

Artificial Sweeteners: More Sour than You Ever Imagined

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The Aspartame Scandal: Twenty-Five Years and Counting

If you still believe sweeteners like Equal and NutraSweet are safe, you'll want to pay very close attention to this special report.

You're probably aware of the dangers of consuming too much sugar and that sugar is not healthy for you. You might have been led to believe that artificial sweeteners like aspartame are safer, and less likely to cause you to gain weight.

Well, neither of those beliefs are true.

Slick marketing of products containing aspartame by giants in the food industry -- especially marketing that sends the message it's *healthy* to consume these products -- might be giving you a false sense of security.

You might even be convinced you're doing the *right thing* for your health and the health of your family by using products artificially sweetened with aspartame.

You couldn't be more mistaken.

It's not pleasant to learn that corporations, government-sponsored regulatory agencies and politicians are more interested in lining their pockets than protecting your health and the health of your loved ones. But unfortunately, these are serious issues that you *must* consider for you and your family's safety.

Manufacturers, marketers and others with financial interests have successfully convinced millions of consumers the chemicals used in artificially sweetened products are safe. Don't believe them! The arguments used to convince you these ingredients are healthy and "natural" will be addressed later in this report.

For now, just keep in mind that the reason you feel products containing aspartame are safe is a direct result of *deliberate deception* on the part of big business and government.

Remember:

If you're consuming a food or beverage created in a lab instead of in nature, you can be assured your body doesn't recognize it. This opens the door to short-term and long-lasting health problems for you and your family.

If you already avoid aspartame, the information you're about to read will confirm the wise choice you've made, and cement your resolve to stay away from any product that contains this potential toxin.



An Accident Waiting to Happen: The Birth of Aspartame

Like an omen, aspartame was discovered in 1965 entirely by mistake. That's right ... *by mistake*.

G.D. Searle chemist James M. Schlatter was at work in his laboratory developing a drug to treat peptic ulcer disease. The story goes that Schlatter accidentally spilled one of the chemicals he was using onto his finger. He licked his finger clean, and in doing so discovered the sweet taste of the aspartame he had spilled.¹

This inauspicious beginning heralded the birth of what has become one of the most potentially dangerous and controversial food additives in human history.

How Aspartame Got to Market in Spite of Itself

As you're about to learn, the tale of how aspartame got to market is a disturbing one. It reads like a crime mystery, one you would assume is based on the author's over-active imagination. Except it's all true.

The approval process for aspartame was said to have been riddled with scandal, bribes and other shady dealings within the pharmaceutical industry, large American corporations, and the FDA.

Initially, the FDA strongly denied the approval of aspartame products. Reasons given were sound and included:

- Flawed data
- Brain tumor findings in animal studies
- Lack of studies on humans to determine longer-term effects

How aspartame got to market despite initial FDA concerns and evidence of its neurotoxicity is a study in good timing, heavy financial investment, and the impact of political clout.

Timing is Everything

Aspartame studies were on the rise just after cyclamate was pulled from the U.S. market and saccharin was under serious scrutiny. The disappearance of cyclamate left a void it appeared saccharin might not be poised to fill.

At the time of the cyclamate ban, the "diet" market was a \$1 billion dollar per year business in the U.S.² Manufacturers of diet products were in a mad scramble to find a substitute product that would insure they left not a dollar of that billion on the table.

Pouring Good Money Into Bad Studies

G.D. Searle spent tens of millions of dollars to conduct the necessary approval tests on aspartame.

Not surprisingly, studies funded by Searle and other groups with a financial interest in aspartame found no adverse health effects. However, independent studies delivered evidence aspartame consumption did indeed create health problems in test subjects.

Flexing Political Muscle

In addition to its enormous financial investment in favorable study results, Searle developed what can be fairly described as a diabolical political strategy to insure the FDA would end up with a positive view of aspartame.

Deceptive Safety Studies

G.D. Searle provided the FDA with over 100 aspartame studies in early 1973. Later that same year, the FDA asked for additional studies. Searle complied and in June 1974, the FDA granted preliminary approval for the restricted use of aspartame.

The study findings submitted by Searle were immediately challenged by Dr. John Olney, a neuroscientist who was instrumental in getting monosodium glutamate removed from baby foods, and Jim Turner, an attorney and consumer advocate.³

In August 1974, Olney and Turner filed the first formal objections to the approval of aspartame. Their petition prompted the FDA to initiate investigations into Searle's lab practices.

