

CHAPTER EIGHT

Fluoride

Many people are confused about preventing dental disease and do not realize that damage is most often the end result of a contagious, transmissible infection. The bacteria of this infection weaken teeth and cause gum disease. Harmful bacteria grow and flourish in an acidic or dry mouth and inflict damage to teeth as corrosive acidity weakens tooth enamel to a breaking point.

Preventing this disease is therefore a matter of limiting the bacteria of dental infection and protecting teeth from mouth acidity. Certain mouth cleaning strategies and xylitol are useful for this and will be described in chapters 13 and 14. Another useful prevention method is fortifying normal tooth strength. Constantly building the strength of your teeth helps them to resist acidic damage but it can also rebuild previously weakened teeth. To build the strength of teeth more quickly, xylitol and fluoride can be used together in harmony. This chapter will try to unravel the many viewpoints that surround the controversial topic of fluoride.

The History of Fluoride

Why do we put fluoride into our drinking water? The answer dates to a time when people did not fully understand how fluoride works, how cavities form, or the potential complication of finding that fluoride, or its compounds, reacts with the metals, chemicals, or pharmaceuticals present in modern-day drinking water.

The story of fluoride and dentistry is interesting and remarkable, particularly because it was the harmful effects of fluoride that sparked interest during the early 1900s.¹ Before that time, the only mention of fluoride in dentistry was in records from Europe of calcium fluoride powder being made into a paste to coat teeth in order to strengthen them.

In 1901, a newly graduated American dentist named Frederick McKay noticed that many of his patients' teeth were severely stained brown. McKay worked in Colorado Springs where, with the help of a well-known

dental expert, G.V. Black, he investigated samples of these stained teeth under a microscope. The two men noticed gaps in the enamel where it had not formed properly. With their stains and strange defects, these teeth became a topic of discussion among dentists from other parts of the United States and around the world. Many of the doctors had seen similar teeth, and they shared information about them in letters and at meetings.

In all cases, despite the poorly formed enamel with its pitting and staining, the teeth did not appear to develop cavities. In 1923 McKay suspected that the brown stains were caused by something in the water supply that children were drinking. McKay arranged for the water supply line to be changed from its original source, and within ten years, the stained teeth had stopped forming.

By the 1940s almost four hundred areas in twenty-six states had identified teeth with similar brown markings. The U.S. Public Health Service became involved, and an official named H. Trendly Dean was put in charge of the investigation. Dean recorded the severity of the tooth defects he investigated and graded the problems he saw as mild, moderate, or severe. He found a close association between the degree of the mottling and the amount of naturally occurring fluoride in the water. Dean showed that when the amount of fluoride was higher, the mottling on the teeth increased, and when it was less, the mottling was reduced. Because of this association, the enamel condition was called *fluorosis*.

Dean compared the number of cavities he found in teeth with the amount of fluoride in the water in twenty-one American cities and discovered that in areas with a concentration of one to two parts per million of fluoride in the water, cases of moderate and severe fluorosis were rare, but the number of cavities was reduced. Dean was aware that enamel fluorosis occurred in these areas, but he believed that the cosmetic issue was not a problem. Based on his observation, one to two parts per million was adopted as the optimal level for fluoride in our drinking water. During the 1952 Delaney Committee congressional hearings, scientists expressed concern that the dosage was too high, especially for children or people with diabetes or kidney disease, but the ADA endorsed the idea, and adjustments to our water supplies have been made ever since.

A strange connection exists between the Aluminum Company of America (present-day Alcoa) and the fluoridation of water. That aluminum-manufacturing company has always been closely involved in fluoride

studies, which is understandable when you know that fluoride is a major waste product of the aluminum industry. During the 1930s and 1940s, this fluoride by-product was used as a registered pesticide in the USA, but more potent chemicals were gradually replacing it in American agriculture. With lack of demand, disposal of fluoride was becoming a problem, at significant cost to the industry. At the same time, the American economy was struggling, and records show that aluminum company engineers were energetically looking for new markets and ways to improve sales. Many fingers have been pointed at the politics and people involved in the original fluoride decision-making process, the scathing critiques of the initial study designs, and the reporting of the results.

