

Researching Artificial Sweeteners

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Introduction

This paper will explore the main controversies over artificial sweeteners. Artificial sweeteners are used broadly in common food and drink products, but have been subject to great scrutiny from public, professional/academic, and regulatory bodies. Ultimately, artificial sweeteners provide distinct benefits to food and drink manufacturers and distributors, but those benefits do not translate to consumers.

Artificial Sweeteners: The Benefits

To begin the discussion, the benefits of artificial sweeteners will be delineated. Understanding the benefits of artificial sweeteners will also answer the question, “why are they used?” After all, natural sweeteners like sugar, agave, honey, etc. exist and have been in use for centuries. Why not simply use them?

The main benefit of artificial sweeteners is a commercial one. Because of their considerable potency, artificial sweeteners are a substantially more efficient way to sweeten food and drink. As a result, companies are incentivized to use artificial sweeteners because they represent a dramatic cost savings.

The difference in potency between natural and artificial sweeteners is indeed dramatic. For instance, the synthetic chemical acesulfame potassium (also called acesulfame-K, “Ace-K”, or simply “K”) was first approved by the FDA in the late eighties and it boasts a sweetness that is 150-200 times that of natural sugar.¹ K is a tremendously popular sugar substitute, and is found in candy, soft drinks, dry drink mixes, baked goods, and even as a table-top sweetener. Added to that, K maintains its molecular stability at high heat levels so it is relatively easy to

¹ Ronald Hoffman, M.D., “How Sweet it is: an Examination of Alternatives to Sugar”, *Intelligent Medicine*, 2013, §2

manufacture. To take another example, an even more popular artificial sweetener is aspartame (often branded as “NutraSweet”), which boasts a sweetness 180-200 times that of natural sugar.² Aspartame is ubiquitous, found not only in marketably sweet products like soft drinks and candies, but also toothpaste, cereals, and yogurt. While aspartame is not as stable at high heats as K, it was approved for use as early as the mid-seventies and has become something of an industry standard by default of its longevity.

Another reason that artificial sweeteners are used is due to purported health benefits. We say “purported” because further research has rendered fairly dubious the claim that artificial sweeteners provide health benefits. But the disadvantages will be discussed in greater detail in their relevant section. For now, it suffices to point out that artificial sweeteners have either little to no caloric value. Before the initiation of greater and more comprehensive health-food awareness on the part of consumers, many viewed caloric intake somewhat dichotomously as being principally responsible for obesity and related challenges such as diabetes; this left an opening (which is more easily attributable to ignorance and lack of relative medical progress than it is to conspiratorial malice) for an “oxymoronic product... a [promise of] sweet, satisfying taste and no calories.”³ Artificial sweeteners were initially billed as a somewhat magical scientific solution to “having your cake and eating it to”—products with all the great flavor consumers indulge in, without the risk of weight gain due to their non-caloric qualities.

Artificial Sweeteners: The Disadvantages

It can be tempting to exaggerate the negative effects of artificial sweeteners. In the colloquial realm claims like “they give you brain cancer” or “that stuff will kill you” are circulated without much hesitation. At present, there are no studies that conclusively prove that

² Hoffman, §4

³ Beth Kowitt, “The Hunt for Perfect Sugar”, *Fortune*, 2017, §10

artificial sweeteners cause cancer or that they invariably lead to an untimely demise. However, the research that *has* been conducted does raise some fairly serious questions as to whether or not these sweeteners are legitimate substitutes for natural sugar.

Studies which measure the *effects* of artificial sweeteners have generally concluded that they are either positively disadvantageous, or at least that they may be. For instance, studies in mice have gone to show that aspartame, saccharin, and sucralose all altered metabolism, resulting in a significantly higher level of blood glucose than the control mice who were fed only natural sugar.⁴ The same research was then conducted with human participants, with a parity of results. Blood glucose is an indicator of diabetes, which is a serious medical concern for about ten percent of the U.S. population. Diabetes tends toward a shortening of the lifespan due to the fact that common complications from it include cardiovascular disease and other leading killers.

