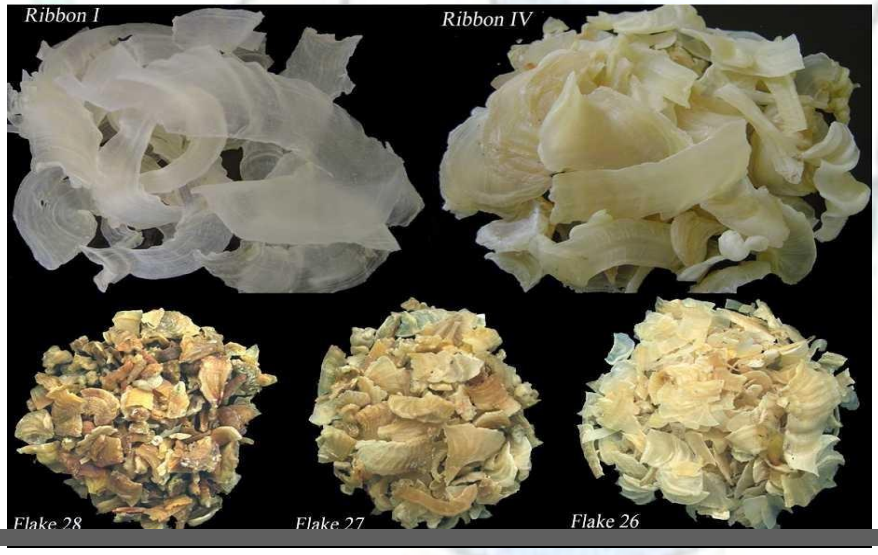
It is dried gum obtain from exudates of the stem of "Astragallus gummifer"

Family;

Leguminoseae

Collection;

The tree is 1 m high and thorny branches of shrubs and obtains from plant when plant is 1-2 year old by a process called **gummosis** When plant is injured the internal layer pith is converted into gum then the plant absorbed water and swells up and throws the gum on the outer surface and by the reaction with air it become hard due to the evaporation of water.



Character:

Colour: Pale yellow and off white **Shape:**

depend upon the type of incision**Odour:**

Odourless

Chemical Constituent;

Tragacanthin and bassorin

Medicinal Uses;

- As emulsifying
- As suspending agent
- As demulcent
- In cosmetics
- In food industry

2)

Drug;

Agar

Synonym;

Chemical Class;

Japan agar

arbohydrates

Biological source;

It is dried hydrophilic complex obtain from of “Gelidium cartilagineum”

Family;

Gelidiaceae

Collection;

Algae is cultivated on coast and washed for 24 hours in running water then beaten and shaken to remove sand and shells. Then it is moved in steam heated digester for 30 hours to extract chemical then a gel like material is obtain. To remove water gel is freezes, ice block of agar is obtained crush and melt it and filter through a vacuum rotary sieve agar flack is obtain.

Character:

Colour: Transparent

Shape: Flattened (tough when damp and brittle when dry)

Odour: Odourless

Chemical Constituent;

Pharmacognosy

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Agarose and Agaropectin

Medicinal Uses;

- As emulsifying agent
- As cathartic
- As demulcent
- As nutrient media for bacterial culture
- As laxative

4)

Drug;

Starch

Chemical Class;

Carbohydrates

Biological source;

It is a polysaccharide obtains from seed like grains of plants

Corn Starch

B.O: Zea mays
Family: Gramineae

Wheat Starch

B.O: Triticum aestrivum
Family: Gramineae

Rice Starch

B.O: Oriza sativa
Family: Gramineae

Pharmacognosy

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Potato starch

B.O: Solanum tuberosum
Family: Solanaceae

Collection and Preparation;

1. preparation of maize starch:

Firstly the grains are softened by soaking in the aqueous solution of sulphuric acid at 50^0 c temperature for 3-4 days then the grains are crush to separate the embryo and germ milky fluid is obtained (which have starch and protein). To separate starch the dilute Alkali solution is added which absorb protein. Starch is dried by flash dryer.

2. Preparation of rice starch:

Firstly broken rice are softened by adding in the aqueous solution of NaOH then crushed it and mixed with water and to separate starch the solution is kept on standing position then dried at the 50-60 c temp.

3. Preparation of wheat starch;

Firstly take wheat and add water to make dough. After that make small bolls and add in water and shake it. Liquid starch is obtained then centrifuges it and dried.

4. Preparation of potato starch:

Firstly potatoes are washed, crushed and separate cellular debris by rotary sieves then add water and keep on standing position starch is separated and then dried it.

Character:

Solubility: Insoluble in cold water and forms a colloidal solution on boiling

Colour: White mass

Shape: Irregular

Chemical Constituent ;

Amylose and Amylopectin

Medicinal Uses ;

- As emulsifying agent
- As binder
- As nutritive
- As anti-dote in iodine poisoning
- In dusting powder

- As a filler in tablets

Tannins

These are complex organic, non-nitrogenous, pale yellow to light brown amorphous substances widely distributed in plants and used chiefly in tanning leather, dyeing fabric, and making ink. Their solutions are acid and have an astringent taste.

Medically Important Tannin Plants

1)

Drug;

Catechu

Synonym;

Katha

Chemical Class;

Tannin

(Acacia catechu)

Botanical Name;

It is dried aqueous extract prepared from “Acacia catechu”

Family;

Leguminoseae

Pharmacognosy

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Chemical Constituent;

Acacatechin, Quercitin, Tannic acid

Medicinal Uses;

- As Astringent, applied to boils and skin ulcers
- Digestive
- In cough
- In Diarrhoea

2)

Drug;

Nut gall

Botanical Name;

Quercus infectoria

Chemical Class ;

Tannin

Family ;

Fagaceae

Chemical Constituent;

Gallic acid **(Quercus infectoria)**

Medicinal Uses;

- Astringent
- Used in Burns.

Fixed Oils

These are esters of glycerol with long chain fatty acids. They are nonvolatile in nature obtained from plants (Castor oil, Almond oil) or animals (Cod liver oil).

OR

Fixed Oils are most commonly used in aromatherapy oil blends, toiletries, foodand industry. Fixed Oils are not volatile, they do not evaporate.

Medically Important Fixed Oil Plants

1)

Drug;

Almond Oil

~~**Chemical Class;**~~

Pharmacognosy

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Lipids (Fixed Oil)

(Prunus amygdalus)

Biological source;

It is dried ripe seeds of “Prunus amygdalus”

Family;

Rosaceae

Chemical Constituent;

Sphingolipid

Medicinal Uses;

- Used for moisturizing skin
- Used in eczema
- As flavouring agent in the preparation of toilet articles
- As vehicle for oily injection
- Mild laxative