The investigations ultimately led to concerns within the FDA about the validity of the studies submitted by Searle. Investigators uncovered substandard testing procedures and manipulated test data. In fact, what investigators found at Searle was an unprecedented incidence of bad testing procedures and inaccurate results. Final approval of aspartame was delayed.

Based on the results of these findings, in January 1977, for the first time in history, the FDA requested a criminal investigation into a food manufacturer for willfully misrepresenting results in their safety tests of a product. The FDA asked the U.S. Attorney's office to examine Searle's handling of aspartame testing.⁴



In August 1977, the FDA published a report by Jerome Bressler which pointed to specific issues with Searle's aspartame safety studies.⁵

The Bressler Report revealed stunning examples of very bad research. A few examples included:

- Deceased lab animals were not immediately autopsied, some not for an entire year after death. Decomposition rendered any data from them inaccurate.
- Tumors found in lab animals were reportedly cut out and thrown away.
- Animals from whom tumors were removed were labeled "normal," and obvious tumors were deemed to be "normal swelling."

In 1979, the FDA established a Public Board of Inquiry (PBOI) to rule on safety issues with aspartame, with the result that NutraSweet would not receive final approval pending further investigation into its link to brain tumors in animals.

Political and Regulatory Dirty Tricks

During the 1977 criminal investigation initiated by the FDA, the law firm representing G.D. Searle arranged to hire away the U.S. Attorney leading the investigation. Samuel Skinner went to work for Searle in July.

Skinner's resignation from the U.S. Attorney's office stalled the investigation into Searle's aspartame studies until the statute of limitations expired. The investigation was subsequently abandoned.



In March 1977, Donald Rumsfeld was hired as the CEO of Searle – yes, the same Rumsfeld that was the Secretary of Defense in the Bush administration. He brought with him additional political clout by appointing several of his D.C. associates to top management positions.

In January 1981, Rumsfeld proclaimed he would get aspartame approved within one year.⁶ Worthy of note is the fact Rumsfeld was part of newly elected President Ronald Reagan's transition team – a team which had carefully selected Dr. Arthur Hull Hayes Jr. as the new FDA Commissioner.

Two months later, in March, Dr. Hayes appointed an internal panel to review the 1979 decision by the Public Board of Inquiry that ruled thumbs down on final approval of NutraSweet.

Three of the five members of Dr. Hayes' panel advised against approval of aspartame, citing on the record that Searle's safety study tests were flawed. Hayes then appointed

a sixth member to the panel who tied the vote three-three. Dr. Hayes then cast the deciding vote in favor of approval.

Hayes, an official with no background on the subject of food additives, claimed aspartame was safe for proposed use, and had undergone more testing and scientific scrutiny than most additives on the market. Shortly after approving this drug he resigned from the FDA panel and was hired by the manufacturer of aspartame for a position in which he was paid several hundred thousand dollars per year.

So, despite all the game playing and countless unresolved safety issues, aspartame was approved for use in soft drinks in the fall of 1983.

Less than a year later, the FDA had recorded 600 consumer complaints of headaches, dizziness and other health-related reactions from aspartame consumption.

The unprecedented number of complaints caused the FDA to call in the CDC (Centers for Disease Control). The CDC concluded adverse reactions to aspartame were occurring in “unusually sensitive” individuals, but there was not enough evidence to prove existence of wide-spread health problems attributable to its consumption.⁷

What is Aspartame, Exactly?

Aspartame goes by the brand names NutraSweet and Equal. It is one of the first generation of artificial sweeteners and is 180 times as sweet as sugar.

At the end of 2008, aspartame was found in over 6,000 products including:

carbonated soft drinks	puddings and fillings
powdered soft drinks	frozen desserts
chewing gum	yogurt
confections	tabletop sweeteners
gelatins	chewable vitamins
dessert mixes	sugar-free cough drops

Products containing aspartame are sold in over 100 countries and are consumed by over 250 million people worldwide.

