SUGAR

IN THE SPOTLIGHT

Cristin E. Kearns, DDS, MBA

Nonalcoholic Fatty Liver Disease
Type 2 Diabetes Risk
Soda Taxes
Warning Labels
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as we innovate and grow.
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From my mother’s living room, you can see the Lick Observatory way off in the distance. It is a group of tiny white domes east of San Jose, settled on the palomino ridge of the Diablo Range at the summit of Mount Hamilton. It is an icon of the San Francisco Bay Area.

The Lick Observatory saw its first light on Jan. 3, 1888. For nine years, it was the largest refracting telescope in the world. It was a gift from James Lick, piano maker, entrepreneur, chocolate speculator, landholder and wealthiest man in California. Lick, like many others, was drawn to California by the Gold Rush. He brought with him a modest fortune from his piano making company in South America and 600 pounds of Ghirardelli chocolates from Peru. After successfully converting the chocolate to cash, he convinced his friend Domenico Ghirardelli to come to San Francisco to establish his chocolate company.

Lick made his fortune not through the mining of gold but through the careful mining of the burgeoning golden economy of California. He held large and important parcels of land in San Francisco and the Santa Clara Valley. Lick opened a flour mill in San Jose and a grand hotel in San Francisco.

After accumulating his great wealth, he considered building statues and grand architectural tributes to himself and his accomplishments. However, after George Madeira introduced him to the wonders of astronomy with a guided telescopic tour of the night sky, Lick decided to bequest the modern-day equivalent of $1.2 billion to the building of an observatory on Mount Hamilton.

The Lick Observatory has figured prominently in astronomical discoveries. The distance to the moon was precisely measured at the Lick Observatory by bouncing a laser off the moon in 1969. The Lick revolutionized astronomy by replacing photographic plates with digital detectors in 1971. Its newest telescope is the Automated Planet Finder (APF). It is constantly searching nearby stars for earth-sized planets.

The Lick’s list of contributions to astronomy is long but the one that has the greatest visual impact is the deep-space photography that was perfected on Lick’s Crossley telescope in the 1900s. It revealed the myriad galaxies beyond our Milky Way. It was the forerunner of the Hubble Space Telescope’s beautiful eXtreme Deep Field photos that show innumerable galaxies, unimaginably far away. These photos prove the universe is beautiful and vast.

Way up there at the Lick Observatory, the researchers in those tiny white domes are studying all the wonders of the universe. But today, for me, that universe has become very small. It has shrunk to the distance between my mother and me. The center of my universe lies inches away on her hospital bed in her living room. The Lick Observatory is a distant backdrop. The birth of stars and their violent deaths in supernovae have little relevance today. My observations are focused on my mother’s breathing.

Her comfort and security are my purpose as she nears the completion of her 97th revolution around the sun.

Astronomers speculate about wormholes, alternate universes and time travel. But I can sit here in my tiny universe containing just two people and travel through time by reviewing the 10 decades of my mother’s life. I can see her as a young girl in rough-and-tumble Oklahoma when cars were beginning to replace horses as the common means of transportation. I can see her as a teenager living through the Dust Bowl and Depression. I can see her witnessing her father destroying his bankbook because their savings were lost.

I can see her as a newlywed when she and my father listened to the radio to learn that Pearl Harbor had been bombed. I can see her when our family settled in Pennsylvania. I can see her enjoying all the opportunities that life and a happy family can present. I can see her traveling the world and enjoying great friendships. I can see all the lives she touched and enriched over her 28 years as a teacher. I can
see her living out her happy retirement here in California surrounded by her family. I can time travel back and forth through her life in this tiny universe. She is my universal constant.

No matter what your profession or vocation, no matter how fast-paced your life seems, your whole universe can contract in an instant and time can slow to a standstill when a debt of devotion and love comes due. I am grateful for many, many things but I am most grateful for having the good fortune to have had the mother I did.


The Journal welcomes letters

We reserve the right to edit all communications. Letters should discuss an item published in the Journal within the last two months or matters of general interest to our readership. Letters must be no more than 500 words and cite no more than five references. No illustrations will be accepted. Letters should be submitted at editorialmanager.com/jcaldentassoc. By sending the letter, the author certifies that neither the letter nor one with substantially similar content under the writer’s authorship has been published or is being considered for publication elsewhere, and the author acknowledges and agrees that the letter and all rights with regard to the letter become the property of CDA.
The nub:
1. We like those who have the capacity and interest to do us good.
2. We ignore those who cannot help us and defend against those who are capable of doing things contrary to our interests.
3. If we only walk with those who are there to help us, we will generally be behind or in front of the crowd — but not “with it.”

David W. Chambers, EdM, MBA, PhD

Who do we want for patients, for friends, as allies for the organizations we invest our time in?

Imagine a 2-by-2-foot table with “good/bad for me” on one dimension and “influential/benign” on the other. It should be obvious that we cultivate the powerful and friendly, avoid those who can potentially harm us, smile on nice little people and ignore the rest.

What a joy to have a few friends who are in a position to do us some good.

Those with little prospect of mattering receive little thought. We save a lot of time and energy that way. Those with small influence but presumed positive attitudes are our context. We “like” them on Facebook. We acknowledge their compliments and ignore their requests if inconvenient. They are frequently the objects of charity. We count on them, often in the aggregate. They are ideal patients. They have financial resources, time and availability, billable needs, networks of friends for referrals and capacity to show appreciation. In fact, that is the very definition of a patient: one who agrees to the conditions of treatment.

We do not have a name for individuals who need dental care but have not agreed to the terms of treatment. These should be classified in the influential, but not very supporting quadrant. They include the patient who insists on care that the dentist knows is less than optimal, insurance companies, those who post negative ratings, young dentists who want to change what it means to be professional and owners of corporate chains that place commercial interests above professional ones.

This is the troubling cell — the one where interests that do not align with our own are advanced by people who matter. It says a lot about our character how we respond. The philosopher Isaiah Berlin suggested that there are two common patterns. The hedgehog curls up in a ball, leaving nothing but hard bristles to ward off attack. This defensive posture is favored by those who perceive that they hold a better hand than they are likely to get if the cards are shuffled and redealt. The fox, the other approach mentioned by Berlin, fusses around looking for a rational perspective on the matter. The great American advocate of pragmatism, William James, makes much the same distinctions, but he places the elements on a time continuum. First, we ignore the powerful and unfriendly and then we push back. The third phase in this process is to claim that the change was our idea in the first place.
Patients With Two Prescription Drug Refills Likely to Become Long-Term Users

New research has pinpointed the number of prescription refills it can take to tip the scales and push a patient to become a long-term opioid user. A study done at the Oregon Health and Science University found that patients who received two refills were likely to become long-time users. The study was completed by using data from Oregon’s prescription monitoring program as well as data from Oregon vital records and a hospital discharge registry. In total, 3.6 million opioid prescriptions were examined and it was found that “The odds ratio of becoming a long-term opioid user was 2.25 higher among patients who received two prescription fills compared to one. It was also 2.96 higher for those initially receiving between 400 and 799 cumulative morphine milligram equivalent dosages within 30 days, compared to patients on lower doses. Long-acting opioids were associated with a higher risk than short-acting drugs.”

Richard Deyo is with the Oregon Health and Science University and was the lead researcher for the study, which was published in the Journal of General Internal Medicine.

“Our data suggest the value of attention to high-risk prescribing, over which clinicians have greater control,” he said in a press release. “This in part reflects concern that we are dealing with risky drugs, not risky patients.”

Prescribers in the United States write nearly 100 percent of opioid prescriptions worldwide, and in California alone more than 1 billion dosage units of hydrocodone combination products were dispensed in the 2013–14 fiscal year. Opioid use and deaths attributed to abuse are sharply on the rise, sending government agencies and public health advocates looking for tools to turn the tide.

Children With Dental Sealants 80 Percent Less Prone to Caries

Further evidence has been presented that shows dental sealants are more effective than other treatments in the fight against childhood caries. The American Dental Association and American Academy of Pediatric Dentistry (AAPD) have published two systematic reviews that evaluated the effectiveness of dental sealants. The literature breaks down the outcomes such as caries incidence, sealants retention and adverse side effects. The reports are titled “Sealants for Preventing and Arresting Pit-and-Fissure Occlusal Caries in Primary and Permanent Molars” and “Evidence-Based Clinical Practice Guideline for the Use of Pit-and-Fissure Sealants.”

Timothy Wright, DDS, MS, is the lead author.

“Sealants are a proven and effective therapy for preventing cavities in children and teens. Oral disease can greatly impact one’s concentration and self-esteem and contributes to more than 51 million hours of missed school each year,” Wright said in a press release. “The joint report reaffirms that sealants should be a routine part of cavity prevention, as children with sealants are up to 80 percent less prone to cavities compared to those without them.”

The reports, which are accompanied with updated clinical practice guidelines, were published in the August issue of the Journal of the American Dental Association, as well as the July/August issue of AAPD’s Pediatric Dentistry journal.

“The new guideline gives clear direction for dentists to best use sealants to improve the oral health of their patients,” Wright said.

To read the systematic review and download the guideline, visit jada.ada.org.

For patient-friendly information to help your practice, download the JADA patient page at jada.ada.org or visit MouthHealthy.org and mychildrensteeth.org.
Undiagnosed Sleep Apnea Costing Billions

The cost of undiagnosed sleep apnea in the U.S. is in the billions, according to two new reports released by the American Academy of Sleep Medicine (AASM). The reports, titled “Hidden health crisis costing America billions” and “In an age of constant activity, the solution to improving the nation’s health may lie in helping it sleep better,” includes results from an online survey of obstructive sleep apnea patients. The reports conclude that “diagnosing and treating every patient in the U.S. who has sleep apnea would produce an annual economic savings of $100.1 billion.” The reports state that the economic burden of it going undiagnosed is around $149 billion. This amount is calculated by lost productivity, vehicle accidents and workplace accidents.

“The high-quality, patient-centered care provided by board-certified sleep medicine physicians can significantly reduce the health and economic burdens of sleep apnea,” said AASM President Ronald Chervin, MD, MS, in a press release.

While dentists can play a key role in recognizing potential sleep-disordered breathing (SDB) and managing some aspects of treatment, SDB is a medical condition and its diagnosis is outside the scope of the practice of dentistry. Proper SDB diagnosis requires monitoring of the patient during sleep and evaluation of the events during the sleep cycle by a qualified physician. Collaboration between the physician and the dentist in identifying and diagnosing patients who are suffering from SDB and determining the best mode of treatment ensures patients receive comprehensive and appropriate care. Additionally, as SDB is progressive, continued monitoring and managing of this chronic condition is best handled through continued dentist-physician collaboration.

CDA’s policy on SBD (25RC-2011-H) is the following:

- It is appropriate for dentists to screen patients for signs and symptoms of SBD and to work with physicians to diagnose and treat SBD.
- CDA supports increased awareness and the education of dental and medical professionals on appropriate involvement in the screening, diagnosis and treatment of SBD.
- CDA supports efforts at the federal and state levels to ensure dentists are recognized members of the health care team managing SBD and to ensure that patients’ health care benefits are maintained regardless of whether a dentist or physician provides patient care.

For more information, visit the Sleep Disordered Breathing Issue Summary resource at cda.org.
If you’re a practice owner in California, new Fair Labor Standards Act rules may have a big impact on how you classify your employees. First, review a duties test to determine if team members should be exempt. Then, either increase employees’ salaries to be compliant with the new regulations or reclassify them as hourly employees. The experts at CDA Practice Support are here to help you navigate the new overtime regulations and minimum salary thresholds so you can get your office ready by the Dec. 1 deadline. Explore online employment practices resources or ask an expert today.

800.232.7645 or cda.org/practicesupport
Embryonic Mouth Formation Explained

Researchers at Whitehead Institute have tested frogs to help explain mouth formation during embryonic development. Xenopus frogs were studied over many years and it was discovered that the mouth starts as a square with eight cells wide and eight cells high and then later becomes two cells wide and 20 cells high. Later in the development, the two rows of cells “unzip” to create the mouth as we know it.

Hazel Sive, is a professor of biology at MIT and part of the Whitehead research team that made the discovery. “Mouth formation involves many steps that ensure the opening happens at the right time and at the right place — when the cells are connected with the correct junctions to be exposed to the outside and where the opening connects to a prepared region, in the case of the mouth to the digestive system. But I was so surprised when we found that this process is initiated in frogs several days before the mouth actually opens,” Sive said in a press release.

The results of the research were published in the Aug. 2 issue of Cell Reports. The Whitehead research team propose that the premouth formation occurs as “neural crest” cells come to lie on either side of the extreme anterior domain (EAD) and that these cells then signal to the EAD cells to begin forming the premouth. Therefore, the study claims to have revealed a precise cellular mechanism that positions and contributes to the future mouth.

Laura Jacox is another researcher on the project and said there is still a lot of work to be done. “There’s a lot of craniofacial development that we don’t understand,” Jacox said. “If we hope to understand why craniofacial anomalies happen in humans and how to treat them at an earlier point to avoid years of surgery and orthodontics, we need to obtain a better handle on what’s going on. Recognizing what is required to form a mouth and the face and how it’s regulated is a step toward understanding how these processes can be disrupted.”

The work of this study was supported by the National Institute of Dental and Craniofacial Research and Harvard University’s Herschel Smith Graduate Fellowship.

Dental Sealants Expose Children to Less BPA Than Many Household Items

The amount of BPA in dental sealants is safe for young children, according to research recently published by the ADA Science Institute. Specifically, the research shows that dental sealants in a 6-year-old child has less BPA in them than food, drinks, sunscreen, shampoo, body wash and other cosmetics and air and thermal paper. The report, published in the ADA Professional Product Review, lays out details on how the BPA released from dental sealants is .09 nanograms — far lower than the limit for a 6-year-old child.

David Sarrett, DDS, is the editor of the ADA Professional Product Review. “This issue of the PPR provides a much-needed perspective on the amount of BPA in dental materials compared with other sources of exposure,” Sarrett said in a press release. “Dental sealants offer a tremendous oral health benefit to children and should continue to be a routine preventive service.”

Sealants are most effective in reducing cavities in children with newly formed permanent teeth. In fact, all children should have their molars evaluated for sealants soon after they erupt. For most children, this occurs approximately at ages 6 and 12. Dentists can remind their patients that sealants can also be useful in cutting down formation of decay in adult teeth, as well. An application of sealants is a preventative measure to keep teeth healthy. It is an effective way to reduce the need for fillings and more expensive treatments that may be required to repair the damage from cavities, so sealants can save patients money.
Virtual Dental Home Model of Care Proven to Be Effective

The virtual dental home model of dental care has been proven to be effective at keeping people out of pain and kids in school, according to a recently released study. The results from a six-year study by the Pacific Center for Special Care, a program of the University of Pacific, Arthur A. Dugoni School of Dentistry, show that virtual dental homes “prevent suffering for millions of Californians who have no access to a dentist” and, as a result, reduces “school absenteeism.”

The term “virtual dental home” describes a dental care model in which a dentist utilizes teledentistry by connecting electronically to specially trained allied dental team members to deliver dental care to underserved populations.

Through the virtual dental home model of dental care, specially trained dental hygienists and assistants collect dental diagnostic records, including X-rays and intraoral photos, from patients in community settings such as schools, Head Start sites and nursing homes. They send that information electronically via a secure web-based system (called store-and-forward telehealth) to the supervising dentist at a clinic or dental office. The dentist uses that information to establish a diagnosis and create a dental treatment plan for the hygienist or assistant to carry out. The hygienists and assistants provide basic care at the community site and refer patients to dental offices for procedures that require the skills of a dentist.

