



## Refined Carbohydrates for Food Addicts

On a trip last week to the Pacific Coast with our (almost) 3-year-old grandson, Jaysen, Mary and I stopped at a general store for a beverage. I looked for one of my old favorites, cream soda. A 20-ounce bottle with 300 calories of high fructose corn syrup was all they stocked. Too sweet for me—after a couple of sips the rest of the bottle ended up in the trash. This experience left me believing that I had stumbled upon “sugar-addict’s heaven”—and there must be billions of sugar-dependent people in this world in order to make these powerfully-

## What Do These Have In Common?



**Coca**



**Poppy**



**Corn**

**An ingredient from each is purified and concentrated  
...for the purpose of intensifying pleasure**

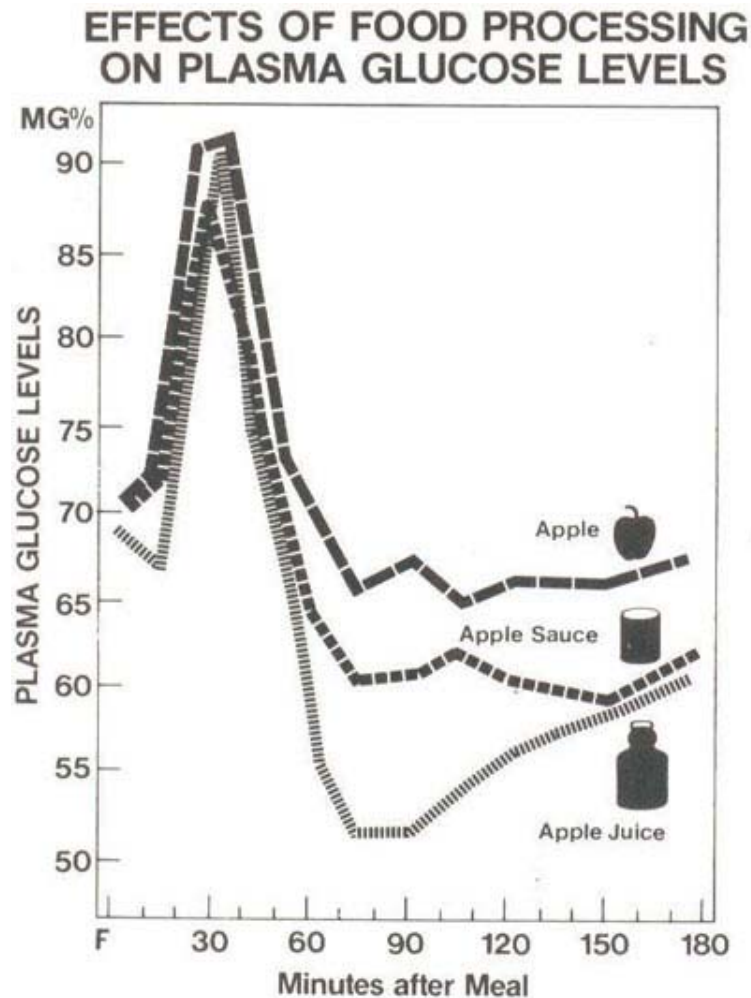
People naturally seek calories in the form of carbohydrate. When concentrated, carbohydrate delivers intense stimulation to the consumer—just like the alkaloids, cocaine and opium, purified from the coca leaf and the poppy plant, give the highest pleasure to their users. In their natural, unprocessed states—in the whole plants—all of these active ingredients are much less potent. My brief experience with the people of Peru, who chew coca leaves daily, led me to conclude that this habit was relatively harmless, and can be beneficial by helping them live in those high altitudes. Once purified, cocaine becomes a powerful, but often life-destroying, stimulant. Similarly, carbohydrates in their natural packages of whole starches, vegetables, and fruits, are essential for life. When they are purified, their stimulating properties are enhanced, as are their harmful effects.

### Food Processing Raises Insulin Levels and More

When people consume significant quantities of unhealthy foods for prolonged periods of time their bodies show signs of distress, usually a rise in one or more risk factors—such as an elevation of blood sugar, cholesterol, triglycerides, blood pressure, and/or insulin. These values are called “risk factors” because they are associated with heart disease, diabetes, hypertension and obesity. The association is not one of “cause and effect,” but rather rich foods cause them to rise and concurrently cause people to become sick.