Pros and Cons of Using Fluoride

The fluoride debate begun in the 1930s has continued ever since, both inside and outside the dental profession. On one extreme there are citizen groups vehemently opposed to public water fluoridation who raise serious questions and valid concerns, but on the other side there are those who beat the drum for fluoride, often unaware of the dubious parts to the story and good alternative approaches that are available. Today many well-respected dentists, physicians, and researchers voice opposition to fluoridation and ask to study more closely the effect that this chemical is having on residential water supplies.² Although health concerns include almost everything, of particular concern are neurological problems, reduced intelligence, and certain forms of cancer.

Arguments against water fluoridation become stronger when products like xylitol are shown to easily and effectively control tooth decay. In Switzerland, salt is a medium for fluoride; consumers have the choice of fluoridated or non-fluoridated salt. Milk fluoridation is another idea, implemented in parts of Eastern Europe, China, and South America. Milk that is fluoridated could be used in school-based programs, particularly for high-risk populations. The cost of such programs would be smaller, and the method possibly more appropriate than water fluoridation.

In 1999, the U.S. Environmental Protection Agency (EPA) reviewed studies from Binghamton University in New York. The scientists had reported kidney and brain damage in rats exposed to half the amount of fluoride added to our water supplies. The National Toxicology Program

conducted further studies in conjunction with Procter & Gamble to determine the extent of neurotoxic damage, particularly stressing fluoride's interaction with aluminum.

Although the results were negative, many people continue to be skeptical, citing too close an association between Alcoa and Procter & Gamble. In fact, an entire book has been written describing the special interests of these companies, the historical sequence of events, and possible links between fluoride and the Manhattan Project of World War II.³

ALUMINUM AND FLUORIDE

There has been a great deal of conversation in the dental world about claims that fluoride has a strong affinity for aluminum. Since the 1990s, there have been concerns that aluminum and fluoride together could be responsible for the alarming increase in Alzheimer's disease and senile dementia.⁴ Officials in the ADA department responsible for water fluoridation assure me that the official word from the Alzheimer's association is that no connection between Alzheimer's and fluoride has ever been found.

In 1987 the Medical Research Endocrinology Department at Newcastle upon Tyne, England, performed experiments where fluoridated water (one part per million) was boiled in an aluminum pan. The studies showed that when fluoride was in the water, aluminum leached out of the pan. The boiling fluoridated tap water leached almost 200 parts per million of aluminum from the aluminum pan into the water in ten minutes, and up to 600 parts per million with prolonged boiling. Varying amounts of aluminum were released depending on the type of pan and depending on the variety of foods cooked in the pan. The more acidic the liquid, the more aluminum leached. Using non-fluoridated water showed almost no leaching from aluminum pans.

When water supplies are from surface water, the treatment facilities routinely add aluminum sulphate prior to the water fluoridation process to remove sediment. In 2000 the National Institute of Environmental Health Sciences acknowledged that fluoride can increase the uptake of aluminum in water, depending on the acidity of the water (that is, its pH). There are reports, most somewhat difficult to substantiate, that claim fluoride may interact with substances in water and create the potential for toxic fluoro-aluminum compounds to form. Officials dispute such claims.

If the combination of aluminum and fluoride worries you, another cause for concern should be the amount of aluminum contained in consumable products, from soy formula to dried infant formulas. Infant formula can contain up to sixty-three times more aluminum than breast milk, and there may be cause for concern about mixing this formula powder with fluoridated water. Baking soda, many processed foods, frozen dough, and even tea may contain varying amounts of aluminum. Nondairy creamer (94 parts per million), Oreo cookies (127 parts per million), antacid medications, and buffered aspirin also have high levels of aluminum. Drinks and foods may be stored in aluminum cans, and many soft drinks are made with fluoridated water. Perhaps someone should take an unopened soda that is a few years old and have a laboratory analyze the ingredients!

Today the majority of people are ingesting fluoride from so many different sources, they are receiving far in excess of the amount originally intended.⁵ These problems, combined with a new understanding of how fluoride works, have created confusion and again fueled the debate about whether or not fluoride is healthy for you and your family. I believe that water supplies, particularly in areas where aluminum sulphate is added, should be studied closely and staunch advocates should take a second look from an evidence-based perspective at the studies from which fluoridation decisions were made. Clear impartial evaluation is the only way to answer legitimate concerns that many have voiced about the quality of our drinking water in the United States.

