

The background is a light pink color decorated with various colorful illustrations of sweets and candies. There are several round candies with different patterns like polka dots and stripes. There are also heart-shaped candies, a candy cane, and some candies with long, thin sticks. The overall theme is festive and sweet.

# Artificial Sweeteners

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# Topic Overview



01

## Sweeteners

What are sweeteners?

02

## Artificial Sweeteners

What are artificial sweeteners?

03

## Other Sweeteners

Are there other types of sweeteners?

04

## Sweetness Intensity

How sweet are they?



05

## Safe Levels

How much is too much when it comes to artificial sweeteners?

06

## Conclusion

Key takeaways about artificial sweeteners and the alternatives.

# What are sweeteners?

Sweeteners are used to add sweetness & enhance flavors in foods and beverages.

There are different types of sweeteners:

1. Sugars (white, brown, raw, etc.)
2. Other plant & fruit sweeteners
3. Artificial sweeteners
4. Sugar alcohols



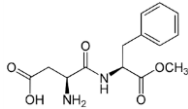


# Artificial Sweeteners

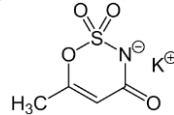
Artificial sweeteners are sugar substitutes that contain very little or no calories which means they may not lead to increased blood sugar levels.

# Artificial Sweeteners

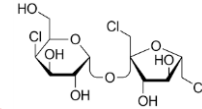
These six artificial sweeteners are considered safe and listed as food additives by the FDA.



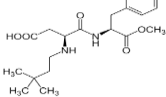
Aspartame



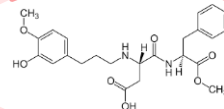
Acesulfame potassium (Ace-K)



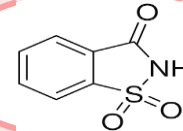
Sucralose



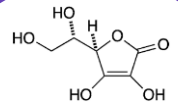
Neotame



Advantame



Saccharin



Do not fear these sweeteners because they have chemical structures – all chemicals do! This is the chemical structure of naturally occurring vitamin C, which is essential to human life..

# Aspartame



Brand names: NutraSweet®, Equal®, and Sugar Twin®

Sweetness: About 200x sweeter than table sugar

Calories? Aspartame does contain calories – about 4 calories per gram, the same as sugar  
→ 1 packet of Equal contains between 4 and 13 calories, depending on the weight

1974: FDA lists aspartame as food additive

1996: FDA lists aspartame as a general-purpose sweetener

Recently, the WHO released a statement saying aspartame may be a carcinogen.

**FDA stance: Studies do NOT show that aspartame is a human carcinogen at current use levels.**

# FDA vs. WHO

## FDA

- Food & Drug Administration
- United States
- Federal government department
- Responsible for the protection of the public health of Americans
- Oversees the nation's food supply, cosmetics, pharmaceuticals, medical devices, and biological products

## WHO

- World Health Organization
- Global
- United Nations agency
- Promotes global health
- Works to expand universal health coverage
- Leads the “world's response to health emergencies”
- Serves the vulnerable

# Acesulfame potassium (Ace-K)



Brand names: Sunett® and Sweet One®

Sweetness: About 200x sweeter than table sugar and often blended with other sweeteners in products; maintains sweetness at high heats → good for baked goods

Calories? This sweetener does NOT contain calories

1988: FDA lists Ace-K for specific uses in beverages and foods

2003: FDA lists Ace-K for general-purpose use as a sweetener & flavor enhancer, under certain conditions



# Sucralose



Brand names: Splenda®

Sweetness: About 600x sweeter than table sugar; heat stable

Calories? This sweetener does NOT contain calories



1998: FDA lists sucralose as a food additive for use in 15 food categories

1999: FDA lists sucralose as a general-purpose sweetener in foods, under certain conditions

# Neotame

Brand names: Neotame® produced by NutraSweet Co. and often sold commercially for use as an ingredient in food products and pharmaceuticals

Sweetness: About 7,000x to 13,000x sweeter than table sugar; about 40x sweeter than aspartame; heat stable

