The Bitter Side of Sweets:
Understanding Today's Dietary Sweeteners and Their Impact on Oral and Systemic Health

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Presenter Disclosures for Betsy Reynolds, RDH, MS
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Definition Time:
Monosaccharides ('simple sugars')

- Glucose (provides major energy source; dextrose is the name given to glucose produced by corn)***
- Fructose (sweetest of all sugars)***
- Galactose (component of milk sugar)

Disaccharides (two monosaccharides)

- Sucrose (glucose + fructose)***
- Lactose (glucose + galactose)
- Maltose (glucose + glucose)

Disaccharide Digestion:
Disaccharides are 'digested' in the walls of the small intestines—through enzymatic action, they are converted to monosaccharides
The monosaccharides then enter the capillaries—glucose goes directly into the blood to be used as an immediate source of energy

Dietary Sugars & Sweeteners

Classification of Sweeteners:

- Dietary sweeteners may be classified as either 'nutritive' or 'nonnutritive'
- Nutritive sweeteners provide the body with calories in the form of carbohydrates as compared to nonnutritive sweeteners which contain few if any calories—BOTH may be added to food and beverages

Some sugars—such as **fructose in fresh fruits**—are found naturally in foods
When the whole fruit is ingested, the body receives not only the sugar in the fruit but the associated fiber, vitamins, minerals, and phytonutrients
It is well-known that plants produce these phytonutrients to protect themselves but recent research has demonstrated that they can also be extremely beneficial for human health
There are more than thousand known phytonutrients such as **lycopene** and **flavanoids**
Lycopene
Lycopene, a carotenoid in the same family as beta-carotene, is what gives tomatoes, pink grapefruit, apricots, red oranges, watermelon, rosehips, and guava their red color—but this pytonutrient is not merely a pigment
Although best known as an antioxidant, both oxidative and non-oxidative mechanisms are involved in lycopene's bioprotective activity
It is a powerful antioxidant that has been shown to neutralize free radicals (especially those derived from oxygen)—it is this 'neutralization' that has led many to believe that lycopene may be protective against certain cancers (prostate, breast, lung, bladder, cervix and skin), atherosclerosis, and associated coronary artery disease
Worth noting: Further research is needed to find out what role, if any, lycopene has in the prevention or treatment of cancer—it is likely that the preventive effect of diets high in fruits and vegetables cannot be explained by just one single part of the diet

In support of these claims regarding cancer, proponents note that lycopene, as a powerful antioxidant, blocks the action of free radicals (activated oxygen molecules that can damage cells), and that several scientific studies have found lower risk of cancer among people who eat lycopene-rich foods
In addition, preliminary research suggests lycopene may reduce the risk of macular degenerative disease and serum lipid oxidation

Serving suggestions:

- Processing fruit makes the lycopene more bioavailable by increasing the surface area available for digestion and making it more easily absorbed by the body
- Lycopene is fat-soluble—eating lycopene-rich vegetables and fruits together with a small amount of oil or fat (for example, salad oil or cheese on pizza) increases the amount of lycopene absorbed by the intestine
- Although lycopene is available in supplement form, it is likely there is a synergistic effect when it is obtained from the whole fruit instead, where other components of the fruit enhance lycopene's effectiveness

Flavonoids

Flavonoids are plant-based compounds with powerful antioxidant properties (stronger than even vitamin C!)
Flavonoids provide the red, pink, and purple colors in fruits and vegetables
Most are water soluble and easily penetrate the brain
Research has shown that they reduce inflammation, promote healthy arteries, and help fight aging by preventing and repairing cellular damage
Flavonoids may also protect against dementia, Alzheimer's disease, and some cancers

Headliners: The results of a study that was reported at the American Academy of Neurology's 63rd Annual Meeting in April 2011 suggested that eating more foods containing high amounts of flavonoids could help protect against the development of Parkinson's disease

Xiang Gao, MD, PhD of the Harvard School of Public Health and colleagues evaluated data from 49,281 men enrolled in the Health Professional Follow-up Study and 80,336 women who participated in the Nurses' Health Study
Dietary questionnaires completed upon enrollment were analyzed for the intake of flavonoids and five sources of flavonoid-rich food—including tea, berries, apples, red wine, and oranges or orange juice
Over two decades of follow-up, the researchers found that men whose intake of flavonoids was among the top 20% had a 40% lower risk of developing Parkinson's disease compared to men whose intake was among the lowest 20%
While no significant association with total flavonoid intake was observed for women, a lower risk of developing Parkinson's disease was observed in association with the intake of anthocyanins and anthocyanin-rich foods (apples and berries) among both women and men
'This is the first study in humans to examine the association between flavonoids and risk of developing Parkinson's disease. Our findings suggest that flavonoids, specifically a group called anthocyanins, may have neuroprotective effects. If confirmed, flavonoids may be a natural and healthy way to reduce your risk of developing Parkinson's disease.'--Xiang Gao, MD, PhD

Flavonoids are a class of compounds that include flavanones, anthocyanins, flavan-3-ols, flavonols, flavones, and polymers

Good Sources of Flavonoids

- Apples (flavonoids are in the skin)
- Blueberries
- Strawberries
- Red grapes
- Broccoli
- Cabbage
- Capers
- Chocolate (dark, not milk) and cocoa
- Onions
- Red wine
- Tea (all kinds)

There are many types of flavonoids and their concentration in specific foods varies greatly—depending on how a product is grown and processed
Eating a diverse diet that regularly includes some of the flavonoid-containing foods is most beneficial
Looks like the health benefits of ingesting naturally-sweet fruits are pretty incredible…SUHWEET!!!!