The scientific name for aspartame is 1-aspartyl 1 phenylalanine methyl ester. It has three components:

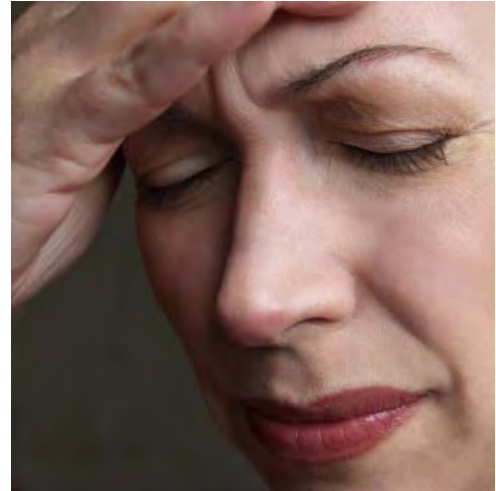
1. phenylalanine which makes up 50 percent of the chemical by weight
2. aspartic acid – 40 percent
3. methanol (wood alcohol) – 10 percent

How Aspartame Acts Inside Your Body

The two primary components of aspartame, phenylalanine and aspartic acid, are amino acids that are combined in an ester bond. You normally consume these two amino acids in the foods you eat. These amino acids are harmless when consumed as part of natural unprocessed foods. However when they are chemically manipulated and consumed out of the normal ratios to other amino acids, they can cause problems.

Your body initially breaks down the ester link between the two amino acids to turn them into free amino acids. The neurotoxic effects of these chemicals in their “free form” can result in immediate health consequences such as headaches, mental confusion, dizziness and seizures.

Your body does require small amounts of these amino acids to function properly. However, the high concentration of these chemicals in the form of aspartame floods your central nervous system and can cause excessive firing of brain neurons. Cell death is also possible.



This is a condition called *excitotoxicity*.

Your body doesn't recognize phenylalanine and aspartic acid in their free form, but your system will try to manage them through metabolization. Whenever your body tries to process an unrecognizable substance, the stage is set for health problems.

The chemicals in aspartame will be absorbed by your intestinal cells, where they will be broken down into other amino acids and byproducts. A large percentage of the absorbed chemicals will be used immediately in your small intestine.

A Formaldehyde Cocktail

Ultimately, aspartame will be fully absorbed into your body. Ten percent of what is absorbed is the breakdown product methanol (wood alcohol). The EPA defines safe consumption of this toxin as 7.8 milligrams a day, which is the amount found in about half a can of diet soda.

It's not the amino acids themselves or the methanol that are toxic to your system, it's the breakdown products they turn into along the way – either during transport, on the store shelf, or during the metabolization process.

Stored at warm temperatures or for a prolonged period of time, phenylalanine turns into diketopiperazine, a known carcinogen.

Methanol can spontaneously break down to formaldehyde, also a toxin, which can accumulate in your cells and result in severe health consequences.

Methanol is found naturally in some of the foods you eat; however, it is never bound to amino acids in nature, as it is as an ingredient in aspartame. In nature, for example, methanol is bound to pectin. Pectin is a fiber which allows the methanol to pass through your body without being metabolized and converted to formaldehyde.⁸

Since methanol in aspartame has no natural binder, nearly all of it turns into formaldehyde in your body. Formaldehyde (which is used in, among other things, paint remover and embalming fluid) is a poison several thousand times more potent than ethyl alcohol.

The EPA has determined formaldehyde causes cancer in humans. Specifically, it is known to increase your risk of breast or prostate cancer.

Incidents of both types of cancer have been on the rise at a pace closely associated with the expanding use of aspartame throughout the world.⁹

The EPA has also concluded there is no known "safe" level of formaldehyde in your body -- risk depends on the amount and duration of your exposure.

The end waste product of formaldehyde is formate. An accumulation of formate in your body can cause metabolic acidosis, which is excessive acidity in your blood. Metabolic acidosis can cause methanol poisoning and can result in blindness, fatal kidney damage, multiple organ system failure, and death.¹⁰



The Major Element of Aspartame – Phenylalanine

Your body converts the amino acid phenylalanine to neurotransmitters that regulate your brain chemistry. These important neurotransmitters are:

- L-dopa
- norepinephrine
- epinephrine

However, if your system is flooded with phenylalanine as a result of an aspartame overdose, the resulting increased levels of neurotransmitters can cause problems in the physiology of your brain – problems which have been linked to a variety of psychiatric disorders. You can also be prone to anxiety attacks, depression, headaches, seizures and tremors.

If you consume too much aspartame in a short period of time, you might also experience immediate reactions including nervousness, sweating, feelings of fear, and heart palpitations.

In pregnancy, the concentrating effects of the placenta can magnify phenylalanine levels in a baby's blood by as much as four to six-fold, and can reach levels so high that cell death results.¹¹ It's not much of a stretch to be concerned consumption of high doses of this chemical during pregnancy could result in birth defects.

