Sweetening without Sugar

Whether you are watching your weight or managing your diabetes or just trying to eat a balanced diet, one of the main ways to monitor your carbohydrate intake is to limit the amount of added sugars in your diet. There are several sugar substitutes available that can help you cut back on sugar intake. Some sugar substitutes will not affect blood glucose levels and some may have a small effect. The following information is for educational purposes only. Mention of specific products does not constitute endorsement.

Sugar substitutes are grouped into two categories: non-nutritive sweeteners which provide no calories, and nutritive sweeteners which provide some calories.

All sugar substitutes on the market in the US are considered Generally Recognized as Safe (GRAS) or approved as food additives by the Food and Drug Administration. They are given an Acceptable Daily Intake (ADI) which is the amount a person can safely consume every day over a lifetime without appreciable risk. The ADI is determined by review of all available safety and toxicological data on individual food additives.

Substituting sugar alternatives in favorite desserts can be frustrating because no artificial sweetener has all the properties of sugar. Sugar not only sweetens a food but also provides volume, texture, color, and moistness in many recipes. Many sugar substitutes on the market cannot be substituted for sugar in equivalent amounts because they are from 200 to 13,000 times sweeter than sugar. Even granulated versions of the sugar substitutes cannot provide the same volume, texture and moistness of regular sugar.

Sugar substitutes work best in foods that rely on other ingredients for volume, moistness or texture. Alternative sweeteners substitute well in recipes for beverages, puddings, salad dressings, sauces, pies, and frozen desserts. Using sugar substitutes in cakes and cookies is usually less successful. Also some sugar substitutes tend to taste better in recipes with acidic ingredients like fruit or yogurt. All sugar substitutes are sweeter when they are combined with other sweeteners. For example, one packet of saccharin and one packet of aspartame in a recipe will be sweeter than two packets of aspartame.

Non-nutritive Sweeteners

Non-nutritive sweeteners are also known as intense sweeteners and are calorie-free. They are so intensely sweet that only a very small amount is needed to sweeten food. Examples include:

- Saccharin
- Aspartame
- Acesulfame-K
- Sucralose
- Neotame

Saccharin

Saccharin is the oldest sugar substitute. In 1977, the Food and Drug Administration petitioned to have saccharin banned because some research showed it might cause cancer in rats. Since increased rates of cancer in humans who use saccharin has never been proven, the FDA withdrew its request to have saccharin banned in 1991.

Sweet'n Low is probably the best known brand of saccharin. Other brands include *Sweet Twin, Sweet'n Low Brown, Sugar Twin*

and *Necta Sweet*. In addition to being a tabletop sweetener, saccharin can be used in cooking and baking. Unfortunately, it does have a strong aftertaste when used in large amounts.

One packet of *Sweet'nLow* has the equivalent sweetness of two teaspoons of sugar, but as the amount of sugar it is to replace increases, the amount of *Sweet'n Low* needed decreases. Since saccharin is 300 times sweeter than sugar, you need less as you use larger amounts to get the equivalent sweet taste of sugar. Also, as more saccharin is used, bitterness increases.

The *Sweet'n Low* Company recommends that you not add more than 12 packets of saccharin initially to any recipe. They suggest that after 12 packets are used, you should slowly add more packets of saccharin to the food until the desired sweetness is achieved. This will produce the least bitter aftertaste. Adding a little vinegar or other acidic ingredient to a dish can sometimes reduce the aftertaste.

The *Sweet'n Low* Company also recommends that if you totally replace sugar with their product in baked goods, that you reduce your dry ingredients by 25% and add a little fruit juice or 2 egg whites for moistness.

Saccharin is also combined with aspartame in a product called *Sugar Twin Plus* which helps reduce saccharin's aftertaste while enhancing the sweetness of the aspartame. Regular Sugar Twin is a granulated product that is substituted 1 teaspoon of *Sugar Twin* for each teaspoon of sugar. However, you may wish to use less *Sugar Twin* when replacing larger amounts of sugar in a recipe.

Aspartame

Aspartame was approved as a tabletop sweetener in 1981 and for use in all foods and beverages in 1996. It is 200 times sweeter than sugar and produces a very limited rise in blood sugar. Aspartame has an ADI of 50 mg/kg body weight and is considered safe for the general public.

