Artificial Sweeteners: A Sweet Sensation From the Past and Future

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The sugar cane plant was first discovered in New Guinea in 600 BC. Since its discovery, cultivation of sugar cane has grew exponentially and became the most desired "spice" as it spread to Southeast Asia and India around 1000 BC. The sugar cane plant was desired by many due to its sweetness and versatility in cooking. The plant continued to spread west into the Mediterranean around 600-1400 BC. The Arabs were responsible for most of this sugar cane dispersal across the Mediterranean. They were constantly being invaded and were on the move constantly, bringing sugar with them wherever they went, stopping in various countries such as Syria, Cyprus, and Crete. In 1412, Prince Henry of Portugal took over Madeira, a European colony in the Canary Islands. He colonized this land, planting small plots of sugar cane, which quickly turned into large sugar cane crops and became fully functioning sugar plantation. He began producing enough sugar cane to influence the European sugar trade, as sugar was becoming more and more popular among those who were able to afford such luxury. With such power, in 1441 he implemented the African slave trade. The African slave trade imported slaves from Africa to Madeira where they were forced to work on the plantations and maintained the crops and did any necessary manual labor to keep production steady. The implementation of the African slave trade changed the sugar refining and plantation system as well as the economy. This implementation also helped established what is known as the famous Trade Triangle. The Trade Triangle had slaves sent to the New World plantations and their labor products were sent to Europe to be sold. The money received from sugar purchases were used to purchase more slaves in Africa. These three actions in retrospect, made a triangle. Meanwhile, sugar production was also flourishing in other lands. Brazil had developed their own sugar industry, which was later backed by one of the most prestigious trading companies, Dutch East India Company. They imported mass quantities of slaves to cultivate their sugar, which allowed Brazil to produce
about 14,000 tons of sugar. With such high production levels, Brazil easily became the center of sugar trading. However, for unknown reasons, Brazil failed to produce steady amount of sugar as the years continued which led to Barbados, an island in the Caribbean, producing 7,000-12,000 tons of sugar per year between 1655-1700.