The study, published in ScienceDaily, followed more than 3,000 patients in California since 2010. It found that two-thirds of children and nearly half of the elderly with disabilities can gain proper treatment through virtual dental homes and the costs were lower per patient than Denti-Cal.

Paul Glassman, DDS, MBA, is a professor of dental practice, director of community oral health and director of the Pacific Center for Special Care at the University of the Pacific, Arthur A. Dugoni School of Dentistry. Glassman developed the virtual dental home approach.

“Our six-year demonstration project confirms that this is a safe, effective way to bring care to people who need it,” Glassman said in a press release. “Basing a virtual dental home in a school, a nursing home or other community setting allows dental hygienists to prevent or treat the majority of oral health problems on site, and also brings prevention information to patients, families and caregivers. Finally, it connects on-site care in the community to dentists in dental offices.”

Digital Dental Glossary of Terms Released

Dentists looking for a complete list of dental terms will be pleased to know that the American Academy of Implant Dentistry (AAID) has released the JOI Glossary of Terms, 2016 Edition. The glossary, published by the Journal of Oral Implantology (JOI), features more than 1,500 terms, including words, phrases and definitions that are commonly found in general dentistry, implantology and oral surgery. James Rutkowski, DMD, PhD, is the editor-in-chief of the JOI.

“The goal of the JOI Glossary of Terms has always been to educate. Whether you are a first-year dental student or have been practicing dental implantology for 20 years, the Glossary is a wonderful professional resource tool,” Rutkowski said in a press release. “It is our hope that the expanded 2016 edition of the Glossary reaches new audiences and continues to drive professional growth for both AAID and the dental community.”

This will be the first time the glossary has been published digitally. Previous editions were in print. The new digital flipbook format “was developed with the goal of enhancing the Glossary’s audience as well as improving content dissemination and ease of use. The tools and features of the digital edition allow readers to more easily find the terms and definitions they need in an online, searchable format.”

The glossary can be accessed at joionline.org.
Sugar is having a public health moment. In 2015, the World Health Organization (WHO) called on countries to decrease added sugars intake among adults and children to reduce the risk of being overweight, obesity and dental caries.\(^1\) The WHO recommended that added sugars intake be limited to less than 10 percent of daily calories and that a further reduction below 5 percent would provide additional health benefits.

Seventy percent of Americans consume added sugars above the WHO’s recommended 10 percent limit.\(^2\) As any dentist can attest, motivating individuals to reduce their added sugars intake will require an armamentarium of interventions targeting a wide range of socioecological influences. Health care professionals can play an essential role in supporting health behavior change at the policy, community and individual levels. This collection of articles in the *Journal of the California Dental Association* is designed to encourage dentists to consider their part in the latest movement to curb nutrition-related chronic disease.

The federal government is off to an encouraging start. On the heels of the WHO call, the 2015-2020 Dietary Guidelines recommended that Americans limit added sugars intake to less than 10 percent of daily calories,\(^2\) ending decades of vague recommendations to eat “less” sugar. The Food and Drug Administration has already moved to apply the new added sugars limit to food labeling. As of July 26, 2018, manufacturers with $10 million or more in annual food sales will be required to disclose added sugars content and what percentage of the daily-added sugars limit it represents on packaged food nutrition labels.\(^3\) Consumers may reconsider their food choices when they learn that a 20-ounce bottle of Coke contains 65 grams of sugars or 130 percent of the daily limit (based on a 2,000 calorie diet). These new requirements will end labeling practices that have allowed manufacturers to hide added sugars content behind more...
than 60 names for sugars, such as barley malt, dextrose and maltose. They will also make clear the amount of sugars that are added to savory foods, such as bread, pasta sauce and ketchup.

At the state and local policy level, a number of initiatives are focusing on reducing added sugars consumption through economic incentives, health promotion programs and health risk disclosure. In 2014 Berkeley, Calif., became the first city in the nation to adopt a tax on the distribution of sugar-sweetened beverages and in 2015 the city of Philadelphia became the first large American city to do so. Also notable in these efforts, though occurring too late for inclusion in this issue, are current initiatives on the November 2016 ballot in the cities of Oakland and San Francisco, which would enact one-cent per ounce taxes on the distribution of sugar-sweetened beverages.

A set of articles presents unique perspectives on recent efforts to curb sugary beverage intake. Alisha Somji, MPH, and colleagues present an analysis of media coverage of sugary beverage tax debates, which highlights a shortfall of dental professional voices. Lucy Popova, PhD, reviews evidence supporting the effectiveness of tobacco warning labels and provides lessons that can be applied to sugary beverage warning labels initiatives. She highlights industry efforts to counter warning labels and the important role dentists can play in policymaking by speaking to the strength of evidence linking added sugars consumption to dental caries.

On the subject of the strength of evidence linking added sugars to chronic disease, the second set of articles review emerging evidence of the metabolic effects of fructose. This evidence suggests that the health risks of added sugars consumption extend beyond overweight, obesity and dental caries. These reviews are important for dentists to consider when communicating with patients or policymakers — might Americans’ attitudes toward added sugars consumption change if they perceived the risks of consumption to be greater? Robert Lustig, MD, who has been credited with launching the modern antisugar movement, reviews research linking fructose consumption with a new disease: nonalcoholic fatty liver disease (NAFLD). NAFLD has become another chronic disease epidemic, with an alarming prevalence rate in children. Candice Allister Price, PhD, and her colleague Kimber Stanhope, PhD, a leading researcher who conducts clinical studies on the effects of diet on the development of metabolic disease, review research linking added sugars consumption to type 2 diabetes risk. Their review highlights conflicting evidence and new experimental techniques that hold promise for unraveling the true relationship of added sugars to type 2 diabetes.

While dentists have long-discouraged added sugars consumption to improve dental health, sugar’s moment in the spotlight offers renewed opportunities for us to engage with diverse stakeholders developing policy and community-level interventions. An August 2016 study, which evaluated Berkeley, Calif.’s, sugary beverage excise tax, passed in March 2015, found a 21 percent drop in sugary beverage consumption in low-income neighborhoods after the tax took effect. During the same time period in San Francisco, where a similar measure was defeated, sugary beverage consumption in low-income neighborhoods increased by 4 percent. These results are a testament to what can be achieved when we move beyond individual-level interventions to address the many layers of influence that intersect to shape a person’s food choice.

REFERENCES
Fructose and Nonalcoholic Fatty Liver Disease

Robert H. Lustig, MD, MSL

In 1977, the first Dietary Goals for Americans were issued by the U.S. Senate, which targeted dietary saturated fat as the primary driver of heart disease. In response, the food industry reduced the fat content in processed food. However, to make it palatable, dietary sugar replaced the fat, so that by 2000, added sugar had increased by 32 percent of total calories. This dietary paradigm continues to this day. More than 55 percent of all American adults consume more than 50 grams of added sugars per day, which is thought to be the cutoff value for added risk of metabolic derangement and the new guideline for added sugar from the USDA and more than the advised maximum according to the American Heart Association (25–37.5 gram/day). Furthermore, U.S. adolescents average 94 grams per day. Over the past 40 years, coincident with this change in dietary pattern, the diseases of metabolic syndrome (type 2 diabetes, dyslipidemia, heart disease) have increased in prevalence. In addition, a brand new disease — nonalcoholic fatty liver disease (NAFLD) — has become epidemic, even within the pediatric age group.

What Is NAFLD?
NAFLD is defined by the presence of liver fat in absence of primary causes such as alcohol and hepatitis C. NAFLD exists in three pathologic stages. Hepatic steatosis, or fatty liver, occurs when up to 5.5 percent of the liver parenchyma is occupied by fat. Steatosis is now found in up to 33 percent of adults, 16 percent of all children and 38 percent of obese children. Of those with steatosis, approximately 5 percent will develop nonalcoholic steatohepatitis (NASH), in which steatosis is accompanied by necroinflammation and fibrosis. Finally, up to 25 percent of NASH patients will progress to cirrhosis and cirrhosis can further progress to hepatocellular carcinoma. NASH is projected to become the leading cause of liver transplantation in the U.S. by 2020. Thirty to 40 percent of NASH-cirrhotic patients succumb to a liver-related death within 10 years.

Who Gets NAFLD?
Considering NAFLD was first reported in adults in 1980 and in children in 1983, the secular trend of NAFLD prevalence is staggering. NAFLD is prevalent in 45 percent of Latino, 33 percent of Caucasian and 24
percent of African-American adults.\textsuperscript{10} NAFLD is now the primary cause of liver transplantation in adults, outstripping hepatitis C.\textsuperscript{15} NAFLD is strongly associated with insulin resistance\textsuperscript{16} and is a primary predictor of type 2 diabetes.\textsuperscript{17}

**What Is the Pathogenesis of NAFLD?**

Prior to 1980, fatty liver disease meant one thing: alcohol. But children don’t drink alcohol. Therefore, understanding the pathogenesis of NAFLD to support prevention and control strategies is of utmost importance.\textsuperscript{19} Fatty liver occurs when the rate of the hepatic lipid influx pathways (either fatty acid import or de novo synthesis of fatty acids) exceeds the rate of hepatic lipid clearance (either fatty acid catabolism or lipoprotein export).\textsuperscript{19,20} Evidence suggests the following mechanisms could promote the development of fat accumulation in the liver:

- **Increased ingestion of dietary fat.** Unrestricted high-fat liquid feeding to rats generates hepatic steatosis,\textsuperscript{21} whereas voluntary high-fat feeding with chow does not.\textsuperscript{22} In humans, although dietary fat ingestion influences the accumulation of fat in the liver,\textsuperscript{23} only 15 percent of liver fat can be explained by this mechanism.\textsuperscript{24} Furthermore, dietary fat makes up a smaller percentage of total calories due to the low-fat directive.

- **Increased free fatty acid (FFA) influx.** FFA from lipolysis of adipose tissue from either the subcutaneous or visceral depot may contribute to fatty liver in type 2 diabetes.\textsuperscript{25,26} However, other conditions of lipolysis do not result in steatosis. For instance, patients with poorly controlled type 1 diabetes manifest both lipolysis and insulin resistance, yet demonstrate low liver fat.\textsuperscript{27} This is presumably due to enhanced fatty acid β-oxidation to ketones, accelerating hepatic lipid clearance for energy usage by the rest of the body.

- **Increased de novo lipogenesis (DNL).** DNL is driven by excessive dietary carbohydrates,\textsuperscript{28} increasing the transcription of three enzymes, ATP citrate lyase, acetyl-CoA carboxylase-1 and fatty acid synthase, to convert carbohydrate to fat, as in kwashiorkor. For example, if carbohydrate intake exceeds energy expenditure, hepatic DNL is incremented tenfold.\textsuperscript{29}

- **Impaired hepatic fatty acid β-oxidation.** Abrupt and massive hepatic failure with steatosis is noted in patients with Reye syndrome.\textsuperscript{31} However, lipid β-oxidation appears to exert only a minor influence in the development of NAFLD in humans.\textsuperscript{32}

- **Impaired triglyceride export.** The liver esterifies excess fatty acids into triglycerides, which are then exported out as very low-density lipoproteins (VLDL). Small numbers of patients with the autosomal recessive abetalipoproteinemia demonstrate severe fatty liver, although their serum triglyceride levels are markedly diminished.\textsuperscript{33}

- **Genetics.** The increased risk of fatty liver in some racial/ethnic groups may be partially explained by sociocultural differences in dietary intake. However, genetic factors may also play a role. Latinos are at highest risk, Caucasians have intermediate risk, while African-Americans have lower-than-expected prevalence for the degree of obesity and insulin resistance.\textsuperscript{34} Specific genetic polymorphisms predispose to NAFLD, most notably patatin-like phospholipase 3 (PNPLA3), which may be particularly important in Latinos.\textsuperscript{15}

**What About Diet Drives NAFLD?**

While each of the processes described above can be perturbed sufficiently in humans to increase liver fat, none of these explains the rise of the current NAFLD epidemic, especially in children. There are likely multiple factors driving NAFLD in any individual. Weight gain predicts incident NAFLD.\textsuperscript{36} Visceral adiposity and insulin resistance are major risk factors, as these increase hepatic lipid processing. The increased risk in some racial/ethnic groups may be partially explained by sociocultural differences in dietary intake. However, as NAFLD has exploded with the export of the Western diet around the world, specific macronutrient and/or micronutrient component(s) of the diet have been implicated. There are four consumables that specifically promote the development of fatty liver disease unrelated to their calories.\textsuperscript{37}

- **Trans fats.** Trans fats can’t be completely metabolized by mitochondria due to the trans-double bond and generate increased reactive oxygen species (ROS). Trans fats have long been assumed to contribute to chronic metabolic disease, especially atherosclerosis.
The high trans fat content in fried and highly processed foods appear to specifically cause NAFLD.\(^{38,39}\) Conversely, monounsaturated lipids such as olive oil (oleic acid)\(^{40}\) and linoleic acid\(^{41}\) (the dietary ligands for hepatic PPAR-\(\alpha\)) decrease accumulation of fat in the liver. However, trans fats are now being removed from our diet because the FDA declared them not generally recognized as safe (GRAS).

**Branched-chain amino acids (BCAAs).** Valine, leucine and isoleucine are essential amino acids that account for > 20 percent of the amino acids in the typical Western diet. In the anabolic state, they build muscle. However, when provided in excess beyond anabolic requirements, these classic ketogenic amino acids must be deaminated in the liver to be diverted toward energy utilization. This supplies too much acetyl-CoA to liver mitochondria, leading to liver fat formation. BCAA serum concentrations correlate with metabolic syndrome.\(^{43}\) High BCAA concentrations are found in corn-fed beef, chicken and fish.

**Alcohol.** Cross-sectional and prospective studies implicate a dose-dependent effect of alcohol in metabolic syndrome and alcoholic steatohepatitis. Alcohol is metabolized to acetyl-CoA, which preferentially undergoes DNL, driving fatty liver disease. While clearly a concern in adults, it is unlikely that alcohol contributes significantly to NAFLD in children.

**Fructose.** On average, American children consume 362 calories or the equivalent of 22 teaspoons of sugar daily.\(^{44}\) Fructose metabolism (FIGURE) generates lipogenic substrates (e.g., glyceraldehyde-3-phosphate and acetyl-CoA) in an unregulated fashion, which are delivered straight to the mitochondria, but also simultaneously driving hepatic DNL, which will either be exported as triglycerides or overwhelm the liver’s lipid export capacity, leading to intrahepatic lipid deposition and hepatic steatosis. In case-controlled studies, sugar-sweetened beverage (SSB) consumption is associated with hepatic steatosis, independent of the degree of obesity.\(^{45}\) In other case-controlled studies, total fructose consumption was associated with NAFLD.\(^{46,47}\) In adults on high-carbohydrate diets over 10 weeks, reduced fat oxidation and increased DNL were seen in those randomized to high-fructose but not high-glucose diets.\(^{48}\) In adults, high-fructose diets exacerbate dyslipidemia and insulin resistance more than isocaloric high-glucose diets — with effects most pronounced in adults who already have metabolic syndrome.\(^{49}\) Trans fats, BCAAs, alcohol and fructose all share four biochemical properties:

- They are metabolized for energy primarily within the liver.
They are not insulin regulated.
They do not have a “pop-off” mechanism to form glycogen for storage.
They overwhelm mitochondrial β-oxidative capacity, leading to excessive DNL, which drives hepatic insulin resistance and fatty liver disease.50

How Is NAFLD Treated?
Treatment of the necroinflammation associated with NASH can be achieved with pioglitazone,51 which increases the peroxisomal capacity within hepatocytes, thus allowing for increased antioxidant capacity. Other treatments that may hold promise include liraglutide and vitamin E, although long-term data are not available.52 However, these treatments do not reduce the hepatic steatosis.

