

An-Najah National University



# Sweeteners

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# Sweeteners



# Definitions:



- **Sweeteners:** are substances that are used to impart a sweet taste with or without providing energy.
- **A sugar substitute:** is a food additive that provides a sweet taste (like that of sugar) while containing significantly less food energy (Kcalories), therefore, it's used in a diet to reduce weight and for diabetics.

# Sweeteners divides into:



- Natural sweeteners
- Sugar replacers (Sugar alcohol)
- Artificial sweeteners (High intensity sweetener)

# 1. Natural sweeteners



- Also called nutritive sweeteners.
- Contain carbohydrate and may have just as many Kcalories as regular sugar and also contain other nutrients (antioxidants, vitamins, etc.)
- are metabolized, and change as they pass through the body, and yield energy.



# Examples





**Agave Syrup**



**Dates**



**Blackstrap molasses**



**Raw honey**





**Coconut Sugar**



**Maple syrup**



**Sorghum syrup**



**Brown Rice Syrup**



# Stevia Plant

- A plant in the sunflower family (also known as sugarleaf and sweetleaf).
- **300** times sweeter than white sugar.
- It is used to sweeten beverages, cereal, coffee and tea as a tabletop sweetener
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- Stevia has only a **minor** effect on blood sugar, so it is favored in carbohydrate-controlled diets.

# Cont.

- In general, **¼ teaspoon** of powdered stevia extract, or **2 tablespoons** whole-leaf stevia, equals about **1 cup** of white sugar in sweetening.



## 2. Sugar replacers (Sugar alcohol)

- They are also sometimes referred to as “**Nutritive sweeteners**”, because the sugar replacers yield energy (calories), But they're lower in calories than sugar, hence help in weight control if used in acceptable value.
- Their chemical structure does resemble alcohol and sugar, but they do not affect the body like alcohol does.



# Where they are found

- Sugar alcohols are found naturally in small amounts in a variety of fruits and vegetables and are also commercially produced from sugars and starch.
- Commercially produced sugar alcohols are added to foods as reduced calorie sweeteners and are found in many “**sugar-free**” and “**reduced-sugar**” products, including:
  - Chewing gum
  - Dairy desserts (such as ice cream, other frozen desserts, and puddings)
  - Frostings
  - Grain-based desserts (such as cakes and cookies)
  - Sweets (such as hard and soft candies, flavored jam, and jelly spreads)



# Cont.



- You'll usually see sugar alcohols in foods and drinks labeled as “**sugar free**” but in this case, sugar free does not mean free of Kcalories, but fewer than products that contain carbohydrate.
- Sugar alcohols in food add bulk and texture, help retain moisture, and prevent browning that occurs during heating.



# Effect on the body

- Sugar alcohols evoke a low glycemic response, the body absorbs them **slowly**, consequently, they are slower to enter bloodstream, as a result, they provide fewer calories per gram than sugar and produce a smaller change in blood glucose.

## - Side effect if excessive consumption:

- Gas abdominal discomfort (bloating)
- Laxative effect (Diarrhea)
- Weight gain?!

# Other benefit of use sugar alcohol

- They don't contribute to dental caries, why?
  - Bacteria in the mouth can't metabolize sugar alcohol as rapidly as sugar,
- Therefore valuable in chewing gums, breath mints and other products that people keep in their mouth for a while.





**There are several types of sugar  
alcohols but the most common  
ones include**



**TABLE H4-3** Sugar Replacers

<b>Sugar Alcohols</b>	<b>Relative Sweetness<sup>a</sup></b>	<b>Energy (kcal/g)</b>	<b>Approved Uses</b>
Erythritol	0.7	0.4	Beverages, frozen dairy desserts, baked goods, chewing gum, candies
Isomalt	0.5	2.0	Candies, chewing gum, ice cream, jams and jellies, frostings, beverages, baked goods
Lactitol	0.4	2.0	Candies, chewing gum, frozen dairy desserts, jams and jellies, frostings, baked goods
Maltitol	0.9	2.1	Particularly good for candy coating
Mannitol	0.7	1.6	Bulking agent, chewing gum
Sorbitol	0.5	2.6	Special dietary foods, candies, gums
Xylitol	1.0	2.4	Chewing gum, candies, pharmaceutical and oral health products

<sup>a</sup> Relative sweetness is determined by comparing the approximate sweetness of a sugar replacer with the sweetness of pure sucrose, which has been defined as 1.0. Chemical structure, temperature, acidity, and other flavors of the foods in which the substance occurs all influence relative sweetness.

### 3. Artificial sweeteners (HIS)

- Artificial sweeteners are synthetic sugar substitutes, sometimes called **non-nutritive sweeteners**, because they contain no (or very little) calories or nutrients.
- Artificial sweeteners are not digested, and pass through the GI tract almost unchanged.
- They are also known as high intensity sweeteners (HIS), because they are many times sweeter than sugar, only small amounts are needed to sweeten foods and beverages.

