Tishk International University
Faculty of Applied Science
Nutrition and Dietetics Department
2nd Grade/ Fall Semester

CARBOHYDRATES

Nutritional Biochemistry 1 (W4)

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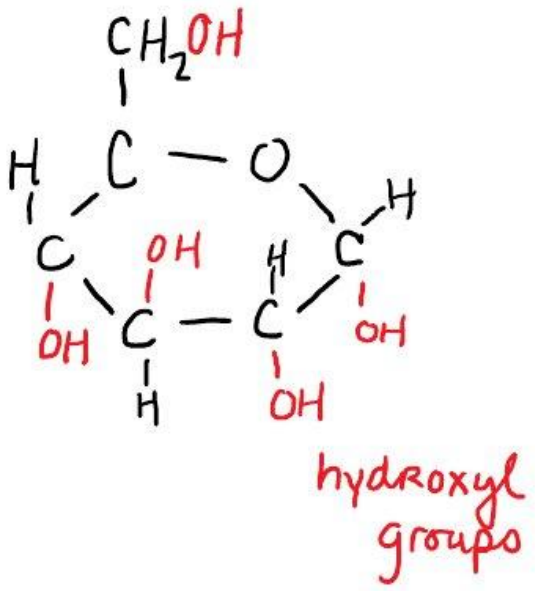
Outlines

- What are carbohydrates? Their Functions?
- Structures and Classification.
- Carbohydrate Digestion and Absorption.
- Recommended Carbohydrate Intakes.

Definition

A carbohydrate is a biological molecule consisting of Carbon(C), Hydrogen(H), and Oxygen(O).



- The term is most common in biochemistry, where it is a synonym of 'saccharide', a group that includes sugars, starch, and cellulose.

- The word *saccharide* comes from the Greek word (*sákkharn*), meaning "sugar".

Carbohydrates are compounds of tremendous biological importance:

- ✓Providing energy.
- ✓They supply carbon for the synthesis of cell components.
- ✓Serve as a form of stored chemical energy.
- ✓Take a part in the formation of structures of some cells and tissues.

➢ Classification of Carbohydrates:

✓***Simple Sugars:***

- Monosaccharaides
- Disaccharides
- Oligosaccharides

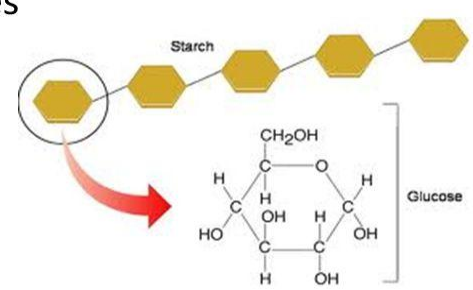
✓***Complex Sugars:***

- Polysaccharides

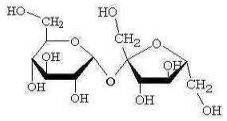
(starch and fiber).