After sixty years, it may be time to revisit the issue of water fluoridation. We must realize that fluoridation of water is not a miracle cure for teeth and that it may have possible drawbacks that were not foreseen at the start. The overriding problem of adding fluoride to municipal drinking water appears to be the potential of ingesting too much and the negative impact on our health of its interaction with such metals as aluminum and lead. Questionable studies, heavy-handed dismissal of dissenters, and a strange aura surround water fluoridation and certainly give cause for concern.

Fluoride Misconceptions

A number of people with “soft teeth” worry that their problems have been caused by a lack of fluoride in their drinking water. These people often complain that their water supplies have been neglected by those responsible

for public health. They mistakenly assume that fluoride benefits teeth as a vitamin might benefit overall health. On the other hand, some people fear fluoride so much that they refuse to even rinse with it. A number of people, unfortunately, will even go as far as to permit tooth damage—to the point of needing a filling, crown, or extraction—rather than put any kind of fluoride in their mouths.

I straddle the fluoride argument. I see benefits from a good fluoride mouth rinse and fluoride in toothpaste, but I am not an advocate for adding it to our drinking water. Water without fluoride will never be the cause of weak or soft teeth. As you have learned, mouth acidity creates tooth softening that leads to cavities and dental problems.

I have weighed any negative facts about fluoride with the positive outcomes it can produce. I have looked at the teeth of those who will not use fluoride in any form and compared them with those who follow my oral care recommendations. The differences in dental health are quite remarkable. Some people fear that fluoride may be absorbed through the skin during rinsing. There is no evidence to substantiate these worries, and I believe that any minuscule risk would be dwarfed by the numerous health benefits that strong and unfilled teeth offer us.

Suppose you have damaged your teeth in some way, for example by drinking soda. Under healthy mouth conditions, the rebuilding of tooth enamel will occur naturally, but if fluoride is involved in the process, these repairs occur more quickly, and the new enamel will be stronger. Fluoride plays its part by stimulating teeth to rebuild themselves after they have become damaged. Fluoride works as an instigator or catalyst to speed up the process of natural tooth remineralization that repairs weak teeth. Remember, it was the soda that caused the damage to the tooth, not a lack of fluoride.

Used correctly, fluoride can help both children and adults avoid fillings and keep their teeth healthy for life. For tooth health, it appears that fluoride does not need to be ingested, used as a consumable supplement, or applied as a high-concentration gel.

As a matter of fact, when fluoride is ingested, around 93 percent is absorbed and flows around your body in the bloodstream. The kidneys in a healthy individual excrete most of the fluoride, but any that remains in the body is permanently deposited into the skeleton. Thus, the efficiency of the kidneys is vital, because kidney function affects the amount of fluoride that

remains in your body. Kidney disease lowers the efficiency of fluoride elimination, and people with kidney problems should always use non-fluoridated water.

We used to think that fluoride was inactivated in milk, but that is not correct. The topical effect of fluoride on teeth remains the same whether it is in water or in milk. The difference is that when it is consumed in milk, or with calcium-rich foods, less fluoride will be absorbed into the bloodstream. This useful effect of combining calcium with fluoride lowers the amount of fluoride absorbed from 93 percent to about 60 percent, which explains why anyone who accidentally ingests too much fluoride is usually given milk to drink.

In my own dental practice in England, I noticed both benefits and problems with fluoride as I looked at the teeth of my family, friends, and patients. Later in my career I revisited the subject of fluoride during my graduate studies in the USA. It was interesting to examine in close detail the questions and concerns I had noted over the years. Since that time I have unearthed many surprising facts about fluoride that make up a complicated story about its use for dental health.

Today I use a professionally installed fluoride filter to purify the drinking water in my home. I teach my patients that the strengthening effect of fluoride on teeth is mainly topical, so there is no need to drink or consume fluoride to have nice teeth. In fact, ingesting too much fluoride may not only be damaging to your health but can be especially harmful to developing enamel.

Sources of Fluoride

Fluoride is carried into our homes from many sources besides drinking water. It can be found in manufactured foods, sodas, beer, infant formula, and powdered iced tea (go to www.cleanwhiteteeth.com for a list of fluoride content in foods). Your personal daily consumption of fluoride from tap water depends on how much liquid you consume each day (including soups, coffee or tea, other liquids, and cooked products). Obviously if you are athletic and live in a warm climate, you will drink far more water than someone sedentary who lives in a colder climate. A one-size-fits-all approach does not seem appropriate for gauging a safe fluoride dose from

drinking water, and it may be that some people are consuming too much fluoride from this source.

