



# Macronutrients: Carbohydrate Structure and Biochemistry

**Medical Disclaimer:** The information in this presentation is not intended to replace a one-on-one relationship with a qualified health care professional, and is not intended as medical advice. It is intended as a sharing of knowledge and information from the research and experience of Dr. Ritamarie Loscalzo, [drritamarie.com](http://drritamarie.com), and the experts who have contributed. We encourage you to make your own health care decisions based upon your research and in partnership with a qualified health care professional.

# Monosaccharides

Glucose

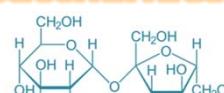
Fructose

Galactose

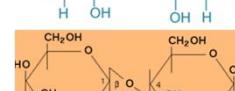
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# Disaccharides

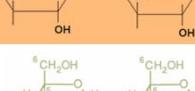
**Sucrose**



**Lactose**



**Maltose**



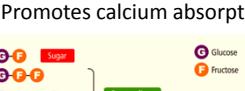
# Oligosaccharides

# Fructooligosaccharides (FOS)

- ✓ Food for gut bacteria
- ✓ Not digestible by pancreatic enzymes
- ✓ Also known as prebiotics
- ✓ Promotes calcium absorption

**Food Sources:**

- ✓ Jerusalem artichoke
- ✓ Yacon
- ✓ Blue agave
- ✓ Bananas
- ✓ Onions
- ✓ Chicory root
- ✓ Garlic
- ✓ Asparagus
- ✓ Jicama
- ✓ Tomatoes
- ✓ Leeks



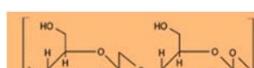
The diagram illustrates the structure of Fructooligosaccharides (FOS). It shows a chain of glucose (G) and fructose (F) units. The chain starts with a glucose unit (G), followed by a fructose unit (F), then a glucose unit (G), and so on. The chain is labeled 'Fructo-oligo-saccharide'. A bracket on the right side of the chain is labeled 'Inulin'.

# Polysaccharides

starch

glycogen

# Cellulose



cellulose



\*\*There can be several hundred to over 10,000 glucose molecules bonded together

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## Sugar Alcohols

- ✓ Also known as polyols
- ✓ Do not contain ethanol
- ✓ Sweetness similar to sucrose
- ✓ Fewer calories than sugar
- ✓ Naturally occurring and chemically derived
- ✓ Do not raise blood sugar

**Glucose**

$$\begin{array}{c} \text{CHO} \\ | \\ \text{HC-OH} \\ | \\ \text{HO-CH} \\ | \\ \text{HC-OH} \\ | \\ \text{HC-OH} \\ | \\ \text{CH}_2\text{OH} \end{array}$$

**Erythritol**

$$\begin{array}{c} \text{CH}_2\text{OH} \\ | \\ \text{HC-OH} \\ | \\ \text{HC-OH} \\ | \\ \text{CH}_2\text{OH} \end{array}$$

**D-Glucitol (sorbitol)**

$$\begin{array}{c} \text{H} \\ | \\ \text{1 H-C-OH} \\ | \\ \text{2 H-C-OH} \\ | \\ \text{3 HO-C-H} \\ | \\ \text{4 H-C-OH} \\ | \\ \text{5 H-C-OH} \\ | \\ \text{6 H-C-OH} \\ | \\ \text{H} \end{array}$$

**D-Xylitol**

$$\begin{array}{c} \text{OH} \\ | \\ \text{H-C-H} \\ | \\ \text{H-C-OH} \\ | \\ \text{OH-C-H} \\ | \\ \text{H-C-OH} \\ | \\ \text{H-C-H} \\ | \\ \text{OH} \end{array}$$