Big Bummer: Many of the sugars in our diet come from 'added sugars' – sugars added to food prior to consumption or during preparation or processing
Added sugars are used to enhance the flavor and texture of foods and to increase shelf-life—examples of added sugars include sucrose and high-fructose corn syrup (HFCS)

Time to Meet the Sweets

Nutritive Sweeteners

- Sucrose
- Agave and Fructose
- High Fructose Corn Syrup (HFCS)
- Honey
- Sugar alcohols

Sucrose ('Table Sugar')

While folks in the U.S. consume an average of 22 teaspoons of added sugars each day (which is 2 to 3 times more than what the body needs), Canadians are not far behind—you are now consuming 14 teaspoons a day
The American Heart Association wants women to limit sugar intake to 6-7 teaspoons a day (~100 calories) and men to ingest no more than 10 teaspoons daily (~150 calories)
Some of the identified 'ill effects' of added dietary sugars:

- Lowers HDL ('good') cholesterol
- Raises triglycerides
- Attaches to proteins to create 'AGEs' (short for 'advanced glycation end-products')

What are **Advanced Glycation End-Products**?
Glycation is an uncontrolled, non-enzymatic reaction between proteins and sugars which significantly alters the structure and function of proteins
The process involves a sugar molecule attaching itself to a protein molecule which results in the formation of a non-functioning glycated protein structure called Advanced Glycation-End products or AGEs
In the early stages of AGE formation, this reaction is reversible—however, within several weeks, the reaction becomes irreversible
The weeks' old sugar-protein complexes can then cross-link with other protein molecules and will remain in the system FOR YEARS!
Because proteins are present throughout the body, the destructive capacity of Advanced Glycation End-products is enormous—understanding how to prevent the formation of AGEs is critical to slowing the aging process and reducing the risk for degenerative diseases
Research over the last 20 years has implicated AGEs in most of the diseases associated with aging like:

- Alzheimer's disease****
- Cancer
- Heart disease
- Type II diabetes
- Kidney disorders
- Atherosclerosis
- High blood pressure
- Stroke
- Visual impairment
- Skin disorders

Alzheimer's Disease

- As the most common cause of dementia for those who are aged 65 and older, it is interesting that we are still not sure of the exact cause—however, it seems that the formation of AGEs and oxidative damage are significant in the formation of beta-amyloid plaques and neurofibrillary tangles associated with Alzheimer's disease
- Both of these destructive complexes contain significant amounts of AGEs—biopsied brains of Alzheimer's patients show a high concentration of AGEs compared to normal brains
- Additionally, recent research has shown that AGEs form early in the disease process for Alzheimer's

Two Primary Sources for AGEs:

- Consumption of certain foods
- Metabolism of carbohydrates

The browning of food is a cooking technique that helps to give desirable flavor to food—it is achieved by heating or cooking sugars with proteins in the absence of water producing AGEs in the process
Since grains, vegetables, fruits and meat all have proteins this browning effect is an indication of AGEs
It is estimated that 30% of food-borne AGEs are absorbed when ingested
Helpful Hint: Eating vegetables and fruits raw, boiled, or steamed is preferred—water prevents sugars from binding to protein molecules
By eating fruits and vegetables raw or by cooking them in water or with steam prevents AGEs from forming
The second source for AGEs involves normal metabolism of carbohydrates (simple or complex)—which are absorbed by the body as glucose
Most blood glucose goes to providing the energy for the body—however, a small proportion is glycated to form AGEs
Because of chronically elevated blood sugar levels, diabetics have consistently faced the challenge of AGEs—unfortunately, this problem has now become an issue for the general population

KEY POINTS:

- Although both proteins and sugars are involved in the process of creating Advanced Glycation-End products, it is excess dietary sugar that is the true source of the problem
- Over the past 30 years sugar consumption has increased dramatically—simple sugars like fructose*** and galactose undergo glycation at about 10 times a higher rate than glucose
- Most sweeteners today are approximately 50% fructose or a fructose derivative

Tips for Battling AGEs

Cook meats low and slow

- Higher cooking temperatures will always produce more AGEs than cooking at lower temperatures for a longer time period
- A crock pot can substantially reduce the production of AGEs

Supplement with carnosine

- Carnosine is a naturally occurring compound consisting of the amino acids beta-alanine and L-histidine typically found in high concentrations in skeletal muscles and brain tissue
- Several studies have shown that carnosine can effectively inhibit the formation of AGEs

Supplement with pyridoxamine (B6)

- Vitamin B6 has three forms: pyridoxal, pyridoxine, and pyridoxamine—it is pyridoxamine that has been clinically shown to be a natural inhibitor in the formation of Advanced Glycation End products

Stop smoking

- Recent research has clearly shown a significantly higher level of serum AGEs in smokers and especially diabetic smokers

Sugar is not only added to soda, desserts and candy but can also be found (if you know where to look) in food items such as deli meat, ketchup, soup, bagels, crackers, **cere**al and baby food

Canadians are spending less time preparing breakfast compared to other meal occasions—it has been estimated that 80% all breakfast meals are made in five minutes or less
Ready to Eat (RTE) cereal remains the top food eaten at breakfast followed by toast, fruit and hot cereal

Breakfast Cereal Alert
According to an analysis of 161 brands, breakfast cereals marketed the most aggressively to children have the worst nutritional quality--Reutgers study; appearing in The Journal of the American Dietietic Association; 108:4 (702-705); 4/23/08
In this study, children's cereals were classified as those that had a character on the box, toys or games inside, or the listing as such on the manufacturer's website
Researchers found that the children's cereals had not only more sugar but contained more sodium, carbohydrates and calories per gram than non-children's cereals—with less protein and fiber to boot!
Sugar accounted for more than a THIRD of the weight of children's cereals compared to less than a quarter for adult cereals
The study found that children aged 6 to 16 tended to overfill their cereal bowls—exceeding the serving size recommended on nutritional labels by 50% to 65%
If kids ate the average amount of 2008 Frosted Flakes they poured for themselves, for example, they would get 18 grams of sugar per serving
Headliners: USDA Study Confirms Cereal Improvements; Grant Moos; posted on 6/6/2013; accessed on 3/31/2016 at: http://www.blog.generalmills.com/2013/06/usda-study-confirms-cereal-improvements/
A USDA Agricultural Research Service-led study found that the nutritional profile of cereals in the U.S. has improved significantly since 2005
The study of Kellogg and General Mills cereals–which represent 62% of the U.S. market and 80% of sales–found that, on average, between 2005 and 2011:

- Fiber increased 32%
- Sodium decreased 14%
- Sugar decreased 10%

In addition, the study–published in the second issue of Procedia Food Science–found that whole grain was an ingredient in at least two-thirds of the cereals
'Trends observed in this important breakfast category demonstrate positive changes in the nutrient composition which may have an important impact on public health.'--Robin G. Thomasa et al; Recent Trends in Ready-to-eat Breakfast Cereals in the U.S; Procedia Food Science; Volume 2, 2013, Pages 20–26; accessed online 3/31/2016 at: http://www.sciencedirect.com/science/article/pii/S2211601X13000060
Headliners: Top Breakfast Cereal Trends in 2015; Amanda Topper; food analyst; Mintel; accessed on 3/31/2016 at:http://www.preparedfoods.com/articles/115129-top-breakfast-cereal-trends-in-2015
Overall, the cold cereal market declined 5% from 2009-2014—reaching sales of $9.6 billion
Category leader Kellogg's overall sales declined 5% in the 52-week period ending 5/18/2014 but made gains with its Special K brand positioned as 'a late night indulgence as well as a breakfast food'
General Mills' sales decreased 3% in the same 52-week period despite a brand-wide social media campaign that engaged users on Twitter, Facebook, and Instagram through visual storytelling
Greater spending on food away from home—as well as consumer interest in a variety of convenient, low cost, and nutritious breakfast items—all created competition and poses a threat to the cereal category
Among those consumers who indicated they were eating less cereal than is previous years, the main reasons were related to the nutritional properties of cereal—one third (33%) indicated they are eating other breakfast items with more protein and 23% indicated they are eating items with more fiber
One cereal market that is prospering: Sales of cereal in natural supermarkets reached $121 million in 2013—which represented an increase of 22% from 2011-13
Cereals sold in natural channels often include varieties from smaller, more niche manufacturers—including those that sell cereals that are gluten free, non-GMO, organic, and/or contain ancient grains