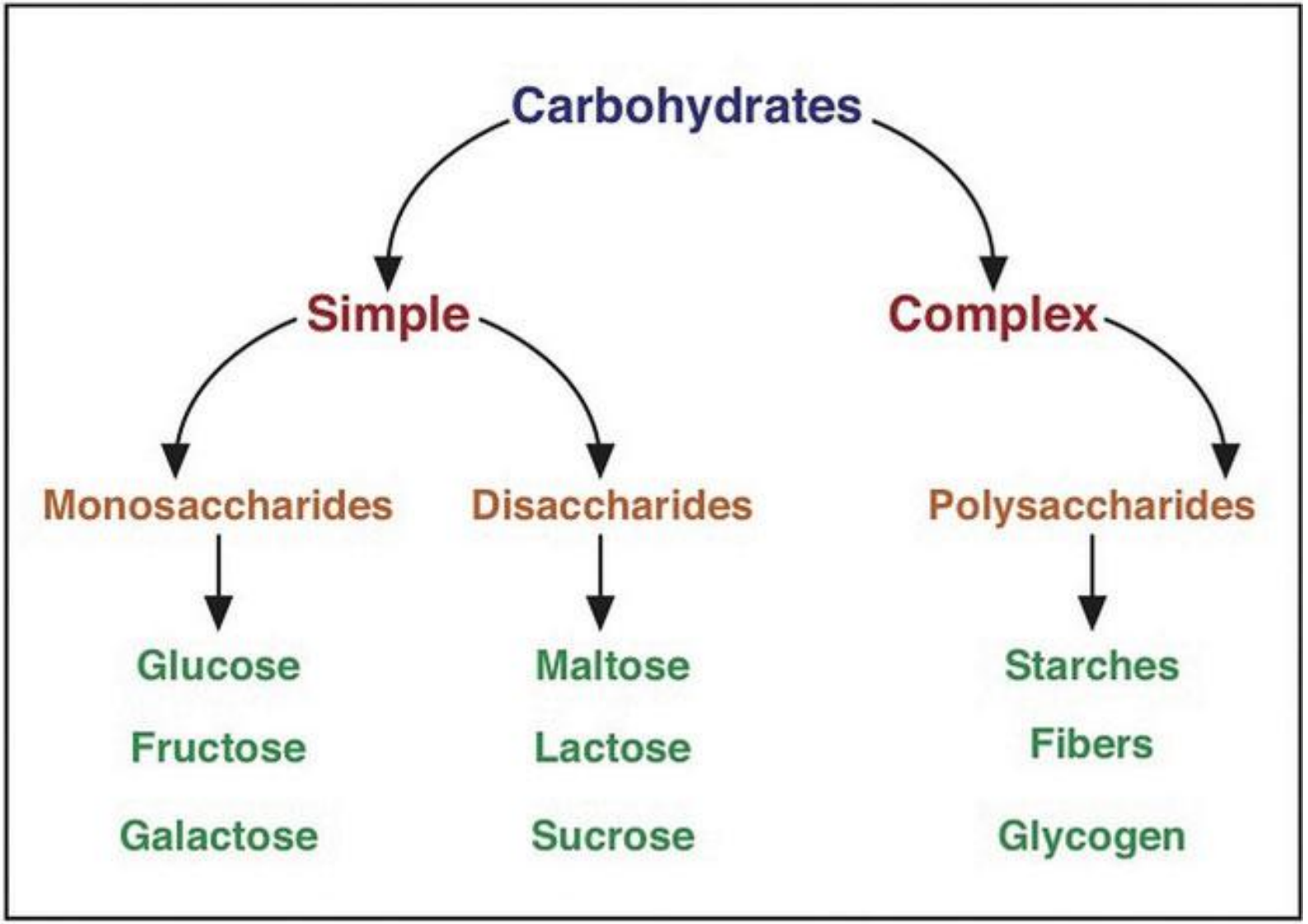
Carbohydrate Structure

- Monosaccharides
- Polysaccharides



- (Disaccharides)




Carbohydrates
Simple
Complex
Monosaccharides
Disaccharides
Polysaccharides
Glucose
Fructose
Galactose
Maltose
Lactose
Sucrose
Starches
Fibers
Glycogen

Simple carbohydrates

➢Monosaccharides

(**glucose, fructose, and galactose** – isomers of each other).

- Glucose (also called **dextrose** and blood sugar) has a six carbon (hexose) ring structure.
- Fructose (also called **levulose**) has a six carbon ring structure.
- Galactose has a six carbon ring structure.
- Ribose has a five carbon ring structure and used in genetic material.

Disaccharides

- Maltose (glucose + glucose) - commonly used in the production of alcohols.
- Sucrose (glucose + fructose) - table sugar and plants are the major source.
- Lactose (glucose + galactose) - primary sugar found in milk and milk products.

Oligosaccharides

- Raffinose (trisaccharide - made up of glucose, fructose, and galactose).

- Stachyose (tetrasaccharide - made up of a glucose, fructose, and two galactose).

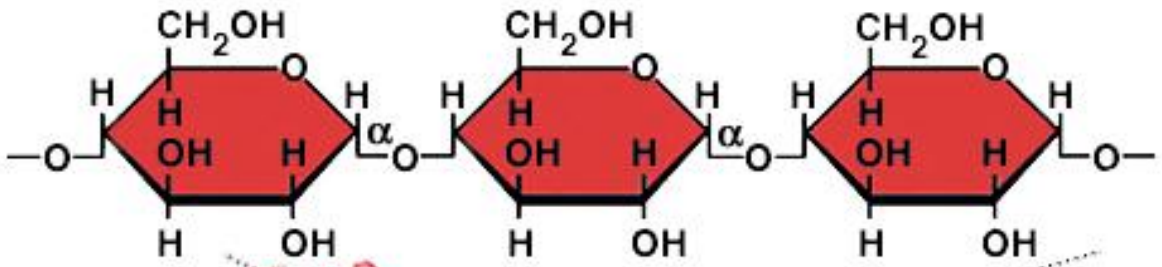
Complex Carbohydrates

*(Digestible starch and glycogen and indigestible fiber).

