Sugar Substitutes

As the problems of obesity and diabetes grow, more and more people are turning to sugar substitutes as ways to reduce their calorie intake and control their blood sugars. Compared to refined and natural sugars (table sugar, honey, high fructose corn syrup, maple syrup, and fruit juice concentrate), sugar substitutes have fewer (or zero) calories, have limited (if any) effect on blood sugar levels, and don’t contribute to dental caries. However, simply replacing regular products with artificially sweetened “Diet,” “Light,” or “Sugar-Free” products does not necessarily lead to weight loss or improved health. Your overall eating and physical activity patterns are what matter most. If you choose to use sugar substitutes, be sensible about it. Below are some interesting facts about each of the available sugar substitutes on the market. They are listed in descending order from most to least safe, based on current research.

1. Sucralose - SAFE
   - AKA: Splenda
   - 600x sweeter than table sugar. Zero calories.
   - Made from sucrose that has been chemically altered to achieve its intense sweetness (three -OH groups are replaced with -Cl).
   - Not well digested/absorbed; most is eliminated unchanged in the urine.
   - Stable in both cooked and cold foods.
   - **RISKS?** None reported at this time. Passed all safety tests in animal studies. Approved for use during pregnancy.
   - ADI (Acceptable Daily Intake) = 5 mg/kg body weight per day for all ages.

2. Sugar Alcohols – SAFE (but may give you the runs if you eat too much)
   - AKA: sorbitol, xylitol, mannitol, malitol, lactitol, isomalt, erythritol, hydrogenated starch hydrolysates
   - LESS sweet than table sugar. Calories vary depending on how well they’re absorbed. On average, provide half the calories as table sugar (2 cal./g vs. 4 cal./g).
   - Despite their name, they are not sugar and they won’t make you tipsy. Made by adding hydrogen atoms to sugars.
   - While they don’t raise blood sugar as much as table sugar, they are just as bulky. So, they can be used tablespoon-for-tablespoon to replace sugar in lower carb foods.
   - **RISKS?** Too much sugar alcohol traveling unabsorbed through the intestinal tract can cause bloating, gas, and diarrhea. FDA requires a “laxative effect” warning notice on labels if consumers could ingest 50 g of sorbitol or 20 g of mannitol from the food in one day. But, just 10 g of sorbitol can cause GI distress.
   - ADI = NA

3. Aspartame – PROBABLY SAFE
   - AKA: NutraSweet, Equal, Sugar Twin
   - 200x sweeter than table sugar. 4 cal./gram, but so little is used that it’s virtually calorie free.
   - Discovered in 1965; approved for use in the US in 1981.
   - Consists of two amino acids: phenylalanine and aspartic acid.
   - When heated, loses its sweetness. Best added to foods after cooking.

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- **RISKS?** People with the rare genetic disease called phenylketonuria (PKU) should avoid it. Has been reported to cause headaches, but so far no scientific connection has been proven. In high doses, may lower brain serotonin levels and cause problems for people with mental illness. There’s no foundation to claims floating around the internet that aspartame causes everything from cancer to Alzheimer’s disease to multiple sclerosis.
- **ADI = 50 mg/kg body weight per day**
  NOTE: For a 150 lb. adult, this equals about 92 packets of Equal or 15 cans of diet soda.
  NOTE: Average dietary intake in US is only 6% of the ADI (3 mg/kg body weight per day).

4. **Acesulfame K - MAY OR MAY NOT BE SAFE** (Not enough good research)
- AKA: Sunett, Sweet One, Sweet & Safe
- 200x sweeter than table sugar. Zero calories.
- A synthetic chemical that cannot be broken down in body; eliminated unchanged in the urine.
- Heat stable and can be used in baking. When used alone, can be bitter, so often combined with other sweeteners.
- **RISKS?** Only 3 animal studies done in the mid 1970s – none very reliable. One study showed increased risk of breast tumors (mostly benign). Needs further testing.
- **ADI = 15 mg/kg body weight per day.** (NOTE: Average intake is only 20% of the ADI.)

5. **Stevia - MAY OR MAY NOT BE SAFE** (Not enough good research)
- AKA: Sweet leaf, Honey leaf
- 300x sweeter than table sugar. Zero calories.
- Derived from the stevia plant found in South America. Plant leaves have been used for centuries to sweeten beverages and make tea.
- Used in Japan since the 1970s, but not approved for use in foods in the US, Canada, or Europe. May be sold as a dietary supplement in the US, but labels may not promote its use as a sweetener.
- Its metabolism in the body has not been completely investigated.
- **RISKS?** Only 2 animal studies available. Male rats fed high doses of stevioside (stevia’s active ingredient) produced fewer sperm. Female hamsters fed large amounts had fewer and smaller offspring. Needs further testing.

6. **Saccharine – NOT SAFE** (although the risk is small)
- AKA: Sweet and Low, Sweet Twin, Sweet ‘N Low Brown, Necta Sweet
- 300x sweeter than table sugar. Zero calories.
- Discovered in 1879, produced from grapes.
- Keeps its sweet flavor during heating and can be used in baked goods.
- **RISKS?** Has been shown to cause bladder cancer in mice at high doses. FDA proposed to ban it in 1977, but instead just required a warning notice on food labels. In 2000, Congress removed the requirement for these warning notices.
- **ADI = NA** (FDA suggests limiting it to 1000 mg/day for adults. 500 mg/day for children).
  NOTE: Avg. intake is 50 mg/day. No more than 12 mg/fluid oz. allowed in beverages and no more than 30 mg allowed in any one serving of a processed food product.

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