Healthier Cereals Have:

- A short ingredient list
- Lots of fiber
- Few or no added sugars
- Higher grocery-store shelf placement—above eye level for most youngsters

Headliners: Breakfast Boosts Kids' Brain Power; Dr. Mehmet Oz and Dr. Mike Roizen ('The You Docs'); appearing in the Idaho Statesman; 3/8/13

The You Docs recently reported that new research demonstrated that eating a daily breakfast improves a child's verbal skills, increases the ability to get assignments done, boosts overall IQ by almost five points, helps prevent diabetes and reduces lead poisoning

The 'breakfast benefits' are dependent on a breakfast consisting of whole grains and lean protein—think fruit or veggie smoothies (added ground flaxseed is even better), whole grain pancakes or steel-cut oatmeal with fresh fruit spread, or peanut butter on 100% whole grain toast

Headliners: Kicking the Sweets Habit; Dawn Klingensmith; reporting for CTW Features; Living Healthy (issue number 5); appearing in the Idaho Statesman; 9/11/10

The evidence of food's addictive properties—especially 'sugar addiction'—is growing

Researchers found evidence of sugar's addictive properties from brain-imaging research in humans that demonstrated sugar acts on the brain much like morphine, alcohol, and nicotine do

'It's a necessary fuel but it's sort of like gasoline—you can flood the engine.'--Dr. Jacob Teitelbaum; physician and author of "Beat Sugar Addiction Now!" (2010)

While animal studies have demonstrated that there are neurobiological changes in the reward center of the brain supporting the hypothesis that sugar addiction is a possibility, further research is necessary in humans

Headliners: Watch Out for Those Addiction-Forming Foods; Dr. Mehmet Oz and Dr. Mike Roizen ('The You Docs'); appearing in the Idaho Statesman; 3/30/13

Food manufacturers apparently engineer products to contain the optimum balance of sugar and high fructose corn syrup—the resulting maximum 'crave' is called the BLISS POINT and reaching it causes the imbiber to continue eating, drinking and buying their products

That is why sugars are added to spaghetti sauce, peanut butter, ketchup, yogurt and even low-fat, processed, frozen foods that say 'Healthy' or 'Lean' on the package

And lest we forget: Mr. Caries

Mutans streptococcus metabolizes sucrose to lactic acid which creates an acidic environment which can demineralize enamel

Sucrose is also used by S. mutans to produce glucans (sucrose is the only sugar that can be utilized to form this sticky polysaccharide) which allows the strep to adhere to the tooth and add to the volume of plaque

Many other sugars (glucose, fructose, and lactose) can be digested by S. mutans but the end product is lactic acid—not glucans

It is the combination of plaque and acid that lead to dental caries

Headliners: Crystal Structure Of Glucansucrase From The Dental Caries Pathogen Streptococcus mutans; Keisuke Ito et al.; appearing in the Journal of Molecular Biology; 408 (2):pp. 177-378. 4/29/11

Researchers from the UK and Japan were able to re-create the 3D structure of an enzyme that plays a key role in tooth decay caused by sucrose

The structural information provides critical insight into how the enzyme 'GTF-SI'—a glucansucrase—catalyzes glucan development leading to plaque biofilm development

Agave

Blue agave is probably best known as the source for Mexico's favorite adult beverage— TEQUILA!

But 'agave syrup' or 'agave nectar'—also derived from this Mexico-indigenous plant—is becoming well-known as a popular dietary sweetener

Marketed as a healthy alternative to sugar and artificial sweeteners, agave syrup is also promoted as a 'low glycemic food' for diabetics

The agave nectar industry is a growing market that has an estimated production of 3,000,000 gallons per year

Agave is also quickly crossing over from the health food market to mainstream grocery chains, restaurants and taverns
Agave syrup is now appearing in products such as energy bars, cereals and organic ice creams

A Couple of Agave Concerns:

- Agave syrup is NOT low calorie—it has about 16 calories per teaspoon which is the same as sucrose
- 'Depending on how the [agave] syrup is processed, it may or may not contain more fructose [than HFCS].'--Roger Clemens; professor; University of Southern California and spokesman for the Institute of Food Technologists

Most agave syrup has a higher fructose content than any commercial sweetener—ranging from 55% to 97% which can be far higher than high fructose corn syrup (HFCS) which averages 55%
Here's why: Most agave 'nectar' is not made from the sap of the yucca or agave plant but from its pineapple-like root bulb
The 'sweetness' is derived from the agave root which contains a complex carbohydrate called inulin
Inulin is made up of fructose molecules!!!!

Because people are consuming fructose in quantities that are 400-800% higher than they were 100 years ago due to its pervasive presence in just about all processed food, experts feel many of today's health concerns may be tied to increased ingestion of this sugar
There are several reasons fructose can be so damaging (besides just the AGEs thing…):

- Fructose elevates uric acid levels—which has been shown to cause chronic, low-level inflammation increasing the risk of cardiovascular disease, stroke, cancer, arthritis and premature aging
- Fructose also tricks the body into gaining weight by fooling metabolism—appetite control systems are severely impaired
- Fructose converts to fat more than any other sugar
- Excessive fructose rapidly leads to weight gain and abdominal obesity, decreased HDL, increased LDL, elevated triglycerides, elevated blood sugar, and high blood pressure—known collectively as 'metabolic syndrome'
- The body metabolizes fructose in a much different way than glucose
- Fructose is broken down in the liver (just like alcohol) and its chronic ingestion produces many of the side effects of chronic alcohol use (including 'beer belly')

Other Concerns with Agave Sweeteners:

Poor Quality Control

- There are very few quality controls in place to monitor the production of agave syrup
- Most agave sold in the U.S. comes from Mexico
- Industry insiders are concerned that the majority of agave producers are using other, more toxic agave plants due to a shortage of blue agave

Pesticides

- The FDA has refused shipments of agave syrup due to excessive pesticide residues

Nutrient Void

- Agave syrup is not a whole food—nearly every brand is fractionated and processed and devoid of the nutrients contained in the original, whole plant

High Fructose Corn Syrup ('HFCS')

The process for making the sweetener out of corn was developed in the 1970s
When processing fructose-glucose, corn starch must be separated from the corn kernel and something called caustic soda is used—some manufacturing plants use what is called 'mercury-grade' caustic soda

Headliners: Study Finds High-Fructose Corn Syrup Contains Mercury; HealthDay News; 1/26/09; accessed 7/13/10 at: www.washintonpost.com

According to two recent U.S. studies, almost HALF of tested samples of commercial HFCS contained mercury—which was also found in nearly a THIRD of 55 popular brand-name food and beverage products where HFCS is the first- or second-highest labeled ingredient

The fructose-glucose product is a solution with fructose and glucose as separate molecules—whereas sucrose is a single molecule coupling fructose and glucose
Because of this, there are twice as many molecules of sweetener in a 10 percent solution of HFCS as in a 10 percent solution of sucrose—making the fructose in the HFCS solution more available to stimulate the sweet receptors on the tongue
It is important to remember that the fructose in fruits and vegetables is not the same fructose molecule that is in 'synthetic' fructose-glucose—naturally occurring fructose comes along with fiber, enzymes, vitamins, minerals, and antioxidants; the derived sweetener has no nutritional value
Because naturally occurring fructose is attached to other molecules and needs to be broken down before it is absorbed, the amount that is absorbed is much less than the fructose in fructose-glucose
It is the rapid absorption of the sweetener that leads to insulin spikes

Pretty much all of the body's cells come equipped with enzymes that allow them to utilize glucose but the enzyme that metabolizes fructose, called fructokinase, is found exclusively in liver cells
Metabolizing fructose leads to an increase in cardiovascular risk factors such as elevated levels of triglycerides and very low density lipoproteins
There is fairly good evidence that fructose reduces leptin levels (which helps us determine when we are full) and does not lower ghrelin as much as glucose does, so we stay hungry
A single 12-ounce can of soda provides the equivalent of 10 teaspoons of table sugar
This just in:

- Annual per capita consumption of soda in the U.S. fell to a 30-year low in 2015 with sales dropping for the 11th straight year
- Even 'diet' sodas were flat as concerns grow about the health impact of artificial sweeteners

--Source: TIME; 4/11/16

The sugar found in sodas is mainly high fructose corn syrup—the higher fructose levels fails to spur production of **leptin**
The Leptin Connection

- The more fat in a cell, the more leptin it produces—signaling the brain that it can reduce food intake
- KEY: But in the obese, the brain becomes less responsive to higher leptin levels
- Leptin also speeds metabolism to burn calories faster
- Conversely, when leptin levels drop, metabolism slows— one reason people have difficulty staying active

Honey

Besides glucose, fructose and maltose, high quality honey contains natural antioxidants, enzymes, amino acids, vitamins, and minerals
Since ancient times, people have used honey as a food and medicine:

- A combination of honey and goat's milk has been known to help heal bronchial infections
- Honey also contains several anti-oxidants
- Honey has an anti-infective component and has been used to heal intestinal ailments and skin wounds

Historically, honey has gone from a medicine and sweetener that only the wealthy could afford to a common item in stores and farmers' markets nearly everywhere
As an all-natural sweetener without any added ingredients, honey contains a variety of flavonoids and phenolic acids, which act as antioxidants—generally, darker honeys have higher antioxidant content than lighter honeys
Honey is known for its effectiveness in instantly boosting the performance, endurance and reducing muscle fatigue of athletes—it is thought that the natural sugars play an important role in preventing fatigue during exercise
The glucose in honey is absorbed by the body quickly and gives an immediate energy boost—while the fructose is absorbed more slowly providing sustained energy
As it has become easier to obtain, it has also been processed more and more, which reduces the beneficial effects
For example, honey contains four **phytonutrients**—each a type of **caffeic**—that have been shown to have beneficial properties in the prevention of colon cancer

The caffeics act specifically on two substances in the colon that are involved in cancer development:

- phosphatidylinositol-specific phospholipase C
- lipoxygenase

These caffeics are literally destroyed by processing—pure raw honey has the best health benefits
It has been suggested that ingesting one tablespoon daily will make a difference in your body

The first International Symposium on Honey and Human Health was held in Sacramento, California, in January 2008
Some significant findings presented included:

- Compared to other sweeteners, honey is much better tolerated by the body—leading to better blood sugar control and sensitivity to insulin--Study results presented by Dr. David Baer; research rhysiologist; USDA; ARS Beltsville Human Nutrition Research Center
- Honey has antimicrobial effects and promotes wound healing—and Manuka honey has been shown to be effective against MRSA infections--Study results presented by Dr. Shona Blair, microbiologist and post-doctoral research Fellow, University of Sydney and University of Technology, Sydney, Australia
- Honey has been demonstrated to increase restorative sleep--Presented by: Mike McInnes, Member of Royal Pharmaceutical Society, Edinburgh, Scotland
- Cognitive function is increased with regular ingestion of honey--Results presented by Dr. Nicola Starkey, Waikato University, Hamilton, New Zealand
- Honey appears to have a positive preventive effect on chemotherapy-induced neutropenia--Study results presented by Jamal Zidon, MD, Head, Department of Oncology, Sieff Government Hospital, Israel
- Honey acts as a cough suppressant--Results presented by Jessica Beiler, MPH, Pediatric Clinical Research, Hershey Medical Center, Hershey, Pennsylvania

One more benefit of honey: A 2011 University of Wyoming study found that, when compared to table sugar, honey delayed the rise of ghrelin (the 'I want to eat now!' hormone) and boosted levels of the feel-full compound PYY
One thing to keep in mind: Honey does add calories—22 per teaspoon (64 calories per tablespoon)—so think drizzle not drench!!!!
Headliners: The Effects of Manuka Honey on Plaque and Gingivitis: A Pilot Study; Helen K P English, Angela R C Pack, and Peter C Molan; study results appearing in J Int Acad Periodontol; 2004 Apr; 6(2):63-7
Based on the results of several studies that had already demonstrated Manuka honey's high antibacterial activity, researchers decided to examine whether or not the honey was non-cariogenic
The pilot study was designed to establish whether or not Manuka honey with an antibacterial activity rated UMF 15 could be used to reduce dental plaque and clinical levels of gingivitis
Analysis of the results indicated that there were statistically highly significant reductions in the mean plaque scores (0.99 reduced to 0.65; p=0.001), and the percentage of bleeding sites (48% reduced to 17%; p=0.001), in the Manuka honey group with no significant changes in the control group
Conclusion: 'These results suggest that there may be a potential therapeutic role for Manuka honey confectionery in the treatment of gingivitis and periodontal disease'

And how about Maple Syrup?

