Evolution has conditioned living things to eat as much as they can whenever they can. After all, it is never certain when the next feeding opportunity will come along. Likewise, when a choice of foods is offered, mammals especially, choose those rich in carbohydrates and fats because they offer energy that can be stored in the body, thereby giving the animal a better chance to survive until the next meal comes along.

Those feeding instincts were fine until a few hundred years of globalization, plus some colonization helped to make sugar commonplace. Not that there haven’t always been critics, “Sugar hath now succeeded honie,” the author of a medical book wrote in 1633, “and is become of farre higher esteem, and is far more pleasing to the palat.” He also claims that sugar “heateth the blood and rotteth the teeth,” among other things. Now of course, sugar is one of the things people try to cut back on or eliminate altogether. But thanks to our survival programming, sweetness is something few can do without, which is why there is such a dynamic market for sugar and sugar substitutes.

A sugar substitute is a food additive that provides a taste of sweetness but usually has less food energy. Some substitutes, such as honey, maple syrup or high fructose corn syrup (HFCS), are natural and some are synthetic. Natural sweeteners are also known as nutritive sweeteners because they contain nutritional value—producing energy when metabolized—and today contribute the bulk of calories in many of prepared foods in developed countries (see chart at left). But because the human body metabolises fructose differently than glucose (fructose does not trigger the release of appetite suppressing endorphins) the rise of HFCS is also contributes to increasing rates of obesity.

While most of the nutritive sweeteners are as caloric as regular table sugar, one group—the sugar alcohols—is metabolized differently, has significantly lower calories, and is used to create many reduced-calorie foods (see glossary at the end of this paper).

Synthetic or artificial sweeteners on the other hand, are known as Non-nutritive sweeteners and were created specifically for their lack of calories. These sweeteners do not provide the body with energy. They are chemicals that offer the sweetness of sugar without the calories. Moreover, because they are much sweeter than sugar, they can be used in tiny quantities to create the same sweetness. In fact, packets of artificial sweeteners on restaurant tables, such as Equal® and Splenda® are mostly full of fillers or bulking agents because only a few grains of the chemical are needed for sweetness.

The Economics of Sweetness

It is this sweetness in minute quantities that encourages food and beverage companies to replace sugar or corn syrup with artificial sweeteners in virtually any product that contains sugar, or to add sweetness to less sweet products such as toothpaste, vegetables, meat products, even pet food. While the profit margins on artificial sweeteners can be very high for manufacturers, they still cost customer companies less than sugar or corn syrup, which was itself introduced as a cheap alternative
to sugar. So it is no surprise that the food industry promotes high margin diet or reduced-calorie products, and over the past few years, the portion of new product introductions containing sugar substitutes has risen steadily from 14% to 26%.

This does not mean that sugar is out of fashion- A recent U.S. Department of Agriculture survey found that the average American consumes the equivalent of 160 pounds of sugar a year or 35 teaspoons a day, a 30 percent increase over 1980. This is due in large part to sugar additives in so many prepared foods. Consumption is even higher in the UK at 165 pounds, while other European countries range from 110 to 145 pounds per year. The result is that sales of sugar, sweeteners and high intensity sweeteners (HIS), rise together, rather than one type displacing another.

However in recent years the increase has slowed as concerns about obesity and related health problems such as diabetes have risen. These in turn stimulate the market for sugar substitutes, especially non-nutritive sweeteners: Today 200 million Americans consume sugar-free or low-calorie products, according to the Calorie Control Council, and half are frequent users, consuming an average of four products every day that contain sugar substitutes. Much of this is accounted for by diet soft-drinks, which make up 39% of the $70-billion annual U.S. soft drink market, and according to Beverage Digest, the percentage is rising.

Despite the concerns of some scientists and doctors and anti-sweetener consumer groups that artificial sweeteners are unhealthy; causing headaches, cancer, blood disorders, strokes, etc., the trend is for greater use of artificial sweeteners. For example new low-sugar beverages, dairy products and snack foods are proliferating. Although stores such as Whole Foods in the US do not stock products that contain artificial sweeteners (every trend spawns a counter-trend), a majority of consumers have welcomed these additives into their diets, particularly in soft drinks.

**NutraSweet, the Pace-Setter**

1991 was a high water mark for the NutraSweet Company. It had sales of over $1bn and was a branded sugar substitute in over 4000 products in 150 countries. The product was also protected by patents, which allowed the company to charge high prices and generate an operating margin approaching 40%. It was also the company that had shown the way for branded ingredients makers.

The G.D. Searle Company was founded in 1890 to make elixirs and medicines for doctors in Chicago. With good products Searle grew quickly. In 1965 a Searle chemist named James Schlatter was working on aspartame, a compound of L-aspartyl and L-phenyl-alanine, amino acids that occur naturally in many foods, but seldom together. The compound was being investigated as a possible treatment for ulcers. One day in the lab Schlatter licked his finger and was surprised by an incredibly sweet taste. He noticed that a tiny dusting of aspartame had fallen on his lab book. Over time, this bad laboratory practice will come to seem the most common way of discovering new sweeteners.

Patent applications for both product and production process were filed. But since Searle had no experience of foods, it formed a group, reporting to Bob Chein, Head of Marketing Research, to explore the market for artificial sweeteners while another group sought FDA regulatory approval. Within weeks, Chein found the sweetener market was worth several billion dollars, was growing, and that the two major competitors, saccharine and cyclamate, both had taste and safety problems.