Aspartame, marketed for years as *Equal,* is now available under other brand names and mixed with other sweeteners. Aspartame is also marketed in a granulated form called *Nutrasweet Spoonfuls* and in pouches for measuring out larger quantities called *Equal Measure*. Other brand names include: *Nutrataste* and *InstaSweet.*

Aspartame has no aftertaste for most people but loses its sweetness whenever it is stored for a long period of time in liquid or when it is heated for more than 15 minutes. Combining it with another sweetener or using it with an acidic food like citrus fruit or yogurt helps retain its sweetness. *Equal Sugar Light* is a combination of sugar and *Equal* and can be used in most recipes. It yields a lower-calorie, lower-carbohydrate product than one made with straight sugar. In some cases, you may wish to sprinkle aspartame over a dessert like a cobbler or pie after it is cooked to get the maximum sweetness rather than mixing it in before it is cooked.

Notice that since aspartame has no aftertaste and is only 200 times sweeter than sugar, you replace the amount of sugar in a recipe with the expected proportion of aspartame. You do not use less aspartame as the amount needed to replace sugar goes up.

Acesulfame-K

Acesulfame-K was approved as a tabletop sweetener and for use in several food categories in 1988. In was approved as a general purpose sweetener in 2003. It has an ADI of 15 mg/kg body weight.

Acesulfame-K is 200 times sweeter than sugar. It has a slight aftertaste when used in large amounts. Acesulfame-K can withstand high cooking temperatures so it can be used in cooking and baking. Again, like saccharin, as you replace larger amounts of sugar with larger amounts of acesulfame-K, less is needed. Any time you use large amounts of saccharin or acesulfame-K in a recipe, you will need to experiment to find the right amount to use. Acesulfame-K is marketed as *Sweet One*, *Sweet-n-Safe* and *Sunette.*

Sucralose

Sucralose is made by combining sugar with chlorine to create a calorie-free substance that is 600 times sweeter than sugar. It is not metabolized by the body and does not raise blood sugar. It has an ADI of 15 mg/kg body weight. Sucralose is heat stable so it can be used in cooking and baking.

Splenda is the most familiar brand of sucralose and comes in two baking-friendly varieties: *Splenda Sugar Blend for Baking* and *Splenda Brown Sugar Blend*. Both blends combine sucralose and sugar, provide half the calories and carbohydrates as straight sugar and are better for baking than pure *Splenda* alone. When baking with *Splenda* blends, substitute one half cup of *Spenda* blend for every one cup of sugar called for in the recipe.

Neotame

Neotame is the newest sweetener on the market. It was approved for use as a general purpose sweetener in 2002 and is manufactured by the NutraSweet Company.

Neotame is made from the same basic ingredients as aspartame and is 7,000 - 13,000 times sweeter than sugar. It is partially absorbed and rapidly metabolized. It does not significantly affect blood sugar. The ADI is 2mg/kg body weight.

Neotame can be used for baking but it cannot be substituted cup-for-cup. It is often blended with sugar for use in commercially prepared baked foods.

Nutritive Sweeteners Sugar Alcohols (Polyol)

Two polyol products have recently become available to consumers. They are typically less sweet than sugar and provide fewer calories. They provide bulk in foods like sugar and are often combined with non-nutritive sweeteners in food products. Polyols provide approximately two calories per gram (half as much as regular sugar) and do not raise blood sugar levels as much as sugar. Because they are not fully absorbed, they can cause gastrointestinal distress and have a laxative effect when consumed in excessive amounts.

XyloSweet

XyloSweet is 100% xylitol. Xylitol is approved as a food additive by the FDA. According to the manufacturer, corn cobs and birch trees are the main sources for commercially produced xylitol. *Xylosweet* tastes as sweet as table sugar, but has 10 calories per teaspoon instead of 16 calories per teaspoon. It has a low glycemic index, so does not affect blood glucose as much as sugar. *Xylosweet* is interchangeable with sugar in most recipes. However, it will not work in yeast breads since yeast cannot metabolize it. It does not crystallize like sugar so will not work well when making peanut brittle or hard candy. The amount needed to sweeten drinks such as lemonade can have a

laxative effect or cause intestinal discomfort and gas. *Xylosweet* is available in some grocery stores and online at www.xlear.com/xylosweet/.

