

## II. TOOTH DECAY: A Preventable Disease

*It is not what you learn that redeems you, but what you do with what you learn.* Paramahansa Yogananda (1893–1952)  
Indian, yogi, philosopher.

### THEN AND NOW:

Starting in the early 1600's until around 1800, London authorities published weekly lists of deaths, called "Bills of Mortality," in order to alert the public to developing plagues. One of the most common and consistently reported causes of death had nothing to do with plagues, however—it was dental infections and complications of tooth extractions.



Thankfully, dental infections and dental surgeries are no longer among the most common causes of death, and in some populations dental disease is decreasing. Nevertheless, dental disease and tooth decay remain widespread and serious problems. In China, seventy-five percent of five-year-olds have tooth decay. A National Institute of Health study reported that fifty-two percent of children in the U.S. between the ages of six and eight have experienced decay; by age seventeen, eighty percent have had at least one cavity.<sup>1</sup> Two thirds of adults, ages 35 to 44, have lost *at least one* permanent tooth and *one-fourth* of Americans, ages 65 to 74 have lost *all* of their natural teeth.<sup>2</sup>

Life expectancy in the United States has increased steadily over the centuries and now stands upward of 75 to 80 years (also see APPENDIX 2: Healthcare Graphs.) Our teeth need to now provide us with more extended service than ever, making a sound understanding of the precise chemistry involved in dental disease all that much more important.

Oral health is affected by both oral hygiene and nutrition. All too often, dental professionals seem to focus on the results of poor oral hygiene, leaving specific *causal* aspects to take a back seat. This is unfortunate because realizing exactly *how* the foods we eat actually result in tooth decay and gum disease is the first step in any effective prevention.

Sugar is well known to be the most significant agent involved in the process of dental disease. Sugar use was recorded in India as far back as 3000 B.C. but has been a scarce luxury until more modern times. There is a direct correlation between the increase of sugar in the human diet and the increase of dental decay. The average American consumes the equivalent of 155 pounds of sugar a year (equal to 39 teaspoons of granulated sugar per day). This is at least four times the amount nationally recommended by most experts.<sup>3</sup>

Seventy percent of sugar in our diets is hidden in manufactured foods. Because sugar enhances flavor and also has addictive qualities, manufacturers add sugar to food to encourage repeat purchase.\* Consumers are often unaware of the extent to which sugar has been added to their food. The tomato condiment ketchup, for example, is high in sugar content, as fructose corn syrup, flavored with vinegar.

Most food contains sugars or readily fermentable carbohydrates that can provide oral bacteria with the energy needed for reproduction. To varying degrees, all sugars—sucrose, monosaccharides, glucose and fructose—will facilitate bacterial reproduction,<sup>4</sup> even in raw forms, such as honey and molasses, as well as several non-sugar dietary sweeteners. This reproduction of specific oral bacteria creates the environment for enamel decalcification and break down dental structures.

Since 1978, soda consumption in the U.S. had *tripled* for boys and *doubled* for girls. Young males age 12-29 averaged over 160 gallons per year, almost 2 quarts per day.<sup>5</sup> A 12-ounce can, supplies nine teaspoons of sugar, often as high-fructose corn syrup (labeled HFCS). Overall injection of HFCS went up 1,000 percent between 1970 and 1990. Soft drink consumption has gone down slightly since 2010. However, and despite links to decay<sup>6-7</sup> and gum disease, it continues at over 450 per 12-ounce servings, per person, per year.<sup>8</sup> *Processed "fruit" juices and energy drinks are not a nutritional substitute for natural fruit and may have even more sugars than some of their carbonated soft drink alternatives\*\** (also see: "The pH of beverages in the United States" at [www.ada.org](http://www.ada.org)).

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\*An illustration of the recognized addictive qualities of sugar, a pill, marketed as gymnema sylvestre can inhibit the desire for sugar by blocking its sweet taste. The goal of gymnema sylvestre is to help dieters resist foods high in sugars by countering their addictive qualities.

\*\*Sugar is not the only harmful ingredient of soft drinks. The phosphoric acid in carbonated beverages has been associated with an increase in the weakened enamel *and* bone (osteoporosis). Teenage girls now show signs of disease that used to be found mainly in elderly women.

In our sugar-saturated culture, it is vitally important that patients understand the science of tooth decay. Few now realize that *frequency of intake, as opposed to amount, is the primary cause of oral disease*. Dietary misconceptions can have very harmful results; the following section examines some issues more closely, focusing on exactly *how* a poor diet and frequency of eating and drinking produces dental disease.

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3. Freire MD, Cannon G, Sheiham A. [An analysis of the recommendations on sugar consumption published between 1961 and 1991]. *Rev Saude Publica* 28:pp228-237, 1994.
4. Truhe T. *Dent Today*, 09/1996.
5. Valentine J. Soft drinks: America's other drinking problem. See: [www.westonaprice.org/modernfood/soft.html](http://www.westonaprice.org/modernfood/soft.html).
6. Ismail AI, Burt BA, Eklund SA. The cariogenicity of soft drinks in the US. *JADA* 109:pp241-245, 1984.
7. Szpunar SM, Eklund SA, Burt BA. Sugar consumption and caries risk in schoolchildren with low caries experience. *Community Dent Oral Epidemiol* 23:pp142-146, 1995.
8. The Statistical Portal. Per capita consumption of soft drinks in the United States 2010 to 2015. [statista.com](http://statista.com).

### THE SCIENCE BEHIND TOOTH DECAY:

The important factor in tooth decay is not the type of food you eat, or even how *much* sugar you eat with your meals. The factor that most influences decay is *how often that food, or drink ingestion occurs*.

If you buy a box of chocolates and eat the whole thing in one sitting, you are not doing much more harm to your teeth than if you eat only one piece. However, if you eat just one, and an hour later eat one more, and an hour later again eat another, and so on throughout the day, you have done ten times more harm to your teeth than if you ate them all at once. With this realization, it is alarming that unscrupulous marketers now even sell children their candy in multiple-use liquid spray dispensers.

At any given time, roughly 50 billion microorganisms call your mouth home.<sup>1</sup> The primary action of bacteria is reproduction. While all bacteria don't harm your teeth, those that are decay-causing help dissolve your teeth as part of their reproduction process. Food, such as sugar and simple carbohydrates, do not themselves rot teeth. Food makes tooth decay possible by staging simultaneous assaults on your teeth: first, it halts the natural ability of saliva to limit bacterial reproduction and second, it nourishes the bacteria to increase that decay-causing reproduction. *To understand how the decay process happens, we must examine the changes that occur in your mouth when you eat.*