

Lecture 4 2022~2023

SUGARS & SUGAR-CONTAINING DRUGS

1) Sucrose:

It's obtained from 2 plants:

1) *Saccharum officinarum* (F: Gramineae)

It is cultivated for the sugar-rich stems or canes. Its folk use different between areas. Hot water extract of the fresh leaf is taken orally to treat hypertension or induce diuresis, decoction of the juice for typhoid, The sweet juice in the stem is used to treat snakebite and wounds from poison arrows



2) *Beta vulgaris* (F: Chenopodiaceae)

C.N.: Red Beet, White Beet

White beet acts to support the liver, bile ducts, and helping to lower blood fat levels. A glass a day of juice will help to support lower blood pressure. Red beet juice is also thought to support immune function and is prescribed by herbalists as part of a cancer treatment regime—though large quantities must be taken (up to 1 quart a day) to be effective.



Sucrose also known as **saccharum** or **sugar**, it is widely distributed in plants & can be obtained commercially from sugar cane & sugar beets.

Uses: sugar (Sucrose)

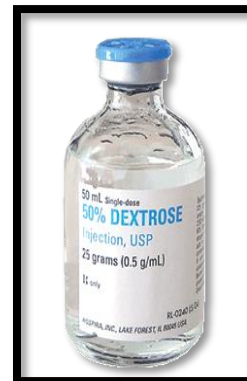
- 1) pharmaceutical necessity for syrups, it is also a demulcent & nutrient.
- 2) In sufficient concentration in aqueous solution sugar is bacteriostatic & preservative.
- 3) Sugar masks disagreeable taste in tablets & retard oxidation in some preparations.

2) Dextrose:

(α -D-(+)-glucopyranose) or (D-glucose), it is the sugar that occurs naturally in grapes & other fruits. It is usually obtained by controlled enzymatic hydrolysis of starch. Rigorous purification procedures yield crystalline dextrose that is 99.5-100 % pure & suitable for parenteral use.

Uses:

- Dextrose is a nutrient & may be given by mouth, by enema, by Sc. inj. or by I.V. inj. as required.
- It is an ingredient in many preparations such as: dextrose injection, alcohol & dextrose injection, dextrose & sodium chloride injection.....



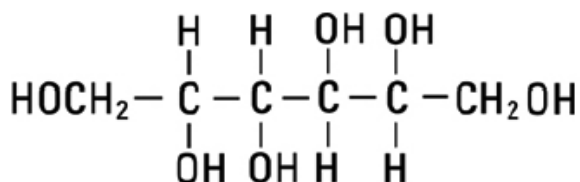
3) Mannitol:

Mannitol or D-mannitol is a hexahydric alcohol (is a type of **sugar alcohol**) obtained by reduction of mannose or by isolation from manna. Manna is the dried saccharine exudate from

Fraxinus ornus (Family: Oleaceae) & contains 50-60 % of mannitol. Manna also used for its laxatives properties.

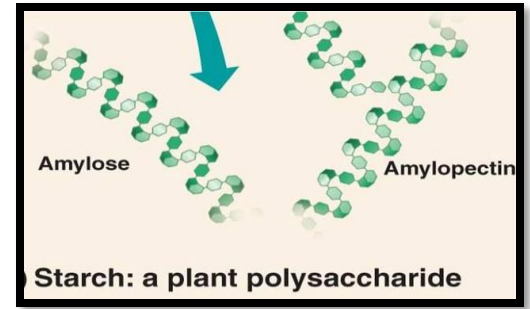
Uses:

It is not absorbed from GIT & when given parenterally, it is not metabolized & eliminated readily by glomerular filtration (kidney) so it is used as osmotic diuretic & as a diagnostic aid.(types diuretics)



4) Starch:

is a polysaccharide widely distributed in plants, it is produced in a large quantities in green leaves as the temporary storage from photosynthetic products.