The EPA sets the standard for fluoride in community drinking water, and 62.2 percent of water supplies in the USA today are fluoridated. As a result, about 160 million people in the United States drink artificially fluoridated water. The ADA also passionately supports fluoridation. Fluoride cannot be removed from drinking water with a charcoal filter, and for many years the reverse-osmosis filter or steam distilling process was the only way to remove it. Now, however, there are various filter systems capable of removing fluoride from your home water supply. Many websites post information about fluoride-filtration systems, or you could consult a local water filtration expert in your area.⁶ One word of caution: Distilled water may be chemically pure, but because it is devoid of all minerals, it often can have an aggressive effect on dental enamel.

Yet another factor to consider with regard to fluoridation is the *halo effect*. This refers to the spreading of fluoride from one geographic area to another when beverages, foods, and other fluoride-containing products are produced in one area to be consumed elsewhere.

By means of the halo effect, most people in the United States receive fluoride by consuming products that have been manufactured in fluoridated areas. Studies during the 1940s showed only 15 percent of teeth with mild fluorosis; moderate or severe forms were rare. Forty years later, mild fluorosis was seen in almost 25 percent of teeth, and a small percentage of teeth showed moderate or severe forms of fluorosis.⁷ Today these figures are much higher, and fluorosis is seen everywhere, even in geographic areas with low-fluoride and non-fluoride water.

Sodium Fluoride

When people say fluoride has been added to their water, they really mean that a fluoride compound has been added. Mouth rinses and toothpastes contain various kinds of fluoride. For example, Crest Regular paste contains sodium fluoride, whereas the newer Crest Pro-Health contains *stannous fluoride*, a compound derived from tin. (Stannous fluoride was popular in the 1960s because it was shown to reduce gum inflammation. The problem with stannous fluoride, however, is that it creates unattractive black or brown staining on teeth.) The addition of minerals to fluoride rinses does

not increase its effectiveness for people with normal saliva, but the extra ingredients usually make it more expensive than other fluoride rinses.

I recommend only sodium fluoride, which has been studied for decades and is the most stable and safe. And it will not stain teeth, a problem that can occur with other kinds of fluoride, particularly stannous fluoride.

Unfortunately, sodium fluoride is the most expensive fluoride, so it is rarely used for fluoridation of our water supplies. More than 90 percent of the fluoridated water in the United States comes from a silicofluoride (either fluorosilicic acid or sodium silicofluoride). These chemicals differ from the simpler sodium fluoride in many ways and may react differently with other chemicals. Many people are concerned that silicofluorides increase the uptake of lead in the body, which could ironically generate higher rates of tooth decay and a host of other problems, including learning disabilities and attention deficit disorder. The ADA spokesperson denies that such reactions are possible, but perhaps more research would allay public worries and fears.

Fluoride Mouth Rinse

I am completely convinced about the positive effects seen in the teeth of those who regularly use a dilute sodium fluoride mouth rinse. A final rinse each night and a first rinse each morning appear to protect and beautify teeth for patients of all ages. Many people think fluoride will help only children's teeth, and they are shocked to find that its protective effects are just as useful for the teeth of people in their eighties as they are for those in their teens.

Perhaps, like me, you grind your teeth. Without extra-strong teeth, I would most certainly have damaged my teeth by now, possibly causing old fillings to loosen or pieces of enamel to chip away and break off. To give my teeth extra strength and resist tooth damage, I use a dilute fluoride rinse in my oral care routine every morning and every night.

Years ago we believed that the benefits of fluoride were built into teeth before they erupted into the mouth. Today we know that fluoride mainly benefits teeth when it is in direct contact with the outside tooth surface. The benefit ends as soon as fluoride is washed away. To strengthen a tooth, fluoride needs to bathe the outside for as long as possible. Fluoride rebuilds teeth by helping to move minerals from saliva into areas of weak or

damaged tooth enamel. The longer the contact time between fluoride and the tooth, the more minerals will go into the enamel to harden teeth.

Any tooth enamel that repairs in the presence of fluoride has a particle of fluoride included in its structure. This small change to the chemistry of the enamel makes the tooth surface become stronger, smoother, and more acid resistant than before. From a patient's point of view this makes the outside of a tooth extra strong and shiny and less able to be damaged by acidity in the future.