Can Fructose Restriction Specifically Reverse NAFLD?
Our group has demonstrated the effects of fructose on DNL and liver fat in two studies. First, in a crossover trial adults consumed an isocaloric diet consisting of either high-fructose or high-complex carbohydrates for two weeks each. Compared to the complex carb diet, the high-fructose diet increased DNL and liver fat by 38 percent.53 Second, our recent paper in the journal Obesity54 documents the effects of isocaloric substitution of sugar with starch in 43 Latino and African-American children with metabolic syndrome over a 10-day period. On Day 0, we assessed their metabolic health on their home diet using baseline lab tests, including liver tests, lipids and lactate, oral glucose tolerance home diet, and in just 10 days. Furthermore, liver fat as measured by magnetic resonance spectroscopy dropped by 22 percent despite no changes in calories or weight, and the reduction in liver fat correlated with the improvement in metabolic health.55

These data strongly argue that NAFLD is a potent, if not the primary driver of metabolic dysfunction, especially in children. These two studies argue that fructose consumption drives development of NAFLD apart from its caloric content. Thus, the mechanisms of alcoholic and nonalcoholic fatty liver disease are quite similar, even if the substrate is different, as fructose and ethanol are metabolized virtually identically in the liver.56

Conclusion
Evolutionarily, sugar was a rare component of the human diet until the Industrial Revolution brought refined sugar to the masses, and with it, a host of metabolic disease.57

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Conclusion
Evolutionarily, sugar was a rare component of the human diet until the Industrial Revolution brought refined sugar to the masses, and with it, a host of chronic noncommunicable diseases, including tooth decay. Furthermore, the ostensibly well-meaning dietary directive of “low fat” led to the unregulated substitution of sugar for fat, the unleashing of a tsunami of metabolic syndrome and the emergence of NAFLD as a primary concern. Indeed, NAFLD is the hepatic manifestation of metabolic syndrome57 and fructose consumption drives each of the components of metabolic syndrome.58 While added sugar in the diet may not be the sole perpetrator of chronic disease, it is the easiest to identify.59 By speaking with one voice, doctors and dentists can argue for public health measures to stem the tide of noncommunicable disease nationwide.

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Considerable epidemiological evidence over the past decade suggests that consumption of dietary added sugars is linked to the prevalence or risk for obesity, type 2 diabetes (T2D) and cardiovascular disease in adults and adolescents.\(^1\)\(^{-9}\) Clinical dietary intervention studies provide strong evidence to suggest that the link between added sugar intake and cardiovascular disease risk is causal.\(^{10\text{-}15}\) However, direct experimental evidence illustrating a causal relationship between added sugar intake and risk for T2D in humans is not as compelling. This review will discuss the physiological mechanisms by which consumption of added sugars may increase risk for T2D, the research evidence that suggests it does and the reason why there is conflicting evidence to suggest that it does not.

HFCS and sucrose are the most commonly consumed ‘added sugars’ in the American diet.

The term “added sugar” refers to sugars that are not naturally occurring in foods. Naturally occurring sugars, also known as simple carbohydrates, come in the form of monosaccharides (one sugar) or disaccharides (two sugars). Monosaccharides include glucose, fructose and galactose. Disaccharides include sucrose (glucose-fructose), maltose (glucose-glucose) and lactose (glucose-galactose). Examples of sources of naturally occurring sugars include honey, sugar beets, sugar cane, fruit and milk. The two most commonly consumed added sugars are sucrose and high-fructose corn syrup (HFCS). Both sugars contain fructose and glucose, but differ as to chemical structure. Sucrose is a disaccharide composed of one fructose and
one glucose as a single molecule, whereas HFCS is composed of both fructose and glucose as separate monosaccharides (FIGURE). Sucrose is extracted and purified from sugar cane and sugar beets. HFCS is derived from the hydrolysis of cornstarch, which produces glucose syrup and then isomerization of glucose syrup to produce syrup containing 42 percent fructose. The fructose in this syrup can be extracted to produce syrup that is 90 percent fructose. The proportion of the fructose to glucose in the final HFCS product is variable depending on how much of the 90 percent fructose syrup is added to the 42 percent fructose syrup. As described by the Code of Regulation,26 the proportion of fructose in HFCS is either approximately 42 percent or 55 percent. However, when analyzed for fructose content, sodas sweetened with HFCS contained 47 percent to 65 percent fructose.27 Unfortunately, food and beverage nutrition labels do not provide information stating the percentage of fructose in the HFCS that is contained in the product, and thus consumers are not able to determine how much fructose is present in the HFCS they are consuming.

Sugar consumption in the U.S. exceeds dietary guidelines for cardiovascular health.

The total amount of energy consumed from naturally occurring sugars in fruit, vegetables and milk in the American diet is only about 5 percent of total daily energy intake.28,29 However, according to self-reported data from the National Health and Nutrition Examination Survey (NHANES), U.S. adults consume an average of approximately 15 percent of daily calories as added sugar.30 Results from this study also demonstrated that added sugar consumption at this level was associated with an increased risk for cardiovascular disease mortality of 18 percent over 15 years.

Of the added sugars consumed in the U.S., approximately 42 percent are consumed as SSBs31 and the remainder as solid food. Added sugars from beverages may affect metabolic function differently than added sugar from solid food due to their more rapid absorption from the intestine. However, the only report comparing the chronic effects of solid versus liquid sugar focused mainly on body weight.32 Adults gained significant amounts of weight after four weeks of consuming sucrose in a beverage, but not after consuming sucrose in jelly beans; the difference between diets was not significant.32 Studies comparing the effects of added sugars in solid foods versus beverages on risk factors for type 2 diabetes and cardiovascular disease are currently lacking, so it cannot be assumed that consumption of added sugars between these two sources have similar metabolic effects.

Some improvement in added sugar intake has been observed over the last 13 years, mainly due to a large decrease in SSB consumption.14 SSB consumption was shown to have decreased between 1999 and 2010,33 coinciding with declines in obesity.14 This is marked progress from the increase of SSB consumption, 11.8 percent to 21 percent of daily energy intake, which occurred between 1965 and 2002.33 Nevertheless, fewer than 1.5 percent of U.S. adults and children meet the American Heart Association (AHA) criteria for a healthy diet pattern for positive cardiovascular health.33 The criteria include a target that limits the consumption of sweets and bakery desserts to 2.5 50-gram servings/week and SSBs to 4.5 8-ounce servings/week. In 2013, the average consumption of sweets and bakery desserts ranged from a low of 3.9 servings/week for Mexican American men to a high of 7.3 servings/week for white women. The average consumption of SSBs ranged from a low of 6.8 servings/week for white women to a high of 11.7 servings/week for Mexican American men. Consumption of added sugar from as little as one SSB per day has been shown to be associated with an increased risk for T2D between 26 and 83 percent, with the highest risk seen amongst young and middle-aged women.35

Metabolic effects of fructose versus glucose: Is a calorie really just a calorie?

Much speculation and press has been devoted to the adverse health effects of consuming HFCS versus sucrose. However, both are fructose-containing sugars and fructose is the principal reason why added sugar consumption is associated with metabolic disease. Studies
comparing the consumption of fructose and glucose (mainly in beverages) in humans have demonstrated that fructose induces markedly greater metabolic dysregulation than glucose. Compared with glucose, fructose has been shown to increase de novo lipogenesis (DNL) (the synthesis of new fatty acids), inhibit fat oxidation (the conversion of fat to energy), increase liver fat content, and uric acid and decrease liver and whole-body insulin sensitivity. However, all of these studies utilized overfeeding or ad libitum (unrestricted eating) dietary protocols, making it difficult to separate the effects of fructose from the effects of positive energy balance/weight gain. Therefore, Schwarz and colleagues recently investigated the effects of fructose compared with starch using a crossover, energy-balanced dietary protocol. They found, even in the absence of positive energy balance and weight gain, subjects exhibited increased DNL, decreased fat oxidation, increased liver fat and blood lipids and decreased hepatic (liver) insulin sensitivity when consuming the fructose diet. This study challenges the notion that a calorie is a calorie and clearly demonstrates that the adverse metabolic effects of fructose overconsumption are not dependent on positive energy balance and body weight gain.

Regulation of glucose and fructose metabolism in the liver is not identical.

Although fructose and glucose are both monosaccharides and have identical chemical composition (C\textsubscript{6}H\textsubscript{12}O\textsubscript{6}), their metabolisms are not identical. Both sugars exit the intestine via the portal vein and are delivered directly to the liver. Glucose metabolism in the liver is regulated by an enzyme called phosphofructokinase. This enzyme is inhibited when hepatic energy status is elevated and there is no need for more glucose. As a result, the energy-replete liver will stop taking up glucose, and instead, the glucose will bypass the liver to the peripheral circulation and be distributed to other tissues. The metabolism of fructose in the liver, on the other hand, is not regulated because its rate-limiting enzyme, fructokinase, is not inhibited in response to increased hepatic energy status. Instead, fructokinase remains active at all times, regardless of the liver’s need for energy. As a result, the ingested fructose will be rapidly taken up and metabolized almost exclusively by the liver and very little will reach the peripheral circulation to be utilized by other tissues.

The uninhibited uptake of fructose causes a substrate overload that leads to increased DNL and inhibited fat oxidation compared to the ingestion of equal amounts of glucose.

The uninhibited uptake of fructose by the liver leads to metabolic dysregulation.

The rapid absorption and metabolism of fructose within the liver triggers a cascade of metabolic consequences. The liver can synthesize both glucose and fructose into fatty acids by the process of DNL. However, the uninhibited uptake of fructose causes a substrate overload that leads to increased DNL and inhibited fat oxidation compared to the ingestion of equal amounts of glucose. The fatty acids are turned into triglycerides (TG), which increases liver fat content and upregulates the packaging of TG into large, TG-rich, very-low density lipoprotein-1 (VLDL-1) particles. The VLDL-1 is sent into the circulation leading to increased levels of postprandial TG, one of the first and most consistent effects of fructose consumption.

With continued fructose consumption, the increased TG production may also lead to increased fat stores in the liver. Increasing levels of hepatic lipids, particularly diacylglycerol (DAG), prevents proper activation of the insulin receptor and may lead to hepatic insulin resistance.

Insulin resistance, a risk factor for T2D, cardiovascular disease and metabolic syndrome, is the state when insulin’s ability to do its many jobs is impaired. In the liver, one of these jobs is to suppress hepatic glucose production, and thus, hepatic insulin resistance is measured by upregulation of hepatic glucose production. Another role of insulin in the liver is to suppress the production and secretion of VLDL. Therefore, when fructose consumption leads to hepatic insulin resistance, hepatic glucose production is upregulated, and VLDL production and secretion, which was already upregulated by the increased liver fat content, is further upregulated. DNL in the normal liver is activated by insulin, but, ironically, the insulin-resistant liver remains sensitive to insulin’s stimulation of hepatic lipid production. This is called “selective insulin resistance.” Thus, when insulin binds to the receptor, the downstream signaling that inhibits glucose and VLDL production in the liver is impaired, while the signaling that upregulates DNL remains intact. This continued activation
of DNL in the insulin-resistant liver very likely exacerbates the effects of sustained fructose consumption, resulting in even higher increases of liver TG production, liver fat accumulation, insulin resistance and VLDL production. Increased and sustained VLDL production leads to dyslipidemia consisting of not just higher levels of postprandial TG, but also increases in other risk factors for cardiovascular disease. These include low-density lipoprotein cholesterol (LDL-C), apolipoprotein B, small dense LDL-C and apolipoprotein CIII.

Continued exposure to high levels of postprandial TG in the blood may lead to lipid accumulation within the muscle. Intramyocellular lipid content is negatively correlated with whole-body insulin sensitivity, possibly because, as in the liver, DAG prevents proper activation of the insulin receptor. Results from studies in which men consumed fructose-sweetened beverages for nine days and three weeks suggest that the development of hepatic insulin resistance precedes the development of whole-body insulin resistance.

Uric acid levels increase in response to fructose.

The association of fructose consumption with the development and prevalence of T2D and cardiovascular disease may also be related to the effect of fructose to increase circulating uric acid levels. The rapid absorption and unregulated metabolism of fructose leads to upregulation of the purine degradation pathway, of which uric acid is an end product. While uric acid’s role in gout has been established for years, more recent evidence suggests that circulating uric acid is strongly associated and predictive of metabolic syndrome, fatty liver and cardiovascular disease. Furthermore, Johnson and colleagues have suggested that circulating uric acid has a contributory causal role in the development of T2D due to its adverse effects on insulin sensitivity and on the pancreatic beta cell.

Sucrose and high-fructose corn syrup impair lipid metabolism.

It is evident that glucose and fructose are metabolically different; however, these monosaccharides are not typically consumed as added sugars. Therefore, studies investigating the effects of consuming sucrose and HFCS are more relevant to understanding the metabolic and health consequences of added sugar consumption. There are old and recent studies that provide strong evidence that the consumption of sucrose or HFCS increase risk factors for cardiovascular disease. More than 30 years ago, Reiser and colleagues provided insulin-resistant subjects standardized, energy-balanced diets containing 5, 18 or 33 percent of energy as sucrose, each for six weeks. Compared with the 5 percent sucrose diet, total, VLDL- and LDL-cholesterol plasma concentrations increased by 17 percent on the 18 percent sucrose diet and by 22 percent on the 33 percent sucrose diet. In more recent crossover studies comparing glucose-, sucrose- and fructose-sweetened beverages, Aeberli and colleagues observed similar increases in small dense LDL-C and LDL-C during consumption of fructose and sucrose that were higher than those during consumption of glucose. Total cholesterol, fasting TG and liver fat content were increased in subjects consuming sucrose-sweetened cola compared to subjects consuming diet cola, water or isocaloric amounts of low-fat milk for six months. Similarly, a recent study demonstrated dose-dependent elevations in body weight, plasma levels of postprandial TG, fasting and postprandial LDL-C, apolipoprotein B, apolipoprotein CIII and uric acid following two weeks consumption of beverages containing 0, 10, 17.5 and 25 percent energy requirement as HFCS. These studies suggest that consumption of both sucrose and HFCS increase risk factors for cardiovascular disease.

Reducing added sugar consumption improves metabolism health.

Three recent dietary intervention studies provide direct evidence that reducing consumption of added sugar results in beneficial health effects. Fasting glucose concentrations decreased in overweight/obese adults who were provided with four servings of water/day as replacements for caloric beverages for six months. In healthy, overweight subjects, replacing SSBs with artificially sweetened beverages for 12 weeks reduced hepatic fat content by 74 percent. Another study in Hispanic and African-American adolescents with metabolic syndrome demonstrated beneficial results in just nine days. Reducing added sugar intake from 27 percent to 12 percent of daily calories, with starch replacing the removed added sugar, lowered blood pressure, body weight, total triglycerides (TG), low-density and small-density lipoprotein (sdLDL-C and LDL-C), apolipoprotein B and CIII, small and improved glucose tolerance.
More evidence is needed to determine the direct effect of added sugar consumption on insulin resistance.

Evidence to support a causal relationship between consumption of added sugar and insulin resistance, also called reduced insulin sensitivity, is not as strong as that for consumption of added sugar and lipid risk factors of cardiovascular disease. Insulin resistance is a major risk factor for T2D and is defined as a reduction in tissue insulin response and signaling. This results in impaired insulin function, which in the liver, as already stated, leads to increased hepatic glucose production and VLDL production/secretion. With whole-body insulin resistance, the major impairments in insulin function lead to reduced uptake of glucose from the blood by muscle and other tissue cells and reduced removal of lipids from the circulation.