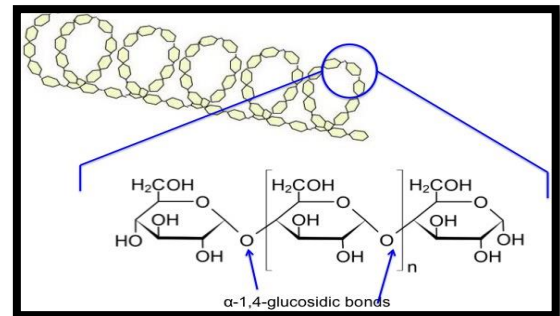
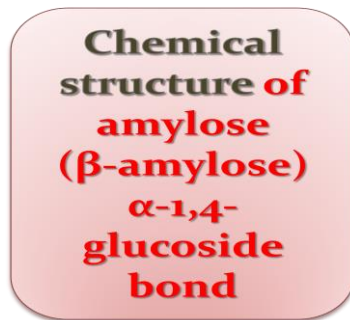


Chemistry & properties of starch:

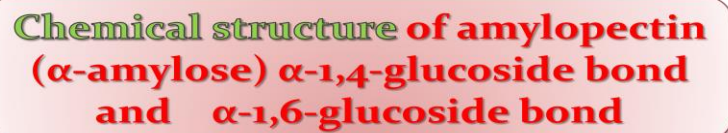
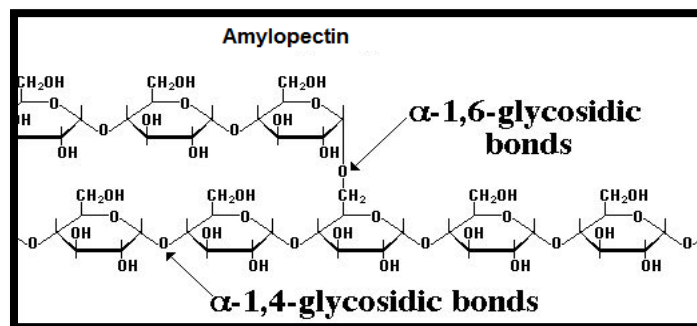
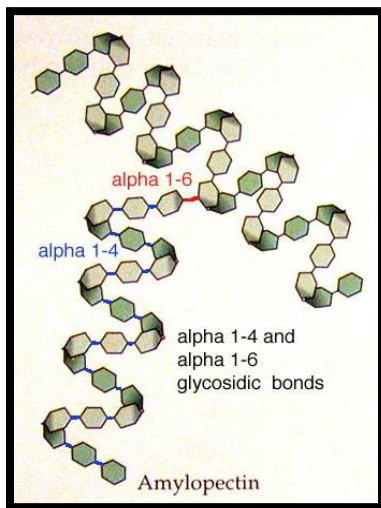
Starch is a mixture of two structurally different polysaccharides.

- 1) Amylose & 2) Amylopectin

Amylose: is a linear molecule composed of 250-300 D-glucopyranose units uniformly linked by α -1,4 glucosidic bonds which causes the molecule to take a helix like shape.



- **Amylopectin:** consists of 1000 or more glucose units that are also connected with α -1,4 linkages. However, a number of α -1,6 links occur at branch points.



Because of these structural differences amylose is more soluble in water than amylopectin & this characteristic is used to separate the two components.

Starch consists of granules separated from the

1) Mature grain of corn

Zea mays (F: Gramineae)

Traditional Uses: Corn silk is a gentle-acting diuretic with mild antibiotic activity. It can help in acute and chronic cases of cystitis and is commonly used in prostate disorders. It may also prove useful in frequent urination and bladder irritability. also have a beneficial effect on the kidneys, reducing kidney stone formation and relieving some of the symptoms of existing stones.