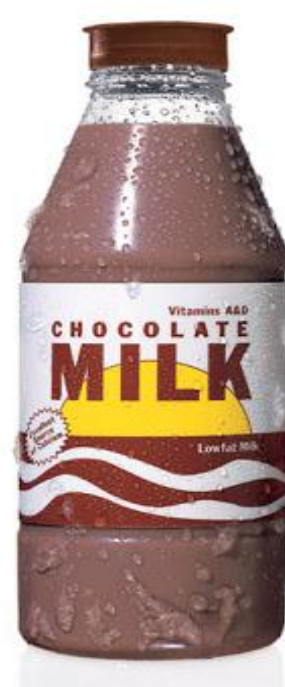
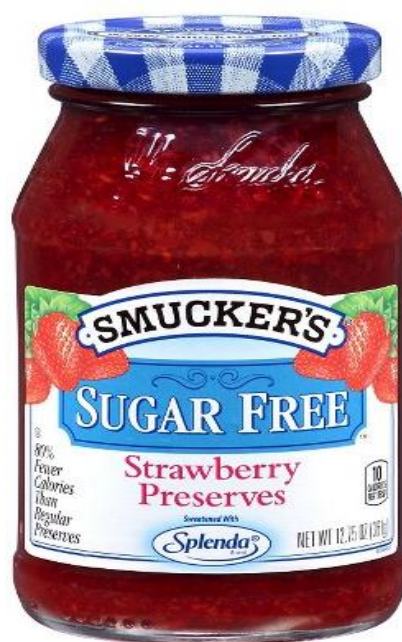
# Uses for artificial sweeteners



**Artificial sweeteners are widely used in processed foods, including:**

- Soft drinks, powdered drink mixes and other beverages
- Baked goods
- Candy
- Puddings
- Canned foods
- Jams and jellies
- Dairy products





# Why choosing the use of (HIS) in place of sugar?



1. Contain no calories or only a few calorie.
2. Don't contribute to weight gain
3. Keep blood sugar levels low
4. Dental care (don't erode teeth as regular sugar would)

# Types of artificial sweeteners



The Food and Drug administration (FDA) has approved the use of several artificial sweeteners:

- **Saccharine**
- **Aspartame**
- **Acesulfame potassium (Acesulfame K)**
- **Neotame**
- **Sucralose**

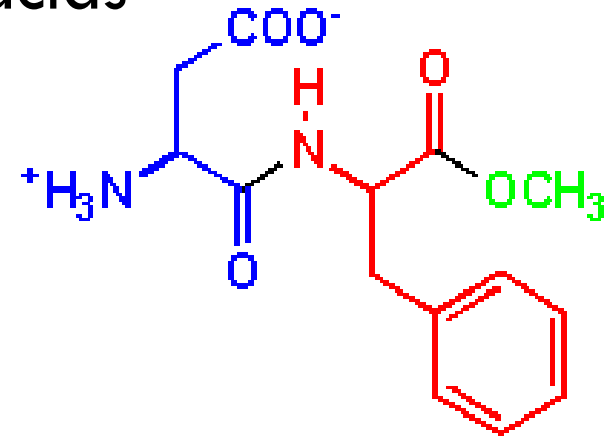
**TABLE H4-1** Sweeteners

Sweeteners	Relative Sweetness <sup>a</sup>	Energy (kcal/g)	Acceptable Daily Intake	Average Amount to Replace 1 tsp Sugar	Approved Uses
<b>Approved Sweeteners</b>					
<b>(Trade Name)</b> Saccharin (Sweet 'n Low)	450	0	5 mg/kg body weight	12 mg	Tabletop sweeteners, wide range of foods, beverages, cosmetics, and pharmaceutical products
Aspartame (NutraSweet, Equal, NutraTaste)	200	4 <sup>b</sup>	50 mg/kg body weight <sup>c</sup>	18 mg	General purpose sweetener in all foods and beverages Warning to people with PKU: Contains phenylalanine
Acesulfame potassium or Acesulfame-K (Sunette, Sweet One, Sweet 'n Safe)	200	0	15 mg/kg body weight <sup>d</sup>	25 mg	Tabletop sweeteners, puddings, gelatins, chewing gum, candies, baked goods, desserts, beverages
Sucralose (Splenda)	600	0	5 mg/kg body weight	6 mg	General purpose sweetener for all foods
Neotame	8000	0	18 mg/day	0.5 µg	Baked goods, nonalcoholic beverages, chewing gum, candies, frostings, frozen desserts, gelatins, puddings, jams and jellies, syrups
Tagatose (NutraLose)	0.8	1.5	7.5 g/day	1 tsp	Baked goods, beverages, cereals, chewing gum, confections, dairy products, dietary supplements, health bars, tabletop sweetener
<b>Sweeteners with Approval Pending</b>					
Alitame	2000	4 <sup>e</sup>	—		<b>Proposed Uses</b> Beverages, baked goods, tabletop sweeteners, frozen desserts
Cyclamate	30	0	—		Tabletop sweeteners, baked goods



# Aspartame & Phenylketonuria

- Aspartame: Combination of two amino acids (Phenylalanine and aspartic acid) and methyl group (CH<sub>3</sub>)



- **Give 4 Kcal**, why?

Body digest aspartame as a protein, it's yield energy 4 Kcal per gram, as does protein, but because it is about 200 times sweeter than table sugar, consumers are likely to use much less of it, so it's energy contribution is negligible.

# Cont.

- This sweetener CANNOT be consumed by people who have PhenylKetonUria, and products containing aspartame must bear a warning label for people with (PKU), WHY?
- Because this sweetener contribute phenylalanine, and people with PKU are unable to dispose of any excess phenylalanine, the accumulation of phenylalanine and it's by-products is toxic to the developing nervous system, causing irreversible brain damage.

# Moderation is key



When choosing sugar substitutes, it pays to be a savvy consumer, Artificial sweeteners and sugar substitutes can help with weight management. But they aren't a magic bullet and should be used only in moderation.

# References:



- Sharon.R.R, Kathryn.P, Ellie.W, Understanding normal and clinical nutrition, 8<sup>th</sup> ed.
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- Carbohydrate Basics Sugars, Starches and Fibers in Foods and Health, Natural sweetener, Jacqueline B. Marcus MS, RD, LD, CNS, FADA, in Culinary Nutrition, 2013