Calories? This sweetener does NOT contain calories

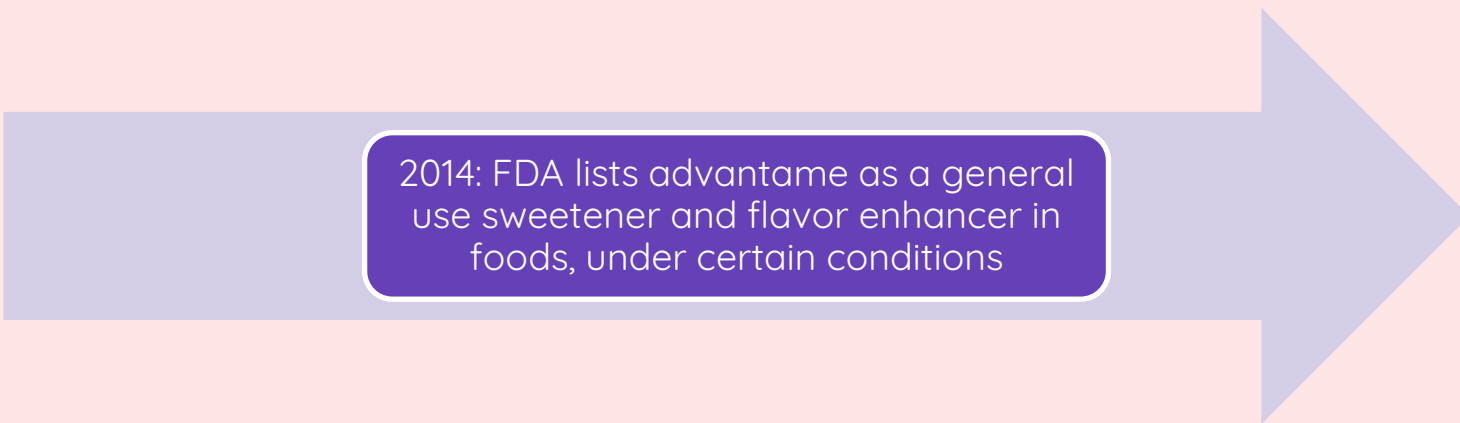
2002: FDA lists neotame for general use as a sweetener and flavor enhancer, under certain conditions

# Advantame

Brand names: sold as advantame and commercially for use in food products

Sweetness: About 20,000x sweeter than table sugar; heat stable

Calories? This sweetener does NOT contain calories



2014: FDA lists advantame as a general use sweetener and flavor enhancer in foods, under certain conditions

# Saccharin



Brand names: Sweet and Low®, Sweet Twin®, Sweet’N Low®, and Necta Sweet®

Sweetness: About 200x to 700x sweeter than table sugar

Calories? This sweetener does NOT contain calories

1879: Saccharin discovered

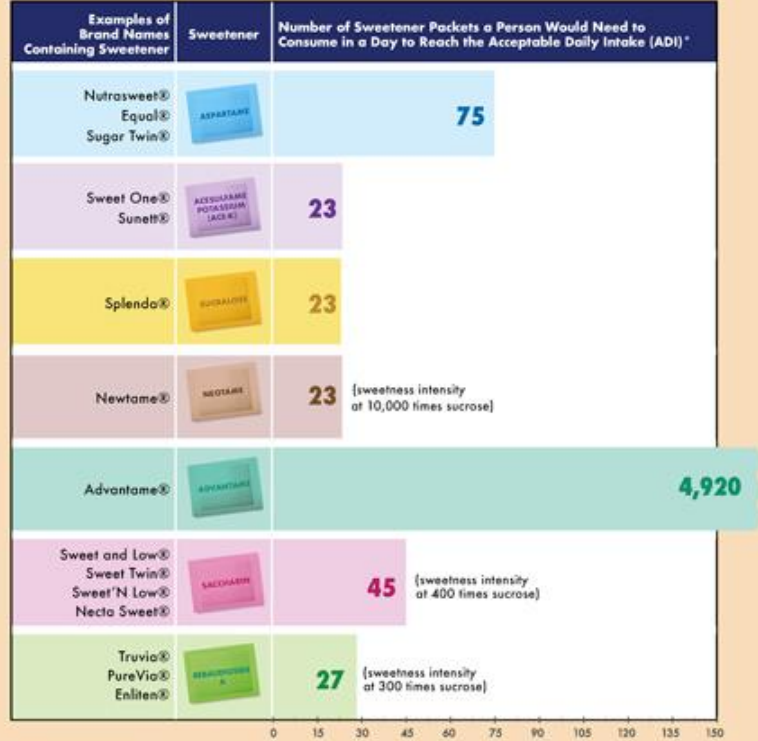
1970s: Saccharin linked to bladder cancer in rats. Congress orders more studies & warning label until product can be found safe

1977: FDA lists saccharin as a food additive

**Saccharin NOT found to react the same in humans (as rats) and is deemed safe at current use levels by FDA.**

# Safe Levels of Sweeteners

How many packets can a person consume and still be at the safe level for each sweetener based on its sweetness intensity?