2) The mature grain of wheat

Triticum aestivum (F: Gramineae)

Traditional Uses: Wheat bran is laxative in effect through expanding polysaccharides, Wheat germ oil protects and nurtures the skin, is a laxative and reduces lipids. It is a valuable dietetic because of the high level of polyunsaturated fatty acids and vitamin E.



Or from

3) The tubers of the potato

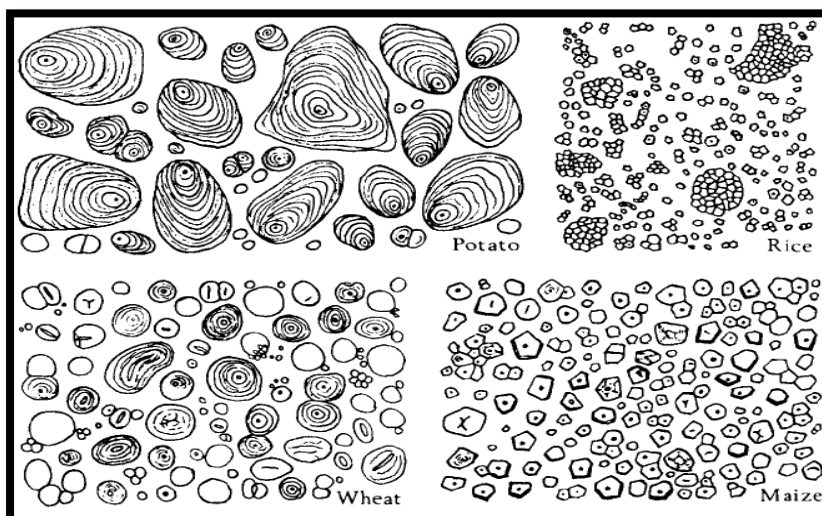
Solanum tuberosum (F: Solanaceae)

Traditional Uses: potato juice can be helpful in the treatment of peptic ulcers, bringing relief from pain and acidity. Potato skins are used in India to treat swollen gums and to heal burns. All parts of the plant except the tuber are poisonous.



The granules of corn starch polygonal, rounded or spheroidal & are about 35 μm in diameter. Wheat & potato starches are less uniform in composition & each containing 2 distinct types of granules. Wheat starch contains large granules 20-50 μm in diameter & small granules 5-10 μm in diameter.

Potato starch consists of irregular ovoid or spheric granules 30-100 μm in diameter & subspheric granules 10-35 μm in diameter.



USES:

- A) Starch is used as an ingredient in dusting powders & as a pharmaceutic aid (including: tablet filler, binder & disintegrant).
- B) Purified starch amylose is also useful in such purposes (as above).
- C) Starch suspension may be swallowed as an antidote for iodine poisoning.
- D) It is the starting material from which liquid glucose (corn syrup), dextrose, dextrans & high-fructose sweeteners.

5) Stevia

Stevia rebaudiana

Family: Asteraceae (Compositae)

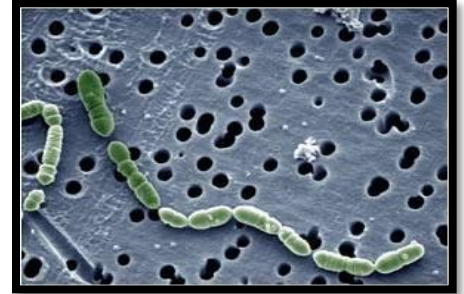
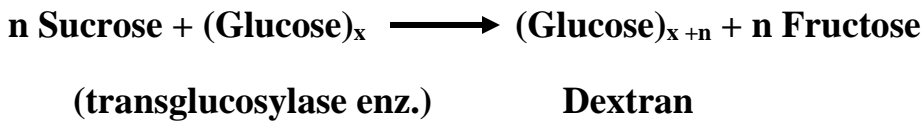
The major sweet compounds that are isolated from the stevia leaves are several glycoside compounds including (stevioside and rebaudioside), which have about 50 to 300 times the sweetness of sugar



5) Dextran

Is an α -1,6- linked polyglucan that is formed from sucrose by the action of a transglucosylase enzyme system (dextran sucrose) present in *Leuconostoc mesenteroides*

this reaction can be summarized in the following equation:



6) Cellulose:

PURIFIED COTTON:

It is the hair of the seed of cultivated varieties of *Gossypium hirsutum* or other species of *Gossypium* (F: Malvaceae).