The refining of plant foods commonly results in elevations of insulin levels. When whole grains are ground into whole flours nothing is added or removed, yet the properties of the food have changed. The physical structure has gone from a nugget to a powder—as a result the surface area of the food exposed to the intestinal lining has increased and the natural fibers of the food have been disrupted. This simple grinding process results in a greater elevation in the insulin levels in a person’s blood after eating, than that which is caused by the whole grain.<sup>1</sup> During the next step of purification the whole grain flour is sifted to remove the chaff, thereby eliminating dietary fiber, vitamins, minerals and other important nutrients. The end product of this purification is white flour, which causes an even greater rise in insulin than the unrefined flour.

A classic experiment reported in 1977 showed similar effects on insulin production from the processing of fruit.<sup>2</sup> After eating an apple, subjects showed a small rise and fall in blood sugar (glucose) and a small rise in blood insulin levels. Applesauce, made by simply grinding the apples, caused a greater rise in insulin and subsequent fall in blood sugar. The juice, made by removing the pulp, caused the largest rise in insulin and fall in blood sugar levels. These kinds of studies demonstrate that consuming grains, vegetables and fruits in their unprocessed form is healthiest for the body.



## Purified Carbohydrates Raise Triglycerides

A common teaching is that carbohydrates are bad because they cause blood triglycerides to increase (higher triglycerides are associated with more heart disease). These findings are based upon experimental designs using simple sugars and refined flours (and/or the subjects were required to eat more food than they could comfortably consume – they were force-fed).<sup>3,4</sup> The rise in triglycerides is caused primarily by an increase in synthesis of these blood fats by the liver.<sup>5</sup> For example, when people with already elevated triglycerides were fed a diet rich in sugar for 6 weeks their levels increased by 45.2%.<sup>6</sup> However, when starches, the complex form of carbohydrate found in whole grains, beans, potatoes, and green and yellow vegetables, rather than sugars, are fed to people, the triglyceride levels do not increase.<sup>7</sup>

My experience has been that people who are having problems getting their cholesterol and triglycerides under control need to stop using refined flour products and simple sugars. Even fruit and fruit juices must be limited because they are high in sugars called fructose—this kind of sugar (fructose) causes a greater rise in triglycerides than any other kind of sugar.<sup>8</sup>

## Purification of Carbohydrate Makes Weight Loss More Difficult

After observing human populations worldwide, the undeniable conclusion that must be reached is that carbohydrates keep people trim, active, and young looking. Asians eating white rice and Peruvians eating white potatoes prove this point beyond any argument. This truth is confirmed by the observation of these people as they migrate to Western countries—as they eat less carbohydrate, they become fatter and sicker.

However, as the carbohydrate becomes more purified through refining, weight control becomes less efficient<sup>10,11</sup> for several reasons:

### 1) Purification concentrates calories.

The calorie concentration of carbohydrate-rich foods can be quadrupled by purification processes.

<b>Calorie Concentration Increases with Refining</b>		
Calories/gram		
	Whole food:	Flour
Corn	.56	3.6
Potato	.87	3.5
Wheat	.82	3.6

Concentration of carbohydrates makes overconsumption of calories easier. Mixing water and other ingredients with the flour lessens their impact: pasta (spaghetti) is 1.4 calories per gram and whole wheat bread is 2.5 calories per gram. By comparison, there are 4 calories in every gram (1/30<sup>th</sup> of an ounce) of pure sugar.

2) **The more carbohydrate available, the less fat that is burned off.** Even though sugar does not readily turn to fat, the body will burn these sugar calories preferentially over fat calories, leaving the fat on the body.

3) **Processing and refining increase insulin production.** Insulin's actions are to push dietary fats into fat cells and prevent them from being released.

4) **Sugar plus fat makes a double whammy.** Sugar is rarely eaten alone, but rather in combinations with fat as single foods, like cake, ice cream, pies and candy bars, or a combination of foods, like the standard American diet which is about half fat and half sugar. The sugar spikes insulin production, pushing the readily available fat from the spoonful of dessert right into the belly fat.

5) **Sugar makes food highly pleasurable**, causing people to consume more calories.

For these reasons people interested in more effective weight loss will minimize their consumption of purified carbohydrates—in addition to minimizing their fat intake. They will also make special efforts to avoid sugar-fat combinations, even commonly overlooked items, such as vegan cookies, soy yogurt, and tofu ice cream.

### Fructose Promotes Obesity

Fructose is the most powerful sweetener of all naturally-occurring sugars; even table sugar (sucrose) owes much of its taste to fructose. (Sucrose is a disaccharide made of one glucose and one fructose molecule.) Corn is the most common source of this kind of sugar and is designated by the name *high fructose corn syrup* (HFCS). This cheap brand of sugar now represents 40% of the caloric sweeteners added to foods and beverages, and is the sole sweetener used in soft drinks in the United States. (Note: Coca-Cola in the old fashioned bottles from Mexico is made from the natural sugar, glucose.)