When the Napoleonic war started in the early 1800s, the British blockaded France's trade routes to the Caribbean. This caused the country to have a low supply of sugar, leaving its people in an outrage. They had no source of "sweetness" and were lost for ideas of what to do. Napoleon came up with the solution of sugar beets to fix this sugar shortage problem. Napoleon invested a lot of money into sugar beets and had their juice extracted, which was surprisingly sweet. Sugar beet juice offered the same sweetness that the French people had been craving and missed. This new product eventually became such a hit that it became even more popular and a cheaper version than sugar. When sugar finally came back onto the market, people still continued to use beetroot juice because it was affordable compared to sugar. This caused sugar to drop in price and become just as affordable as beetroot juice. These cheap forms of sugar and sugar itself were popping up everywhere and people were starting to use them in everything because they had access to this "luxury" item. Honey and molasses were being taken out of original recipes and being replaced with sugar. Because sugar was being added to almost every food product and the consumption of sugar was increasing dramatically, the public began to see adverse effects: weight gain, high blood pressure and other diseases that we know now as diabetes, heart disease etc. These conditions were occurring because of the cast increase in sugar consumption. Malnutrition was becoming an issue as many were consuming such sugary products that provided empty calories and lacked the essential vitamins, minerals, and other components one needs to function as healthy human being.
In 1877 a Russian chemist named Constantin Fahlberg was working for H.W Perot, a firm who imported sugar from various countries, where he analyzed the purity of sugar. H.W Perot hired Ira Remsen, who provided the laboratories for the sugar tests. Fahlberg worked in this lab and eventually became a part of Remsen's institute. One day when Fahlberg sat down for dinner, he picked up his roll and it tasted incredibly sweet, which was unusual. He realized some chemicals from his hands must have gotten onto his bread and caused it to taste sweet. He went back to his lab, tasted everything on his lab bench until he found the familiar sweet taste. It was benzoic sulfinide, which was created through a reaction between $o$-sulfobenzoic acid, phosphorus chloride, and ammonia. This sweet substance became the first "substitute" for sugar and was later named Saccharin. Remsen and Fahlberg published this finding and took credit for the joint finding. Fahlberg later tested this chemical in 1882 to see if it had any adverse effects on the body. He found after twenty-four hours, he experienced no ill side effects, noting that the entire dose had been excreted out into his urine. With this positive finding, doctors started to prescribe Saccharin to treat headaches and nausea. Saccharin also became popular with dieters as it had no calories and mimicked the sweetness of real sugar. It was used as a sweet additive in coffee, tea, and other drinks, developing the term "artificial" sweeteners. Those in the food regulation industry were still concerned about the safety of Saccharin and in 1912, Saccharin's use in processed foods was prohibited, as its consumption levels had skyrocketed to dramatic levels. However, it could still be sold in pure forms, coming in powder or capsules. When World War I began in 1914 there was a shortage of sugar and scientists pushed for the use of Saccharin on a permanent basis in foods. This same push for Saccharin occurred again at the start of World War II, 1939-1945. However, post World War II, Saccharin production increased causing a major change in dynamics of processed foods as well as people's diets. People started to rely on
processed foods and premade meals rather than taking the time to make meals at home. These processed foods were using Saccharin instead of sugar for its cheaper prices and it improved consumer satisfaction. In 1958 Cumberland Packing Corporation developed the next artificial sweetener product, Sweet N' Low. Sweet N' Low is a mixture of Saccharin and Cyclamate. This new mixture taste more like sugar and consumers loved the resemblance of actual sugar. This new product caused the usage of artificial sweeteners to increase even more. However, Cyclamate was shortly banned in 1968 after studies found its possible relation to cancer. Because of this finding, the Food Additive Amendment act was created. This required all new products to be safe before distribution especially if they contained food additives. The FDA also created the first list of substances and additives that were deemed safe. By 1963, artificially sweetened soft drinks came onto the market. People had been sweetening lemonade and tea with sugar and saccharin for years but now soda had finally become "calorie free". This calorie free provided that sweet taste of regular soda but with half the calories. This new invention on the market caused the industry to triple as consumers jumped at the chance to drink anything sweet and calorie free. Dieters, diseased, and the malnourished could now enjoy their favorite soda without the cost of the calories from all the sugar while still getting the sweet taste they desired. The main artificial sweetener used in sodas was Aspartame, which was discovered in 1965. This sweetener is two hundred times sweeter than sugar and caught the attention of soda drinkers instantly. By 1967, another artificial sweetener popped up on the market, Sucralose, which was six hundred times sweeter than sugar. The most recent artificial sweetener found in 2002, Neotame, is easily metabolized and excreted by the body. It is used with other sweeteners and it used by a variety companies in the food industry.
Artificial sweeteners are found in many types of products, including canned goods, beverages, ice cream, yogurt, spreads, and gums. Different sweeteners are used for a variety of reasons. For example, some are lower in calories than natural sugar and are therefore safe for diabetics to consume. Before the discovery of Sucralose, Aspartame was the most common artificial sweetener and was widely used as a sugar substitute in coca cola and ice cream. Now, there are a variety of artificial sweeteners on the market including stevia, sucralose, and sugar alcohols, all of which are manufactured to offer consumers the “best” product, using different marketing strategies.

There are many uses for artificial sweeteners. Some products with artificial sweeteners are intended for consumers who are trying to lose weight, while others are for those who cannot consume natural sugar, like those with diabetes. Chocolate chips and gums contain sugar alcohols such as xylitol, mannitol, sorbitol, erythritol, and lactitol. Some types of sugar alcohols, like Xylitol, prevent tooth decay by reducing levels of bacteria. Ice cream is generally sweetened with Splenda or Stevia, and is often labeled “guilt free.” Canned goods, which are pasteurized at high temperatures, often contain Splenda, which is a sucralose, because Stevia is not heat stable. Stevia is an example of a zero-calorie sweetener that is sold in a variety of brands, including Sweet Leaf and Truvia. As Stevia is a plant extract and naturally low in calories, producers of low calorie products use it to sweeten products marketed to dieting consumers. “Natural” is an important quality when it comes to marketing food products for individuals who are health conscious, and companies do not want to produce foods that will not sell because consumers think they are made from chemicals. However, stevia gives off a bitter and unpleasant aftertaste, especially when heated, so it is not widely used. When stevia is used, masking flavors are often added to the final product to reduce the bitter aftertaste. These flavors contain molecules called
chemosensates, which trigger taste receptors in the mouth (Gelski 2011). These molecules induce salivary production to reduce dryness in the mouth, thus reducing the perception of bitterness. Higher quality stevia like that of Truvia have less of a bitter aftertaste, however it is much higher in cost to produce. Therefore, masking flavors are paired with lower quality stevia to decrease the production cost.