By 1979 FDA tests neared completion and it was clear that aspartame’s prospects were far bigger than originally thought because Americans were becoming interested in fitness and health. This implied a strategic choice: to market NutraSweet to food and drink manufacturers as an ingredient; or
to market it to both manufacturers and consumers under its own brand name. Either could be profitable, but the riskier (and potentially more profitable) option was to establish an ingredient brand, which had never been done before.

**The NutraSweet Company**

Because food industry customers would be new, the NutraSweet company was set up as a separate division of Searle under Bob Shapiro in 1982, a few months after the FDA approved aspartame for dry applications (candies, powdered drinks, etc.) but before any sales had actually taken place. Searle had been so concerned with getting aspartame approved, that little effort was put into selling it. Within six months of approval however, several food companies introduced products containing aspartame.

Shapiro built production capacity and upgraded marketing. Ogilvy & Mather, the giant advertising firm, was hired for marketing strategy and ultimately it was decided:

1. To develop and market aspartame under the NutraSweet name, and
2. To position NutraSweet as scientific, safe, conscientious and reliable.

NutraSweet was by now the most thoroughly tested ingredient in history. Shapiro did not want to rely on client companies to promote the brand, after all, they had their own brands to support. And while there were similar brands, like Teflon and Dolby, there was no brand in the food industry that was remotely similar.

Shapiro’s fears about customers promoting NutraSweet rose when brands using aspartame did only moderately well in the marketplace. He felt the food companies weren’t doing enough to educate customers about the benefits of the product. Between 1982 and 1985 Shapiro spent $60 million on advertising for NutraSweet. He sent NutraSweet gum and an information pack to nearly every household in America. With these, NutraSweet attained great product awareness and consumers began to understand and trust the product. At the same time Shapiro built relationships with Coke and Pepsi and other food companies.

While it was often straightforward to make products using aspartame, the big companies felt NutraSweet’s demand to place their red and white logo on the packaging was extravagant and the cola giants were leery of committing such important projects to a company as small, young and brash as NutraSweet.

Shapiro had only until 1992 before the patent on aspartame ran out and the company would have to compete with generics. Plus, if he succeeded, others would develop products as good or better than aspartame. So he knew that even while he was promoting NutraSweet, he had to develop its replacement.

**The Cola Wars**

In 1969, the average American consumed 95 litres of carbonated soft drinks (CSD) per year. But by the mid-1980s, the category growth-rate was only 4% per year. To broaden its product line and brand appeal Coca-Cola introduced Diet Coke with saccharine in 1981, but it wasn’t very sweet and had an aftertaste, so it did poorly and the diet segment stayed at about 10% of CSD sales.

The early 80s, the CSD companies wanted to ride the growing trend towards health and fitness and began introducing reduced-calorie products. In 1982, under sales pressure from Shapiro, PepsiCo took the plunge and launched Diet Pepsi sweetened with NutraSweet. It was a huge hit. And not wanting to miss out, Coke soon followed. By the end of the year the diet segment had blossomed from 12% to 21% of the soft drink sales. By 1991 diet had reached 34% and NutraSweet topped $954 million in sales. With that, Coke and Pepsi felt that they finally had solid diet products. Moreover, they saw that these products not only grew the diet segment, but made the entire CSD category grow.
Diet Share of US CSD Sales

<table>
<thead>
<tr>
<th>Year</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>12%</td>
</tr>
<tr>
<td>1983</td>
<td>11%</td>
</tr>
<tr>
<td>1984</td>
<td>14%</td>
</tr>
<tr>
<td>1985</td>
<td>17%</td>
</tr>
<tr>
<td>1986</td>
<td>21%</td>
</tr>
<tr>
<td>1987</td>
<td>23%</td>
</tr>
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<td>1988</td>
<td>26%</td>
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<td>29%</td>
</tr>
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<td>1990</td>
<td>31%</td>
</tr>
<tr>
<td>1991</td>
<td>34%</td>
</tr>
<tr>
<td>1992</td>
<td>37%</td>
</tr>
<tr>
<td>2000</td>
<td>38%</td>
</tr>
<tr>
<td>2007</td>
<td>39%</td>
</tr>
</tbody>
</table>

The impact of the Coke and Pepsi adoptions was profound for NutraSweet. Sales rose more than 8-fold over ten years and by the 1990s topped $1bn. About three quarters of this came from diet Coke and diet Pepsi.

However, despite rising sales, healthy margins, and growing profits, the company remained under-capitalized. Like other companies in this situation, NutraSweet became a ripe target for acquisition by a company with deeper pockets and in 1985 NutraSweet was acquired by Monsanto, maker of a variety of branded herbicides, fungicides and industrial chemicals. Monsanto felt that they were getting a good brand with lots of upside potential, and that they could extract more profit from the brand than could Searle because they had much more experience in supplying chemicals and ingredients to client companies. Plus, they were experienced at running consumer brands. The acquisition also enabled NutraSweet to invest in new product development and marketing.

Growing up

Huge growth may be a company’s dream, but it comes at a cost. By 1986 NutraSweet needed to transform its loose, entrepreneurial organization into a buttoned-down partner of giant corporations and management had to:

1. Strengthen their low cost producer status.
2. Develop a much stronger customer service orientation and improve customer relationships
3. Continue to develop new applications for aspartame.
4. Become the dominant international competitor in artificial sweeteners.
5. Develop a successor to aspartame in the shortest time possible.