Use of the ‘gold standard’ method directly assesses the effects of added sugar on insulin resistance.

Population data show strong associations between added sugar consumption and insulin resistance and T2D. In contrast, direct experimental evidence demonstrating that added sugar consumption leads to a reduction in insulin sensitivity in humans is sparse. This is partly due to the variable validity and sensitivity of current methods for assessing insulin sensitivity. The hyperinsulinemic euglycemic clamp is considered to be the gold standard for determining both whole-body insulin sensitivity, via insulin-mediated glucose disposal and hepatic insulin sensitivity, via liver glucose production. It is also the most difficult and expensive of the methods to conduct. The least expensive and easiest method is homeostatic model assessment of insulin resistance (HOMA-IR), which is calculated from fasting insulin and glucose levels. Its main advantage is its utility for large population studies, however, it is frequently used in intervention studies with limited samples sizes. Several diet intervention studies that have utilized HOMA-IR to index insulin sensitivity have failed to detect effects of dietary sugar manipulations.

Only a few studies have used the hyperinsulinemic euglycemic clamp to determine the effects of fructose consumption on insulin resistance. In 2013, researchers in Switzerland reported significantly reduced hepatic insulin sensitivity, indexed by liver glucose production, in subjects consuming 80 g of fructose per day for three weeks compared to when they consumed 80 g of glucose/day. They did not, however, observe any differences in whole-body insulin sensitivity, fasting glucose, fasting insulin and, presumably, HOMA-IR. Schwarz and colleagues reported similar results for their nine-day crossover study comparing a fructose diet to a complex carbohydrate diet. Again, even though changes in fasting glucose, fasting insulin, HOMA-IR and whole-body insulin sensitivity were not detected following either diet, liver glucose production was less suppressed when the subjects consumed the fructose compared with the complex carbohydrate diet. Importantly, body weight gain was clearly not the mediator for the increase in hepatic insulin resistance in either study.

In the study by Aeberli and colleagues, body weight and BMI were significantly higher after the glucose intervention compared to the fructose intervention, and in the Schwarz study, diet was specifically designed to maintain energy balance and body weight throughout both interventions. As already stated, these two studies support the idea that hepatic insulin resistance precedes whole-body insulin resistance. They also demonstrate that HOMA-IR, based on the changes of fasting glucose and insulin, does not have the sensitivity to detect changes in hepatic insulin sensitivity. Furthermore, Shaibi and colleagues have reported that HOMA-IR lacked the sensitivity to detect changes of whole-body insulin sensitivity that were detected by more laborious methods. More sensitive measures than HOMA-IR are necessary to directly assess the impact of consuming sugar on the development of insulin resistance.

A few studies that have used oral glucose tolerance tests (OGTT), or variations of, have detected effects of dietary sugar manipulations on glucose tolerance. OGTTs are easier and less expensive to conduct than the hyperinsulinemic euglycemic clamp. Impaired glucose tolerance, indexed as a two-hour glucose concentration between 140–199 mg/dl during OGTT, is indicative of whole-body insulin resistance and is a strong predictor of future T2D. Several investigators have proposed methods for utilizing OGTT outcomes to calculate an index for whole-body insulin sensitivity, and a couple of these have been utilized to show detrimental effects of fructose or fructose and glucose consumption on whole-body insulin sensitivity. The sensitivity of these methods compared to hyperinsulinemic euglycemic clamp in detecting a change in whole-body insulin sensitivity following a dietary sugar intervention is unknown.
Fructose induces metabolic dysfunction by two pathways.

Obesity is one of the major risk factors for insulin resistance, T2D and cardiovascular disease, and both population studies and direct experimental evidence suggest that sugar consumption induces weight gain. This evidence, along with the evidence that sugar consumption increases risk factors even in the absence of weight gain, suggests that added sugar consumption promotes the development of metabolic disease by promoting weight gain and through the direct adverse effects of fructose. Furthermore, it is possible that when added sugar consumption promotes weight gain, the direct adverse effects of fructose (i.e., increased DNL, hepatic fat content and hepatic insulin resistance) are exacerbated. This is an important possibility to consider given that the average American diet contains 50 percent more added sugar than that recommended by the newly revised 2015-2020 Dietary Guidelines for Americans and has resulted in weight gain and obesity in two-thirds of the U.S. adult population.

Conclusion

Substantial evidence from epidemiological studies supports a positive association between the consumption of added sugars and metabolic dysfunction that increases risks for T2D and cardiovascular disease. The evidence from clinical diet intervention studies testing the effects of sucrose or HFCS on risk factors for cardiovascular disease suggest that sugar consumption can increase risk for cardiovascular disease. Recent dietary intervention studies also show improvement in risk factors for metabolic disease when intake of added sugar is reduced. However, stronger direct experimental evidence from studies that utilize methods more sensitive than HOMA-IR to test the effects of sucrose and HFCS to promote insulin resistance is required to establish a causal link between added sugar intake and insulin resistance. Establishing this link will help to stimulate the implementation of policy changes targeting T2D and obesity prevention. Policies that help to change the food environment into one that does not promote the development of obesity and metabolic disease may lead to behavioral changes in a population that is not meeting dietary guidelines. Similarly, clinical interventions investigating the effects of dental caries and periodontitis on metabolic disease risk are needed to establish potential mechanisms of contribution and direct causation. Such evidence may lead to improved dental care and reduced incidence of periodontal disease.

Health community, including physicians and dentists, can have a significant role in attenuating the obesity and T2D crisis by educating their patients about clinical research findings and dietary guidelines that limit add sugar consumption.

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Advocating for Soda Taxes: How Oral Health Professionals Fit In

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ABSTRACT Our recent analysis of how soda tax debates appear in the news revealed that oral health professionals seldom appear. By elevating their expert voices, oral health practitioners can contribute new and salient arguments for soda taxes to the public discourse and help advance public policy that improves oral health outcomes. We propose media advocacy strategies that oral health professionals can use to increase their visibility in the news to make the case for soda taxes.
Oral health professionals see the effects of sugar and sugary drink consumption on their patients every day, particularly in low-income and ethnic minority communities. Though preventable, dental caries is the most prevalent chronic disease worldwide and the most common chronic childhood disease in the U.S. In California and across the U.S., children from low-income households and communities of color are at highest risk for acquiring dental caries and being unable to get treatment for them. Untreated tooth decay can lead to substantial mouth pain and is a leading cause of children’s school absences in the U.S., compromising their educational potential as well.

Because consumption of sugar and sugary drinks is a strong risk factor for dental erosion and caries across the lifecourse, oral health professionals recognize the need for limiting the consumption of sugary drinks. Together with other public health professionals, oral health leaders are increasingly exploring the potential of soda taxes as a policy lever. Indeed, one of the California Dental Association’s current policy priorities is reducing consumption of sugary drinks by supporting taxes and warning label policies. These taxes can reduce consumption of sugary drinks and fund health promotion programs. In 2013, Mexico became the first country to pass a substantial excise tax on sugary drinks, and within the first year of implementation soda sales decreased by 12 percent, with the sharpest decline among vulnerable low-income residents. However, the sugary drink industry has fought aggressively against these policies, spending tens of millions of dollars against state and local soda tax proposals in recent years.

Dentists and other oral health professionals can take the lead in making the case for soda taxes and framing overconsumption of sugar as a significant public health and health equity issue with oral health consequences. Too often, however, their voices are absent from the dialogue about these policy strategies. News coverage, which sets and reflects the public debate about public policy, offers a window through which we can understand that dialogue. Based on our recent analysis of how soda tax debates were portrayed in news coverage — and specifically, how oral health and oral health professionals appeared — we identify possible strategies for the oral health community to support soda tax efforts, particularly using media advocacy. By raising their voices, dentists, hygienists and other oral health experts can contribute new arguments in favor of soda taxes to the public dialogue and help advance public health policy to improve oral health outcomes.

Berkeley and San Francisco’s Soda Tax Debates

In 2014, Berkeley and San Francisco voters both considered sugary drink tax proposals. Berkeley became the first city in U.S. history to pass a sugary drink tax. More than half of voters supported San Francisco’s proposal, but it lacked the two-thirds majority of votes needed for it to pass. In a previous analysis, we examined news coverage, social media and campaign materials to gauge what types of discourse surrounded the initiatives.

We found that tax proponents regularly made the case for soda taxes using health-related arguments. In the news, journalists, tax advocates and others most often connected sugary drinks to obesity (38 percent of articles) and diabetes (34 percent). However, tax proponents rarely discussed the negative oral health implications of sugary drink intake or the oral health benefits of sugary drink taxes. Indeed, oral health was mentioned in only 2 percent of articles about sugary drink taxes. Though dental caries are the most prevalent chronic disease worldwide, diabetes was discussed 17 times more frequently and obesity 19 times more frequently than were the oral health consequences of sugary drink consumption.

Even when oral health did appear in the news, it was rarely discussed substantively. Instead, oral health issues were typically mentioned in passing or listed among other chronic diseases. For example, one San Francisco Chronicle letter to the editor referred to “... diabetes, tooth decay, obesity and the myriad other problems that result from the consumption of sugary drinks ...”

Dental caries and oral health may have been left out of the public debate in part because of the absence of dentists and other oral health professionals in media coverage. The soda tax debates in Berkeley and San Francisco featured a range of speakers promoting the taxes, including campaign representatives, city officials, public health advocates, clinicians, researchers and community residents. However, though the Berkeley Dental Society was a major supporter of Berkeley’s proposal and a local dentist is part of the city’s new panel of experts to advise how to allocate the funds collected, oral health experts were almost entirely absent from the media we examined.
Why Oral Health Needs to Be Part of the Conversation

Dental health professionals have a long history of advancing community dental health through advocacy. The Centers for Disease Control and Prevention listed community water fluoridation as one of the top 10 greatest public health achievements of the 20th century — an achievement that likely would not have been possible without oral health professionals promoting institutional change.35

Oral health practitioners have also led advocacy efforts specifically targeting sugary drinks. In Illinois, for example, dentists and the Illinois State Dental Society urged policymakers to impose a sugary drink tax. In 2009, 200 dentists converged on the State Capitol to show support and generate media attention.29 Using these and other media advocacy strategies,46 these oral health advocates made the case for a soda tax, arguing that the funds generated could help open dental clinics and assist people in need.37

The voices of dentists, hygienists and other oral health experts, then, can help shift the public conversation around sugary drink regulation — a conversation that is often influenced by forces concerned with profits over health. Policies to limit sugary drink consumption face stiff opposition from the soda and sugar industry. Led by the American Beverage Association, the nonalcoholic beverage industry has spent tens of millions of dollars since 2009 defeating the more than two dozen municipal and state sugary drink taxes proposed across the country.32,38,39 During the most recent soda tax battles in California, the soda industry spent $9.1 million in San Francisco40 and $2.4 million in Berkeley.41

Oral health advocates made the case for a soda tax, arguing that the funds generated could help open dental clinics and assist people in need. Oral health advocates made the case for a soda tax, arguing that the funds generated could help open dental clinics and assist people in need.37

Oral health practitioners also need to be vigilant and vocal “in their own backyards,” because the sugar industry has gone as far as influencing scientific research to downplay the implications of sugar consumption. Historically, the industry interfered with the agenda of the National Institute of Dental Research, forcing it to shift priorities toward vaccines against tooth decay and enzymes to remove dental plaque and away from studying how to restrict sugar consumption to prevent tooth decay.42 More recently, Coca-Cola was criticized for providing millions of dollars to fund misleading research that shifted the blame for obesity to lack of physical activity and away from the consumption of sugary drinks.43 Dental practitioners should be alert to industry influence that can distract from their health goals.

Recommendations

What can oral health professionals do to build the capacity of the field to advocate for policies to combat the adverse effects of sugar? Among other strategies, the field can:

Make advocacy a part of dental education. While dentists provide clinical care to individual patients, their advocacy for dental public health policies at the community, state and federal levels can improve the health of whole populations and shape the future of dental practice. However, dental training largely ignores the role of policy in shaping oral health and does not develop future dentists’ advocacy skills. A study examining the participation of American Academy of Pediatric Dentistry members in advocacy found that while 90 percent of respondents supported advocacy as a role for dentists, less than half reported taking action and only 22 percent were specifically trained in advocacy during residency.44

But dental students are eager to be more involved in shaping policy. At Texas A&M University’s Baylor College of Dentistry, for example, students created an Advocacy Academy and planned a lobby day where they gained experience interacting and building relationships with state representatives.45 Indiana University School of Dentistry also introduces students to the policy process through an annual Health Policy Forum, an evaluation of which showed half of students who participated in the 2009 forum were more likely to get involved in political advocacy afterward.46 A recent study from the Journal of Dental Education found that dental hygiene students benefit from leadership courses that include training on legislative advocacy, and that ongoing mentorship after graduation is necessary so that practitioners can continue to develop these skills.47 The American Student Dental Association recognizes advocacy as an important aspect of leadership development for dental students and provides opportunities for members to develop advocacy skills, including national lobby days.48 There are also postgraduate programs that incorporate policy advocacy. Dental public health residencies, such as the one at the University of California, San Francisco, provide training to dentists in planning, evaluating and advocating for policies.49,50

In short, the field needs comprehensive and organized efforts to teach dental students core competencies about oral health policy issues and how to lobby...
their local and state governments. Integration of these skills into dental training can help create a new generation of professionals who are equipped with the tools to advocate for policies that guarantee oral health for everyone.

**Build coalitions with other stakeholders and assume a seat at the table.** Oral health is part of overall health, and risk factors for oral disease coincide with risk factors for other chronic noncommunicable diseases associated with sugary drink consumption, including obesity, diabetes and cardiovascular disease. Established dental societies and organizations, such as the California Dental Association and the American Dental Association, can use their existing leverage and broad reach to bring oral health professionals together to participate in advocacy efforts. Oral health professionals can also form alliances and coalitions with those in public health and health care. These coalitions will be poised to make a stronger and more cohesive case for policies that limit soda intake, such as sugary drink taxes, restrictions on sugary drink marketing (company sponsorships for health organizations, schools and sports events) and sugary drink-free health facilities, public buildings, schools, childcare centers and sports facilities. As part of these coalitions, dental professionals can bring an oral health lens to advocacy efforts, for example by pushing for the money garnered from soda taxes to go toward funding oral health prevention efforts along with other health promotion programs.

**Incorporate media advocacy into broader advocacy efforts.** Media advocacy, “the strategic use of mass media to support community organizing to advance a social or public policy initiative,” is a tool that can amplify and accelerate larger strategic efforts by dentists to advance policies to promote oral health. A range of resources exist to support oral health advocates in learning about and successfully using media advocacy — we highlight here a few key tactics, including:

- **Identify policy goals and targets.** As mentioned above, there is a range of policies with the potential to limit sugary drink intake. A first step for creating an effective media advocacy strategy is to consider what specific policy change you are trying to achieve, who has the power to create that change and who the allies are that can work with you to achieve it.

- **Put oral health on the agenda using news and opinion space.** To increase the visibility of dentists and other oral health professionals in public dialogue about health policy and related issues, submit blog posts and opinion pieces that provide an oral health perspective. Some examples of effective springboards for opinion pieces include breaking news, the release of new research/data about sugary drinks, controversial behavior from the soda industry, local events or holidays connected in the public’s mind with the policy process or with sugar consumption, like Election Day or Halloween, respectively. Also, reach out to and develop relationships with journalists to ensure that the news stories they write on public health issues incorporate oral health perspectives. Contact journalists over social media, send them emails and be proactive in putting stories on their radar.