The genetic disease Phenylketonuria (PKU) is a condition in which your body is unable to use phenylalanine at all. If a toxic buildup occurs, it can result in mental retardation. People with PKU must avoid all sources of phenylalanine, including aspartame.

Aspartic Acid and Cell Death

The second largest component of aspartame is aspartic acid.

Aspartic acid functions as a major excitatory neurotransmitter in your brain. People who suffer from depression or have brain atrophy have been found to have low levels of aspartic acid in their bodies.

As you might expect, the chemical is found in abnormally high levels in people who suffer from seizures and strokes. In very high doses, aspartic acid can cause brain damage.

The term *excitotoxicity* was coined by Dr. Russell Blaylock, a neurosurgeon¹². It describes the ability of certain amino acids like monosodium glutamate (MSG) and aspartic acid to literally excite cells to death.



The scientific community has shown widespread acceptance of Dr. Olney's concept of excitotoxins and its link to neurodegenerative diseases like Parkinson's and Alzheimer's.

Unfortunately, the FDA refuses to acknowledge the connection between free form amino acids and excitotoxicity. Consequently, no demands have been made of food manufacturers to eliminate chemicals like MSG and aspartic acid from the food supply.

Excitotoxins can also encourage the production of free radicals. Free radicals can damage tissues and organs throughout your body and may accelerate diseases like arthritis, atherosclerosis, cancer, and coronary artery disease.^{13, 14}

Your blood brain barrier (BBB) is a system of capillary structures that prevent toxins from entering your brain.

If you have diabetes, hypertension or are a smoker, your BBB may be compromised and you might experience a heightened reaction to aspartame.

Unborn children and infants up to one year of age have incomplete and not well-insulated BBB's. Excitotoxins enter their nervous systems easily and quickly.

Babies under a year are four times more sensitive to excitotoxins than adults.

During the first year of life, irreversible brain damage can result from chemicals in breast milk that have crossed the unborn child's blood brain barrier. And yet – few if any pregnant and breastfeeding women are warned of the dangers of consuming artificial sweeteners.

Are Your Health Problems Related to Aspartame Consumption?

You might not realize you're having a reaction to aspartame. In fact, most people don't make the connection, and a tremendous amount of time and money is spent by aspartame "reactors" (people sensitive to the chemical), trying to find out why they are sick.

To determine if you're a reactor, take the following steps:

1. Eliminate **all** artificial sweeteners from your diet for one to two weeks.

(Note: If you typically consume aspartame in caffeinated drinks, you'll want to gradually reduce your intake in order to avoid caffeine withdrawal symptoms.)

2. After one to two weeks of being artificial sweetener-free, reintroduce aspartame or other artificial sweetener in a significant quantity (at least three servings daily) and avoid other artificial sweeteners during this period.
3. Do this for one to three days and notice how you feel, especially as compared to when you were consuming no artificial sweeteners.
4. If you don't notice a difference in how you feel after reintroducing aspartame, it's a safe bet you're able to tolerate aspartame *acutely*, meaning your body doesn't have an immediate, adverse response. However, this doesn't mean your health won't be damaged in the long run by this chemical and its breakdown products.



Keep in mind aspartame is completely metabolized by the human body, and its byproducts can create a serious risk to your health. Neurological damage can occur from long-term aspartame use.

Adverse Reactions to Aspartame

There have been more reports to the FDA for aspartame reactions than for all other food additives combined. And, there are over 900 published studies on the health hazards of aspartame. You can find a list in the [National Library Medicine Index](#).

There are also some 10,000 documented reports of adverse reactions to aspartame, including death. Since it is estimated only about one percent of people who experience a reaction report it, it is safe to assume at least a million people have had a reaction to this chemical.

Migraines are by far the most frequently reported reaction. Other commonly reported symptoms of an aspartame reaction include:

headache	change in mood
change in vision	convulsions and seizures
sleep problems/insomnia	change in heart rate
hallucination	abdominal cramps/pain
memory loss	rash
nausea and vomiting	fatigue and weakness
dizziness/poor equilibrium	diarrhea
hives	joint pain

Debilitating, Life-Threatening Conditions Linked to Aspartame

Aspartame has been implicated in a number of diseases, and there is special concern among doctors and scientists regarding the role aspartame plays in migraine headaches, epilepsy and neuropsychiatric disorders.

Aspartame has been identified as a definitive causative factor in the following serious health concerns:

Migraine Headaches

Aspartame has been shown to trigger migraines, and to cause more frequent, severe headaches in regular sufferers. This is especially true with long-term exposure to the chemical.