I advise patients to avoid high-concentration fluoride products and look for lower-dilution products, such as ACT, with 0.05 percent fluoride, which, ironically, can be more effective in strengthening your teeth than gels and pastes that contain ten times the concentration of fluoride. A recent evidence-based review of topical fluoride products showed that very strong gels and foams (the kind used in dental offices for treating children's teeth) may have little or no effect on strengthening the teeth of children who already have good teeth.⁸

My patients with the healthiest teeth usually rinse with ACT, which comes in mint, cinnamon, and bubble-gum flavors. A new ACT has been produced with "freshening" additives, but it contains ingredients that appear to alter its effectiveness. Large stores make their own formulation of the rinse as a generic product, but those rinses appear to be less effective than the original. Whatever kind of fluoride rinse you choose, I suggest you find one that does not include alcohol. Finding ACT in some parts of the United States and Europe has proven to be a problem, but Internet ordering can help.

Weak and strong fluorides work differently. This may be one reason why a dilute fluoride may work to strengthen your child's teeth more than a stronger one. A weak fluoride works as a catalyst, helping build minerals into teeth—as described earlier—whereas a strong fluoride gel works by inactivating bacterial enzymes, temporarily stopping the bacteria from producing the acids that damage teeth.

Interestingly, the volume or amount of fluoride that bathes your tooth is of no importance. A few drops of a fluoride mouth rinse will work just as well as a large mouthful. The manufacturers of mouth rinse would like you to use as much as possible, but the truth is, you can be economical with your rinse and still do a complete job. Try to keep fluoride in contact with your

tooth surfaces for as long as possible; the longer the duration of contact, the stronger your tooth enamel will become.

Adults (and children with adult teeth) will benefit from using a dilute 0.05 percent sodium fluoride rinse without alcohol the last thing before going to bed. If you rinse and spit out but do not wash your mouth or drink anything more, a thin residue will cover your teeth for many hours during the night. The residue helps minerals in saliva rebuild damaged tooth enamel to improve the condition of your teeth while you are sleeping. The treatment will be especially helpful for people with tooth damage caused by dry mouth, acid reflux, or trauma to teeth from a hard bite.

The more often you rinse with fluoride, the more help you give your teeth; there does not seem to be any amount of time that is too short to provide some benefit. Rinsing several times a day will speed and improve results if you are trying to strengthen your teeth or repair damage. Fluoride as a liquid rinse enters the small crevices and grooves in teeth, even under and around braces or bridgework, to strengthen places that are often the most inaccessible to a toothbrush and at greatest risk for cavities.

If a fluoride rinse is used regularly, it constantly rebuilds the strength of teeth and prevents weakness, sensitivity, and cavities from forming. Fluoride rinsing offers insurance against progressive damage to your teeth. If you dislike or fear dental treatments or are concerned about the health-related problems of filling materials, fluoride rinsing should be your lifelong friend!

Children's Teeth and Fluoride

Fluoride is especially important as teeth emerge into the mouth of a young child. Permanent teeth come into the mouth in a sequence, normally starting with four back-molar teeth. Adults with otherwise good teeth frequently have cavities in these first permanent molars, found about halfway along the jaw, both upper and lower, on the side of the mouth. First permanent molars erupt around kindergarten or first grade, behind the row of baby teeth and usually before any sign of a loose tooth.

First permanent molars have a high rate of decay, often forming cavities within a year of their eruption. It has been estimated that 70 to 93 percent of first permanent molars have tooth damage within two years of erupting, and most of the damage occurs within the first twelve months. Pediatric dentists

are accustomed to seeing children who, before their teeth have even had time to harden, need crowns, root-canal treatments, or even extraction.

Fluoride speeds up the absorption of minerals by enamel, and in this way it can shorten the time of hardening or maturation that occurs as a tooth erupts into the mouth. Fluoride rinsing can speed this maturation process and increase the odds that a child's new tooth will remain cavity free for life. Twelve-year molars and wisdom teeth are just as vulnerable when they erupt, entering a teenager's mouth with compromised protection. These molars are normally the last teeth to erupt, and they frequently cause problems because they are at the back of the mouth and difficult to clean.