Studies have, for many years, focused on weight gain's relationship to artificial sweeteners because many consumers rely on them as a weight loss tactic. One, studying women between the ages of fifty and sixty nine over the period of a year found that artificial sweetener users were significantly more likely to gain weight than nonusers, but that at the same time the average differences in weight gained and loss was relatively marginal, leading the researchers to conclude that artificial sweeteners do not help weight loss, nor do they prevent weight gain.⁵ Because weight gain is another risk factor in diabetes, and especially since artificial sweeteners are perceived to actually *help* weight gain, much research has centered on whether or not this can actually happen. While researchers are unsure exactly why (given its non-caloric qualities) these sweeteners do not help in weight loss or weight gain prevention, one speculation is that this may

⁴ Taylor Feehley & Cathryn Nagler, "The Weighty Costs of non-Caloric Sweeteners," *Nature* vol. 514, pp. 176-77

⁵ Steven Stellman & Lawrence Garfinkel, "Artificial Sweetener Use and One-Year weight Change among Women," *Preventative Medicine*, vol. 15, no. 2, pp. 195-202

be due to the fact that *because* it has no calories, the body's insulin reaction to sweet tastes results in a lowering of insulin and an increase in appetite.⁶

Since aspartame has unique prominence and ubiquity among other artificial sweeteners, some comments about it in particular are warranted. Dr. Ronald Hoffman chronicles a history of disputations regarding aspartame and its negative side effects⁷. When it was first approved by the FDA its approval pended in lieu of possible evidence that it caused brain damage; in the eighties research suggested that it might imbalance neurotransmitters responsible for serotonin, resulting in depression. Today, the FDA is flooded with complaints that range from nausea, seizures, joint pain, and much more. More recent literature on the effects of aspartame suggests that it poses excitotoxinal neurological risks that could contribute to or exacerbate a whole range of serious diseases from migraines and seizures to dementia, ALS, and endocrine disorders.

While all of these studies suggest that there are serious problems with artificial sweeteners—and aspartame especially—it is somewhat difficult to understand how aspartame *itself* (i.e., inasmuch as it consists of discrete chemical compounds) could produce these effects. Some of the chemical compounds that comprise aspartame are not harmful, or only harmful in very rare circumstances for those with very rare conditions (who would, presumably, be accustomed to and aware of the rarity of their condition and therefore vigilant in what they consume). These include aspartic acid and phenylalanine, both acids which are found across most diets and which, if consumed temperately, probably do not pose any serious general health risk.⁸ However, methanol is another result of aspartame and considerable controversy exists over its safety. Methanol is an ingredient found in “antifreeze and jet fuel” which gives it

⁶ Hoffman, §16

⁷ Hoffman, §§9-17

⁸ Luke Yoquinto, “The Truth about Aspartame,” *Live Science*, §§4-5

something of a *prima facie* red flag owing to connotative sensationalism, but amounts of methanol similar to those provided through aspartame exist naturally in common healthy foods like fruit.⁹

All of these considerations leave artificial sweeteners in a sort of limbo. There is no conclusive evidence—no “smoking gun”—showing that it causes any particular thing or not. The only thing that is certain is that it does *not* contribute to weight loss or weight maintenance, but beyond that it is unclear exactly *how* it effects the human body, although it *is* clear that it is linked to and associated with a great deal of different diseases. Short of conclusive evidence it may be very unlikely that artificial sweeteners are actually *banned*, but the general public’s suspicions directed toward them certainly put companies who use them in a precarious position, regulations or not.

Artificial Sweeteners and the Market

Discovering the raw, ontological reality of artificial sweeteners’ effects on the body may not be necessary if the market abandons them simply due to well-founded suspicions regarding their side effects. A general shift in consumer sentiment toward artificial sweeteners and food additives in general has already begun. More and more consumers are preferring natural and organic food products, and one might only anticipate this trend to continue with recent market disruptions, such as Amazon’s acquisition of Whole Foods.