In pursuit of these goals, NutraSweet invested in production, culminating in 1989 in a $120m factory that doubled US production capacity. This made clear NutraSweet’s intention to become the industry cost leader to pre-empt competitors entering its market.

Trying to keep momentum: Experiments in new areas

Needing new products, NutraSweet developed Simplesse with the idea of duplicating NutraSweet in the reduced fat market. In 1989, after $35m and six years of development Simplesse was approved by the FDA. The company also developed a frozen dessert using Simplesse to reduce fat by 95%. It was called Simple Pleasures and was supported by a national consumer advertising campaign.

Despite a good reception for both products, by 1991, NutraSweet saw that neither was going to be huge; Simplesse faced forty competitors, and NutraSweet did not have the resources to build the brand. For Simple Pleasures, there was competition in the channels of distribution – the brand could not buy enough shelf space, and many customers of Simplesse viewed Simple Pleasures as a competitor. In short, the company did not have the depth to manage a national consumer brand.

Patent Expiration leads to generic competition and price pressure

The patent on aspartame expired in Europe in 1990, and in the US in late 1992. At the beginning of 1992, NutraSweet announced a sweetener that was 8-10,000 times sweeter than sugar and began FDA approval process. In the meantime, it rolled out new forms of aspartame such as table-tops (Canderel® in Europe, Equal® in the US) for sale in restaurants and supermarkets.

With patent expiration came price erosion. The largest maker of generic aspartame was Holland Sweetener Co. AG, which pursued an anti-dumping action against NutraSweet, forcing it to sell in Europe at the same price as in the US. By the end of 1994, Holland Sweetener had 30% of the European market and doubled production capacity. Competition also came from new products.
Several of these could not match NutraSweet's taste performance, but they had price advantages. In addition, several of them were heat stable and could be used in cooking applications.

By 2000, Monsanto saw that the NutraSweet brand could no longer deliver its usual high margins and sold the table-top business to Merisant, a marketer of 19 sweetener brands. It also sold the ingredient business to JW Childs which continued to hold the rights to use the NutraSweet name for ingredients. As part of the deal Merisant bought all its aspartame supplies from Childs. Even though the brand was split up, consumers continued to see the familiar sweetener packets on restaurant tables and the swirling logo on thousands of consumer products. On the other hand, neither Merisant nor Childs put much money into marketing support for the brand.

### Table 2  Major Artificial Sweeteners

<table>
<thead>
<tr>
<th>Sweetener</th>
<th>Trade Name</th>
<th>Price/ kg</th>
<th>Sweetness x Sugar</th>
<th>Attributes</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saccharine</td>
<td>Sweet ’n Low</td>
<td>$4</td>
<td>300</td>
<td>Aftertaste</td>
<td>US, Europe, Asia</td>
</tr>
<tr>
<td>Aspartame</td>
<td>NutraSweet, Candarel</td>
<td>$80</td>
<td>180--200</td>
<td>Unstable at high temp</td>
<td>Worldwide</td>
</tr>
<tr>
<td>Acesulfame-K</td>
<td>Sunnette</td>
<td>$24</td>
<td>200</td>
<td>Aftertaste</td>
<td>Worldwide</td>
</tr>
<tr>
<td>Alitame</td>
<td>n/a</td>
<td>?</td>
<td>2,000</td>
<td>Cookable Soluble</td>
<td>Pending approval</td>
</tr>
<tr>
<td>Sucralose</td>
<td>Splenda</td>
<td>$180</td>
<td>600</td>
<td>Cookable</td>
<td>Approved 1998</td>
</tr>
<tr>
<td>Sweetener 2000</td>
<td>Neotame</td>
<td>$640</td>
<td>8-10,000</td>
<td>Cookable, Soluble</td>
<td>Approved 2002</td>
</tr>
</tbody>
</table>

By 2007 the market measurements company SRI estimated that the US food additives market to be worth more than $5bn and growing at about 3% per year. High intensity artificial sweeteners made up about a quarter of this market. And of this, NutraSweet had about half, but this was expected to slip as customers experimented both with generic aspartame, and blends of artificial sweeteners that more exactly approximated the taste of sugar.

In the rest of the world where an increasing portion of NutraSweet revenues came from, NutraSweet’s market share was usually a bit lower than in the US. In Europe for example, Holland Sweetener Co. had about 45% of the aspartame market by 2005. Ironically, Holland Sweetener also faced generic competition from Aspartil, manufactured by Enzymologa of Mexico, and from Ajinimoto of Japan, which began to acquire the aspartame production capacity of other firms in the 1990s, culminating in the purchase of Holland Sweetener’s capacity in 2006.

Of the major artificial sweeteners worldwide, the oldest is Saccharine, which dates back to the 1880s while the newest, Neotame, a modified version of Aspartame, was approved in 2000. However, while these sugar substitutes have a synthetic base, another sweetener, Sucralose, was approved in 1998 and is marketed under the name “Splenda” and has been able to make much of the fact that it can be seen as more “natural” because it is ultimately derived from sugar.