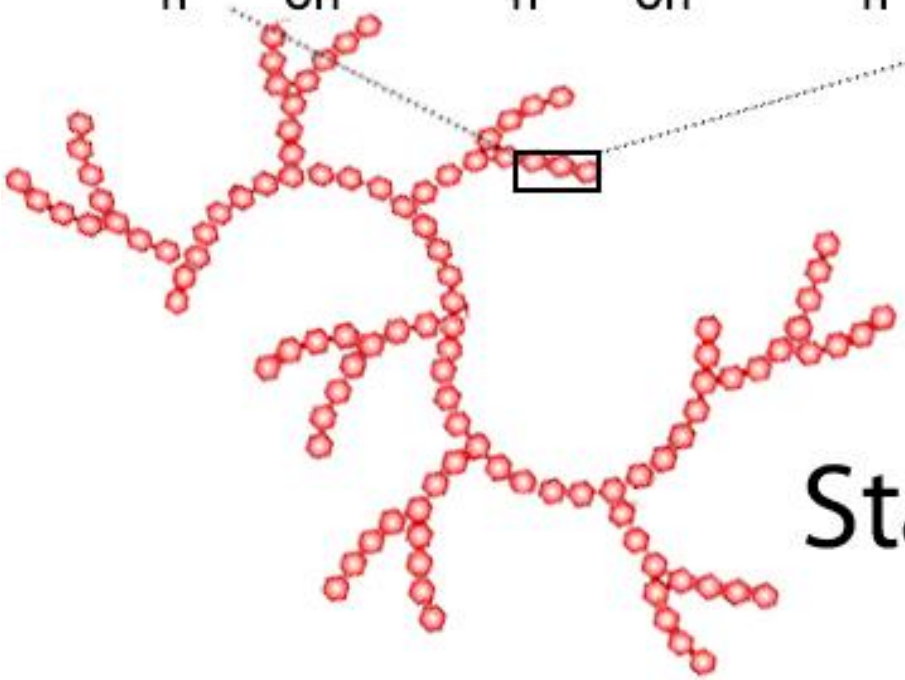
❑Starch

- Long chains of glucose.
- *Amylose* is a straight chain polymer.
- *Amylopectin* is a branched chain polymer.
- Food sources include potatoes, breads, pasta, and rice.
- Amylopectin raises blood sugar levels quicker because of the branched configuration which enables more digestive capabilities

Starch



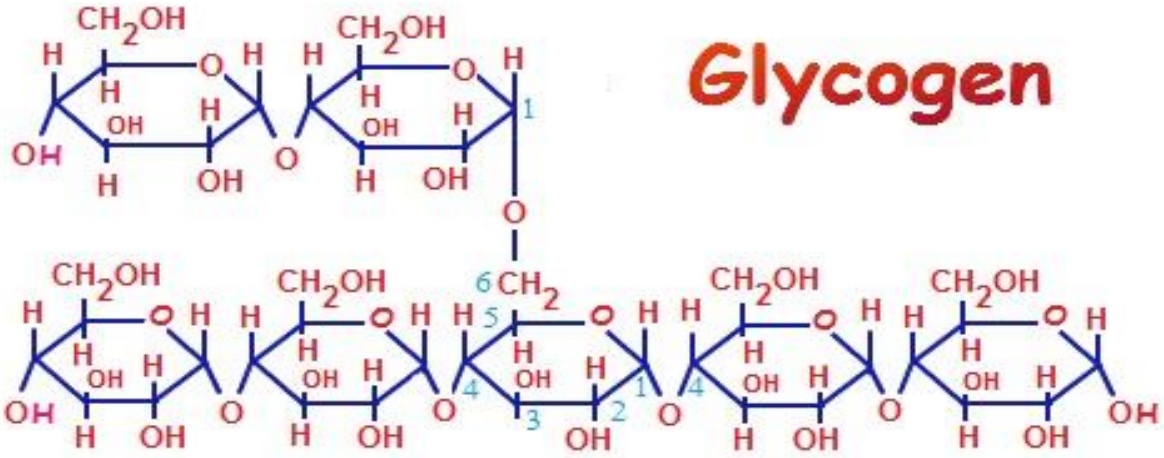
Glucose molecules



Starch

❑Glycogen

- Storage form of glucose in the human body.
- Long branched chains of glucose.
- Highly digestible because of the branched structure.