One area where a decline in consumer perceived value of artificial sweeteners can be seen is in diet sodas. Diet sodas have traditionally been something of an apex or pinnacle of the previously mentioned oxymoronic value proposition: a product with superior sweetness and without any of the negative health/weight gain side effects. But over the last twelve years,

⁹ Yoquinto, §7; Hoffman, §5

national consumption of diet soda has declined by about twenty five percent.¹⁰ Coke and Pepsi represent the lion's share of this market, but each company has been experiencing declining sales for years on their diet labels.

Pepsi attempted to respond to the voice of the market by removing aspartame from their diet line. In 2015, Pepsi's senior VP said that the company conducted market research and that the number one priority of their consumers was to remove aspartame from their diet label, so Pepsi acquiesced.¹¹ But Pepsi did not replace aspartame with natural sugars, it replaced it with a combination of sucralose and K. While K is not the same as aspartame, nor has it been studied to the same extent that aspartame has been studied, some fairly serious questions linger about its health effects, and researchers are presently working to help understand if it is as bad as they believe aspartame to be.¹² The results of Pepsi's switch away from aspartame were probably not what the company expected: their sales declined *even more* in the wake of the reformulation. The new diet Pepsi without aspartame was quickly pulled from shelves.

Conclusion

There is a very serious tension that the Pepsi case illustrates. It seems fairly plain that whatever the ultimate effects of aspartame, consumers have already reached the point where *they* conclusively don't trust it. What the FDA says or doesn't say hardly factors into that decision. In a hyper-digital world where information, research, etc. are disseminated instantaneously, a budding health awareness permeates the consumer market and is beginning to rear its head even against the most enduring brands. Pepsi's research revealed that their customers' top priority was a soda with no more aspartame, but what that *really* meant was that they wanted a soda

¹⁰ Kate Taylor, "The Four Biggest ways American Beverage Consumption will Change", *Business Insider*, 2016

¹¹ Bruce Horowitz, "Diet Pepsi to Ditch Aspartame," *USA Today*, 2015

¹² Quentin Fottrell, "Is Diet Pepsi with Sucralose healthier than aspartame?" *Market Watch*, 2016.

without artificial sweeteners—replacing aspartame with more synthetic chemicals was not the solution the market was looking for, and the market’s reaction made that abundantly clear. But at the same time, switching large brands like Pepsi or Coke to natural sugars would indicate a significant loss in cost savings. As indicated from the beginning, the reason that these sweeteners are even popular at all is that they allow food and drink manufacturers to be *considerably* more efficient with their resources. Dialing back from aspartame, K, sucralose, etc. would represent a possible decrease in efficiency of two hundred. So such companies are far more incentivized to make artificial sweeteners seem palatable than they are to abandoning them and going back to natural sugars.

This tension—between the interests of corporations and consumers—will probably ultimately be won by consumers, since it is ultimately they who make the corporations successful. Good businesses pivot to market demands, they revitalize and reformulate dying brands to better align to broad consumer sentiments, and they care about giving people what they want more than telling people what they need. It seems safe to say that over the last forty years or so, as consumerism has grown bloated in its insatiability, that food and drink manufacturers have played along and been happy to feed a misimpression the consumer landscape had regarding the value of artificial sweeteners. But “the game is up” now that consumers are catching on to the (at best) dubious effects and results of the synthetic chemicals they consume through their foodstuff. This will no doubt make it incredibly difficult for corporate behemoths to respond to, since their infrastructures are developed around the rapid and efficient use of something the market no longer wants, but at this rate they simply won’t have any other choice if they wish to continue. They’ve already harmed the level of trust between them and consumers over artificial sweeteners, and the best way to get it back is to abandon them.

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