**Splenda, One of the most successful consumer-product launches in history.**

For years the sweetener bins at McDonald’s were dominated by the same three colors: pink, white, and blue. But in the summer of 2006, the chain’s countertops took on a new yellow hue. McDonald’s 13,700 U.S. stores moved out Sweet’N Low’s pink packets to make room for Splenda, a sweetener that customers had been clamoring for since it hit the market in 2002. Though the switch didn’t make McDonald’s any more money, Splenda’s popularity meant that another sweetener simply had to go.
It may be hard to believe that consumers could feel so strongly about an artificial sweetener, but McDonald's wasn't a one-off. When Starbucks began stocking Splenda, employees kept it behind the counter so customers wouldn't take fistfuls. In fact, thanks in part to its courting of big-name brands, Johnson & Johnson's McNeil Nutritional PPC division has accomplished one of the most impressive feats in consumer-marketing history: taking an unknown brand to No. 1 in less than five years.

The secret formula? Starting small but attacking the market on many fronts. McNeil rolled out the brand gradually, first to diabetics and then to grocery stores and restaurants. Meanwhile, the company persuaded small food and beverage makers—including low-carb diet company Atkins Nutritionals to use Splenda as an ingredient before going after high-profile brands.

McNeil also aimed Splenda marketing not at other sweeteners but against sugar—its advertising emphasized that it is the only artificial sweetener that measures and bakes like sugar. This may turn out to have been a costly gamble since it resulted in legal action from Merisant, and the sugar industry (see articles below). Nonetheless, it struck a chord with consumers trying to satisfy their cravings for sweetness, without feeling like they were going chemical.

Splenda may be achieving something no other sweetener has been able to do: dip into sugar sales—it’s rise coincides with falling sugar sales in the US, and flattening demand in Europe. Splenda's revenues recently passed those of top sugar brands Domino and C&H, according to Information Resources International. "Our competition isn't just low-calorie sweeteners," says Debra Sandler, McNeil's worldwide group president. "It's any sweetener, including sugar. I'm looking for iconic status."

The Right Stuff

Splenda is the trade name for sucralose, which is produced by English ingredient maker Tate & Lyle and was discovered by accident in 1976. It is made in a 5-step process in which sucrose reacts with chlorine (the chemicals and process makes some scientists leery). In the end, it is a sugar molecule in which three hydrogen-oxygen groups are replaced with three chlorine atoms that is not metabolized by the body. It is also 600 times as sweet as sugar. Even better, Tate & Lyle found that sucralose could withstand cooking and freezing. Tate & Lyle partnered with Johnson & Johnson who helped get FDA approval in 1998. McNeil then created the Splenda brand to sell to retail stores and restaurants.

Sandler, a 13-year veteran of PepsiCo, was charged with introducing the brand and she decided to make the product available to a small but crucial consumer base: diabetics—long the bedrock customers for sugar substitutes. In 1999 she began selling Splenda on the website for LifeScan, a J&J company that makes glucose monitors. Diabetics, it turned out, had a powerful word-of-mouth network and the online business moved more than 1 million units in two years; meanwhile, Sandler mobilized the medically savvy J&J sales staff to educate doctors and nutritionists about Splenda.

Sweetening the Pot

Those early days established what would become Splenda's main marketing message—"made from sugar, so it tastes like sugar"—an appeal to consumer desires to avoid the aftertaste and perceived
health risks associated with Sweet'N Low's saccharine and Equal's aspartame. After Splenda's yellow boxes appeared in shops in 2000, McNeil rolled out a series of ads playing off nursery rhymes such as "Splenda and Spice and Everything Nice." The emotional appeal was a dramatic shift from the more functional advertising of Equal and Sweet'N Low, which competed mainly against each other. By challenging sugar head-on, Splenda positioned its product as more natural.

As a subtle way to boost Splenda's recognition, McNeil got the ingredient into consumer products as soon as possible. Sandler knew that Cadbury Schweppes's Diet Rite wanted to differentiate itself from Coke and Pepsi, so after Splenda got FDA approval, McNeil began working with the beverage maker to replace the cola's aspartame with the Splenda. Diet Rite saw Splenda as reinforcing its own "Better for you" message and began promoting the reformulated cola in 2000. Sales have climbed steadily as a result; they were up 35 percent in 2006 alone.

It also didn't hurt that Splenda's debut coincided with the low-carb diet craze. Seeing the brand's potential as a low-carb ingredient, McNeil approached Atkins Nutritional and persuaded them to use Splenda in its new line of nutritional bars. Suddenly companies all around the country wanted to use sucralose and in return, often displayed the Splenda logo on their packages. The Velvet Ice Cream brand enlarged its Splenda logos in 2003, after sales passed those of the company's old NutraSweet line. In 2003, Splenda overtook Equal as the No. 1 artificial sweetener and according to Mintel, sucralose contributed in part to the 11 percent drop in sugar sales between 1999 and 2004.

Going to the Table

In April 2004, McNeil ceded management of the ingredient business to Tate & Lyle, which has since gotten Splenda into more than 3,000 foods and drinks, including Diet Coke. For Tate, sucralose is only about 5% of its sales at about $150m, but with a margin of 46%, represents 22% of its profits from sales to McNeil, General Mills and Unilever amongst others. Demand was so high that Tate turned away new clients until 2006 as it increased production.