Pure Canadian maple syrup can be used as a healthier substitute to sugar in a variety of desserts and baked goods, such as pies and cakes--Source: http://www.purecanadamaple.com/benefits-of-maple-syrup/sugar-alternative/ accessed on 10/20/16
Why is maple syrup one of the best sugar alternatives?

- This healthy sweetener is 100% natural with no coloring or additives—boiled down directly from tree sap, pure maple syrup is an unprocessed, authentic product of nature
- Because maple syrup is not processed, it contains higher levels of potentially beneficial minerals such as calcium, potassium, sodium and copper
- In addition, maple syrup does not contain high fructose corn syrup—leading pancake syrup brands in the U.S. do not contain ANY pure maple syrup and rely on high fructose corn syrup as the primary sweetening ingredient (additives like artificial flavorings and coloring agents are also used)

Sugar Alcohols

Despite their name, sugar alcohols are neither sugar nor alcohol—they get their name because they are carbohydrates that have a chemical structure similar to sugar and to alcohol

Sugar alcohols are considered nutritive sweeteners because they provide calories when consumed

Sugar alcohols (also referred to as 'polyols') contain fewer calories than sugar—sucrose provides 4 kcal/gram, and sugar alcohols provide an average of 2 kcal/gram (range from 1.5 kcal/gram to 3 kcal/gram)

One reason that sugar alcohols provide fewer calories than sucrose is because they are not completely absorbed by the small intestines—because of this, some 'flavors' of sugar alcohols cause GI upset such as diarrhea and bloating

Pure xylitol—derived from cellulose products such as wood straw and pulp cane—does not usually produce the gas or bloating associated with other sugar alcohols

One of the main benefits of Xylitol: Reduction in levels of mutans streptococci in plaque and saliva

Xylitol has been shown to:

- Disrupt the energy production in mutans streptococci leading to bacterial cell death
- Reduce MS adhesion to teeth and decrease acid production by the cariogenic microbes
- Work most effectively on teeth that are erupting
- There is also evidence that maternal consumption of xylitol may reduce the acquisition of MS and dental caries by their children

Headliners: Xylitol and Dogs (and Ferrets) Do Not Mix!; ASPCA Animal Poison Control Center

It has been known for quite some time that there is a link between xylitol ingestion and hypoglycemia in dogs—now, with the prevalence of this sweetener in human foods, the ASPCA Animal Poison Control Center has noted a connection between xylitol consumption and acute toxicity in dogs

Signs of toxicity can be seen as quickly as 30 minutes after xylitol ingestion in dogs

'Our concern used to be mainly with products that contain xylitol as one of the first ingredients. However, we have begun to see problems developing from ingestions of products with lesser amounts of this sweetener.' --Dr. Eric Dunayer, DVM; specialist in toxicology; ASPCA Center

Dogs ingesting substantial amounts of items sweetened with xylitol could develop a sudden drop in blood sugar, resulting in depression, loss of coordination, and seizures

Liver failure in canines has also been reported following ingestion of xylitol

Good Advice: Make sure to keep all foods containing xylitol out of your pet's reach and call your veterinarian immediately if xylitol consumption is suspected

One more thing: Xylitol has also been suspected of causing toxicity in ferrets and cats

Non-Nutritive Sweeteners

Nonnutritive sweeteners are zero- or low-calorie alternatives to nutritive sweeteners—they are hundreds to thousands of times sweeter than table sugar

It is estimated that 86% of Americans use low-calorie, reduced-sugar or sugar-free foods and beverages--Calorie Control Council; 2007

For decades, non-caloric sweeteners have been marketed as being 'healthier' because they have less calories—but numbers are showing a relationship between the percent of people using artificial sweeteners, the amount of products containing artificial sweeteners and the percent of the population that are obese

In 2007, researchers from the Department of Neuroscience at Mount Sinai School of Medicine detected the same receptors for sweet taste normally found in the tongue (T1R3 and the taste protein α-gustducin) in the human intestines

Since that discovery, more non-tongue related taste receptors have been located in other areas of the body such as the esophagus, stomach, and pancreas

Here's the key: Non-nutritive sweeteners are not neutral—they work on ALL the taste receptors throughout the body

Once sweet has been detected, the pancreas releases insulin (which plays an important role in body fat accumulation)

At the same time, chemicals are sent to the brain's satiety center—which becomes confused as to whether or not the body is actually receiving calories

Hunger increases, satiety decreases, insulin spikes and the brain signals that a person should eat more—leading to weight gain

Sugar substitutes are also used by manufacturers to entice people to 'eat and repeat'—jumping on the band wagon is the International Dairy Foods Association and the who have petitioned the FDA to change the 'standard of identity' of milk so that any safe and suitable sweetener (including non-nutritive sweeteners such as aspartame) can be added to milk without listing the ingredients on the label

Headliners: Artificial Sweeteners: A Systematic Review of Metabolic Effects in Youth ; Brown RJ, DeBanate MA and Rother KI; National Institute of Diabetes, Digestive and Kidney Diseases; National Institutes of Health; study results appearing in Int J Pediatr Obes; 8/10; 5(4): 305-312

This systematic review examined current literature on artificial sweetener consumption in children and its health effects—data from large, epidemiologic studies were found to support the existence of an association between artificially-sweetened beverage consumption and weight gain in children

Because many people use artificial sweeteners to cut their caloric intake, relying on artificial sweeteners may prove counter-productive

'The example I use [to explain the effect of ingesting artificial sweeteners] is that when your gas tank is empty, you can fill it up with water—the gas gauge will read full but the car won't operate. It's the same thing with our bodies—we can only store up to six hours of carbohydrates, which is our body's (especially our brains) preferred fuel. [Therefore,] we need to consume carbohydrates through the day.'--Dr. Felicia D. Stoler, DCN, MS, RD, FACSM; author: "Living Skinny in Fat Genes: The Healthy Way to Lose Weight and Feel Great"

Popular Non-Nutritive Sweeteners:

- Saccharin
- Aspartame
- Acesulfame K
- Sucralose
- Stevia

Saccharin

Saccharin is a man-made sweetener that is used in food products in many countries