Another important artificial sweetener is sucralose, a chemically produced sugar substitute. Common brand names include Sukrana and Nevella, but the largest brand name on the market is Splenda, which has recently released ‘Splenda Essentials,’ which is Sucralose fortified with B vitamins, antioxidants, and fiber. The manufacturer of Splenda claims that Splenda Essentials with B vitamins will “help support a healthy metabolism,” and consuming the product will assist an individual in losing weight. The Splenda Essentials with Antioxidants contain “20% of Daily Value of Antioxidants (Splenda Essentials, 2012).” The product has pictures of nutrient-rich fruits like blueberries and strawberries to suggest that Splenda Essentials will provide the same benefits as real fruit. However, they are fortified with chemically synthesized vitamins, including Vitamin C, ascorbic acid, and Vitamin E, which is di-alpha-tocopheryl acetate. Splenda Essentials with Fiber contain one gram of fiber per serving, and has pictures of whole grain cereals on the product, again to suggest the idea that it will provide the same benefits as eating whole grain products. However, it is fortified with refined corn fiber and does not contain the same benefits as whole grains. Splenda Essentials portray these appealing characteristics to deceive their consumers into purchasing their products.

Splenda claims that their products contain certain healthy characteristics that it might not have. The pictures on Splenda Essential products are deceptive because consumers see them and often assume that the new, improved versions will help them lose weight, or that they are a
suitable alternative to real fruit. A lawsuit was filed in 2012 claiming Splenda Essentials violated the California’s Sherman Food, Drug, and Cosmetics Act, and the Consumers Legal Remedy Act (“Splenda Essentials…” CSPI 2012).

Another artificial sweetener competitor is Equal, which is made with Aspartame. Currently, Aspartame is the largest artificial sweetener produced globally and the industry has the potential to reach $1.5 billion by 2015 (“Global Artificial Sweetener…” 2010). This is a valuable point as it gives this a global context and makes it clear how prevalent this artificial sweetener is in the world’s food supply. Equal has a different approach with their marketing strategy. Equal promotes their product as an artificial sweetener, not “natural” one. They make a point of stating that they do not deceive consumers. Instead, they tell them that the product has a “sweet, clean taste, like sugar.” Conversely, Splenda claims their product is “natural” because it is made from sugar, even though it is chemically produced in a lab.

The marketing of artificial sweeteners often concentrates on those demographics most interested in losing weight. Many individuals are drawn to products that speed up their metabolism or burn calories without needing to compromise their eating habits. In fact, over the past decade, the number of products containing sugar substitutes has risen from 14% to 26% (Bennett). Many products containing artificial sweeteners, like ice cream, are labeled “no guilt,” so the consumer feels they can eat more without the concern of calories, from sugar at least. In an effort to better appeal to these consumer trends, many companies that produce artificial sweetener have teamed with healthy product development companies. Splenda, for instance, has produced nutritional bars to present their product as a healthful item suitable for consumers who want to lose weight.
Peering into the physiologic effects of artificial sweeteners, their effects within the matrix of our food, and what health implications that may have for us, is well worth noting. The metabolism and effects are different for each one and each individual but are very similar. In the next few pages I will predominately touch on sucralose and aspartame. They are the most predominant in the foods we eat with some of the most interesting, and perhaps concerning, pathways. Insofar as the effects are concerned, the ones worth noting are sucralose, aspartame, saccharin, neotame, and stevia.

Sugar is what we are really after. The entire reason for designing an artificial sweetener is because we as a human species like sweet—we are drawn to it. To better understand the medium of sweet and our attraction to beverages like diet coke and flavored water or foods like breakfast cereal and meal replacements, we will look at sugar first. What is the classification of sugar? Predominately it is known as the disaccharide sucrose. Sucrose is a glucose and fructose molecule held together by a glycosidic linkage. Not easily broken by amylase in our saliva or hydrochloric acid in our stomach but is broken into its glucose and fructose components via hydrolysis. Hydrolysis occurs by the sucrose enzyme sucrase, sitting on the microvilli in the small intestine (gut), and also with the help of a water molecule. The major appeal of artificial sweeteners in the eye of the consumer is that unlike sucrose, they do not contain any Calories (which we will note in the future may not always be the case). Consuming sugar or foods that contain/breakdown-to sucrose, raise blood sugar. This in-turn stimulates the hormone insulin to be secreted by the beta cells of the pancreas to manage/store the blood sugar. For short-term storage, a small portion is stored in the liver and skeletal muscle and the rest is stored as adipose tissue. As this sugar is transported into our system, sucrose interacts with the main four divisions of our gut: our intestinal wall, the enteric nervous system, the gut associated lymphatic tissue,
and our intestinal gut flora—the latter being most affected. Sugar can have deleterious effects on the health of cut flora and the gut overall.