Meanwhile, McNeil focused on selling Splenda packets to the nation's 100 largest food-service chains. Similarly, the company worked with restaurants to create Splenda-branded menu items. In 2003 it approached the Cheesecake Factory, which spent months developing a recipe for its 6-Carb Original Cheesecake Sweetened With Splenda, which has been one of the restaurant chain's top sellers since its debut in 2004. McNeil now supplies chefs with 5-pound bags to encourage them to develop recipes. It's also spent some of the millions it's poured into R&D to create new consumer variations that are optimized for baking, releasing a white-sugar blend and a brown-sugar blend.

All of this brand building soon became even more important. Though sucralose itself isn't patented anymore, there are 35 patents protecting the process of making it; these started to expire in 2006, so it's only a matter of time before generic versions surface. (Ironically, NutraSweet is reportedly working on one.) "Tate & Lyle and Johnson & Johnson aren't going to have a free run on this forever," says Julian Lakin, a food and beverage analyst for Mirabaud Securities. But Sandler isn't worried: McNeil is poised for a major European expansion and she thinks the Splenda brand can stand up under pricing pressure. "Private labels are a fact of life, and we'll protect our brand by continuing to innovate," Sandler says. "From my perspective, the Splenda brand is limitless."

The Natural Movement

The growing preference for foods and beverages with natural additives is a major restraint on the intense sweetener market. Over the past few years, natural and organic foods and beverages have recorded impressive growth and consumers are showing a growing preference for sweeteners perceived as more natural, such as sucralose, polyols and natural sweeteners such as Stevia.

NutraSweet and generic aspartame currently hold the largest share of the High Intensity Sweeteners market. In 2007, revenues generated from aspartame represented about 44 percent of the total HIS
market, but are expected to decrease to 35 percent by 2012, due to increased competition and price pressures. This is somewhat complicated by the eminent emergence of generic sucralose, already being marketed by Chinese companies.

Revenues for Acesulfame-K and saccharine are also expected to decrease over the forecast period due to the increasing popularity of sucralose. As such, sucralose at current growth rates is forecast to have strong growth, and is likely to account for as much as 40 percent of the market in 2012, growing from its present share of 23 percent.

In respect to application trends, beverages account for more than 65.0 percent of the consumption of intense sweeteners. The remaining 35.0 percent is in other applications such as tabletop sweeteners, low-calorie confectionery, baked foods, ice creams, and dairy products.

The global scene is much as in the US, but lagged by a few years, and with a few exceptions where different products are approved for use. There are also historical differences; stevia for example, is a sweetener of long standing in Asia, but relatively new to Europe and the US, where it is being examined by regulators.

Questions

1. How would you describe the High Intensity Sweetener market? What are the market’s main characteristics?

2. Outline the general marketing strategy employed by NutraSweet.

3. Was the same strategy employed by Splenda? If not, what are the differences? How would you advise McNeil Nutritionals to maximize the value of the brand?

4. What are your expectations for the High intensity Sweetener market over the next 5 years or so?
Obesity concerns drive artificial sweetener market

Social and health concerns relating to obesity are driving market growth for the global artificial sweetener market, according to a new report.

Published by Global Industry Analysts, Artificial Sweeteners: A Global Strategic Business Report reveals that a worldwide weight reduction effort is stimulating the $5.3bn global artificial sweeteners market, of which the US and Europe currently make up 65 per cent.

According to the report, the global sweetener market is currently achieving a compound annual growth rate of 3.7 per cent. Other key factors driving the market include attempts to create foods for diabetic patients (linked to obesity), a growing number of people wanting to cut sugar intake, worries regarding dental care, and an increase in production of diet foods and beverages.

Breaking the category down, the global market for sucralose artificial sweeteners will allegedly grow the fastest, posting a CAGR of around 10 per cent. This will be followed by the aspartame-based artificial sweetener market, which will most likely reach above and beyond the $3bn mark in 2008, expanding on its current 50 per cent hold of the global market. However, a category not faring so well is that of the saccharine artificial sweetener market, which the report claims could be linked to a study conducted in the 1960's that found high doses of the ingredient caused bladder cancer in laboratory rats. Nevertheless, more than 90 nations, including Canada, approve restricted level use of the sweetener following various studies conducted from 1977 to 1991.

In the US, the Food and Drug Administration (FDA) continues to approve the use of saccharine, along with four other sweeteners: sucralose, aspartame, acesulfame K and neotame. It is also reviewing two new low-calories sweeteners, altitame and cyclamate -opening up the global market for further competition, price erosion and distributed customers.

In terms of sweetener usage, new-age beverages, dairy products, salad dressings and salty snack foods represent the fastest expanding markets for the sugar substitutes industry. Major players in the market include Nutrasweet, Tate & Lyle, Nutrinova, Merisant, McNeil Nutritional, Danisco, Spherix and Imperial Sugar. Despite the anticipated developments in the market, many food and beverage companies globally are said to be steering towards a health and wellness trend, replacing 'artificial' ingredients, such as colours and sweeteners, with ingredients considered more 'natural'.

Likewise, a report by the Freedonia Group published earlier this year claimed that an expected increase in overall high intensity sweeteners volume will result in the market seeing falling prices, as patent protections expire and new competitors - especially importers based in developing nations - enter the marketplace. High intensity sweeteners are expected to remain the largest product category through 2010 due to their leadership position in diet soft drinks and tabletop uses, which are among the main applications for alternative sweeteners.