- Purified cotton is free from adhering impurities, alkali, acid, fatty matter, dyes & water soluble substances. It is also should be bleached & sterilized. Purified cotton is known as absorbent cotton. Its name was derived from Arabic word (gos) which means a soft silky substance. *hirsutum* is a Latin word meaning hairy.
- **PURIFIED COTTON:** consists almost exclusively of cellulose (β -linked linear glucopyranosyl polymer). The β -linkage is not hydrolyzed by mammalian enzyme system which is an important consideration in the application of many cellulose derivatives but hydrolyzed by cellulase enzyme produced by many m.o.

USES of purified cotton:

It is employed as a surgical dressing & serves as a mechanical protection to absorb blood, mucus, or pus & to keep the bacteria out thus preventing wound infection. It is the source of pure cellulose & cellulose derivatives.

Cellulose derivatives:

A) Methylcellulose: is a methyl ether of cellulose containing not less than 27.5% & not more than 31.5% of methoxy groups. In water, Methylcellulose, swells to produce a clear to opalescent viscous colloidal suspension. So it is used as

- 1) A bulk laxative
- 2) A suspending agent.
- 3) It is also used in ophthalmic solution (natural tears eye drop)

B) Ethylcellulose: is an ethyl ether of cellulose containing not less than 44% & not more than 51% of ethoxy group.

Uses:

It is a free flowing white powder & it is so it is used as tablet binder or as a coating

C) Hydroxyethylcellulose: it is hydroxy ethyl ether of cellulose. It is used as a thickening agent & as ingredient in some formulations of artificial tears.

7) GUMS & MUCILGES:

Gums are natural plant hydrocolloids that may be classified as anionic or non-ionic polysaccharides or salts of polysaccharides.

They are translucent, amorphous substances that are frequently produced in higher plants as a protective after injury.

Gums are typically heterogeneous in composition & upon hydrolysis the most frequently observed components are arabinose, galactose, glucose, mannose, xylose & uronic acids.

Application of Gums:

There is a diverse application of gums in pharmacy & there are considered as agents of pharmaceutical necessity since they are hydrophilic polymers, they used as tablets binders, stabilizers, emulsifiers, suspending agents & thickeners.

Distinguishing between gums & mucilages:

- 1) Gums readily dissolves in water, whereas, mucilages form slimy masses
- 2) Gums are a pathologic products & mucilages are physiologic products.

A) **Tragacanth:** is the dried gummy exudate from **Astragalus gummifer** (F: Leguminosea), or other species of **Astragalus** it commonly known as tragacanth gum.

Traditional uses: the herb has been used alone and in combination for liver fibrosis, acute viral myocarditis, heart failure, small cell lung cancer, amenorrhea, and antiviral.



B) Acacia:

Is the dried gummy exudate from the stems & the branches of **Acacia senegal** or other species of **Acacia** (F: Leguminosea). It is known as gum arabic.



C) Sodium Alginate:

Or called (algin), is the purified carbohydrate product of extracted from brown seaweeds by the use of alkali. It is chiefly obtained from *Marcocystis pyrifera* (Fam: Lessoniaceae). Algin consists chiefly of the sodium salts of alginic acid



Sodium alginate can be used as a caviar substitute.

D) Agar:

Is the dried hydrophilic colloidal substance extracted from

Gelidium cartilagineum

(F: Gelidiaceae).

Agar is used as suspending agent, emulsifier, gelating agent for suppositories, tablet disintegrant. It is extensively used as a gel in bacteriologic culture media.

