To Your Health
January, 2010 (Vol. 04, Issue 01)

Addicted to Sugar

How to Avoid the Unavoidable

By Clair Whiteman

Sugar has become a standard component of the American diet. In fact, Americans have become so dependent upon dietary sugar that many health care professionals are considering it the country's number-one addiction. In the past 20 years, average per-person sugar consumption has increased from 20 pounds to *156 pounds* of sugar annually, despite increased public awareness of its devastating health effects. With the obvious overconsumption of sugar that occurs in the American diet, it is no wonder that the most prevalent health issues within the U.S. population, including obesity, cardiovascular disease, metabolic syndrome, and diabetes, have all been linked to excessive sugar intake.

How Sugar Affects Your Health

The insulin response: The health issues that develop as a result of a high-sugar diet are strongly linked to the response of the hormone *insulin* to carbohydrate ingestion, a phenomenon known as the glycemic response. Simple carbohydrates such as sugar are considered high glycemic and are metabolized quickly by the body, resulting in a rapid release of insulin and a quick rise and fall in blood sugar. This is often felt as a burst of energy followed by feelings of fatigue (i.e., a crash).

Insulin resistance is a progressive condition that occurs when normal insulin activity is inadequate to produce a response on insulin receptors on muscle and adipose (fat) cells. Initial signs of insulin insensitivity include high circulating levels of both glucose and insulin. In addition, consumption of excess dietary carbohydrate can stimulate lipolysis (fat generation), resulting in higher levels of circulating triglycerides, very-low-density lipoprotein and low-density lipoprotein (VLDL and LDL, respectively) cholesterol.

Fat storage leading to disease: As the body's ability to store excess energy becomes further impaired, fat deposition begins to occur around the internal organs. This specific form of weight gain, known as *visceral fat*, is characteristic of insulin resistance and is strongly linked to an increased risk for cardiovascular disease and metabolic syndrome. Insulin resistance and other metabolic disorders also appear to correlate with higher levels of C-reactive protein (CRP) and other inflammatory markers which have been strongly linked to cardiovascular risk.

Dental health and immunity: Other negative effects of high sugar consumption include its impact on dental health and immunity. Simple carbohydrates are the preferable food source for pathogenic oral and intestinal microbes such as *Strep mutans* and *Candida albicans.* A diet high in refined sugars stimulates the proliferation of these microbes and can lead to intestinal bacteria overgrowthand dental issues including cavities and gingivitis. Research has also shown that sugar may suppress immune function resulting in impairments in the body's resistance to infections.

In addition to these adverse effects on physical health, a diet high in sugar may also influence mental and emotional well-being. High sugar intake has been linked to attention disorders, and populations that

consume a diet high in refined carbohydrates are more likely to experience mental disorders such as depression and anxiety.

Other negative health effects: In addition to the aforementioned effects, a diet high in dietary sugar may also induce inflammatory destruction to other body organ systems. Advanced glycation end products (AGEs) are toxic compounds that are formed when circulating sugars combine with the free amino acid groups of proteins, nucleic acids, and lipids. AGEs exert their toxic effects by promoting pathogenic cellular alterations which result in widespread inflammation and tissue damage. AGEs are now seen as a key influential factor in the development of arthritis, heart disease, asthma, and accelerated aging due to their mediation of pro-inflammatory activity. AGEs are also found in the brains of dementia patients, and may contribute to the neurofibrillary tangles that are characteristic of Alzheimer's disease.

How to Limit Your Sugar Intake

Increased understanding of the damaging effects of AGEs has led to the realization that reducing sugar intake could have positive effects all across the health spectrum. The first step to limiting dietary sugar intake is to identify what the sources are in your diet. While many of us associate sugar with sweet foods, like pastries and candy, these types of foods only contribute to about 10 percent of overall sugar intake. High contributors of dietary sugar include sweetened beverages like sodas and juices as well as processed foods such as sauces and dressings. It is important to recognize that sugar is not only added to food to increase sweetness; it also has "hygroscopic" properties that contribute to a food's moisture content and mouth-feel. These attributes are why sugar is often added to unexpected foods, like spaghetti sauce and bread, and why it enjoys such widespread distribution within our food supply.