LOS ANGELES, Nov. 17 (UPI) -- Splenda's slogan tying the substitute sweetener to sugar is at the heart of a $1 billion lawsuit brought in Los Angeles by the sugar industry.

In their federal lawsuit, Sugar Association officials take issue with two subsidiaries of Johnson & Johnson Co., the creators of Splenda, using the marketing slogan "Made from sugar, so it tastes like sugar," the Los Angeles Daily News said Saturday. The Sugar Association alleges the slogan, along with its partner phrase "Good for the whole family," represents deceptive advertising on the part of McNeil PPC Inc. and McNeil Nutritional LLC.

The legal battle has been brewing for three years and has revolved around how Splenda is made, with Sugar Association officials arguing it is truly a man-made chlorocarbon. McNeil officials deny misleading anyone, saying Splenda, the top sugar substitute, is made through a patented, multi-step process that starts with sugar. The Daily News said Sugar Association attorneys managed to get the U.S. District Court trial, which has a key hearing scheduled for Monday and will officially get underway in January.

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Splenda Marketing lawsuit to go ahead, says judge

11-Dec-2007 - A lawsuit regarding claims of false advertising for the artificial sweetener Splenda is set to go ahead as planned, after a federal court rejected a request for summary judgment.

The case between industry body Sugar Association and Johnson & Johnson - parent company of the distributor of the artificial sweetener - was originally set to go to trial this month. It follows a long-standing dispute between the company and the trade body, which claims that the marketing slogan for the product - 'Made from sugar so it tastes like sugar' - is deliberately being used to make consumers believe that the artificial sweetener contains sugar. However, Johnson & Johnson, representing its subsidiary firm McNeil Nutritional, requested a summary judgment on the grounds that the plaintiffs had unreasonably delayed bringing suit.

United States District Dale Fischer rejected this request, saying that the claims against Johnson & Johnson should be heard by a jury at a trial on the merits. The trial is now scheduled to begin on January 29, 2008.

According to Andy Briscoe, president and CEO of the Sugar Association, "this ruling will give consumers a chance to hear the facts in this case. Consumers have a right to know what they really are buying and an equal right not to have a big corporation try to tell them something else."

McNeil Nutritional, which has faced similar accusations of misleading marketing on multiple occasions in the past, claims that its marketing slogans "are true and in no way state or imply that Splenda (...) contains actual sugar or is 'natural'."

This is not the first time the US sugar industry and McNeil Nutritional have butted heads over the issue. In November last year, the Sugar Association filed a complaint with the nation's Federal Trade Commission (FTC), requesting an investigation into the marketing of Splenda. Prior to that, McNeil Nutritional had filed a lawsuit against the Sugar Association, accusing it of false advertising in connection with a website it had established. The site, truthaboutsplenda.com publishes information about the sweetener, which the association claims comes from "many sources, including consumers who feel deceived by Splenda being advertised as tasting like sugar and being a natural product."

But a federal court in Wilmington, Delaware, dismissed the suit, stating that McNeil had no right to maintain an independent action. McNeil has also come up against resistance from competitor Merisant, which sells the artificial sweeteners Equal and NutraSweet.

The two companies were earlier this year embroiled in a fierce court battle, which Merisant said was all about providing consumers with accurate information while also creating an "equal playing field" for manufacturers of other artificial sweeteners. A settlement agreement was reached in May this year, although no information on the terms of the agreement was released. A similar case between European subsidiaries of Merisant and McNeil in May resulted in an order for the use of the advertising slogans of Splenda to be banned in France.

Lorraine Heller, Food Navigator USA
**Glossary Of Natural & Artificial Sweeteners**

**Indicates a natural product, i.e., one derived principally from a plant or other natural product**

**ACESULFAME-K or ACE-K** (Sunett®, Sweet One®)

Acesulfame-K, measure for measure 200 times sweeter than table sugar, was approved for use in soft drinks in 1998, and as a flavor enhancer in 2003. It contains no calories. As an intense sweetener, only small amounts are needed; it is often combined with other sweeteners to intensify sweetness and reduce bitterness. The sucralose (Splenda)/Ace-K blend has become a popular ingredient in baked goods because of its ability to retain sweetness when heated to high temperatures. The FDA Acceptable Daily Intake is 15 mg per kg, or 25 cans of diet soda.†† Critics claim that approval of Ace-K was based on poorly designed studies, flawed data and questionable interpretation of statistics. The FDA has turned down proposals to further test Ace-K, as well as aspartame, and other sweeteners.

**AGAVE SYRUP or AGAVE NECTAR**

Agave (pronounced uh-GAH-vay) is a species of succulent plant that grows chiefly in Mexico and surrounding countries. The sap or juice of the leaves is about 90% fructose. Unlike the crystalline form of fructose, which is refined primarily from corn, agave syrup is fructose in its natural form, i.e. unprocessed. Some varieties are fermented and distilled into mezcal and tequila. See also Fructose. The nectar is available from BlueAgaveNectar.com.