Seizures

In the mid 1990's, a hotline was established specifically for pilots to report acute adverse reactions to aspartame. The hotline received several hundred calls from pilots complaining about reactions to the chemical, including many who suffered grand mal seizures while in the cockpit.

In 1992, the United States Air Force issued a warning to pilots to avoid products containing aspartame because it has been linked to seizures and vertigo, dizziness, sudden memory loss and gradual loss of vision.

Seizures are a *primary* side effect of aspartame consumption. As if that weren't disturbing enough, they occur in people who've never had a seizure before, and disappear just as quickly when aspartame consumption is stopped.

MIT conducted a survey of 80 seizure sufferers. Survey results showed the role aspartame played in those seizures met FDA criteria for an imminent hazard to the public's health.¹⁵ This measure is what the FDA normally relies upon to pull unsafe products from the market. Products other than aspartame, apparently.

Depression

A study begun at Northeastern Ohio University to determine whether aspartame was linked to depression had to be halted. Can you guess why?

Nearly a third of the test subjects in the depressive group dropped out due to the severity of their reactions to aspartame consumption. Two others left the study due to serious eye problems – one developed a detached retina that ultimately led to blindness, and the other experienced a bleeding conjunctiva of the eye.

Visual Changes

The individual ingredients in aspartame as well as their breakdown products can do serious harm to your retina and optic nerves. Aspartame has been linked to blurred vision, eye pain, visual hallucinations and blindness.

Formaldehyde is known to cause retinal damage, and methanol poisoning can lead to changes in your vision and ultimately, blindness.

According to Dr. H.J. Roberts, an expert on aspartame who has treated hundreds of patients with sensitivity to the chemical, the visual problems seen in frequent aspartame users are identical to those found in people who developed methanol poisoning from wood alcohol during the era of prohibition.



Brain Cancer

The subject of aspartame and cancer continues to be controversial. However, there is sufficient evidence of a link to warn off anyone who is concerned about maintaining good health.

On the heels of its approval for use in diet soda in 1983, over a million pounds of aspartame was consumed. Less than a year later, in January 1984, the incidence of brain cancer took off at a rate far higher than any other type of cancer.¹⁶

According to the National Cancer Institute, there was a 10 percent increase in malignant brain cancer in 1985 – just two years after aspartame flooded the market in diet beverages.

Young women who drink large quantities of aspartame-laced diet drinks are especially susceptible to developing three specific types of brain cancer:

- glioblastoma
- astrocytoma
- primary lymphoma

Equally alarming is evidence women of childbearing age who consumed aspartame during pregnancy were delivering babies with an increased risk of brain and spinal cord cancer.^{17,18}

Aspartame and Weight Gain

Would it surprise you to learn aspartame may cause you to gain weight? It's true – products marketed as “reduced calorie,” “sugar-free,” and “diet” can actually sabotage your weight control efforts.¹⁹

The two main ingredients of aspartame, phenylalanine and aspartic acid, stimulate the release of insulin and leptin – hormones which instruct your body to store fat.

In addition, a large intake of phenylalanine can drive down your serotonin levels. Serotonin is the neurotransmitter that tells you when you're full. A low level of serotonin can bring on food cravings which can lead to weight gain.²⁰

What Will You Do, Now That You Know?

I hope this report has convinced you one of the worst things you can put into your body, or feed to your family, is the artificial sweetener aspartame.

You can read more about aspartame and other artificial sweeteners in my comprehensive book, [Sweet Deception](#), as well as in the outstanding book by H.J. Roberts, *Aspartame Disease – An Ignored Epidemic*. I also recommend you watch the excellent documentary *Sweet Misery*.

Neotame: The “New and Improved” Aspartame

You’ll also want to be on the lookout for this modified version of aspartame, as it likely carries similar health risks to the original.

Neotame is chemically related to aspartame, but has greater heat stability and is 72 times sweeter.

Breaking the Cycle

If you consume a lot of “diet” products, you probably have cravings for sweet foods and beverages.

Why?

Because if your body isn’t receiving the fuel it needs in the right combinations, you’ll develop sweet cravings.

To optimize your diet, you’ll want to determine your nutritional type, and begin to eat the kinds of foods your body requires.

When you are eating right for your nutritional type, your sweet cravings will disappear.



There may also be an emotional component to your cravings. If so, you’ll need to address it, as well. I highly recommend the Emotional Freedom Technique (EFT) or a medical hypnosis program.