- **Become visible and vocal spokespeople.** Oral health professionals see the effects of sugary drink consumption every day and can speak to the impact of sugary drinks on the lives and health of their patients. As experts, they can use the media to educate the public and build support for soda taxes. They can also recruit community members who have experienced oral health problems themselves or whose children have been affected. These authentic voices can speak powerfully and effectively about the consequences of tooth decay and the importance of policies to reduce sugary drink consumption in guaranteeing that every child has a healthy smile.

**Conclusion**

Media coverage of Berkeley and San Francisco’s soda tax debates offers insight into the public dialogue around these high-profile issues. We found that oral health was largely absent from discussions of health around these policies, but that there are many opportunities for oral health professionals to become part of the conversation. By identifying specific policy goals, inserting oral health perspectives into news and opinion coverage and becoming visible spokespeople, oral health professionals can position themselves to provide new and powerful health arguments to both policymakers and the public. In other words, oral health professionals are well poised to build their capacity as media advocates and advocate for policies that reduce sugary drink consumption and improve the oral health of whole populations.
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Sugar-Sweetened Beverage Warning Labels: Lessons Learned From the Tobacco Industry

Lucy Popova, PhD

ABSTRACT Tobacco warning labels effectively educate consumers about the harms of tobacco and reduce smoking behavior. Lessons from tobacco warning labels can be applied to developing and implementing warning labels for sugar-sweetened beverages (SSBs). Large pictorial rotating warnings are particularly effective. Dental professionals can be an important voice in countering the industry’s efforts to create controversy around the effects of SSBs and in advocating for effective warning labels based on the evidence from the tobacco warning labels.

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Consumption of SSBs is greater among African-Americans and Mexican-Americans than among Caucasians for both men and women and across most age groups.\textsuperscript{15,17} Consumption is also greater among low-income and low-education groups.\textsuperscript{18} These are the same groups that have higher rates of obesity, diabetes and other diseases.\textsuperscript{19,22}

Lessons learned from tobacco control are applicable to developing and promoting policies around added sugars. Public health advocates, including dental professionals, could use the tools, strategies and policies of tobacco control to reduce the negative impact of added sugars on population health. One such policy is warning labels on sugar-sweetened beverages. This article provides an overview of what we know about tobacco warning labels, what types of labels are particularly effective and how these lessons can be translated to SSB warning labels policymaking.

History of Tobacco Warning Labels

The U.S. was the first country in the world to require a health warning on cigarette packages. This earliest warning label appeared in 1966 on the side of cigarette packs and read, “Caution: Cigarette Smoking May Be Hazardous to Your Health.” U.S. labels were updated slightly over the years to change the copy, but remained in the same place — the side of the package. Although Congress authorized the U.S. Food and Drug Administration (FDA) in 2009 to develop and implement new pictorial warning labels, the first set of warning labels was struck down in court and today cigarette packs still carry the same four labels first introduced in 1985 (FIGURE 1).

The rest of the world moved on. Driven by the motivation to make warnings more effective, written warnings became more specific, explicitly mentioning diseases caused by smoking, such as lung cancer and heart attack, as Iceland first did in 1969.\textsuperscript{23} Warnings moved from the side of the packs to the front and the back of the pack (first in Saudi Arabia in 1987) and grew larger — covering 30 percent, 50 percent, 80 percent and even 90 percent of the pack, as Nepal did in 2015. Pictures illustrating the health effects of smoking appeared in Iceland first in 1985.\textsuperscript{23} Finally, the brand colors and logos were removed from the packs and replaced with a drab olive color, pioneered by Australia in 2012 (FIGURE 1).

Previously secret internal tobacco industry documents chronicle the history of the tobacco industry’s resistance to the implementation of warning labels and reveal that tobacco companies made it their policy to “avoid health warnings on all tobacco products for just as long as we can”\textsuperscript{24} because of their potential effectiveness. These internal tobacco industry documents are housed in the University of California, San Francisco, Truth (formerly Legacy) Tobacco Industry Documents Library. This library contains more than 80 million documents and is available as a free online resource, industrydocuments.library.ucsf.edu/tobacco, to researchers all over the world.

Sen. Wallace Bennett (R-Utah) put forth the first proposal for a warning label on cigarettes in 1957.\textsuperscript{25} It read, “Warning, prolonged use of this product may result in cancer, in lung, heart and circulatory ailments and in other diseases.”\textsuperscript{26} However, the legislation didn’t pass until eight years later, and then in a much weaker form, as described above. The first pictorial warning label was proposed to be on state cigarette tax stamps in South Dakota in 1959 by Sen. Donald Stransky, who was a heavy smoker himself.\textsuperscript{27} The picture would feature skull and crossbones with the words “The use of this product is not recommended by the State of South Dakota. The use thereof may result in cancer or heart disease.”\textsuperscript{28} The bill passed in the South Dakota Senate by a small majority. The tobacco industry mobilized tobacco distributors, agricultural and business groups and others.\textsuperscript{29} A governor of North Carolina, a tobacco-growing state, threatened to retaliate by labeling the farm products from South Dakota as coming from the soil with the “highest content in the nation of selenium, a well-known poison.”\textsuperscript{27} Newspapers in other tobacco-growing states, such as West Virginia, asked whether bread, butter and meat produced in South Dakota and linked to obesity and heart disease should be labeled with skull and crossbones as well.\textsuperscript{30} The bill was defeated in the House.\textsuperscript{31}

Following South Dakota, between 1959 and 1961, Utah and New York proposed skull and crossbones labels, while Massachusetts and Missouri proposed textual health warnings.\textsuperscript{31} None of these legislative proposals passed.

As the momentum of the legislative proposals demanding warnings on cigarettes and continued accumulation of scientific evidence linking smoking and disease made warnings inevitable, tobacco companies were determined to influence the content of these warnings to minimize their effectiveness, saying, “it has been our policy to resist any mention of specific
The first U.S. cigarette warning label, “Caution: Cigarette Smoking May Be Hazardous to Your Health” was originally proposed by the Federal Trade Commission (FTC) as, “Caution: Cigarette Smoking Is Dangerous to Health. It May Cause Death From Cancer and Other Diseases.” The tobacco industry succeeded not only in curtailing the wording of this health warning but also in postponing its implementation date and in prohibiting (preempting) any local or state governments from passing any laws related to warnings on cigarette packaging or advertising. The passage of this law (Federal Cigarette Labeling and Advertising Act of 1965) was called by The Atlantic, “The Quiet Victory of the Cigarette Lobby: How It Found the Best Filter Yet — Congress.”

Tobacco companies also worked to “always to have warning clauses attributed to an appropriate government authority.” This allowed tobacco companies to continue to dispute the claims about the harmful effects of tobacco. Because the government was the source of the warnings, the tobacco companies could disassociate themselves from these warnings and continue to argue that tobacco was not that harmful and continue to confuse smokers, despite conclusive scientific evidence.

The warning created by this act and later weak warnings were successfully used by the tobacco companies to seek immunity from litigation in state and federal jurisdictions and then in the Supreme Court. They argued that the federally mandated warning label was sufficient for consumers to be fully informed about the risks of smoking.

Most recently, tobacco companies sued the FDA when it required nine new pictorial warning labels to cover 50 percent of the front and back of cigarette packs and 20 percent of advertisements. The tobacco companies claimed that these labels unjustifiably and inappropriately violated their First Amendment rights by compelling them to disseminate anti-tobacco messages for the government. Two different challenges were brought up and the courts used somewhat different standards for constitutional review resulting in different outcomes, but ultimately, the divided United States Court of Appeals for the District of Columbia Circuit ruled the proposed pictorial warning labels as written to be in violation of the tobacco companies’ constitutional right to freedom of speech.

A detailed discussion of the different levels of scrutiny and the court’s decision making is available elsewhere. In brief, the court ruled that the government did not provide sufficient evidence that the proposed warning labels would lower smoking rates. The FDA chose not to appeal to the Supreme Court; instead, it revoked its pictorial warning regulation but promised to continue research and develop new warning labels. As of June 2016, the FDA had not announced any further regulatory developments regarding pictorial warning labels on cigarettes.

While tobacco companies oppose warning labels, consumers actually support them. A national survey in Brazil showed that 76 percent approved of pictorial warning labels, including 73 percent of smokers. In the U.S., the majority of residents supported the introduction of pictorial warning labels between 2007 and 2012, although after the specific labels were introduced by the FDA in 2011 the support among current smokers (those who reported smoking cigarettes in past 30 days) declined from 62 percent in 2011 to 40 percent in 2012.

People consider warning labels effective in dissuading themselves or other smokers from smoking and pictorial warning labels were perceived as more effective than text. Research on Tobacco Warning Labels

After the implementation of the first warning labels in 1966, the FTC’s 1981 report concluded that the original warning labels were not novel, overexposed and too abstract to remember and be personally relevant. Warning labels, like advertisements, wear out over time. Written warning labels wear out faster than graphic ones. In response, Congress passed a law mandating four rotating warnings. Studies on them began appearing in the late 1980s, demonstrating that several years after the implementation, those written labels on cigarette packs were also not noticed and not remembered by smokers and adolescents. Since then, the diffusion and evolution of tobacco warning labels have been propelled by observational and experimental studies showing the effectiveness of large graphic warning labels in informing consumers about the health harms of smoking and reducing their smoking behavior.

Warning labels are noticed, read and remembered. Both smokers and nonsmokers notice warning labels on cigarettes and recall their content. For example, in an Australian study, among the new written warning labels, the most frequently recalled were “Smoking kills” and “Smoking in pregnancy harms your baby.” A meta-analysis of experimental studies showed that pictorial warning labels attract attention.
and keep it longer than written warning labels, but that the differences in recalling the content of the warning labels were not significant between written and pictorial labels.\textsuperscript{55} Another study showed that graphic warning labels on tobacco advertisements, compared to small copy-only warnings capture attention quicker and hold it longer, resulting in better recall of the warning’s message.\textsuperscript{56}

Warning labels increase knowledge of the risks of smoking. Noticing warning labels is related to a greater knowledge of health risks of smoking.\textsuperscript{57} In countries where a specific disease (such as stroke) was mentioned on health warnings, more people had the knowledge that smoking causes this particular disease than in countries without health warnings concerning this disease.\textsuperscript{55,56} After new written warning labels were introduced in Australia, smokers increased their knowledge of the harmful constituents of smoke.\textsuperscript{57}

Warning labels make smokers think about quitting. In countries with pictorial or large (50 percent of the pack) written warning labels, more smokers report that labels led them to think about stopping smoking.\textsuperscript{59} For example, 57 percent of Australian smokers said that warning labels motivated them to think about quitting smoking.\textsuperscript{60}

Warning labels make smokers quit smoking and prevent nonsmokers from starting to smoke. Evidence from countries after the introduction or changes in warning labels indicate that these changes are related to reduced numbers of cigarettes smoked and fewer smokers.\textsuperscript{54} A recent systematic review found that implementation of strengthened warnings (i.e., a switch from copy-only to graphic warning) was associated with increased quit attempts and short-term smoking cessation and decreased smoking prevalence in those countries.\textsuperscript{61} However, in observational population-level studies it is difficult to determine unique causal effects of warning labels when they are implemented along with other policies, such as smoke-free laws. Nonetheless, a quasi-experimental study parsing out the effects of other policies estimated that implementation of graphic warning labels in Canada reduced smoking rates by 2.87 to 4.68 percentage points.\textsuperscript{62} In addition, a recent randomized clinical trial demonstrated that smokers whose packs had large graphic warning labels were more likely to attempt to quit smoking during the four-week clinical trial than smokers with copy-only warnings (40 percent versus 34 percent, or 1.29).\textsuperscript{63}

History of Warning Labels on Sugar-Sweetened Beverages

As of April 2016, no health warnings on SSBs have been implemented. However, there is support for this measure. In California, 78 percent of registered voters support requiring text warning labels on soda or other sugary drinks.\textsuperscript{64} There have been some attempts to pass laws requiring warning labels on SSBs. In February 2012, a bill was introduced in California that would require SSBs to carry a warning: “STATE OF CALIFORNIA SAFETY WARNING: Drinking beverages with added sugar(s) contributes to obesity, diabetes and tooth decay.”\textsuperscript{65} (FIGURE 2.)

However, this bill was held in committee and did not advance. Another attempt to implement this warning label was undertaken in 2015, but likewise did not pass the committee.\textsuperscript{66} The beverage industry opposed these bills and lobbied the legislators to make sure they did not advance.\textsuperscript{67,68} The California Dental Association lent its support to both bills.\textsuperscript{69,70} Similar bills have been proposed in New York state,\textsuperscript{71} Hawaii, Vermont and Washington,\textsuperscript{72} but as of July 2016 these bills had not yet been passed into laws. San Francisco passed a law in 2015 requiring advertisements for SSBs displayed on billboards, buses, transit shelters, posters and stadiums within the city to carry a warning: “WARNING: Drinking beverages with added sugar(s) contributes to obesity, diabetes and tooth decay.”\textsuperscript{65} (FIGURE 2.)

Just as tobacco companies resisted warning labels on cigarettes, the food and beverage industry is fighting the implementation of warning labels on SSBs. Newly discovered sugar industry documents reveal that the cane and beet sugar industries have actually been working to resist regulation of sugars, including warning labels, since the 1970s.\textsuperscript{73,74} Their main tactic was to influence research agenda of the national agencies (such as the National Caries Program) and produce their own research that would point at causes other than sugar for health issues such as dental caries.\textsuperscript{77} More recently, the American Beverage Association argued that warning labels on SSBs are misleading, that SSBs are not uniquely...
harmful to health and that singling them out is unfair and will not improve public health. They claim that the solution to the obesity and diabetes crises lies not in demonizing the SSBs but in educating people on balancing calories consumed and calories spent through exercise. During the hearing on the warning labels ordinance in San Francisco, the American Beverage Association brought in a dietician from Washington, D.C., to repeat this argument. After the San Francisco Board of Supervisors unanimously passed the ordinance requiring warning labels on advertisements for SSBs, the American Beverage Association, the California Retailers Association and the California State Outdoor Advertising Association sued the city of San Francisco. Their motion for preliminary injunction that would have prevented the ordinance from taking effect was denied by the U.S. district judge on May 17, 2016. Expert testimony countering industry claims, including the evidence linking SSBs to health effects (such as dental caries) as well as evidence of the effectiveness of tobacco warning labels, played an important role in the judge’s decision. On June 8, 2016, however, the same judge granted a shorter-term injunction that would prevent the ordinance from going into effect until his previous ruling is reviewed in the U.S. Circuit Court of Appeals.

Research on SSB Warning Labels

Some research is emerging evaluating reactions to and short-term effects of textual warnings on SSBs. A study evaluated the effects of different versions of a California warning label (“SAFETY WARNING: Drinking beverages with added sugar(s) contributes to obesity, diabetes and tooth decay”) on parents of 6- to 11-year-old children in an online experiment. Labels differed in that one used “weight gain” instead of “obesity,” another added “preventable diseases” in front of the disease names and another added “type 2 diabetes” to the list of diseases. Parents who saw any of these labels (compared to parents who saw a beverage with no label or with the American Beverage Association’s “Clear on Calories” label that depicted the number of calories) believed that SSBs were less healthy for their child and were significantly less likely to select an SSB for their child from an online vending machine. The variations in the wording of the warning label (e.g., “weight gain” versus “obesity”) did not have a significant effect on the parents’ perceptions or hypothetical purchasing behavior.

What Should Warning Labels on Soda Look Like?