**ASPARTAME** (Equal® Candarel)

Approved in 1981 by the FDA, aspartame is 160 to 200 times sweeter than sugar. It contains the two amino acids, phenylalanine and aspartic acid, and has no aftertaste. It has about 4 calories per gram, but because of its intense sweetness, very little is used so the amount of calories it provides is negligible. Aspartame has a tendency to break down when heated, but newer forms of the sweetener have made it more heat-stable and suitable for cooking and baking. In packaged food or beverages, aspartame has a relatively short shelf life of 6 months or so, after which sweetness dissipates. Aspartame contains phenylalanine, an amino acid, which some people with a rare condition called phenylketonuria (PKU) are unable to metabolize; so all food products containing aspartame carry a warning about iphenylalanine. The FDA Acceptable Daily Intake is 50 mg per kg of body weight, or 15-20 cans of diet soda, or 97 packets of Equal, for a 150-pound person.†† It is deemed safe by the World Health Organization and the Centers for Disease Control and Prevention.

**CYCLAMATE**

Cyclamate, which used to be in the U.S. versions of Tab and Fresca, has been banned in the U.S. since the 1970, after studies showed a link to bladder cancer in rodents. Many believe the research to be flawed; cyclamate is legal in Canada and in dozens of other countries and is found in Canadian Sweet’N Low instead of saccharine, while saccharine is banned in Canada. The FDA is reconsidering the approval of cyclamate.

**ERYTHRITOL** (SweetSimplicity, ZSweet)**

Erythritol is a natural sweetener that has been made for some time, but not in enough quantity to be marketed to consumers. Its components are recognized as safe by the Food and Drug Administration. Like maltitol, it is a polyol (sugar alcohol) and belongs to a group of carbohydrate-based sweeteners. It is a white crystalline powder with a clean, sweet taste that is similar to sucrose. Erythritol is naturally present in such fruits as grapes and melons, in mushrooms and in fermented foods such as wine, soy sauce and cheese. Unlike maltitol, it does not have a laxative effect. Like maltitol, it is also much pricier than aspartame, sucralose and other sugar substitutes. At just .2 calories per gram, it is considered calorie-free by the FDA.
**FRUCTOSE**

Fructose, along with glucose, is a component of sucrose (table sugar). It is often referred to as fruit sugar because of its presence in fruits. Fructose is also added to foods and beverages in the form of crystalline fructose (made from corn starch) or high fructose corn syrup (HFCS). Like sucrose, fructose provides four calories per gram, 16 calories per teaspoon; but it has a low glycemic value. Fructose is sweeter than table sugar, so less is needed as a sweetener.

**GLYCEMIC INDEX**

Introduced in 1981, the Glycemic Index (GI) is a system that measures the effect of carbohydrates on blood glucose. Carbohydrates that are rapidly digested and absorbed have a high glycemic index; those that are absorbed and digested slowly have a low glycemic index.

**HIGH FRUCTOSE CORN SYRUP (HFCS)**

High fructose corn syrup (HFCS) is a modified form of corn syrup that has an increased level of fructose. A process developed by Japanese researchers in the 1970s can increase the fructose content of corn syrup to 42%, 55%, or 90%. Because fructose is much sweeter than glucose, the overall sweetness of the syrup is increased and it becomes more cost-effective than sugar in food processing. Until the 1970s most of the sugar in foods came from sucrose derived from sugar beets or sugar cane, which were 50/50 fructose and glucose. Some nutritionists say that HFCS should be avoided due to its possible links with obesity and diabetes. Also cited as reasons to avoid HFCS are that it is highly refined, that it might be produced from genetically modified corn, or that corn products in general should be avoided. Other nutritionists say that HFCS is no more or less harmful than other forms of sugar and that all sugars should be consumed sparingly.

**ISOMALT**

A sugar alcohol that is widely used in sugar-free hard candies, chewing gums and some chocolate. It contains half the sugar and has a low GI response.

**LO HAN KUO**

A natural sweetener made from the extract of a fruit by the same name, lo han kuo (also spelled lo han guo and luo han kuo) has been used in China and Southeast Asia for generations. It is 200 to 250 times as sweet as table sugar. A low glycemic index makes it appropriate for diabetics. It is very stable under high temperature and thus suitable for cooking and baking. It is currently labeled a dietary supplement by the FDA.

**LOW-CALORIE SWEETENERS**

Low-calorie sweeteners provide a sweet taste with few or no accompanying calories. Before being approved by the food safety administrations, sweeteners must undergo extensive safety testing. All FDA-approved low-calorie sweeteners meet the same standard of safety and are safe for consumption by pregnant women and children. Six low-calorie sweeteners currently are approved for use in the United States: acesulfame potassium (Ace-K), aspartame, neotame, saccharine, sucralose, and tagatose. The FDA is considering petitions to approve allitame and cyclamate, both of which have been approved for use in numerous other countries.

**MALTITOL**

Maltitol is a polyol (sugar alcohol) made by hydrogenation of maltose obtained from starch. Maltitol has approximately 90% of the sweetness of sugar but just half the calories—2.1 calories per gram as opposed to 4.0 calories per gram for sugar (i.e., it reduces calories by 12% to 15%). Its high sweetness allows it to be used without being mixed with other sweeteners. It gives a creamy texture to food, so it can be also used to replace fat. It works especially well in the production of sugarless sweets: chocolates, hard candies, baked goods, confections and ice cream. High-end manufacturers
also use it in chewing gum, but because it is a more costly product, many domestic manufacturers use other sweeteners. Maltitol is also known under its trade names Maltisorb® and Maltisweet®. It is considered to be the best substitute for sucrose.

**MANNITOL**

A sugar alcohol used in chewing gums and mints.