This bombarded system continues to accumulate adipose tissue, primarily in the visceral region of the body, as a storage and self defense mechanism to protect us for the future when there may be less food available. This apparent societal effect of sugar consumption is just as much a social and life style issue as it is scientific and physiological. Most evidentially, the metabolic uses of scientific information are driven by the behaviors in our society. Until we have a consciousness change, as a species, about how we are going to grow, process, and eat our food, artificial sweeteners will be on the rise to match our biological driver for this sweet sensation. With that in the forefront of our mind: how is this all different for artificial sweeteners? We will break a few of them down and see some of the major differences. As previously mentioned, artificial sweeteners do not contain Calories. The body does not metabolize them for energetic use the same way the macromolecules of our diets diet do, namely—proteins, lipids, and carbohydrates (ie. sugar).

Why look into artificial sweeteners at all? People do not want to gain fat for sociologic reasons as well as obesity related health conditions and artificial sweeteners do not contain Calories for us to gain body fat directly. What is staggering is that when we look at data from the past 40 years, we see a strong correlation between the advent of artificial sweetener consumption and obesity rate increase. This correlation cries out for explanation.

Splenda is the number one packaged sugar sweetness replacement product in the U.S. food market. The artificial sweetener used in Splenda is sucralose. Since products like Splenda are claimed to contain no sugar then they are said to be safe for diabetic consumption. Sucralose
is 600 times sweeter than sucrose and in a packet of Splenda sucralose is less than or equal to 1% of the contents in the package. The remaining 99% or more of the package is mainly filler comprised often of maltodextrin, a polysaccharide, and dextrose, which is D-glucose. These fillers are carbohydrates and sugar and end up contributing four Calories to each package. Four calories may not seem like much but when people levitate toward sweet and are exposed to hyper-sweetened products but rationalize no negative physiologic effects of them, mass consumption is more prevalent than we think. For a diabetic patient this could mean severe hypoglycemic and hyperglycemic episodes especially if consumed in mass quantities for a prolonged period of time.

Now why does sucralose have no Calories? It has to do with the carbon to chloride covalent bond it contains. The only bonds in nature that contain chloride are ionic bonds, like that of table salt where sodium is ionically bonded to a chloride molecule. Because of this covalent bond, sucralose is also lipophilic. Some of the sucralose is excreted through the digestive and pulmonary systems but a significant portion remains in the body and can accumulate in the adipose tissue. The body will increase fatty acid synthesis to buffer the chemical and soothe any irritation it may be causing in smooth muscle, gastrointestinal tissue, or vascular tissue. When sucralose remains in adipose tissue, it isn’t causing much, if any, direct damage to the body. What is of concern is when fatty acid degradation, such as beta-oxidation, occurs and the chemical is rereleased and makes way toward portal circulation.

The liver has two stages of detoxification, phase one (oxidation) and phase two (conjugation). The body produces and utilizes the enzymes and co-enzymes necessary for phase one more readily than it does for phase two. In order to have lipophilic sucralose be made water-soluble so that it can be sweat off and excreted through the urine, it has to run completely
through both phases. When exercise is induced and fat begins burning, the body rereleases sucralose and the liver send it through phase one (oxidation) and an even more harmful intermediate metabolite is produced. This circulates through the vascular system and can easily pass through the blood brain barrier. Symptoms often include: headaches, a range of gastrointestinal issues, allergies, and weight gain.

Now let us take a look at an even bigger contender in the artificial sweetener world. Aspartame is the number one artificial sweetener in the food supply. It is often characterized by its most common package names Nutrasweet or Equal, just as sucralose is for Splenda. The chemical composition for aspartame is phenylalanine sandwiched between aspartic acid and methanol. Aspartic acid and phenylalanine are necessary amino acids in the human body and perform a variety of functions. We see an issue when these free amino acids are in excess with the consumption of aspartame. The peptide bond between phenylalanine and aspartic acid is broken through hydrolysis (with an acid, base, or water). Aspartic acid causes an influx of calcium ions (Ca++) into the cell, which in turn send an influx of different free radicals into the cell. This is not an issue when we get aspartic acid, as well as phenylalanine, form our diet, but this large influx of processed protein to free amino acid is where the problems lie. Free radicals are fine in small amounts. They are constantly performing necessary oxidative reactions in our body. When in excess this can excite neurons to death. Phenylalanine is often thought to deplete serotonin when in fact they are just outcompeting each other. When phenylalanine is in excess, serotonin is greatly diminished which off sets mood regulation, and this can have dramatic effects over the long term.