Saccharin was identified by Constatin Fahlberg quite by accident in 1878 when he was doing research on coal tar—licking his fingers during laboratory experimentation lead to the surprise discovery

In the 1970s, scientific studies raised concerns that saccharin could be carcinogenic in laboratory rats

Today's saccharin is approximately 200-700 times sweeter than sucrose and is approved as a tabletop sweetener (Sweet n Low®, Sugar Twin® and Necta Sweet®) as well as a sweetener for beverages

'We're delighted that Sweet'N Low® continues to be strong in unit and volume sales, and we're further pleased to offer consumers the best value among zero-calorie sweetener brands. Sweet'N Low® is the most reasonably priced sugar substitute brand—which may keep our total dollar sales figures lower, but also keeps our customers' grocery bills lower, and that's a good thing.'--Steven Eisenstadt, CEO of Cumberland Packing Corp. (manufacturer of Sweet'N Low®)

Cumberland Packing Corp., which invented the single-serve packet as well as the colored packet identifier with Sweet'N Low

Sweet'N Low has a long shelf life—several years when stored in cool, dry conditions—and does not lose sweetness when heated

Sweet'N Low may be used as a tabletop sweetener and dissolves easily in hot and cold beverages—the zero-calorie sweetener can also be used for cooking, baking, freezing and preserving

Cooking Tips:

- In recipes for sweetened sauces and beverages, all sugar can be replaced with an equivalent amount of Sweet'N Low
- Recipes for most baked goods require some sugar for proper volume, moisture and texture
- Bitter aftertaste is common

Aspartame

Aspartame continues to be used in a number of foods (including soft drinks, desserts, breakfast cereals and chewing gum) and as a table-top sweetener since its introduction into the U.S. market in the early 1980's
Known for not promoting tooth decay and having no significant calories, aspartame has many appealing benefits
Aspartame can also be found in food labels as:

- Canderel®
- L-aspartyl-L-phenylalanine methyl ester
- N-L-alpha-Aspartyl-L-phenylalanine 1-methyl ester
- 3-Amino-N-(alpha-carboxyphenethyl)succinamic acid N-methyl ester
- APM
- SC-18862
- E 951 (European registry number)

In a dry state, the stability of aspartame is good—however, in food systems its stability is pH-dependent
Aspartame-containing products are most stable at a pH 4.3—making it a perfect fit for sweetening soft drinks
The stability of aspartame is temperature-dependent which causes the ingredient to break down at higher temperatures
Therefore, aspartame is not to be used in baking or cooking
Aspartame-containing products are sold in over 100 countries and is consumed by 250 million people worldwide
Aspartame can be found in more than 6000 products such as:

- Diet sodas, juice drinks, and flavored waters
- Chewing gum
- Table-top sweeteners
- Diet and diabetic foods
- Breakfast cereals
- Fiber supplements
- Jams
- Sweets
- Vitamins
- Prescription drugs
- Over the-counter drugs (such as Alka Seltzer Plus and some Tylenol medications)

Over 800 million pounds of aspartame have been consumed in various products since it was first approved

Chemical composition of Aspartame:

- Aspartame is composed of amino acids—phenylalanine and aspartate—and methanol
- Amino acids are generally linked together in long chains that are folded together to create proteins
- Amino acid isolates are artificially separated from the rest of the amino acid protein chain when formulating aspartame
- The amino acids remain 'isolated' as single or dipeptide molecules—unlike the 80-300 amino acid chains that form natural proteins in dietary foods—when they are added to foods during the manufacturing process
- In normal protein foods such as meat, fish or eggs, phenylalanine and aspartic acid comprise 4%-5% of the total amino acid profile—this is how our bodies are used to 'seeing' amino acids in dietary foods
- However, in aspartame, the ratio of these two amino acids is 50% phenylalanine and 40% aspartic acid (with 10% methanol)
- On a percentage basis, aspartame contains a massive quantity of two unnaturally isolated amino acids that are simply not found in this ratio in nature—and they are bonded together with a known poison (methanol)
- It is the dissociated components of aspartame and their effects on health that has some skeptics worried about its widespread use

Elevations in plasma concentrations of phenylalanine and aspartic acid increases transport of these amino acids into the brain—altering the brain's neurochemical composition in the process
When phenylalanine is in the system at high loads, it is converted to neurotransmitters that regulate brain chemistry
Three of these neurotransmitters are:

- L-dopa
- Norepinephrine
- Epinephrine

The resulting increased levels of these neurotransmitters affect the physiology of the brain and have been linked to a variety of psychiatric and physiological disorders (anxiety, depression, headaches, seizures and tremors)
One of the key neurotransmitters in relation to mood is serotonin—when aspartame is consumed, it goes directly into the brain and lowers serotonin levels
A study conducted by the Department of Psychiatry at Northeastern Ohio Universities College of Medicine several years ago demonstrated that 30 milligrams per kilogram of body weight of aspartame each day increased the severity of depressive symptoms for patients with a history of depression—the symptoms worsened in a matter of seven days
Reactions were so severe among the depressed study participants that the study was halted by the International Board of Review
The aspartic acid in aspartame has been identified as an **excitotoxin**—along with glutamate, the aspartate derived from aspartic acid cause particular brain cells to become excessively excited
With excessive exposure, excitotoxins can cause neural cells to die off and result in loss of brain synapses and connecting fibers
The blood-brain barrier is a system of capillary structures that prevents most toxins from entering the brain
The blood-brain barrier is compromised in cases of diabetes, hypertension and in smokers—which can potentiate reactions to aspartame
Unborn children and infants up to one year of age have an incomplete and not well-insulated neural barrier
Cautionary note: Excitotoxins enter infants' nervous systems easily and quickly—babies under a year of age are FOUR times more sensitive to excitotoxins than adults
Synergistic damage is also thought to result from the absorption-metabolism sequence of methanol
Methanol breaks down to form formaldehyde and formic acid—both methanol ('wood alcohol') and formaldehyde have been shown to be carcinogenic and mutagenic
The U.S. Environmental Protection Agency ('EPA') defines safe consumption of methanol as 7.8 mg per day—about the amount found in half a can of diet soda

What is PKU?
In phenylketonuria or 'PKU', the enzyme that converts phenylalanine to tyrosine does not function properly and fails to make the conversion possible—leading to build-up of phenylalanine in the body
Doctors have known for a long time that too much phenylalanine causes severe neurological impairment and other problems in infants with PKU—but it was thought that higher levels of the amino acid was not a big problem for teens and adults
We now know that high phenylalanine levels can cause problems throughout life
Problems associated with PKU:

- Lower intelligence (IQ)
- Bad moods (being cranky or irritable)
- Feeling 'foggy'
- Thinking and responding slower
- Depression
- Anxiety
- Not being able to focus or pay attention

Here's what happens:
Following consumption of aspartame-laced products, the phenylalanine flooding the blood stream enters the brain—setting off an induced 'PKU effect'

This induced PKU affect occurs because the isolated amino acid grossly overwhelms those enzymes required to reduce the circulating phenylalanine for use in other metabolic reactions
This 'overdose' of the competitive phenylalanine isolate (and aspartic acid) not only raises phenylalanine blood levels but also incapacitates the enzyme actions which controls several types of neurotransmitters (and their precursor amino acids)
To protect the brain and mood, it is important for sufferers of PKU to keep levels of pheylalanine low for life—avoiding ANY food or beverage product containing aspartame is crucial
Because of the unique chemical structure and metabolic pathway of aspartame, it is no wonder why some are worried about how this widely-used sweetener affects the body
One big concern: Childhood obesity and diet soda consumption

Acesulfame K

Acesulfame K has been an approved sweetener since 1988—and yet most people are not even aware that this artificial sweetener is being used in their food and beverages
Like saccharin, acesulfame K is also flawed by a slight metallic after-taste in high concentrations
A great advantage of acesulfame K is its stability under heating, which allows it to be used in baking or to sweeten warm drinks
As a food additive, acesulfame K is incorporated into many products such as baked goods, frozen desserts, sugar-free gelatins and puddings, chewing gums, and non-dairy creamers
Acesulfame potassium is also used in cosmetics, vitamin and pharmaceutical preparations (including powder mixes, tablets, encapsulation of chewing gum in delayed release formulation and liquid products)
It is widely used a mouthrinse and toothpaste sweetener
It is listed on food labels as acesulfame K, acesulfame potassium, or Ace-K
Acesulfame K is 200 times sweeter than sucrose and is often used as a flavor-enhancer or to preserve 'sweetness' in food products
Since its international introduction in 1983, acesulfame K has been used in more than 5,000 products and has been granted approval in over 100 countries around the world
How is it made?????

- Acesulfame K is synthesized from acetoacetic acid tertbutyl ester and fluorosulfonyl isocyanate
- The resulting compound is transformed to fluorosulfonyl acetoacetic acid amide, which is then cyclized in the presence of potassium hydroxide to form the oxathiazinone dioxide ring system
- Because of the strong acidity of this compound, the potassium salt is produced directly

According to the official Acesulfame K website http://www.acesulfamek.org/faq.html:

- More than 90 studies have been conducted on the safety of acesulfame K and they have consistently shown that this sweetener is safe for human consumption

The CSPI rates acesulfame K as one food additive to avoid due to concerns over safety testing—the studies were rated as 'mediocre'
An article published in the International Journal of Occupational and Environmental Health (2010) by a Drexel University researcher echoed the CSPI's concerns and recommended that the sweetener undergo more rigorous and lengthy testing in the National Toxicology Program's bioassay program
The FDA has set an acceptable daily intake (ADI) of up to 15 mg/kg of body weight/day
Just a couple of concerns:

- Exposure to this chemical compound over a prolonged period of time can result in headaches, liver complications, mental confusion, cancerous developments, visual impairment and renal diseases
- During the manufacture of acesulfame K, methylene chloride is used as a solvent—its use in the food industry is contentious
- For diabetics, it is important to note that although acesulfame K stimulates insulin secretion, in extreme cases, it can cause hypoglycemia—this is one of the major drawbacks of acesulfame potassium

Sucralose

Sucralose is the active ingredient in Splenda® and is 600 times sweeter than sucrose
It was approved by the FDA in 1999 to be utilized in foods, beverages, pharmaceutical products, diets and vitamin supplements as a food additive
Currently, sucralose is incorporated into more than 4000 products and the number of new products containing it continues to increase
Sucralose is able to be stored for more than one year while maintaining 99% of its original flavor
Its characteristics are preserved, even during pasteurization, sterilization and cooking at high temperatures
A new, in-depth review on the synthetic sweetener sucralose published in the Journal of Toxicology and Environmental Health is destined to overturn widely held misconceptions about the purported safety of this ubiquitous artificial sweetener
The review reveals an extensive array of underreported safety concerns including the formation of highly toxic chlorinated compounds (such as dioxin) when Splenda is used in baking—an application which its manufacturer, McNeil Nutritionals (a subsidiary of Johnson & Johnson) actively encourages the product to be used for--Shifman SS and Rother KI (2013): Sucralose, a synthetic organochlorine sweetener: overview of biological issues, Journal of Toxicology and Environmental Health, Part B: Critical Reviews; 16:7:399-451. Accessed on 2/27/14 at: http://www.tandfonline.com/doi/pdf/10.1080/10937404.2013.842523
According to manufacturers' claims: Sucralose does not interfere in the utilization or absorption of glucose, metabolism of carbohydrates and secretion of insulin—making it 'safe' for use by diabetics
Another recent human study linked Splenda to diabetes-associated changes—calling into question its value as a non-calorie sweetener for those suffering with, or wishing to prevent, blood sugar disorders
Pepino MY, et al: Sucralose affects glycemic and hormonal responses to an oral glucose load; appearing in Diabetes Care (9/13); 36(9):2530-5. Accessed 2/27/14 at: http://www.ncbi.nlm.nih.gov/m/pubmed/23633524/
The American Diabetes Association does nothing to hide its explicit partnership with McNeil Nutritionals (maker of Splenda) despite the obvious conflict of interest—on its website, the organization describes McNeil Nutritionals as a 'corporate sponsor' and lauds them as being 'committed to helping people and their families with diabetes by focusing on the overall nutritional needs of the diabetes community'--Accessed on 2/27/14 at: www.diabetes.org
One reason that sucralose has become one of the best-selling artificial sweetener is that manufacturers tout the additive as being 'made from sugar so it tastes like sugar'
While sucralose starts off as a sugar molecule, it is what goes on during product processing that raises concerns
Sucralose is a synthetic chemical that is made using a five-step process that ultimately adds three chlorine molecules to sucrose
The chemical processes involved in making sucralose alters the chemical composition of sucrose so much that it is somehow converted to a fructo-galactose molecule
This type of chlorinated fructo-galactose molecule does not occur in nature and disrupts the body's ability to properly metabolize it
Because sucralose cannot be properly processed by the body, manufacturer McNeil Nutritionals claims that Splenda® is not metabolized or digested by the body and has zero calories
Not quite the case: Most folks are able to absorb ~15% of ingested sucralose—some people absorb more and some less—making adverse effects possible
So what happens to the ~85% of sucralose that is not metabolized?
Headliners: Artificial Sweetener Leaves Environmental Aftertaste; Tim Wall; reporting for Discovery News; 1/23/11; accessed on 2/9/12 at: http://news.discovery.com
Researchers found that the 'unmetabolized' sucralose passes right through the body, into the sewage treatment facilities, and out into the surface and ground waters looking pretty much the same as it did when it was stirred into a cup of coffee
Arizona State University researchers Cesar Torres and Rosa Krajmainik-Brown published findings in Environmental Engineering Science that demonstrated the artificial sweetener is indeed making its way through traditional water filtering systems
'Sucralose is a chloinated sugar. Some of my work focuses on bioremediation of chlorinated organics. I know that many are toxic and they are more difficult to biodegrade than the non-chlorinated counterparts. Because of this, I became interested in sucralose and its fate in the environment.'--Krajmalnik-Brown in an ASU press release