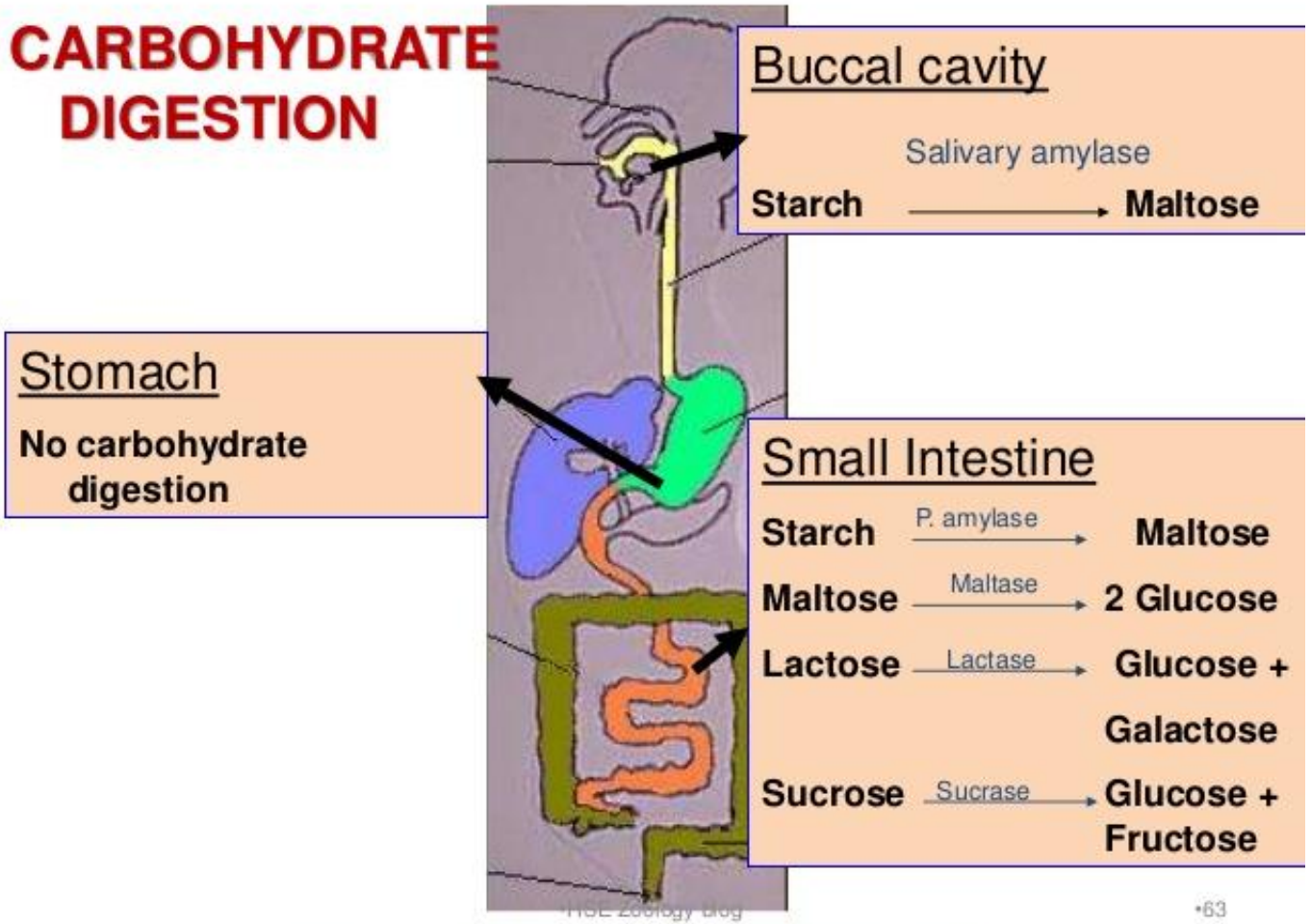
❑Fiber

- ✓Dietary fibers chemically composed of non-starch polysaccharides:

  - Cellulose and hemicellulose – found in wheat, rye, rice, vegetables.
  - Pectins, gums, and mucilage – citrus fruits, oat products, beans.

- ✓Dietary fibers also composed of the non-carbohydrate called lignin.

Carbohydrate Digestion and Absorption



Recommended Carbohydrate Intakes

- ✓ 130 grams of carbohydrates daily.

Homework

- Why ribose is not a dietary consideration?
- NET CARBS?

Net carbs comparison, almond butter: UK (fiber already excluded) vs USA (fiber included in "total carbs")

Nutritional Information

Typical Values	Per 100g
Energy	681 calories
Protein	17.1g
Carbohydrates	5.8g
_of which sugars	3.9
Fat	65.6g
_of which saturates	4.9g
Fibre	10g
Sodium	Trace
Vitamin E	24mg
Biotin	0.073mg
Magnesium	154mg

Nutrition Facts

Serving Size 2 tablespoons (28g)
Servings Per Container 8

Amount Per Serving	
Calories 200	Calories from Fat 160
	% Daily Value*
Total Fat 18g	28%
Saturated Fat 2g	10%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 0 mg	0%
Total Carbohydrate 6g	2%
Dietary Fiber 4g	16%
Sugars 1g	
Protein 7g	


Questions?