There is about 40% aspartic acid, 50% phenylalanine, and 10% methanol in aspartame. While excess free amino acids are causing an issue, what’s more is the weakness of the
phenylalanine methyl bond (methyl ester bond). When ingested, the hydrochloric acid in our stomach breaks the bond and forms free methanol. What’s the big deal though? We ingest methanol all of the time in our fruits and vegetables. The issue is that while yes, there is a significant amount in your fruits and vegetables, it’s bound to pectin and passes through your gastrointestinal system without damaging your bodies systems. Free methanol moves to formaldehyde via the enzyme alcohol dehydrogenase. Often when we look at animal models, take rats for example, we see that formaldehyde moves to formic acid (or rather formate and CO2). Formic acid is then excreted in the urine and breathed out through the pulmonary system with a fair amount of ease. If we could do this, than there would be little to no issue with methanol formation to formaldehyde. The problem is that we do not have formaldehyde dehydrogenase to move from formaldehyde to formic acid. This is why animal toxicology models are flawed and do not accurately represent metabolism in humans. Since formaldehyde stays in the human body, it stays in body tissues and cells causing protein and DNA damage. Some of the issues that can arise are: breast cancer, prostate cancer, oxidative damage in the brain, increased metastasis of cancer cells in vitro, certain blood cancers (multiple meloma, non-hodgkins lymphoma, and leukemia), and migraines being the most common symptom.

There have also been links to carbohydrate cravings from the free aspartate and accelerated fatty acid synthesis, leading to increased fat storage and weight gain. This is because it raises insulin and leptin. Insulin is the fat producing hormone; it stores excess energy. Leptin inhibits appetite but if overproduced, as with ingestion of aspartame, someone can become leptin resistant just as someone can become insulin resistant.

Having touched on the two main artificial sweeteners there are a few others worth noting. Saccharin is something to keep note of because it is the third largest consumed artificial
sweetener and has similar physiological effects to that of aspartame and splenda. It too has been shown to have impacts on insulin and leptin increasing carbohydrate cravings and weight gain. Bladder cancer is also of major concern for saccharin. Neotame is an up and coming artificial sweetener owned by Nutrasweet. The structure of this molecule is almost identical to aspartame but a 3,3-dimethylbutulaldehyde has been added which stops the hydrolysis of the peptide bond between phenylalanine and aspartic acid from breaking. This still leaves the issues of formaldehyde and with an even higher melting point, the range of foods that neotame can be added to will increase. Finally stevia, which has common brand names such as Truvia and PureVia, is a “natural” sweetener. What this essentially means that is grows in nature in the same molecular configuration as we apply it to the food supply. It’s not technically anymore artificial than sugar is. It is processed and packaged but is less of an additive than sugar by quantity since this non-caloric sweetener is 200-300 times sweeter than table sugar. Typically stevia is not added to very many foods since it does leave a metallic after taste, as do most alkaloids such as the coca leaf. What’s more is this stevia sweetener is almost unanimously seen as safe by the scientific and public community.

With all that has been looked into with sweeteners, where are we now? Currently, for many people using artificial sweeteners seems like the easy way out to lose weight. They may be free of calories but are they really free of consequences? Ever since the introduction of sweeteners, their presence in food has increased exponentially. Oddly enough, correlating with the rise of obesity. In class, data was presented on how with the boom of artificial sweeteners there was also a significant increase of obesity prevalence. Therefore, the general public should not view artificial sweeteners as a way to decrease their calorie consumption. Instead, they should learn what these chemicals do to you metabolically and psychologically. The more aware
someone is about the consequences of something, the more likely they will question if they should have it.