De novo lipogenesis, the synthesis of fat from sugar, occurs readily with fructose, whereas with other kinds of simple sugars, like glucose, this synthesis does not commonly occur.<sup>11</sup> Many experts blame the recent rise in obesity on high fructose corn syrup consumption.<sup>12</sup> The use of this HFCS has increased by more than 1000% between

1970 and 1990.<sup>13</sup> Fructose affects hormones very much like the way that fat does; it increases hunger, which results in more dietary fat and food intake. In addition, fructose does not stimulate brain satiety, as glucose does.<sup>11</sup>

#### Fructose Promotes Obesity:

- Increases hunger
- Increases fat intake, food intake, and calorie intake
- Does not stimulate brain satiety
- Promotes De Novo Lipoge

### Sugar Rots the Teeth

Dental caries are the result of the interplay of cariogenic micro-organisms (bacteria), carbohydrates, and susceptible teeth.<sup>14</sup> Studies of ancient skeletons indicate widespread tooth decay has only recently occurred and is a result of the refining of plant-foods and the use of sugars.<sup>15</sup> The more sugar is consumed, and the more often it is consumed between meals, the more likely the teeth will decay. Even today, the level of dental caries is low in countries where people eat less than 33 to 44 pounds (15 to 20 Kg) of sugar per person per year.<sup>16</sup> (The average sugar intake in US in 1999 was 158 pounds annually—72 Kg.)

Bacteria living in the mouth are able to convert simple sugars into strong acids which eat through the tooth's enamel and begin the process of tooth decay. One kind of sugar seems to be as caustic as any other for producing acid and demineralizing the tooth enamel.<sup>14</sup> Bottle feeding with formula and fruit juices results in the loss of the front teeth; a place in the mouth where exposure to sugars can be prolonged.<sup>17,18</sup> This condition is commonly referred to as *baby bottle tooth decay*. Even the lactose sugar found in mother's breast milk will cause tooth decay if the sugar has prolonged contact with baby's teeth, which commonly occurs when the infant sleeps with the breast dripping milk sugar on the teeth all night long.<sup>19</sup>

The best solution to tooth decay is to reduce the exposure of the tooth enamel to simple sugars by avoiding processed and refined foods. Secondary efforts should be to remove the sugars by tooth brushing and rinsing the

mouth with water after eating.

### Refined Sugars Are “Empty Calories” and They Rob Your Body of Nutrients

Important ingredients naturally found in the plants include carbohydrates, dietary fiber, proteins, essential fats, vitamins, minerals, and an abundance of other phytonutrients. These ingredients all work together in the body's metabolic processes. When ingredients are missing from a food, then they must be borrowed from another source. Pure sugars have been stripped of all their nutrients, except for the simple carbohydrate—thus they are called “empty calories.” To metabolize the sugar, nutrients stored in the body or from other foods must be scavenged—in this sense “sugar robs your body of vitamins and minerals.”

Fortunately, foods are abundant in nutrients. Disease due to nutrient deficiencies from consuming even large amounts of refined flours and sugars is rarely obvious. However, on a subtle level, eating significant quantities of nutrient-poor food must hinder the general ability of the body to resist disease and to heal.

### Is Sugar Really Food Heroin?

People who consume purified carbohydrates in the form of refined flours and simple sugars become habituated to their intense stimulation. Remember from last month's newsletter (September 2006) that humans are anatomically and physiologically designed to seek and consume carbohydrates. The tip of our tongue tastes with pleasure only one calorie-containing substance, carbohydrate. These carbohydrates provide a reward to the person by producing opioid- and dopamine-mediated responses—changes in the brain's chemistry which cause us to feel pleasure. For some people changing their diet seems to be harder then kicking an addiction to tobacco, alcohol, cocaine, or heroin. Other people easily come to the conclusion that whole foods are tastier than the purified products and many of us do not enjoy the intense stimulation from high sugar foods and beverages—and that is why after two sips I threw my cream soda in the trash.