Recognizing the sources of sugar in your diet can require some savvy label reading skills. Sugar can be listed on food packages in a variety of ways, including glucose, fructose, dextrose, corn syrup, sucrose, and cane sugar, to name a few. As a consumer, it is important to recognize that all of these are types of sugar, and as a result all can cause negative health effects. A particular form of sugar used in processed foods, *high-fructose corn syrup* (HFCS), may be especially damaging. HFCS is one of the most commonly used sweeteners in the U.S., and is produced from corn starch via a series of enzymatic processes. Clinical research now shows that HFCS may present more health risks than regular cane sugar. Opponents of the use of HFCS claim that it promotes elevated triglycerides, weight gain, and the formation of AGEs. Studies have shown that soda beverages sweetened with HFCS are more likely to contain methylglyoxal derivatives,

a form of AGE that has been linked to diabetic complications.

Watch Out for Sugar Substitutes

When looking to reduce dietary sugar intake, many of us turn to artificial sweeteners or sugar substitutes as an alternative option. The most common non-nutritive artificial sweeteners used in our food supply today are aspartame, saccharin, acesulfame K and sucralose. Since being introduced into the American diet, there have been handfuls of published studies linking the use of artificial sweeteners to conditions such as cancer and attention deficit disorder.

According to the FDA, none of these claims has been backed extensively by clinical research, and the use of artificial sweeteners continues to be prevalent within our food supply. Recent research, however, has shown that regular use of artificial sweeteners may actually promote weight gain and interfere with appetite control mechanisms. Ingestion of artificial sweeteners still initiates an insulin response from the pancreas as a means of inducing carbohydrate metabolism. Since artificial sweeteners provide no carbohydrate value, insulin levels remain high, leading to hypoglycemia and increased hunger. This interference with appetite control mechanisms can lead to overconsumption of food at the next meal. The correlation between artificial sweeteners and increased food intake may indicate that their use is not supportive in weight management protocols.

Sugar has become as much of a part of American culture as apple pie. Unfortunately, the adverse health conditions associated with sugar intake have also become a prevalent component of our society. Reducing dietary sugar intake can be challenging, but the numerous associated health benefits make it well-worth the effort.

If your current diet is high in refined sugars, try taking small steps to regulate your intake. Cut down on soda drinking or dilute juices with water. You can also reduce your intake of processed foods and start making your own meals at home to limit your exposure to sugars that are incorporated as part of food processing. If you must use sugar, try sticking with more natural varieties, such as honey, agave, molasses, fruit, and cane sugar. Making these minor adjustments can have significant benefits on all aspects of your health and

well-being.

Lots of Added Sugar ... and Little Else?

Considering that for a 2,000 calorie diet, the author's recommended sugar intake is approximately 30-50 grams per day (6-10 percent of food calories [kcals]), you might be surprised at how much sugar these classic brand-name foods contain. You might also be surprised at their relatively poor nutritional content (in some cases, the food is essentially sugar and little else) - but we'll leave that for another article.

Food	Sugar (grams)
Starbucks mocha frappuccino blended coffee (16 oz.)	47 g
Coca Cola (12 oz.)	39 g
Krispy Kreme donut (chocolate iced glazed)	21 g
Hostess Twinkie (1)	19 g
Oreo cookies (3)	14 g
Red Bull energy drink (8.3 oz.)	27 g

Note: It is unknown whether artificial sweeteners are also included in any of the above food items.

Clair Whiteman, BSc, received her degree in nutrition and dietetics from Bastyr University in Washington state. She is currently the on-staff nutritionist for BioGenesis Nutraceuticals, a professional-grade supplement line.