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What You'll Learn:

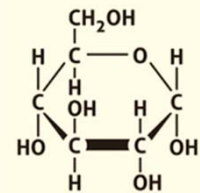
- ★ What carbohydrates are
- ★ Introduction to the carb family members
- ★ Food sources of carbohydrates
- ★ Refined vs whole carbs
- ★ How to know which carbs work best for you
- ★ Therapeutic diets related to carbs
- ★ What's best for you – low, medium, or high carb intake



What Are Carbohydrates?

- ★ Large molecules consisting of carbon (C), hydrogen (H), and oxygen (O) atoms, usually with a hydrogen to oxygen ratio of 2:1 $C_m(H_2O)_n$, i.e., glucose is $C_6H_{12}O_6$
- ★ Hydrates of carbon- H_2O plus C
- ★ Also known as saccharides:
 - ✓ Monosaccharides (1 sugar)
 - ✓ Disaccharides (2 sugars)
 - ✓ Oligosaccharides (3-9 sugars)
 - ✓ Polysaccharides (many sugars)

GLUCOSE MOLECULE



Function Of Carbohydrates

- ★ Energy
- ★ Fiber for intestinal function
- ★ Spare protein for use as energy
- ★ Transport of proteins



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Carbohydrates in Foods

Simple Carbs

- ★ Sugar
- ★ Candy
- ★ White flour anything – crackers, cookies, pizza crust
- ★ White rice
- ★ Flour products

Complex carbs

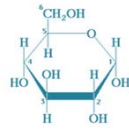
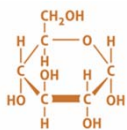
- ★ Legumes
- ★ Whole grains
- ★ Nuts and seeds
- ★ Vegetables
- ★ Fruit
- ★ Tubers and root vegetables



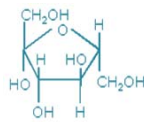
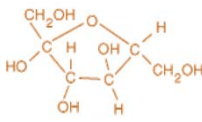
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Monosaccharides

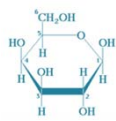
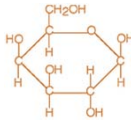
Glucose



Fructose



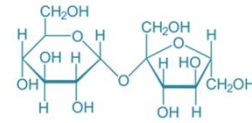
Galactose



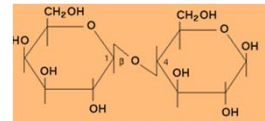
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Disaccharides

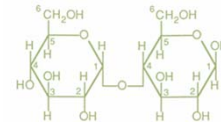
Sucrose



Lactose



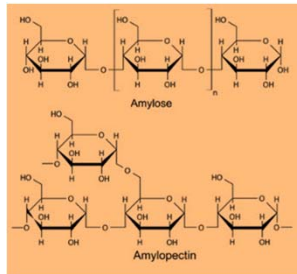
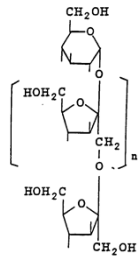
Maltose



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Oligosaccharides

Fructooligosaccharides



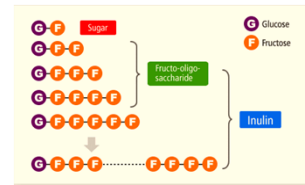
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Fructooligosaccharides (FOS)

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

Food Sources:

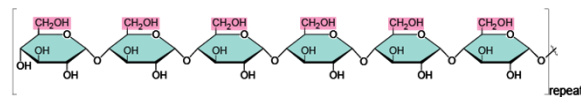
- ✓ Jerusalem artichoke
- ✓ Yacon
- ✓ Blue agave
- ✓ Bananas
- ✓ Onions
- ✓ Chicory root
- ✓ Garlic
- ✓ Asparagus
- ✓ Jicama
- ✓ Tomatoes
- ✓ Leeks