**Notes About the Chart:**  
 The ADI in milligrams per kilogram body weight per day (mg/kg bw/d) for the sweeteners in the chart:

- Aspartame is 50 mg/kg bw/d
- Acesulfame potassium (Ace-K) is 15 mg/kg bw/d
- Sucralose is 5 mg/kg bw/d
- Neotame is 0.3 mg/kg bw/d
- Advantame is 32.8 mg/kg bw/d
- Saccharin is 15 mg/kg bw/d
- Rebaudioside A, a type of steviol glycoside, is 12 mg/kg bw/d

This is based on the ADI for steviol glycosides: 4 mg/kg bw/d, expressed as steviol equivalents, set by the Joint FAO/WHO Expert Committee on Food Additives, in which the FDA participates.

\* Number of sweetener packets a 60 kg (132 pound) person would need to consume to reach the ADI. The FDA assumed a sweetener packet is as sweet as two teaspoons (approximately 8 grams) of sugar for these comparisons.

Despite rumors that artificial sweeteners may not be safe, they are shown to be safe within the acceptable daily intake levels, as seen in the image to the left.

The WHO says that 40 milligrams of aspartame per 2.2 pounds of body weight is safe.

The average 12-ounce can of diet soda contains between 200 and 300 milligrams of aspartame.

This would mean that a 150 pound person could safely drink nine 12-ounce cans of diet soda per day, as far as artificial sweeteners are concerned.