New front teeth that erupt at around seven or eight years of age are also soft as they enter the mouth. Soft teeth usually look dark or yellowish in color. There is nothing wrong with these teeth, and with sufficient time they will harden and lighten in color. Any bleaching of these newly erupted teeth can seriously weaken an already weak tooth; therefore, it is not recommended. It is much safer to help new teeth harden and mature as quickly as possible by rinsing with a dilute fluoride rinse and eating xylitol. Both these products have been shown to assist and encourage mineralization of the outer shell of tooth enamel, which will make teeth stronger and appear whiter quickly, often within a year.

Maturation is dramatically slowed in the mouth of a child with a blocked nose, asthma, or allergies or for any child taking mouth-drying medications. The mineralizing process is less complete for children with acidic mouths from acid reflux, poor diets, or chronic illness. Cavities and worn-down teeth will cause such children discomfort, dental pain, and the need for fillings and crowns even before first grade. Mineralization, on the other hand, is more efficient in the alkaline mouth of a healthy child. In all circumstances, maturation is encouraged and enhanced with the use of a fluoride rinse and xylitol together in a program of preventive oral care.

Fluoride is not a vitamin. If babies consume a fraction too much fluoride before the age of three, it may poison the cells that form healthy tooth enamel. *Ameloblasts* are the enamel-forming cells found in the jaws of infants and babies, and they are the cells that produce the materials that develop into the outer enamel of our teeth. Ameloblasts are very sensitive and are easily poisoned by fluoride. If these cells die, the teeth still grow, but gaps occur where the enamel does not form properly. Such enamel

defects are seen on teeth as white or (in more severe cases) brown spots and is the condition known as fluorosis.

Human breast milk has a very low fluoride concentration, regardless of the mother's intake. Commercially prepared formula, on the other hand, can have very high fluoride levels. Manufacturers have been told to reduce the amount of fluoride in their formula milk and baby-food concentrates following a study in Iowa of dried infant milk.⁹ The study showed that the babies were consuming too much fluoride and in erratic amounts from formula products. The study showed that the fluoride in infant formula could cause fluorosis of varying degrees, especially in cases where the powdered formula was reconstituted with fluoridated tap water. (Note: If a meal is prepared with fluoridated water that has been boiled for some time, steam will evaporate away a percentage of the water and leave the remaining liquid with an increased concentration of fluoride in it.)

My five children were born between 1977 and 1990. I gave my first child fluoride drops in the recommended concentration because I lived in an area without fluoride in the water. At that time dentists believed that giving fluoride drops to infants would work internally to make their teeth grow more perfectly, with smoother surfaces and more resistance to decay. My first daughter was born in 1977, and it was not until her two permanent front teeth erupted when she was eight years old that I discovered they had been changed by this fluoride; there were brown defects in the center of each one. Her enamel-forming cells had been poisoned by the five fluoride drops I conscientiously added to her drinks each day when she was a baby. Such defects in teeth are given the name *moderate fluorosis*, and to correct their appearance would require cosmetic dental repair with crowns or veneers to mask the damage.

I gave less fluoride to my second daughter, who was born in 1980, because dosage recommendations had changed and because I was a busy mother. She now has small cloud-like spots over her permanent front and side teeth, a condition of mild fluorosis and the result of similar but slightly less poisoning of her enamel-producing cells. My other children have never received fluoride supplements, and we now filter fluoride out of our drinking water at home. On the other hand, since the age of about six (when they could rinse and spit), all my children have used a dilute fluoride rinse twice a day. My younger children's teeth are beautiful and without defects.

Some physicians and dentists still prescribe fluoride tablets to children, and the discussion continues between dentists and doctors, some believing that fluoride's protection occurs from the inside of the tooth while others, like myself, prefer to rely on the benefits that fluoride provides directly to the surface of teeth. Parents should know that the Academy of Pediatric Dentistry suggests that children under three, who are prone to eating toothpaste, should not use any fluoride-containing paste.

If you have cavities but do not want to go to a dentist, fluoride rinsing, especially combined with the use of xylitol, will help stop their progression. If you use fluoridated toothpaste, you can make a less-expensive mouth rinse from toothpaste mixed with water. I recommend original Crest toothpaste that contains sodium fluoride. Make sure it is a paste without plaque control or whitening additives, which have unnecessary chemicals in them and can be abrasive. Use the normal amount of toothpaste on your brush and clean your teeth in the usual way. Before spitting out, sip a small amount of water (about a tablespoon) and swish the water around your teeth, creating a dilute sodium fluoride rinse in the concentration that works to harden teeth.