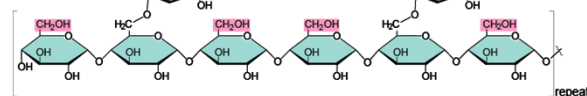
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Polysaccharides

starch

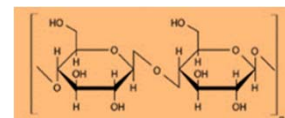


glycogen

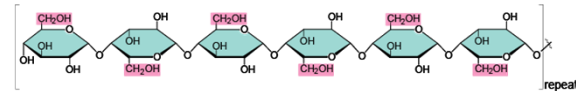


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Cellulose



cellulose

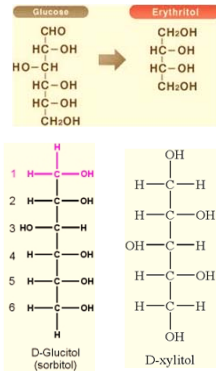


**There can be several hundred to over 10,000 glucose molecules bonded together

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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



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Sugar Alcohols Compared

Name	Sweetness relative to sucrose	Energy (kcal/g)	Sweetness per food energy, relative to sucrose
Erythritol* (4 carbon)	0.812	0.213	15
Mannitol (6 carbon)	0.5	1.6	1.2
Sorbitol (6 carbon)	0.6	2.6	0.92
Xylitol (5 carbon)	1.0	2.4	1.6
Compare with: Sucrose	1.0	4.0	1.0

* Erythritol is by far the best choice, sorbitol the worst

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Erythritol

- ★ Most absorbed in the small intestine and excreted unchanged in the urine
- ★ About 10% enters the colon - does not normally cause laxative effects
- ★ Free of side effects in regular use
- ★ Doses over 50 grams (1.8 oz) can cause nausea and stomach rumbling
- ★ More difficult for intestinal bacteria to digest than other sugar alcohols, so it's less likely to cause gas or bloating
- ★ Naturally occurring in pears, melons, grapes, mushrooms, wine, soy sauce, and cheese



Smart Sweet Erythritol 4.5 lbs
by Smart Sweet
4.5 lb (20.45 oz) - 1 customer review
Price: \$36.50 + \$5.91 shipping
Note: Not eligible for Amazon Prime
In Stock
Ships from and sold by Global Sweet Products, LLC.
- All Natural, Free of GMO, Gluten, Yeast, Soy & Casein
- Zero Calories, Zero Glycemic Index
- Safe for Diabetics, High Digestive Tolerance
- 70% as Sweet as Sugar

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How Does Cooking Affect Carbohydrates?

- ★ Conversion of starch to sugar
- ★ Increases glycemic index
- ★ Increases available calories
- ★ Decreases resistant starch content
- ★ High heat creates acrylamide, a known carcinogen



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The Top 20 Foods By Average Acrylamide Intake In US

- * French fries (made in restaurants)
- * French fries (oven baked)
- * Potato chips
- * Breakfast cereals
- * Cookies
- * Brewed coffee
- * Toast
- * Pies and cakes
- * Crackers
- * Soft bread
- * Chile con carne
- * Corn snacks
- * Popcorn
- * Pretzels
- * Pizza
- * Burrito / tostada
- * Peanut butter
- * Breaded chicken
- * Bagels
- * Soup mix



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When Are Higher Carbs Needed?

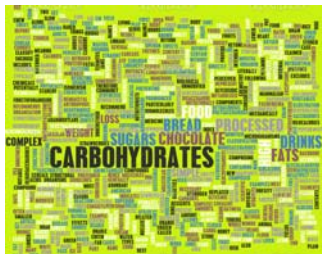
- * Need to gain weight
- * Competitive athletics
- * High caloric need
- * Growing children
- * Pregnancy unless insulin resistant



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Types of Carbs

- * Grains – whole vs processed
- * Legumes
- * Fruits
- * Vegetables
- * Fiber – soluble vs insoluble
- * Sugar
- * Sugar alcohols



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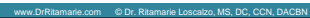
Assessment of Carbohydrate Status and Tolerances

- ✓ Fasting blood glucose
- ✓ Home testing - post meal and exercise blood glucose
- ✓ Hemoglobin A1C
- ✓ Fructosamine
- ✓ Insulin



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