Lessons from tobacco warning labels can be applied to SSBs to make these labels more effective. The World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC) provides specific guidance. Adopted in 2003, the FCTC was the world’s first global public health treaty, and it was signed by 168 countries (the U.S. was not one of them). Article 11 of the FCTC could be used to guide the design of the SSB warning labels according to the recommendations for tobacco warning labels that were developed based on empirical evidence. For example, a warning label should cover no less than 30 percent (preferably 50 percent) of the primary display area of a package. Warning labels should be rotated frequently to keep them novel. They should appear on the package and on advertisements. Ideally, a picture should accompany the written warning to make the message more salient and to communicate the message for those with low literacy. All of the currently proposed warning labels for SSBs fall short of the FCTC recommendations.

Two examples of SSB warning labels are presented in Figure 3. The soda can on the left features a warning label similar to the current U.S. alcohol and tobacco warning labels. The label is positioned vertically, while the main product copy is horizontal. The use of all capital letters and a text color that blends in with the background may also make this label less effective. In contrast, the soda can on the right has a prominent pictorial warning label that could be more effective. The image covers 50 percent of the front surface, which makes it easier to see and attract attention. The copy and the picture focus on one specific disease (tooth decay) which is more salient than the list of diseases in the current California label. The image is more likely to be noticed and remembered by viewers, and the presentation of the information is more visually appealing. This approach aligns with the FCTC guidelines and could potentially be more effective in changing consumer behavior regarding SSB consumption.
decay), but this would be part of the set of rotating pictorial warnings with other labels focusing on obesity and diabetes. Tobacco companies extensively researched visual elements for cigarette packs to make them more eye-catching. They found that a white background, high-color saturation and high contrast made the design elements stand out. Yellow was the most noticeable and memorable color, but consumers did not perceive it as pleasant, associating it with stress and anxiety. Based on the findings from tobacco industry research, to increase visible prominence of labels, black copy on a yellow background could be used. The warning does not contain attribution to the government source. Attribution to a government authority allows the industry to continue to dispute the science about the harms of the products.

Knowing the history of the resistance of tobacco companies to warning labels and the incipient resistance from the beverage and sugar industries, putting warning labels on sugar-sweetened beverages will not be an easy public health task. It would be helpful for advocates to review the arguments the tobacco industry used to avoid, delay and curtail warning labels, as well as other strategies of tobacco companies and other industries. There are useful summaries available for the arguments that are commonly used by the tobacco industry to combat warning labels and the ways to counter them. Similar resources are now available for advocates promoting regulation and labeling for SSBs. For example, the “slippery slope” argument might have contributed to the defeat of the early warning labels in the U.S. In Australia, when the ominous predictions of tobacco companies failed to materialize, this argument seemed to have lost its appeal. Tobacco control advocates should point out the fallacy in this argument that there is no evidence that putting warning labels on one product automatically leads to labeling other undesirable products.

When proposing warning labels for SSBs, whether textual or graphic, localities should work with legal counsel in order to pass judicial review. Among other things, advocates of warning labels on SSBs might need to demonstrate that the current advertising for SSBs is deceptive and needs to be corrected, propose labels that are based on facts and are not unjustifiably burdensome or too broad and convince the court that warning labels would advance a government’s substantial goal (such as reduce the rates of obesity, diabetes and other diseases or inform consumers about the harmful effects of SSBs).

When choosing whether to pursue warnings on products, advertisements or other locations (such as point of sale), advocates should consider several issues. It might be easier politically to require warning labels on advertisements because making separate packages for different localities or states might be seen as too burdensome to the manufacturers or distributors. Legally, they should consider if their proposed warning labels might be preempted by the federal Nutrition Labeling and Education Act (NLEA), which gives the FDA the authority to regulate food labeling.

Conclusion

Health warnings on tobacco products have been an effective tool for educating consumers about the health risks of tobacco. Warning labels are just one of the tobacco control policies that are applicable to SSBs. Other policies include mass media campaigns, taxes and restrictions on marketing and sales, among others. Dental professionals are already educating their patients about this and other health issues, such as smokeless tobacco. The California Dental Association and the American Dental Association provide online, printable handouts that dental professionals can use to educate their patients about a variety of dental issues, including the role of sugar. But dental professionals should not only educate their patients. Health advocates, including dentists, should familiarize themselves with the history of the tobacco warning labels, the industry’s tactics to resist warning label regulations and the research on the effectiveness of warning labels. The industry will continue to challenge the science on health effects of SSBs and any efforts to put warning labels, including challenging the content and design of the labels. Dentists can lend support to policymakers to resist these challenges. Testifying in front of local city councils and writing or calling state representatives or writing editorials to local newspapers are just some of the ways to do this.

Future proposals for SSB warning labels should base the design, content, size and copy versus graphics on the evidence from tobacco research. More research on the effectiveness of SSB warning labels with the stronger design (such as the one suggested in this paper) should be conducted to preempt further industry challenges. Lessons from the tobacco warning labels indicate SSB warning labels...
would not be easy to implement, but by combining emerging scientific evidence with public support and outreach of health professionals, this policy might be able to move forward and be another important tool to promote making informed decisions for healthier food choices.

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6112 HEALDSBURG  Ideal for DDS seeking part-time practice in highly desirable locale or as foundation to grow. 100% out-of-network. Trending $200,000 in collections with Profits of $105,000.

6111 SANTA ROSA  Perfectly positioned for next Owner. Best equipment, networked and digital including Pano. 3-days of Hygiene. 2016 trending $520,000+ with profits exceeding $250,000. Conservative Owner. Best location.


6109 CALIFORNIA’S NORTH LAKE TAHOE “Best-of-the-best!” Solid foundation anchored by 8.5 days of Hygiene. Consistent $1 Million per year performer. Beautiful office with unsurpassed views. Enjoy great Alpine lifestyle.

6107 EUREKA  100% out-of-network with insurance industry. Produced $918,000 and collected $895,000 on 20-hour week. Doctor's schedule booked 3-months out. 7+ days of Hygiene. Highly respected. Full price $250,000.

6106 SACRAMENTO’S EL DORADO HILLS  No rush and no chaos here. Staff is Dream Team. Beautiful facility. 2015 collected $640,000. UCR Fees. Very special opportunity. Median household income in 2013 was $104,500. Great schools, growing business parks and very upscale community.

6105 MODESTO  Collected $430,000+ on 3-day week. 3-days of Hygiene. 5-ops. Central location. Successor should open 4th day.

6104 SANTA CLARA – CUPERTINO AREA  Restorative practice. 2015 collected $1.55 Million with Profits of $694,000. Paperless and digital. Beautiful office. UCR Fees! Extremely attractive selling features available to retain the goodwill.

6103 SAN FRANCISCO’S UNION SQUARE  Opportunity to acquire highly regarded practice with condo. Beautiful 5-ops, digital and paperless. 6th op available. 2015 collected $658,000.

6100 SANTA CLARA  Phenomenal launching pad for next Owner. Fantastic location, 5-op facility. Management not taking advantage of what is possible even though 2015 collected $758,000 with Profits of $323,000. Perfectly positioned to be a $1 Million+ year performer immediately! Needs young DDS.

6098 WEST PETALUMA  Petaluma is THE business center of the North Bay! Business parks are growing and young families are drawn to this great family community per the unique amenities of this historic river city. Collected $468,000 with Profits of $199,000. 3-days of Hygiene and starting a 4th day in September.

6089 MOUNT SHASTA  Small town living renowned for outdoor lifestyle. Best air and water! Escape Rat Race and corporate intrusion. 3-day week collected $881,000. Available Profits totaled $485,000. Digital radiography including Pano. Full price $350,000.

ANTELOPE VALLEY  Has grossed $1.8 Million. Fantastic location. 60,000 autos pass by per day. 8-ops. Partnership for $250,000 or buy all.

ARCADIA  Facility only. 3-ops equipped. $65,000 or $95,000 with Ortho.

BAKERSFIELD AREA  5-ops, next to McDonalds. 1,800 sq.ft. includes building. Grosses $40,000/month. Full Price with building $350,000.

BAKERSFIELD  Established 55 years. 5-ops in 3,000 sq. ft. Will do $1 Million. Full Price $300,000. Building available for $350,000.

BELLEFLOR  Established 60-years. Grossing $350,000. Full Price $240,000.

EAST LOS ANGELES  One million Latinos in service area. PPS sold to Seller in 1985. Will do $1 Million in 18 months. Full Price $300,000.

EAST SAN FERNANDO VALLEY  Absentee Owner. $8,000/month Cap Check. 4-ops. Do a Million within a year.

INDIO  4,000 sq.ft. dental building. Full Price $650,000.

LADERA RANCH  Grossing $650,000. Shopping center location.

LAGUNA NIGUEL  Location, location, location! 4-ops with Panorex. Full Price $185,000.

LA JOLLA  Established 20-years. 3-ops. Grossed $150,000. Super opportunity with immediate growth. Full Price $150,000.

LAWNDALE  Hi identity. 2 ops. Full price $125,000.

LOS ANGELES HMO  Grossing $1.2 Million. 5-ops. Full Price $1.2 Million.

LOS ANGELES HMO  Does $4 Million.

NORCO – CORONA  Will do $1.5 Million. 8-ops. Exquisite. Full Price $1.2 Million.

NORWALK  Fantastic high identity location. 5 ops. Full Price $250,000.

ORAL SURGERY PRACTICE – LOS ANGELES  Established 40 years.

ORANGE  Beautiful 10 operatory office ready for merger.

PASADENA  Established 60 years. 7-ops. Always $1+ Million. Full Price $600,000.

REDLANDS  Shopping center. Grosses $350,000. Full Price $250,000.

RIVERSIDE  Facility only. 4 ops. Full Price $50,000.

SOUTH ORANGE COUNTY BEACH CITY  Grosses $650,000. 4 ops. Beautiful!

PERIO PRACTICE - PRESTIGIOUS BEACH CITY  Established 40 years.

TORRANCE  Established 12 years. 5 star building. 3-ops. Grossing $250,000. Full Price $195,000.

TUSTIN  Dental building. Full Price $1.5 Million.

VENTURA - OXNARD  5-ops. Grossing $850,000. High identity. Full Price $685,000.

YUCCA VALLEY  8/10th of an acre. Great highway visibility. Full Price $250,000.

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**Los Angeles County**

**Duarte (GP)** - Turn Key office in a busy shopping center with great signage. Has 2 eq ops and 1 plumbed not eq. Computerized with DeniSoft. Projecting approx. $173K for 2016. **Property #5048.**

**La Canada—Price Reduced!!** Turn key general practice in a 2 story bldg with large signage. Has over 45 years of goodwill. Consists of 4 eq ops and 2 plumbed not eq. Has digital x-ray. Long term lease. Great opportunity. **Property #5051.**

**Lakewood** - GP established circa 1963 located in a 2 story med prof bldg. Consists of 5 eq ops. Projecting approx. $411K for 2016. **Property #5119.**

**La Puente— GP + Bldg.** Over 24 yrs of goodwill, this practice is located in a single story free standing bldg. Has 4 eq ops. Some HMO and Denti-cal. Grossed approx. $452K in 2015. **Net $186K. Property ID #5101.**

**Long Beach** — GP w/ over 50 yrs of goodwill in a multi story bldg. PPO & Cash only. Dentrix software. Reasonable rent. 3 eq ops w/ great window views. Projecting approx. $399K for 2016. **Property ID #5116.**

**Los Angeles**— GP w/ 40 years of goodwill. In a 10 story medical/dental bldg. Has 4 eq ops w/ views to the mountains. PPO/Cash/Medi-cal/CAP. Grossed $823K in 2015. **Net of $185K. Property ID #5107.**

**Santa Clarita** - Beautiful practice in a premier shopping plaza. Has 6 eq op on a ~2,400 sq ft suite. Leaseholds & Equipment only. **Property ID #5108.**

S. San Fernando Valley / Central L.A.— Part-time Endo practice located in a multi story bldg bldg w/ 3 eq ops & 1 plmbd not eq for expansion. Has low rent. 21 yrs of goodwill. **Property ID #5117.**

**Westchester**— GP established circa 1972 located in a multi story bldg with own parking garage. Consists of 4 spacious eq ops w/ views to the city. Projecting approx. $325 for 2016. **Net $102K. Property ID #5128.**

**West Covina** — GP w/ 13 years of goodwill located in a 1 story building shopping center. Has 5 eq operators - Digital X-ray. Some Denti-cal. **Buyer’s net of $179K. Property ID #5083.**

**Orange County**

**Brea**— GP with 3 eq ops is located in a 2 story medical dental bldg. see approx. 15-18 patients/day. PPO & Cash only. Has reasonable rent. Buyer’s net of $69K. **Property ID #5121.**

**Irvine**— Establishing in 2004 this GP office is located in a one story medical building. The practice consists of 2 eq ops and 1 plumbed not equipped for expansion. Digital office w/ 1 sensor. Seller works 2.5 days/wk and sees approx. 7-10 new patients/mo. **NET OF $117K. Affordable rent. Property ID #5088.**

**Laguna Hills**— With over 30 yrs of goodwill this GP is located in a 2 story med bldg. Has 5 eq ops in a 1,600 sq ft suite. See an average of 14-16 new patients/mo. Projecting approx. $324K for 2016. **Property ID #5127.**

**Orange**— LH & Equip Only! Great opportunity for a GP or Specialist. Located in a single story prof. bldg. Option to buy Condo. Has 5 equipped ops and 1 plmd not eq. **Property ID #5122.**

**Orange County**— Modern designed practice w/ 7 eq ops in a approx. 3,500 sq ft suite. Located in a 2 story retail / medical bldg. Grossed $677K for 2015. **NET of $149K. A must see. Property ID #5104.**


**South Orange County**— Ortho/Pedo state-of-the-art practice located in a 2 story medical/dental bldg. Has new built-out that includes a Pano + Ceph. Consists of 2 eq ops and 5 chairs in open bay. Grossed approx. $36K in 2015. **Property ID #5100.**

**Kern, Ventura, & San Luis Obispo Counties**

**Newbury Park / Thousand Oaks**— General Practice established in 1997. This modern designed office consists of 8 operators in a 2,800 sq ft suite. Buyer’s net of $196K. Monthly revenues of $70K. Great office. **Property ID #5087.**

**San Diego County**

**Del Mar—Price Reduced!** Established in 1995. This 2 eq op. office is located in a 3 unit prof. building. Has views to the ocean. Reasonable rent. **Property ID #5110.**

**El Centro (GP) – Price Reduced!!** This practice is located in a single story building. **Building is for sale. 5 equipped operatories. Grossed $227K for 2015. Buyer’s net of $63K. Property ID #5023.**

**San Marcos**— All digital GP w/ 4 equipped ops and 1 plumbed not equipped in a 3 story medical bldg. **Buyer’s net of $208K. Property ID #5126.**

**Riverside & San Bernardino Counties**

**Chino**— Real Estate Only! **This is a rare opportunity to purchase a condo located in a single story strip mall. Has been a dental practice for 40 years. Property ID 5076.**

**La Quinta—LH & Equip Only!** Beautiful practice located in a single story busy shopping plaza with 3 equipped operatories and 1 plumbed not equipped. Reasonable rent. Has Dentrix software and digital x-ray. **Property ID #5124.**

**Murrieta**— Modern designed practice located in a single story shopping center. This office consists of 4 eq op and 1 plmd not eq in a approx. 1,790 sq ft suite. Cash and PPO only. Computerized with QSI Cloudbase. Grossed approx. $526K for 2015. **Net of $180K. Great opportunity. Property ID #5105.**


Understanding the Role of the Better Business Bureau

TDIC Risk Management Staff

As recently as a century ago, unscrupulous companies peddled an assortment of questionable products to relieve common medical ailments. Persuasive salesmen and deceptive advertising touted these magic tonics as miracle cures. Unfortunately, many of these so-called medicines were ineffective at best and deadly at worst.