Only children who can safely spit should use a fluoride rinse. If your child needs the healing help of fluoride for damaged teeth, I recommend brushing a young child's teeth with a drop of ACT on the toothbrush in place of toothpaste. We are not looking for children to drink fluoride, so experiment with your children using plain water to determine if they can achieve the rinsing and spitting maneuver safely before you give them a fluoride rinse. I encourage parents to slowly add drops of the fluoride rinse to the water as the child's ability improves, until finally the child will be using a full-strength and undiluted rinse.

Most of us need to spit twice (one spit followed immediately by another spit) to effectively remove the rinse from our mouths. Encourage young children to spit one more time, because extra spitting is fun for them and ensures that they do not hold extra rinse in their mouths and swallow it. Do not use any other rinse, and avoid drinking after your fluoride rinse, because you want to leave a microscopic film of it on your teeth to protect them during the night.

Dentist-Applied Fluoride Treatments

The amount of fluoride in a liquid, food, or product is measured in parts per million. Water supplies are fluoridated to a designated “optimal” level of between one and two parts per million. Fluoride gels and foams that dentists use in their offices usually have concentrations of fluoride between 9,000 and 12,300 parts per million, and most of them are so strongly acidic that the products could easily etch the surface of a porcelain sink. In May 2006 the ADA’s Council of Scientific Affairs published a report about the effectiveness of fluoride treatments, using an evidence-based method. The results were surprising to many dentists because they showed that, especially for decay-free children, fluoride gels and foams are not considered clinically relevant, because there is *no measurable benefit from applying them to healthy teeth*. Only when fluoride gels were used for a minimum of four minutes did they appear to help children with active disease (new cavities) or serious tooth decay and to help harden newly erupted molar teeth. One-minute applications of fluoride foam were a quick and convenient treatment in the 1990s, but they have been shown to be ineffective.¹⁰ Results show that stronger fluoride works to kill bacteria but is less effective in strengthening teeth, so new recommendations for strengthening teeth advocate frequent exposure to low-dose fluoride.

FLUORIDE VARNISH

The data from the ADA’s evidence-based review of the studies showed that the best results from dentist-applied fluoride treatment were repeatedly found with fluoride varnish for children of all ages who are at risk for cavities. This treatment has been used in preventive programs in Europe for more than thirty years. The varnish is a sticky mixture that dries onto teeth and slowly gives out low doses of fluoride over weeks and often months, finally wearing itself away. It is an exciting option, especially for special-needs and noncompliant children and those who are sick or at some special risk for cavities. Applying fluoride varnish is simple and painless for the child, takes less time for the dentist, and requires no tooth preparation. The best news is the overall protection this treatment offers to baby and permanent teeth. The evidence-based review showed that for patients at high risk, fluoride varnish applied twice a year gave “significant help to prevent cavities.”¹¹

When fluoride varnishes first appeared on the market, their worst feature was their unattractive yellow color, but today they are colorless. If any tooth has poorly formed enamel or a soft spot, fluoride varnish can offer preventive help. Fluoride varnish applied to newly erupted teeth, combined with consumption of xylitol, seems like an ideal treatment, since it helps prevent cavities and may speed up tooth maturation, so these new teeth gain their natural and unique protective covering more quickly.

Most dentists have trouble digesting the various arguments about fluoride, but it becomes more confusing to see the logo of the American Academy of Pediatric Dentistry on the Coca-Cola product called Spring Water and advertised as “Fluoride to Go.” The academy says that the logo does not imply endorsement of the bottled water, which contains added fluoride, but most mothers would assume the product is healthy and beneficial for children.

In a perfect world, where acidic liquids never touch teeth and we never age or have acidic, dry mouths, fluoride would be unnecessary. In real life many foods, drinks, medications, and conditions beyond our control are risk factors that put us in need of extra help. This is where the latest evidence shows fluoride to be a useful tool, especially when used as a low-dose rinse or a varnish to help reduce the need for fillings and dental treatments. At the very least, fluoridated water may provide the public with a free mouth rinse to swish around teeth after meals as protection against cavities. Whether you should drink this water or not is a subject for another book.