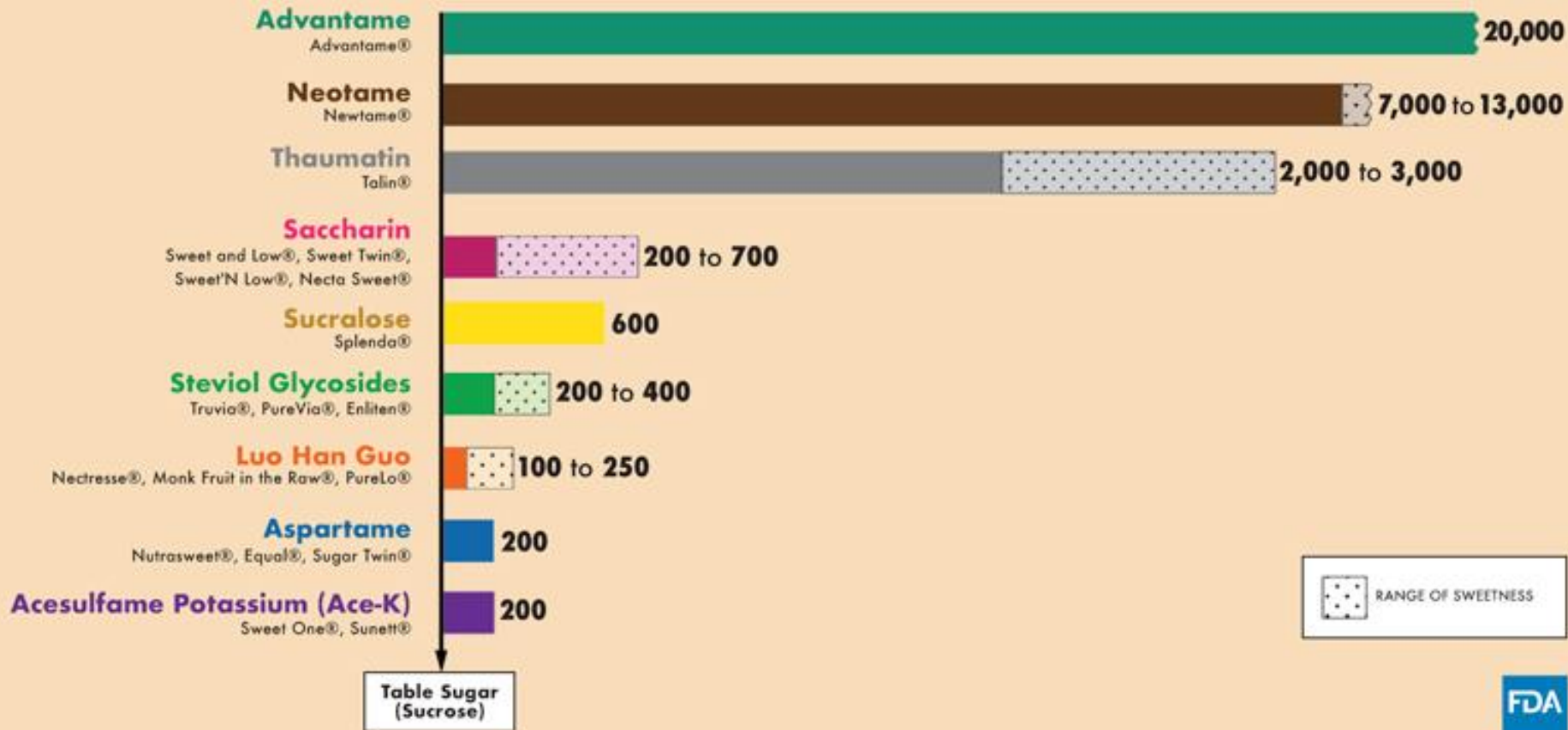
# Plant & Fruit Based Sweeteners

- The FDA considers three plant and fruit based sweeteners to be GRAS (generally regarded as safe), including:
  - Stevia glycosides – naturally derived compounds from stevia leaves
    - 200x to 400x sweeter than table sugar
    - General-purpose sweetener in foods and drinks
    - Does NOT contain calories
  - Extracts of the Swingle fruit, aka Luo Han Guo or monk fruit
    - 100x to 250x sweeter than table sugar, depending on the level of extracted compounds
    - General-purpose sweetener and for table use; sometimes combined with other sweeteners
    - Does NOT contain calories
  - Thaumatin proteins from the West African Katemfe fruit
    - 2,000x to 3,000x sweeter than table sugar
    - Used in a variety of foods, including: wine and other fermented/distilled beverages, fruit jams, baked goods, ice cream, potato-based snacks foods and other similar snacks, and breakfast cereals
    - About 4 calories per gram



# Sweetness Intensity of Sweeteners Compared to Table Sugar

TIMES SWEETER



RANGE OF SWEETNESS



# Sugar Alcohols

Sugar alcohols are another type of sweetener allowed in the US by the FDA.

Sugar alcohols include:

- Erythritol
- Mannitol
- Maltitol
- Sorbitol
- Xylitol
- Lactitol



Unlike artificial sweeteners, they are not sweeter than sugar. Sugar alcohols are 25% to 100% as sweet as table sugar.

Sugar alcohols:

- Are a little lower in calories than sugar
- Do NOT promote tooth decay
- Do NOT cause a sudden blood glucose spike, like table sugar can
- Are mostly used in sugar-free candy, cookies and snack foods, and gum
- Do NOT contain alcohol
- Have similar chemical structures to sugar



# Natural vs. Chemically Made Sweeteners




## Chemically Made

- Aspartame
- Ace-K
- Sucralose
- Neotame
- Advantame
- Saccharin
- Sugar alcohols\*

## Naturally Derived

- Sugar (raw, brown, white)
- Stevia
- Monk fruit
- Thaumatin (Katemfe fruit)
- Sugar alcohols\*

\*Although sugar alcohols may be found naturally occurring in some foods, sugar alcohols are often manmade and manufactured for foods and drinks.





# Practical Application


Many people find artificial sweeteners helpful as part of a diet for weight management and diabetes control. They can help with this since they are either low or no calorie sweeteners and are much sweeter than table sugar. This means that even if they do contain some calories, they can be used in small amounts, resulting in less calories than if table sugar were used as the sweetener. Another benefit is that they may have much less of an effect on blood sugar levels.

# Key Takeaways



## Sweeteners

There are many types of sweeteners, including sugars, artificial sweeteners, plant/fruit sweeteners, and sugar alcohols. All sweeteners can fit into a healthy diet.



## Safety

After reviewing many studies over the years, the FDA has found the artificial sweeteners (and other sweeteners) mentioned in this presentation to be safe for human consumption, within the acceptable daily intake levels.

## Sweetness

Artificial sweeteners range from 200x to 20,000x sweeter than table sugar. They often maintain their sweetness when heating, so they are great for baked goods. Some foods contain a blend of sweeteners to add to the sweetness and flavor.