Fed up with shady opportunists making false claims that tarnished the public perception of their profession, a group of advertising executives came together to boost consumer trust. Promoting self-regulation, ethical business practices and truth in advertising, the group is now known as the Better Business Bureau.

While the mission of the BBB has stayed the same, its role has changed significantly. Like other consumer protection entities, it can be either a blessing or a curse for business owners, including dentists. Positive ratings through the BBB can help a business grow, but the opposite can happen should a dissatisfied customer file a complaint.

The Dentists Insurance Company, TDIC, reports a case in which a patient was unhappy with a stayplate. He showed up to the dental practice unannounced, threw the stayplate, cursed and demanded a refund. The dentist declined the refund, so the patient filed a complaint with the BBB. In another case, a patient demanded a partial refund of a dentist’s consultation fee. When the dentist declined, the patient filed a complaint.

“We have been getting an increase in calls to the Risk Management Advice Line about complaints to the Better Business Bureau,” said Sheila Davis, assistant vice president, claims and risk management, TDIC. “It is important for dentists to know how to protect themselves should they be the subject of a complaint.”

When a complaint is filed, the BBB will automatically send it to the business owner for a response. However, responding can put a dentist at risk because HIPAA prohibits any disclosure of confidential patient information, regardless of whether the patient disclosed his or her information first. Even acknowledging that the complainant was a patient of record is a violation of law and can set dentists up for liability claims.

For dentists who are not accredited members of the BBB, TDIC recommends not responding to complaints at all. Dentists can send a letter stating that they decline to respond due to patient privacy concerns. The dentist can then attempt to contact the patient and resolve the matter directly.

“The Better Business Bureau is not a regulatory agency and responses are not mandatory,” Davis said.

Dentists who are accredited members of the BBB are required by the terms of their accreditation to respond. However, they are still required to follow patient privacy laws. TDIC recommends they submit a generic response, refraining from identifying the patient or disclosing anything that could be considered private patient information.

You are not a sales goal.

You are a dentist deserving of an insurance company relentless in its pursuit to keep you protected. At least that’s how we see it at The Dentists Insurance Company, TDIC. Take our Risk Management program. Be it seminars, online resources or our Advice Line, we’re in your corner every day. With TDIC, you are not a sales goal or a statistic. You are a dentist.

Protecting dentists. It’s all we do.

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In another case reported to TDIC, the BBB contacted an accredited member dentist after reading a negative review of the dentist on a popular review site. The BBB asked whether the accusations outlined in the review were true, questioned the dentist’s practices and requested she provide copies of treatment records. The dentist was advised not to disclose any patient records and to withdraw membership from the BBB.

“Dentists who fail to protect patient information can be subject to disciplinary action,” Davis said. “It is their responsibility to ensure patient information is only accessible to those authorized to have access.”

TDIC recommends that dentists address complaints to the BBB the same way they would address any patient complaint: with professionalism and compassion. Upset or angry patients often lodge complaints when they feel they have no other option for a resolution. Dentists should schedule a consultation, at no charge, to listen to the patient’s concerns and offer mutually agreed upon solutions.

“Patients sometimes file complaints because they feel their issues are not being addressed,” Davis said. “Often, they just want to be heard.”

Finding the right balance between consumer protection and patient privacy can be tricky, but it is a crucial responsibility of all dentists. By arming yourself with accurate information and understanding the role the BBB plays, it is possible to protect yourself and your practice from risk.

TDIC’s Risk Management Advice Line at 800.733.0634 is staffed with trained analysts who can answer consumer and other questions related to dental practice.
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Dental Practice Brokers CA DRE #00863149
4103 SAN FRANCISCO GP
Vibrant downtown location in historic high-rise bldg. Retiring doctor offering 30+ years of goodwill. 4.5 days of hygiene, 1,500+ active patients, 20-25 new patients/mo. Gorgeous, spacious facility in approx. 2,500 sq. ft. 2015 GR $796K. 2014 GR $768K. Average adjusted net income $274K+ Asking $599K.

4129 PETALUMA GP
GP located in stunning 1,856 sq. ft. seller owned facility. State-of-the-art office includes 6 ops, lab area, sterilization area, consult room, separate storage area, bathroom plus private bathroom. Asking $525K.

4126 HONOLULU GP
4 ops in 942 sq. foot office located in popular local mall. Practice est. over 35 years ago, 7 years in current location. Equipment includes digital x-ray, pano & laser. Seller transitioning to retirement. Avg. GR $433K. Asking $279K.

4108 HUMBOLDT COUNTY GP
Well-established, high performing general practice boasts 6 fully equipped ops. in 2,900 sq. ft. free standing office w/Digital X-ray, 2 platinum Dexis sensors, & Cerec Omnicam & MCXL units. Loyal & stable patient base, in charming community. w/ a small town feel. Perfect for a dentist who wants to escape the grind and live along the coastline. Avg. GR $1.4M+, 2016 on schedule for $1.5M+. Seller willing to help for smooth transition. Asking $1,041K.

4091 HOLLISTER GP & PEDIATRIC
Country living at its best – small town feel with affordable housing, in quaint bedroom community to Silicon Valley. Fully equipped 1,600 sq. ft. office with 2 enclosed adult ops and 3 open pedo ops, near Hazel Hawkins Hospital. Turn-key practice, great opportunity for a pediatric dentist. Approx. 565 active patients. 2015 GR $219K. Seller is relocating but will help for a smooth transition. Asking price $300K.

4114 CONCORD GP
Well-established practice offering 30+yrs of goodwill. Concord is on the verge of redevelopment of the old Naval Weapons Base later this year, which will cover 2,300 acres and include 12,000 housing units. The project will include Residential/Commercial/Recreational and Open Space. This practice opportunity is strategically located for growth potential due the slated re-development. Office has 3 fully equipped ops in 836 sq. Average GR $360K+ on 2 doctor days. Asking $322K.

4114 WALNUT CREEK GP
Walnut Creek practice in gorgeous facility with recent leasehold improvements plus new and upgraded equipment. Practice has 30+ years of goodwill. Looking for a mature, experienced practitioner for a loyal and mature patient base. Located in commercial center with several amenities and marketing opportunities. Doctor works 2 days per week. Owner available for a smooth transition. Asking $432K.

4120 SF GP
Well est. downtown family practice grossing over $1M with an avg. overhead of 61%. 5 fully equipped ops., in remodeled office. Retiring seller works 3.5 Dr. days/week. Seasoned, dedicated staff & loyal patient base. Terrific opportunity for experienced & confident dentist. Asking $806K.
Nitrous Oxide (N2O) is a clear, colorless, oxidizing liquefied gas with a slightly sweet odor that, when mixed with oxygen, is used for dental anesthesia. It is considered a nonflammable gas. Inhaling pure nitrous oxide can lead to asphyxiation. Dental practices using nitrous oxide should utilize scavenging equipment to minimize employee exposure to the gas.

Cal/OSHA has established a time-weighted average permissible exposure level (PEL) of 50 ppm for nitrous oxide over an eight-hour day. An employer must monitor the work environment if the employer or any employee believes individual staff may be exposed to concentrations in excess of the PEL. Monitoring should be performed until such time that the work environment is within the PEL. Title 8 of the California Code of Regulations, Section 5155 Airborne Contaminants establishes the PEL for nitrous oxide. The appendix to section 5155 explains how to compute exposure levels and includes a link to the table of permissible exposure limits for all identified air contaminants.

Vendors that provide monitors for assessing employee exposure levels are listed in Glutaraldehyde, Formaldehyde and Nitrous Oxide Monitors on cda.org/practicesupport. Effective scavenging equipment and periodic inspection of equipment should keep nitrous oxide exposures to within acceptable limits. Recommendations for the safe use of nitrous oxide in the dental office are included in articles published in the Journal of the American Dental Association. These articles may be accessed online at jada.ada.org.

- The U.S. National Institute for Occupational Safety and Health (NIOSH) has online resources for controlling nitrous oxide exposure:
  - Control of Nitrous Oxide in Dental Operatories, 1996.
  - NIOSH Alert: Controlling Exposures to Nitrous Oxide During Anesthetic Administration, 1994.

Pregnant Employees
Once an employer is notified of a pregnancy, the first obligation is to assess the risks within the workplace for the pregnant employee. We recommend:
- Assessing the risks to which a pregnant woman, a woman who has recently given birth or a woman who is breastfeeding is exposed and the length of the exposure.
Informing any employee concerned with identified risks with information on the control/protective measures that will be put in place.

Determining the practical measures to be implemented in the workplace to protect against the risks.

To be cautious, it is best to have a pregnant staff member, or one who is trying to conceive, refrain from being in the same operatory when nitrous oxide is being administered, unless the employee’s physician states otherwise. Even the best scavenger system does not prevent exposure to nitrous oxide gas as patients can have their mouths open during procedures allowing the gas to escape.

Other Regulations

The Dental Board does not require a permit to administer nitrous oxide to patients.

Dental practices that use nitrous oxide and have 10 or more employees should post a Proposition 65 notice. The notice, an FAQ and patient fact sheet are available on cda.org/practicesupport.

Piped systems for compressed gases must comply with local fire code. Portable cylinders of compressed gas must be stored and handled according to Cal/OSHA regulation, 8 CCR 4650. Dental practices with compressed gas cylinders must:

a) Store the cylinders in areas where they are protected from external heat sources.

b) Inside of buildings, store cylinders in a well-protected, well-ventilated, dry location at least 20 feet from highly combustible materials. The storage space must be located where cylinders will not be damaged by passing or falling objects or subject to tampering by unauthorized persons. Store cylinders in places away from elevators or stairs.

c) Not keep cylinders in unventilated enclosures such as lockers and cupboards (with the exception of fire extinguishers).

d) Store oxygen cylinders separate from fuel gas cylinders or combustible materials (especially oil or grease) a minimum distance of 20 feet or by a noncombustible barrier at least 5 feet high or a minimum of 18 inches (46 centimeters) above the tallest cylinder and having a fire-resistance rating of at least one hour.

e) Transport and store compressed gas cylinders in a manner that prevents them from creating a hazard by tipping, falling or rolling.

f) Ensure all cylinders that are designed to accept valve protection devices are equipped with such devices when the cylinders are not in use or connected for use.

g) Unless cylinders are secured on a special truck or rack, regulators shall be removed and valve-protection devices, when provided for, shall be put in place before cylinders are moved.

h) Securely fasten and transport compressed gas cylinders in suitable trucks. All gas cylinders in service must be secured to other rigid structures so that they will not fall or be knocked over. For short distances, cylinders may be moved by tilting and rolling them on their bottom edges.
It is a Great Time to Sell! Inventory & Rates are Still Low & Buyer Demand is High! Call for a Free in Office Valuation!

ARCADIA - (4) ops compt. G.P. Located in a well known Prof. Bldg. on a main thoroughfare. Cash/Ins/PPO + Cap Ck. 2015 Collect $300K+ on a (3) day week. PENDING

GROVER BEACH - (3) op Turnkey Office w included charts (not guaranteed). 2 ops eqtd w newer eqt. 3rd plumbed. Digital Pano & x-ray. Dentrix. In a strip ctr. LL incentives. SOLD

HUNTINGTON BEACH - (5) op plumbed space for lease. Some eqt available. TI's too. NEW

OXNARD #9 - (3) op compt. G.P. & a Prof Office Condo for sale. Located on a main thoroughfare. 3 ops eqtd. Annual Gross Collect $200K+ p.t. Cash/Ins/PPO/HMO $4.5K/mos Cap Cks. Digital x-rays. Low overhead. Buy & Combine or open a satellite. NEW


PORT HUENEME - (3) op compt. G.P. Located in a large strip ctr. with exposure, visibility, & signage. 2.5 - 3.5 year old eqt. Mostly associate run. Gross Collect $200K p.t. w no adv. NEW

SANTA BARBARA COUNTY - (3) op compt G.P. & a 1,900 sq ft Bldg. that houses the practice & a residential unit that can be rented or lived in. “Fee for Service.” No PPO, HMO or Denti-Cal. 2015 Gross Collections – $275K on a relaxed 3½ day week. Seller refers all O.S., Pero, Ortho, Endo & implant placement. Seller retiring but will assist w transition. NEW

SAN FERNANDO VALLEY #9 - (8) op compt. G.P. w modern eqt. in a prof. bldg. on a main thoroughfare. Cash/Ins/PPO/HMO. Cap Ck approx $7K/mos. 2015 Collect $1.4M+ on a 3½ day week. (4) days of Hygiene. Seller retiring. NEW


Santa Ana - absentee owned (6) op fully eqtd G.P. First floor street front location on a main thoroughfare. Exposure/visibility/signage. No PPO & No Denti-Cal. Pano eqtd & Comput. Annual Gross Collect. $400K. $500K on a (3) to (4) day week. PENDING

THOUSAND OAKS (4) ops/(2) eqtd compt. Turnkey Office w included charts. Chart included but not guaranteed. Sirona Eqpt. Located in a condo in a Prof. Bldg. PENDING


Regulatory Compliance appears monthly and features resources about laws that impact dental practices. Visit cda.org/practicesupport for more than 600 practice support resources, including practice management, employment practices, dental benefits plans and regulatory compliance.
Timely Referrals — Our Ethical Obligations to Our Colleagues

Robert D. Stevenson, DDS

A n important, but often overlooked, element of professionalism is conduct between dental practitioners. Because dentists possess specialized knowledge and skills that are not readily available to the public, we are obligated to “work together for the collective best interest of society.”

Although we may be competent in many areas, occasionally situations arise that demand a higher level of expertise than we can provide. These cases are best referred to a qualified specialist.

Management of the referral process may be taken for granted, but it is an important process nonetheless. A good relationship, including appropriate communication between the referring dentist and the consulting dentist, helps to ensure continuity of care for the patient and benefits the individual practices as well.

Section 9 of the CDA Code of Ethics informs us that, “Whenever the delivery of care to a patient requires diagnostic and therapeutic modalities that are beyond a dentist’s scope of services, the dentist has the obligation to inform the patient of all available treatment options and to refer the patient to a provider who is qualified to provide consultation or necessary care.”

What are the ethical obligations that the referring dentist and the consulting dentist owe to one another? Competence is a significant value in the referral process. The ability of the referring dentist to assess his or her own competence, as well as his or her confidence in the consulting dentist are both central to the referral process.

Another value involved in this professional connection is veracity. The relationship between the referring dentist and the consulting dentist is obviously founded on trust, which is based in part on open, honest communication and on perceived competence. The patient must also be aware of this trust.

Professionalism is also notably important. Among the many courtesies that are extended among collaborating professionals, clear and effective communication is essential in facilitating continuity of care.

The referring dentist should clearly convey the requested treatment, the reason for referral and, if possible, how the procedure fits in with the overall treatment plan. The consulting dentist is obligated to discuss treatment results, prognosis and needed follow-ups with the referring dentist. If treatment is extended, periodic updates should be given. If complications arise, the consulting dentist should discuss this in a timely manner with the referring dentist so that modifications can be considered in the larger treatment plan.

If a treatment plan involves multiple specialists, this communication becomes exponentially more important. The referring dentist should take the lead in transmitting information among the various consulting dentists. Each consulting dentist should know how his or her responsibility fits in the larger picture, and the consulting dentists should share their follow-up information with all the dentists involved.

Another essential part of this discussion is autonomy. Each patient has the right to self-determination. Respect for autonomy insists that the patient be informed of the risks, benefits and alternatives of the proposed referred treatment. The patient has the right to consider the available options and make a decision.

In some instances, the patient may exercise his or her autonomy by refusing the referral. In other instances, the patient may inform the consulting dentist of his or her refusal to return to the referring dentist. Consulting dentists must carefully consider their response when autonomy appears to conflict with continuity of care. The guiding principle is the consideration of “the benefit of the patient as [the] primary goal.” Regardless of the outcome, this refusal should be communicated with the referring dentist.