On the administration side of things, how does the Food Drug Administration go about regulating these artificial products? Well in their mind a sugar is a sugar whether it comes from corn sugar, cane sugar, or any of its constituents. Looking into what was on the FDA website, food companies are required to state on the ingredients label what specific sweeteners are added. For aspartame specifically, it must explicitly say that is contains phenylalanine since people with phenylketonuria will not be able to digest it. However, overall the FDA has approved these sweeteners for numerous foods in a variety of products. According to the National Health institute, there is no sound scientific evidence that the use of artificial sweeteners cause any sort of cancer related or serious health problems. Nevertheless, with concerns that these sweeteners do cause issues, the FDA responded with giving out an acceptable daily intake (ADI) of four major sugar additives. They recommend with aspartame, the safe level would be around 50 milligrams per kilogram of weight, which would be roughly having 18 cans of diet soda a day. With saccharin, the ADI is 5 milligrams per kilogram, which would equal around ten packets of the sweetener, more commonly known as Sweet and Low. Sucralose, also known as Splenda, has been the subject of fewer artificial controversies because it hasn’t shown any real negative side affect. The ADI for sucralose is 5 milligrams per kilogram, or about 6 cans of diet soda. Lastly, acesulfame K’s ADI is 15 milligrams per kilogram, which is also around 6 cans of diet soda. The FDA gave these intake levels to show how moderation, like all things is the key. Since these sweeteners are not necessary harmful at these levels, then they can be justified when adding them to different food products. If people used these specific amounts and did not have them that frequently, then they probably would not experience any negative side affects.
With all that has been said about artificial sweeteners, how does society learn more about them? Ever since the potential health consequences have surfaced, multiple documentaries, studies, and research have been based around the use of these products. Right now on Netflix, there are two documentaries commentating about the use and dangers of sweeteners. In one of the films, Hungry for Change, it shows how Americans have exploited sugar into basically our entire food system. They explained how in the 1900s, the average person would consume around 15 grams of sugar per day. Today, the average person consumes 70-80 grams per day, while most kids and teenagers are having 120-160 grams per day. The documentary concluded that this dramatic increase could be explained by the use of artificial sweeteners. When you abuse that type of sugar it has metabolic consequences, as we have seen in our own research. The metabolic changes can lead to these addictive processes and change brain chemistry, making it very difficult for the public to consume the right amount and type of carbohydrate. The movie basically tells the viewers that a lot of people are addicted to food that keeps making them unhealthy. It’s all a vicious cycle. However, the main point of the film is to just have people become more conscientious of what exactly they are putting into their bodies.

The there are only two ways to change a diet of a population. One is to educate the society when they are young about the affects of artificial sweeteners and what foods they are found in. The other is to entirely remove it from food products during processing. The latter would most likely be harder to accomplish seeing as industries use artificial sweeteners as a way to keep cost down, to ‘lower calories’, and also as a health alternative for diabetics. With this being said, educating the public about sweeteners would most likely help influence making the practice of eating artificial sweeteners less common. In today’s school systems, it is widely known that food and nutrition in general is not a topic highly focused on. If kids have a chance to
learn how many items contain these substances, there is a chance they would start using them less.

Sugar has come a long way from its roots, in a literal and physical sense. It started all the way in Polynesia thousands of years ago, made its way as a global commodity, gave rise to carbonated beverages, and then finally to artificial sweeteners. Looking at the timeline of the sugar history, sugar additives are relatively new in the scheme of things. Sugar additives are shown as a beacon of hope for diabetics. Giving them an opportunity to enjoy sweetness while keeping their insulin and metabolism problems at bay. However, when used in excess, artificial sweeteners are believed to somewhat carcinogenic, change the way we crave food, and trick our body into seeking more carbohydrates. There have been many documentaries revealing the health concerns for artificial sweeteners, thousands of studies have been performed, and the FDA has even supplied recommended daily amounts. With that being said, every citizen of Western countries, knowingly or not, is consuming artificial sweeteners. These chemicals are basically in every type of food that is processed. So where does that lead us? We know, just from media and word of mouth, that artificial sweeteners are in this weird grey area—a superhero one day, and a villain the next. The overall message is pretty much that anything is excess will lead someone down a dangerous path. From the research, it can be concluded that these sweeteners break down a little differently than normal sugar, meaning they will also cause different consequences. Overall, this is what it comes down to: you are the deciding factor of what you put into your body. On every product there’s a label, if there’s artificial sugars just know moderation and using these sugars appropriately is vital for your overall health. Judging from the research, only serious problems will come when someone ingests an excess of artificial sugar. Therefore, the next time
you walk down a grocery aisle and pick up your favorite sugary snack, weigh the pros and cons, and always question – to eat or not to eat? The choice is yours.

Works Cited