Zsweet

Zsweet is a new sweetener blend of erythritol and natural fruit extracts. It is calorie-free and does not raise blood glucose. *Zsweet* is highly digestible so it does not cause a laxative effect. It closely resembles the texture, flow and mouthfeel of sugar. *Zsweet* can be substituted for half the sugar in a recipe. It is currently available online at www.zsweet.com and at limited places in the U.S.

Shugr

Shugr is made from erythritol and maltodextrin (a carbohydrate made from cornstarch), tagalose (a sugar replacer made from lactose) and sucralose. It is calorie-free and raises blood glucose only a little. According to the manufacturer, it cooks just like real sugar. *Shugr* is only available online at www.shugr.com.

Stevia

Stevia is derived from the sweet-tasting leaves of a South American shrub known as Stevia rebaudiana. Marketed as *Sweet Leaf* or *Truvia*, it has slowly made its way to the shelves of most grocery and health food stores to become America's number one zero-calorie sweetener. It has also been marketed in Europe.

Manufacturers of sugar substitutes recommend using recipes that have been specially formulated for their product. All of the major sugar substitute manufacturers have websites with recipes online. Most will send recipe booklets to you upon request.

If you like to experiment with recipes, substituting sugar substitutes in dessert recipes can be fun. However, if you are not into experimentation, using recipes from a diabetic or "lite" cookbook may be more reliable. Even recipes from a published cookbook may not meet your standards for taste and eye appeal.

While sugar-free desserts are usually lower in sugar and calories, they are not usually something you can afford to eat every day. They may still be high in total carbohydrate.

For more information and recipes for individual sweeteners go to the following websites:
http://www.sweetnlow.com/
http://www.equal.com/
http://www.sweetone.com/
http://www.splenda.com/
http://www.neotame.com/
http://www.xlear.com/xylosweet/
http://www.zsweet.com/
http://www.shugr.com/
http://www.stevia.com/
http://truvia.com/

Sweetner	Calories	Sweetness	Metabolic Effects	Stability	Functions	Taste Comments
Non-Nutritive						
Saccharin - Sweet'N Low® -Weight Watchers® -Sucaryl® -Sugar Twin® -Adolph's® -Sweet10®	0	300 times	Excreted unchanged	Stable under high temps. (302°F)	Soft Drinks, other beverages and foods	Tastes bitter
Aspartame -Equal -Nutrasweet -Nutrataste -InstaSweet	0	200 times	Metabolized aspartic acid, phenylalanine and methanol *Caution for PKU	Loses taste after long storage periods	Varies on type of Aspar-tame used	Does not taste bitter
Acesulfame-K -SweetOne -Sweet-N-Safe -Sunette	0	200 times	Excreted unchanged	Stable in cooler environ-ments	Table top sweetener, baking, cooking	Slight aftertaste
Sucralose -Splenda	0	600 times	Not metabolized or stored in body	Highly stable	Baking, cooking with acidic ingredient	Lactose may be present in small amounts but should not cause problems in lactose-intolerant individuals
Neotame	0	700-13,000 times	Partially absorbed, rapidly metabolized completely eliminated in body wastes and does not collect in the body	Stable	Substitute in baking cup-for-cup	No current health concerns or possibility of reaching toxic levels
Nutritive (Sugar Alcohols)						
Xylo Sweet	10 cals/ tsp	Like Sugar	Low glycemic index; may have GI discomfort gas and result in laxative	Stable with exception in yeast breads	Baking, with exception of yeast and crystallize d candies	Similar taste to sugar
Zsweet	0	Like sugar	does not raise blood glucose. highly digestible----- does not cause a laxative effect	Stable	Baking (use for ½ of sugar)	Similar taste and texture of sugar
Shugar	0	Like sugar	Raise blood sugar slightly	Stable	Cooks like sugar	Similar to sugar
Stevia -SweetLeaf -Truvia	0	Like sugar	No effect on blood glucose levels	Stable	Cooking/ baking, general sweetener	Similar to sugar

Table Revised 2/2/12