By considering these and other principles, dentists will protect the patient’s right to competent, comprehensive care from their dental providers.

Robert D. Stevenson, DDS, is clinical managing partner and associate professor at Western University of Health Sciences, College of Dental Medicine. He is a member of the CDA Judicial Council.

For further assistance with any additional questions related to referrals, contact your local ethics committee, or Britney Ryan, CDA judicial council manager, at 800.232.7645.

REFERENCES
3. American Dental Association, General Guidelines for Referring Dental Patients, 2007, p. 2. Because referrals are not limited to general dentist referring to specialists, the referring dentist is defined here as the primary care provider and the consulting dentist is the dentist who is not the primary care provider.
5. It is not within the scope of this article to discuss management of this scenario.
BAY AREA

AC-335 SAN FRANCISCO: Great Practice! 2100 sf, 8 ops in desirable location of SF. Call for Details $475k
AC-566 SAN FRANCISCO: Spectacular views of Washington Square. 3 ops +2 add'l plumb in 1400sf office $225k
AG-564 SAN FRANCISCO: Over 25 yrs goodwill. Large 5,600+ sf w/ 9 ops near Land's End $2,225M
AG-576 SAN FRANCISCO: Part time practice w/ Amazing Growth Potential. Perfect for 1-3 DDS 4 ops $1,400 sf $550k
AG-615 SAN FRANCISCO: Move-In Ready Facility in charming desirable neighborhood. 1400 sf w/ 4 ops $125k
AN-514 SAN FRANCISCO Facility: Located in the bustling financial district! 1,007 sf w/4 ops. $125k
AN-565 SAN FRANCISCO: This remarkable opportunity could be your "dream come true!" 2,067 sf w/ 6 ops. $1,05M
AN-592 SAN FRANCISCO: Imagine accessibility, visibility & free parking in San Francisco! 1,000 sf w/ 2 ops + 1 add'l $100k
BC-361 OAKLAND: Established for over 23+ years! 2,200 sf w/7 ops. Seller is retiring. $330k
BC-432 PITTSBURG: Own this family-oriented Practice! 1,640 sf w/ 6 ops. Seller is Retiring $350k
BC-520 HAYWARD Facility: Located in Downtown, 1500 sf, 4 equipped ops, X-Rays in 3 ops. Call for Details $65k
BC-549 LAMORINDA AREA Facility: Excellent Location! Highly Visible, 900sf w/3 ops +1 plumbed add'l. $75k
BC-569 BERKELEY: Excellent, Well-established, Family-oriented Practice, 4ops in 1382sf 10pts/day, 35npts/mo $450k
BC-614 JAN LEANDRO Charts Only: Increase your Production & continue TX to this stable patient base $150k
BG-570 JAN LEANDRO: 30+ yrs goodwill w/focus on C&B. 2100 sf w 5 ops. Room for 6th op. Over $900k in 2015 $625k
BN-504 RICHMOND: Established Practice and Real Estate! 1,450 sf w/ 2 ops + 2 add'l $100k /RE $700k
BN-575 PLEASANT HILL: Do not pass up this remarkable opportunity! 1,450 sf w/5 ops. $330k
BN-586 BRENTWOOD: Unlimited growth potential! Carry on the stellar reputation of the Practice! 2,800 sf/8 ops. $1,4M

BAY AREA CONTINUED

CC-552 SAN RAFAEL: 3ops in 800sf. Practice & Lease Concession: $225,000 / Charts Only: $175,000 + an add'l am't for EQ
CC-567 ST. HELENA: Live and Practice in beautiful Wine Country, 5ops in 1842sf, single-story bldg. Price Reduced $79k
CC-599 SANTA ROSA: Wonderful & stable pts base in well-respected Practice, 3ops in 1040sf. $250k
CC-611 SOUTHERN MARIN COUNTY: Desirable, well-established neighborhood, 20npts/mo 3ops in 1100sf $650k
CG-537 MARIN COUNTY: Rare Opportunity in upscale, highly desirable area. State of the art office. 2400 sf w/7 ops $1.1M
CG-583 SANTA ROSA: Practice & Real Estate. Seller Willing to consider all reasonable offer. Health Forces Sale $875K Includes building
CH-607 FAIRFIELD: This practice is truly all about location and visibility! 1,333 sf w/3 ops + 1 add'l. $160k w/Cercel
CG-616 NAPA: State of the Art Practice - Seller moving out of state! Call for Details!
DC-480 SILICON VALLEY: Multi-Specialty Practice, 14+ ops in 7500sf, Owner Financing avail-Terms & Prices for the $1.075M
DC-476 DUBLIN: Shared Facility. Great for Specialist - Endo, Pedo or Ortho. 1100 sf w/2 ops+1 add'l $125k
DC-604 LIVERMORE Facility: Turn Key Facility in fast growing city, 3ops +3 add'l plumbed in 2380sf modern office. $110k
DN-497 PLEASANTON Facility: Great Location! 870 sf w/ 3 ops + 1 add'l. Owner Financing w/10% Down Reduced!! $95k
DG-519 SANTA CLARA Facility: Move In Ready! 2240 sf w 6 fully equipped ops $225k
DG-530 SAN JOSE: Highly respected quality practice! 2015 collections $1M+ Priced at $899k
DG-581 SAN JOSE: Gorgeous Practice, stable patient base & loyal staff! $496k
DG-582 SAN JOSE: Collections over $900k! 3000 sf w/8 ops. Top of the Line Buildings! $550k
DN-542 FREMONT Facility: Spacious & beautifully equipped State-of-the-Art! 3,400 sf w/5 ops + 4 add'l. $295k
DN-557 SALINAS: 3,000 sf w/7 ops and collecting over $2.225M. Priced at only $1.4M
DG-619 SAN JOSE: One of the most unique practices you will ever see! 1,450 sf w/5 ops. $1.1M

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NORTHERN CALIFORNIA

EC-525 SACRAMENTO: Great Location! Excellent Visibility! 1,500 sf w/ 3 ops, 10-15 new pts/mo $220k
EC-531 GREATER SACRAMENTO: Practice and Real Estate for Sale! 1,750sf w/ 4 ops + 1 add'l, 8npts/mo $80k
EN-646 ROCKLIN Facility: Don’t miss out on this remarkable opportunity! 2,150 sf w/ 4 ops. Now Only $100k
EG-556 SACRAMENTO: Near CSUS Campus. Long-term 2nd generation office. 935 sf w/ 4 ops $389k
EG-589 SACRAMENTO: Perfect Downtown Location near Capitol. 2,300 sf w/ 6 ops $475k
EN-534 ROSEVILLE Facility: Location, Location, Location! Turn-key..just needs you! 2,000 sf w/4 ops. $45k
EG-560 CARMICHAEL: Focusing on the philosophy of treating patients as family! 1,200 sf w/ 3 ops + 1 add’l! $130k
EN-573 SACRAMENTO: The goal and focus of this practice is to provide excellent service! 1,075 sf w/ 2 ops. $93.1k
EG-579 ROCKLIN Perio/Gen: Attractive, well-appointed practice in the prestigious Whitney Oaks area. 1,600 sf w/3 op + 1 add’l! NOW ONLY $235k
EN-588 SACRAMENTO: well-established practice awaits your talent and skill! 1,500 sf w/ 4 ops. Now Only $295k
EN-603 ELK GROVE: Absolutely one of California’s most desirable communities to both live and work. 1,300 sf w/ 3 ops. $318k
EN-609 SACRAMENTO: Truly a “cut above”, this remarkable, well-established opportunity grosses more than $1.7million annually! 3,700 sf w/ 10 ops. $1,17M
FC-415 FT. BRAGG: Excellent Practice! Dr. avg 18+ pts/day & 20+ npts/mo, 1,800 sf w/ 5 ops + 1 hyg. Op $425k
FC-489 CLEARLAKE: Located on “4-Corners” of Hwy 53, 4ops in shared 3600sf facility. $470k / 50% interest in RE Also Available
FN-527 TRINITY COUNTY: Be the only dentist in town! “Pride Institute” designed! 2350sf w/ 5 ops +1 add’l. $250k
GC-472 ORLAND: Live & Practice in charming small town community. 1,000 sf w/2ops. Seller Retiring. $160k
GG-386 REDDING: Amazing Practice. Lease or Buy Real Estate! 2,860 sf w/ 4 ops. Plumberd for 2 add’l ONLY $260k
GG-453 CHICO: 5,000 sf w/ 7 ops Perfect for 1 or more dentists! $325k
GG-554 PARADISE: -2,550 sf w/ 9 ops. 40 yrs goodwill! Amazing Opportunity! $525k
GG-574 SIERRA FOOTHILLS: Popular Professional Plaza. Spacious 3,000 sf w/ 7 ops $875k
GG-517 YUBA CITY: Rare Opportunity to purchase Dental Facility with REAL ESTATE! Only $350k
GN-244 OROVILLE: Must See! Gorgeous, Spacious, 2,500 sf w/5 ops! Collections over $450k in 2013. Only $315k
GN-399 REDDING: Loyal patient base and relaxed workweek schedule. 1,440 sf w/3 ops. $150k
GN-507 CHICO: It just doesn’t get any better than this! 3,500 sf w/ 7 ops. Practice $335k

NORTHERN CALIFORNIA CONTINUED

GN-546 CHICO AREA: Catering to fearful patients, this office is well-known for offering quality dentistry with sedation. 2,600sf w/ 4 ops. $350k
GN-606 BUTTE COUNTY: Hesitate and you will miss out on this one-of-a-kind opportunity! 1,700 sf w/ 4 ops. $295k
GN-605 CHICO Facility: Turn-key! Ideal to merge or move your existing patient base into! 1,600 sf w/3 ops. $50k
HC-461 SONORA: In the beautiful Sierra Foothills, 4ops, 1350sf, freestanding bldg. - Practice $700k & RE Also Available!
HN-213 ALTURAS: This well managed practice continues to have consistent revenues! 2,200 sf w/ 3 ops + 1 add’l. $115k
HN-280 NO EAST CA: Only Practice in Town 900 sf w/ 2 ops REDUCED! ONLY $60k

CENTRAL VALLEY

IC-468 SAN JOAQUIN VALLEY: High-End Restore Practice! 6 ops in 2500+ sf office. Call for Details! $425k
IC-572 MODESTO: In desirable Dental/Medical Professional building of town, 3ops in 1300sf office. $160k
IN-506 TULOROCK: Practice in the heart of the Central Valley! 2,000 sf w/ 5ops + 1 add’l. $425k
IN-577 W. STANISLAUS CO: Offering that “Main Street” feel and quality of life. 1,800 sf w/ 4ops + 1 add’l. $250k
IC-541 FRESNO Facility: 1,210 square feet and consists of 2 fully equipped ops and plumbed for add’l! op Call for Details!
IN-551 COALINGA AREA: Serving this community of working families! Paperless Practice. 1,200 sf w/ 3 ops. REDUCED! $395k!
IN-593 FRESNO: Change smiles in this quality family-oriented practice! 2,430 sf w/ 6ops. $375k

SPECIALTY PRACTICES

AC-601 SAN FRANCISCO Perio: High quality practice, 30npts/mo, 3ops in shared 1963sf office, Seller workback for smooth transition $800k
BC-544 ALAMEDA COUNTY Peds: 1,056sf w/ 4 chairs in growing, revitalized community, Seller Retiring $225k
BG-517 NORTH EAST BAY Endo: 2,750 sf w/ 8 ops! Strong Practice! $500k
BC-600 CONCORD PEDO & ORTHO Charts Only: Continue treatment to these Peds & Ortho patients Call for Details! $400k
CG-346 SOL MARIN CO Perio: Beautiful 1,142 sf w/ 3 ops. No reasonable offer will be refused! Reduced $150k
CG-424 NAPA Prosth: Office has Digital X-ray & NEW 3D Imaging Unit! Ready for Experienced, high-end Prosthodontist! On track to collect just under $1m $690k
DC-459 SF PENINSULA Perio: 50% Partnership Buy In! Call for Details! $600k
EG-579 ROCKLIN Perio/Gen: Attractive, well-appointed practice in the prestigious Whitney Oaks area. 1,600 sf w/3 op + 1 add’l. $325k
FN-536 LAKE COUNTY Peds: Focusing on Prevent dental problems before they begin! 1,750 sf w/ 3ops. Now Only: $225k

“Ask the Broker” can now be found at www.westernpracticesales.com
ILIFE V5s Robot Vacuum Cleaner
($189, ILIFE)

Robot vacuum cleaners have become increasingly popular with the Roomba among the most well-known. Roombas and other top-of-the line robot vacuums, however, can be expensive (anywhere from $300 to $900). New competitors have sprouted up offering cheaper price tags and more features. The ILIFE V5s Robot Vacuum Cleaner is less than $200 and it vacuums and mops. It can vacuum up anything from fur to dust and can be programmed to begin vacuuming at any time of the day. The setup is relatively easy. Simply plug the charging docking station into the wall, turn the device on and let it charge. Push the “Clean” button either on the top of the device or on the remote to get started. The remote control is handy and helps users manually direct the device if it needs some help finding its way. The V5s comes with a dustbin that is easy to clean out and a water tank for the mopping feature. The vacuuming is effective, as the device is able to sweep up a pile of coffee grounds with ease. It navigates around the house on its own and can go easily from hard wood to carpet and is thin enough to fit under couches. The bumper on the front detects obstructions and quickly redirects the device. It isn’t the sharpest tool in the shed, however. It doesn’t remember the layout of a home all that well and can get stuck often. Users will need to have their spaces clear of random chairs, kid or pet toys, etc., for it to function completely. And it doesn’t alert the user when it is stuck, which can lead to a battery drain. In other words, it requires a little babysitting. The mopping feature isn’t terribly effective, but it is better than nothing. Overall, the V5s gets the job done at a decent price and will take some of the pressure off those who must constantly vacuum.

— Blake Ellington, Tech Trends editor

Truebill (Free)

Every day, more users are shifting to the subscription model for many online services that feed daily productivity and recreation. With many of these accounts linked to credit cards and bank accounts, spending money is now easier than ever. Keeping tabs of how much is spent on these services is a daunting challenge. Without a means to track these recurring expenditures, there is high potential that some people do not even know they are paying for some services. Truebill seeks to make users aware of these charges and helps them save by canceling the things they no longer want or need. Once an account is created, Truebill requires linking to credit card and bank accounts in order to analyze statements and offer suggestions on how users can save money. The company assures users that bank-level security with read-only access to statements is used. The service never asks the user for a credit card number in order to charge them; it only requires the user to give login account information for their bank accounts in order to work as advertised. This could be a hard selling point because the user has to trust this company in order for the service to work. After users link their accounts, the service uses sophisticated algorithms to find and track bills and subscriptions. Depending on the specific financial institutions and number of accounts needed to link, it may take several hours or days for the service to obtain all statements. When the analysis is complete, users receive a dashboard of all their subscriptions, bills and other recurring payments in a simple, yet comprehensive display listing. Selecting a subscription from the dashboard reveals details on how much money was spent on it in previous months. Users can get detailed, step-by-step directions on how to cancel a subscription directly from the app. In addition, the service looks for ways to save money on other things like auto insurance, credit monitoring and cellphone service. The dashboard for every user varies based on his or her subscriptions and services. On average, users will be surprised at what Truebill can find in order to save money. There may be subscriptions that users don’t realize they have. Users may be paying too much for services and utilities they currently have. Users will find this app and service useful in analyzing their spending habits and taking action to reduce the amount of money wasted every month.

— Hubert Chan, DDS
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