### References:

- 1) [Heaton KW, Marcus SN, Emmett PM, Bolton CH](#). Particle size of wheat, maize, and oat test meals: effects on plasma glucose and insulin responses and on the rate of starch digestion in vitro. *Am J Clin Nutr*. 1988 Apr;47(4):675-82.
- 2) [Haber GB, Heaton KW, Murphy D, Burroughs LF](#). Depletion and disruption of dietary fibre. Effects on satiety, plasma-glucose, and serum-insulin. *Lancet*. 1977 Oct 1;2(8040):679-82.
- 3) Vidon C. Effects of isoenergetic high-carbohydrate compared with high-fat diets on human cholesterol synthesis and expression of key regulatory genes of cholesterol metabolism. *Am J Clin Nutr*. 2001 May;73(5):878-84.
- 4) Schaefer EJ. Body weight and low-density lipoprotein cholesterol changes after consumption of a low-fat ad libitum diet. *JAMA*. 1995 Nov 8;274(18):1450-5.
- 5) [Schwarz JM, Linfoot P, Dare D, Aghajanian K](#). Hepatic de novo lipogenesis in normoinsulinemic and hyperinsulinemic subjects consuming high-fat, low-carbohydrate and low-fat, high-carbohydrate isoenergetic diets. *Am J Clin Nutr*. 2003 Jan;77(1):43-50.
- 6) [Reiser S, Hallfrisch J, Michaelis OE 4th, Lazar FL, Martin RE, Prather ES](#). Isocaloric exchange of dietary starch and sucrose in humans. I. Effects on levels of fasting blood lipids. *Am J Clin Nutr*. 1979 Aug;32(8):1659-69.
- 7) Hudgins CH. Human fatty acid synthesis is reduced after the substitution of dietary starch for sugar. *Am J Clin Nutr*. 1998 Apr;67(4):631-9.
- 8) [Bantle JP, Raatz SK, Thomas W, Georgopoulos A](#). Effects of dietary fructose on plasma lipids in healthy subjects. *Am J Clin Nutr*. 2000 Nov;72(5):1128-34.

- 9) [Sarlis WH, Astrup A, Prentice AM, Zunft HJ, Formiguera X, Verboeket-van de Venne WP, Raben A, Poppitt SD, Seppelt B, Johnston S](#), Vasilaras TH, Keogh GF. Randomized controlled trial of changes in dietary carbohydrate/fat ratio and simple vs complex carbohydrates on body weight and blood lipids: the CARMEN study. The Carbohydrate Ratio Management in European National diets. *Int J Obes Relat Metab Disord*. 2000 Oct;24(10):1310-8.
- 10) [Poppitt SD, Keogh GF, Prentice AM, Williams DE, Sonnemans HM, Valk EE, Robinson E, Wareham NJ](#). Long-term effects of ad libitum low-fat, high-carbohydrate diets on body weight and serum lipids in overweight subjects with metabolic syndrome. *Am J Clin Nutr*. 2002 Jan;75(1):11-20.
- 11) [Teff KL, Elliott SS, Tschop M, Kieffer TJ, Rader D, Heiman M, Townsend RR, Keim NL, D'Alessio D, Havel PJ](#). Dietary fructose reduces circulating insulin and leptin, attenuates postprandial suppression of ghrelin, and increases triglycerides in women. *J Clin Endocrinol Metab*. 2004 Jun;89(6):2963-72.
- 12) [Malik VS, Schulze MB, Hu FB](#). Intake of sugar-sweetened beverages and weight gain: a systematic review. *Am J Clin Nutr*. 2006 Aug;84(2):274-88.
- 13) [Bray GA, Nielsen SJ, Popkin BM](#). Consumption of high-fructose corn syrup in beverages may play a role in the epidemic of obesity. *Am J Clin Nutr*. 2004 Apr;79(4):537-43.
- 14) [Zero DT](#). Sugars - the arch criminal? *Caries Res*. 2004 May-Jun;38(3):277-85.
- 15) [Cox TM](#). The genetic consequences of our sweet tooth. *Nat Rev Genet*. 2002 Jun;3(6):481-7.
- 16) [Mann J](#). Free sugars and human health: sufficient evidence for action? *Lancet*. 2004 Mar 27;363(9414):1068-70.
- 17) [Sheikh C, Erickson PR](#). Evaluation of plaque pH changes following oral rinse with eight infant formulas. *Pediatr Dent*. 1996 May-Jun;18(3):200-4.
- 18) [Zeng X, Luo Y, Du M, Bedi R](#). Dental caries experience of preschool children from different ethnic groups in Guangxi Province in China. *Oral Health Prev Dent*. 2005;3(1):25-31.
- 19) [Bowen WH, Lawrence RA](#). Comparison of the cariogenicity of cola, honey, cow milk, human milk, and sucrose. *Pediatrics*. 2005 Oct;116(4):921-6.