Although the environmental impact needs to be fully elucidated, it is disconcerting to know that it almost indestructible
New concerns have been raised by researchers at the University of San Diego who hypothesized that '…Splenda® has less of a feedback mechanism to stop the craving, to get satisfied'
Translation: This would help explain why, when artificial sweeteners like sucralose are ingested, the body craves both more of the additive as well as sugar—because the brain is not satisfied at the cellular level
This supports and helps to explain the growing body of research that is implicating artificial sweetener use with weight gain
'There is good evidence that the brain responds differently to artificial sweeteners and you should take that into account when designing weight-loss programs.'--Guido Frank; psychiatrist and lead study author; currently at the University of Colorado (Denver)
Headliners: In May 2011, McNeil Nutritionals introduced new Splenda Essentials products!
The new line of products from the Splenda brand includes Splenda Essentials no-calorie sweetener with B vitamins and Splenda Essentials no-calorie sweetener with antioxidants
The brand previously introduced Splenda Essentials no-calorie sweetener with fiber
'We're thrilled to launch the new Splenda Essentials sweetener product line, giving consumers an entire line of products that offer additional nutritional benefits, like B vitamins to help support a healthy metabolism. Consumers may not focus on getting all their recommended vitamins in a day, but they never forget to sweeten their coffee—these products are all about helping people make small, good-for-you choices each day so that they can get closer to meeting their health goals.'--Fred Tewell; group product director for Splenda sweetener products
Headliners: CSPI Downgrades Splenda From 'Safe' to 'Caution'; Center for Science in the Public Interest; posted 6/12/13; accessed on 2/27/14 at: http://www.cspinet.org/new/201306121.html
Recent laboratory findings from an independent laboratory suggest that the use of sucralose might be associated with leukemia
Based on these findings, the Center for Science in the Public Interest is downgrading sucralose, the artificial sweetener better known by the brand name Splenda, in its Chemical Cuisine guide to food additives—the nonprofit food safety watchdog group had long rated sucralose as 'safe' but is now placing it in the 'caution' category pending a review of an unpublished study by an independent Italian laboratory that found that the sweetener caused leukemia in mice—the only previous long-term feeding studies in animals were conducted by the compound's manufacturers
And the You Docs agree—stating that, although more research will have to be done, the FDA stamp of approval for sucralose may not 'necessarily mean something [like sucralose] is your healthiest option' and advise consumers to 'contemplate the possibility of giving up artificial sweeteners (and added sugars) in foods and beverages'--Dr.Mehmet Oz and Dr. Mike Roizen; "Maybe Sucralose is not that Splendid"; column appearing in the Idaho Statesman; 5/25/12
It should be noted that CSPI's Chemical Cuisine gives the artificial sweeteners saccharin, aspartame, and acesulfame potassium 'avoid' ratings (the group's lowest) and considers rebiana (a natural high-potency sweetener obtained from stevia—stay tuned!) to be 'safe' though deserving of better testing.

Stevia

Stevia (Stevia rebaudiana) is a species of shrub and herb native to the rain forests of Paraguay—it is in the sunflower family (Asteraceae) and is related to lettuce and marigolds
Also known as 'sweet leaf' and 'sugar leaf', stevia is used as a dietary supplement and sugar substitute—it has no calories, no carbohydrates, and a zero glycemic index which makes it a great natural alternative to sugar and chemical sweeteners
Stevia is up to 300 times sweeter than sugar
It has been used in Japan (where aspartame is banned) since the 1970s as the main alternative to sugar in gum, soft drinks and other commercial foods and beverages
In 1991, stevia import to the United States was banned by the FDA who deemed it an 'unsafe food additive'
Proponents of stevia believed this ruling was in response to pressure from the artificial sweetener industry
Stevia remained banned until 1994 when it was approved as a dietary supplement but not a food additive
In December 2008, stevia was granted GRAS (Generally recognized as safe) status by the FDA

Headliners: FDA Approves Two New Stevia-Based Sweeteners; Posted by Dr. Mercola; 1/10/09; accessed 1/11/12 at: http://articles.mercola.com/sites.articles/archive/2009/01/10

The FDA approved two versions of a zero-calorie sweetener developed by the Coca Cola Company and PepsiCo

Cargill—which is marketing the sweetener 'Truvia' from Coca-Cola—received notification from the FDA that the agency had no objection to the product calling it 'generally regarded as safe ('GRAS')'

PepsiCo acknowledged it had also received a GRAS designation from the FDA for its stevia-based sweetener, PureVia

Both products use rebiana—a purified form of rebaudioside A which is one of the components of the stevia plant

According to research published in 2008 in 'Food and Chemical Toxicology', rebiana has no effect on blood pressure or blood sugar, and appears to be safe for human consumption—it should be noted that Cargill, the maker of Truvia, partly funded the study

Erythritol is a sugar alcohol that is used with rebriana to improve flavor—like other sugar alcohols, erythritol is generally recognized as safe by the FDA

Although most sugar alcohols can cause bloating, gas, diarrhea and can have a laxative effect, erythritol tends to cause less of a problem than other types of sugar alcohols

It seems that Stevia will be the sweetener of the future as it really is much more effective than sugar for sweetening and it is much healthier than most other artificial sweeteners

In closing:

- Natural is better than chemical
- Sweets derived from fruits are better than sugar or artificially sweetened processed foods
- Always read labels—if there are too many syllables, opt for something else
- Consumption of sweeteners should not exceed 4 grams of added sugars per hour

Product Overview

THANK YOU!