**NEOTAME**

Neotame is a non-caloric sweetener and flavor enhancer with a clean, sweet, sugar-like taste, granted approval by FDA in 2002. It is the sweetest of all products, measure for measure about 8,000 times sweeter than sugar. Neotame is a synthetic derivative of a combination of aspartic acid and phenylalanine—the same two amino acids that are used to make aspartame. It is more stable than aspartame for cooking and baking. Unlike aspartame, neotame isn’t broken down in the body into the amino acid phenylalanine, which is toxic to people with the phenylketonuria (PKU). It is rapidly metabolized and completely eliminated. The FDA Acceptable Daily Intake is 18 mg per kg.††

**POLYOLS**

Sugar alcohols, a group of sugar-free sweeteners. See Sugar Alcohols, below.

**REBIANA**

A compound in the leaves of the stevia plant. In July 2007, Coca-Cola and Cargill corporations announced that they had been jointly developing a new low-calorie sweetener, with the working name Rebiana. See also Stevia.

**SACCHARINE** (Sweet ‘N Low)

Saccharine was discovered in 1879 by a Johns Hopkins University chemist—he accidentally spilled a substance on his hand and noticed the sweet taste while eating dinner. It has been available worldwide since the end of the 19th century; its popularity grew during the sugar shortages of World War I. Saccharine is 300 times sweeter than sugar and is very stable in foods, but has a bitter aftertaste. The human body is unable to metabolize saccharin, so it has virtually no calories. Saccharine can be used in cooking. Sweet’N Low, which is powdered, branded saccharine, was launched in 1957, and was immediately preferred to the tiny tablets that preceded it for its superior dissolvability. In the 1970s, lab experiments feeding rats enormous amounts of saccharine produced tumors, and a scare that it was carcinogenic. Today, the National Cancer Institute gives it a clean bill of health for humans, however it is banned in Canada (Canadian Sweet ‘N Low has cyclamate, which is banned in the U.S.). The FDA Acceptable Daily Intake is 5 mg per kg, or 8.5 packets of sweetener.*

**STEVIA**

Stevia, which is 150 to 400 times sweeter than sugar, is derived from a South American herb called Stevia rebaudiana. It has been used for centuries in Paraguay and Brazil to sweeten yerba mate and medicinal teas. It is almost calorie-free, does not cause cavities, and does not trigger a rise in blood sugar. Stevia accounts for 40% of the sweetener market in Japan. In the U.S. it is currently classified as a dietary supplement and not as a food additive. It is usually found in a liquid concentrate, but there are also packets and tablets. Lesser-quality stevia can have a subtle anise or licorice flavor.

**SUCRALOSE** (Splenda)

Sucralose, 600 times sweeter than sugar, was approved by the FDA and came onto the market in 1998. It is the only artificial sweetener made from sugar. Sucralose passes through the body without being digested. Sucralose is heat-stable and can be used for cooking and baking; it also has a long shelf life. Sucralose tastes like sugar. It has a clean, quickly perceptible, sweet taste that does not leave an unpleasant aftertaste. The exceptional stability of sucralose allows both food manufacturers
and consumers to use it virtually anywhere sugar is used, including cooking and baking. The FDA Acceptable Daily Intake is 5 mg per kg, or 5 cans of diet soda.††

**SUCROMALT**

Xtend Sucromalt is a product of Cargill Corporation, derived from sucrose and maltose. It is 60% to 70% as sweet as sugar and behaves like corn syrup, with a slow carbohydrate release.

**SUCROSE**

Sucrose—commonly referred to as table sugar—is a disaccharide comprising glucose and fructose. It is derived from sugar cane or sugar beets, and has four calories per gram (about 16 calories per teaspoon). The refining process removes impurities from the sugar plant, producing the white crystals we know as table sugar. Molasses is simply a less refined sucrose.

**SUGAR ALCOHOLS**

Sugar alcohols (also known as polyols, polyhydric alcohols, or polyalcohols) are a hydrogenated form of carbohydrate. They are commonly used for replacing sucrose in foodstuffs, often in combination with high intensity artificial sweeteners to counter the low sweetness. They occur naturally in a wide variety of fruits and vegetables; but can be commercially made from other carbohydrates such as sucrose, glucose, and starch. Sugar alcohols include erythritol, isomalt, maltitol, mannitol, sorbitol, and xylitol.

**TAGATOSE**

A new entry, tagatose is a low-calorie sweetener derived from lactose, which occurs naturally in some dairy products and other foods. It is very similar in shape and texture to sucrose (table sugar) and is 92% as sweet, but with only 38% of the calories. Since it is metabolized differently from sucrose, tagatose has a minimal effect on blood glucose and insulin levels. In the mid-1990’s tagatose was approved by the FDA use in foods and beverages.

**XYLITOL**

A natural sweetener derived from fruits and vegetables (e.g. birch bark, plums and corn cob). A sugar alcohol, pure xylitol is a white, crystalline, natural substance that looks and tastes like sugar. Its sweetness is equal to sugar, but it contains 40% fewer calories. It does not require insulin to be metabolized, so it can be used by diabetics. It reduces tooth decay, has been endorsed by dental associations, and is used extensively in sugar-free chewing gums and hard candies.

††FDA-established acceptable daily intake (ADI) limit per kilogram (2.2 pounds) of body weight. Product consumption equivalent for a 150-pound person.

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