You can find links to information about nutritional typing, EFT, and a wealth of other resources to help you kick your artificial sweetener habit at my website, www.Mercola.com.

I can’t overstate the importance of avoiding aspartame to your short and long-term health, the quality of your life, and the lives of your loved ones. I hope you’ll take this information to heart and eliminate aspartame and other artificial sweeteners from your diet.

References:

- ¹ Wikipedia, The Free Encyclopedia, Aspartame, <http://en.wikipedia.org/wiki/Aspartame> (Accessed 2/20/09)
- ² Time.com, Cyclamates' Sour Aftertaste, October 31, 1969, <http://www.time.com/time/magazine/article/0,9171,839127,00.html> (Accessed 2/20/09)
- ³ Rense.com, How Aspartame Became Legal – The Timeline, <http://www.rense.com/general33/legal.htm> (Accessed 2/21/09)
- ⁴ H.J. Roberts, Aspartame Disease: An Ignored Epidemic, West Palm Beach, Sunshine Sentinel Press, 2001/James Turner, The Aspartame/NutraSweet Fiasco, <http://www.stevia.net/aspartame.htm>
- ⁵ Bressler, J, et al. FDA Report on Searle, August 4, 1977
- ⁶ Constantine, A, History of Aspartame, 2004, http://www.wnho.net/history_of_aspartame.htm
- ⁷ "Morbidity and Mortality Weekly Report," www.cdc.gov
- ⁸ Bowen, J., Aspartame Toxicity and Methanol, Ethanol, Pectin, Methyl Alcohol, <http://www.321recipes.com/aspartame.html>
- ⁹ Schwartz, G.R., "Aspartame and Breast and Other Cancers", *West J Med* (1999)
- ¹⁰ Sejersted, O.M., Jacobsen, D., Ovrebo, S., Jansen, H. "Format Concentrations in Plasma from patients Poisoned with Methanol," *Acta Med Scand* 213 (1983): 105-110
- ¹¹ Kerr, G.R., Waisman, H.A. *Transplacental Ratios of Serum-Free Amino Acids During Pregnancy in the Rhesus Monkey; Amino Acid Metabolism and Genetic Variation*. New York: McGraw Hill, 1967
- ¹² Russell Blaylock, MD, *Excitotoxins: The Taste That Kills*, Health Press (NM), 2006
- ¹³ Fichtlscherer, S., Breuer, S., Schachinger, v., Dimmeler, S., and Zeiher, A.M. "C-Reactive Protein Levels Determine Systemic Nitric Oxide Bioavailability in Patients with Coronary Artery Disease" *Eur Heart J*. Vol. 25, No. 16 (Aug. 2004): 1412:8
- ¹⁴ Napoli, C., Sica, v., deNigris, F., Pignalosa, O., Condorelli, M., Ignarro, L.J., Liguori, A. "Sulphydryl Angiotensin-Converting Enzyme Inhibition Induces Sustained Reduction of Systemic Oxidative Stress and Improves the Nitric Oxide Pathway in Patients with Essential Hypertension" *Am Heart J*. Vol. 148, No. 1 (July 2004): e5
- ¹⁵ Wurtman, R.J., Press Conference on Cable News Network (CNN), July 17, 1986
- ¹⁶ Olney, J.W., Farber, N.B., Spitznagel, E., and Robbins, L.N. "Increasing Brain Tumor Rates: Is There a Link to Aspartame?" *J. Neuropathol Exp Neurol* 55 (1996): 1115:123
- ¹⁷ National Cancer Institute SEER Program Data, Jellinger, K.E. et al. "Primary Central Nervous System Lymphomas: An Update" *J Nat Cancer Inst* 84 (1992): 414-422
- ¹⁸ Gurney, J.G., Pogoda, J.M., and Holly, E.A. "Aspartame Consumption in Relation to Childhood Brain Tumor Risk: Results from a Case-Control Study" *Natl Cancer Inst* 89 (1997): 1072-1074
- ¹⁹ Hall, W.L., Millward, D.J., Rogers, P.J., and Morgan, L.M. "Physiological Mechanisms Mediating Aspartame-Induced Satiety," *Physiol Behav*. Vol. 78, Nos. 4-5 (Apr. 2003); 557-62
- ²⁰ Chen, L.N., and Parham, E.S. "College Students' Use of High-Intensity Sweeteners is Not Consistently Associated with Sugar Consumption," *J Am Diet Assoc*. 91 (1991): 686-90