

## **A Journey Through Nutrition and Health of the Oral cavity**

**“Life is not merely being alive, but being well.” Marcus Valerius Martialis**

(Health Quotes, Sayings about Well-Being, Wellness, Illness)

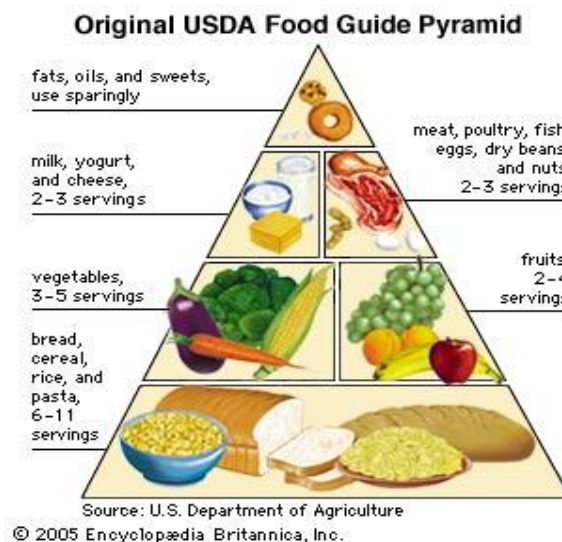
Life is a gift one should feel privileged to receive. It is up to each individual to live it to the fullest and continue to stay healthy. Initially, caregivers make dietary decisions and decide the quality and the nutritious value of each meal. With age, a preference for certain tastes and a sense of choice develops. Additionally, guidelines for acceptable consumptions of food are established. It is very common to hear phrases such as, “You are what you eat,” “Eat your vegetables if you want to grow,” or “Drink your milk or else you won’t be nice and strong.” in a household with children. It is a constant struggle for a guardian to provide healthy meal choices to a child throughout the day. These are choices that stay with the individual and help influence the meal choices the child makes in the future as an adult. Allowing a child to constantly snack on cakes and cookies will only lead to poor dietary selections later in life. No two individuals are the same; thus, different people have different dietary requirements. Still, the basic goal is to raise healthy children who can make smart food choices and pass along those nutritious values to future generations.

Often, it is difficult to determine what should and should not be eaten. Making those same decisions for others, especially children, is even more difficult. Luckily, nutrition experts provide helpful guidelines and tips. “A healthy diet helps children grow and learn. It also helps prevent obesity and weight-related diseases, such as diabetes.” (Child Nutrition). The following rules should be followed when planning meals for kids. “Offer water and milk instead of sugary fruit drinks and sodas, offer five servings of fruits and vegetables a day, choose healthy sources of protein, such as lean meat, nuts and eggs, serve whole-grain breads and cereals because they are high in fiber, broil, grill or steam foods instead of frying them, and limit fast food and junk food.” (Child Nutrition). Although these guidelines make it easier to make healthy decisions, in today’s fast-paced society, full of artificial flavors and quick “on-the-go” food options, it is very unclear what is acceptable to eat and to allow children to eat. Michael Pollan said, “Don’t eat anything your great-great grandmother wouldn’t recognize as food. There are a great many food-like items in the supermarket that older generations would not recognize as food; stay away from these.” (25 Great Quotes About Nutrition) This is a great rule of thumb to follow because several items such as cereal bars, and other canned, packaged, or synthetic foods are often replaced for real, nutritious meals made with fresh produce. Fresh fruits and vegetables are where real vitamins and minerals necessary for a healthy life come from. Many processed foods lose these nutrients while undergoing preservation and packaging processes.

It is very simple to overlook slicing a piece of fruit in the morning and just grab a granola bar to go instead. It is more convenient and so, a common choice. Such

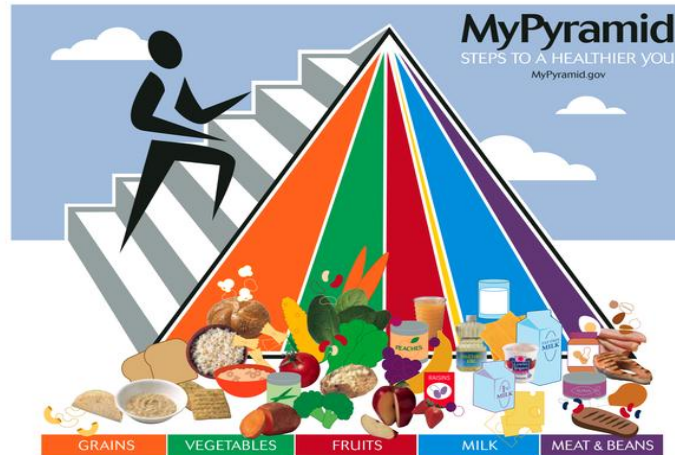
tendencies do not set a good example for children, who quickly adapt similar habits. Thus, "... it is not surprising that overweight children tend to have overweight parents and are themselves more likely to grow into overweight adults than normal weight children" (Dehghan 4). This is not to say that occasional treats cause obesity, but as poor choices in food and beverages become more and more frequent, health complications and obesity are quick to follow. As food becomes "more affordable to larger numbers of people as the price of food has decreased substantially relative to income and the concept of 'food' has changed from a means of nourishment to a marker of lifestyle and a source of pleasure." (Dehghan 3). This means that not only do we consume calories to fulfill the dietary requirements of our bodies; we unnecessarily exceed this limit to a great extent.

Generally, excess calorie consumption has negative effects, yet there are still some cases where certain food groups need to be consumed in greater servings. For example, "...There is a growing body of evidence suggesting that increasing dairy intake by about two servings per day could reduce the risk of overweight by up to 70%." (Dehghan 3). A spike in calories consumption is not the best way to live healthily. A good plan to follow for healthy living involves the implementation of the food plate, which was once referred to as the food pyramid. The former food pyramid (displayed below)



*(Behold -The Food Plate!)*

was a basis upon which a healthy lifestyle could be maintained. Then, new information surfaced. "Numerous studies have shown that sedentary behaviors like watching television and playing computer games are associated with increased prevalence of obesity " (Dehghan 4). Once it was clear that proper exercise is an important component in keeping an individual in good physical shape, a new pyramid was implemented to incorporate the importance of physical activity.



(Behold -The Food Plate!)

Now, this concept has been modified even further to the food plate (below).



(7305 US Food Plate Poster)

This variation of the food pyramid is simply an alternative way of looking at the different food groups. It displays healthy options within each group and gives beneficial eating tips to promote a well-balanced, nutritious diet. In order to balance calories, “the USDA advises simply, “Enjoy your food, but eat less” and “Avoid oversized portions.”. ” (Behold -The Food Plate!)

Making sure those we care for obtain adequate nourishment is a very important task, and should not be taken lightly. Following all rules and regulation set forth by the USDA and using good judgment when choosing snacks and components of a meal can go a long way. This helps shape future dietary requirements and improves health significantly. Mike Adams stated, "Today, more than 95% of all chronic disease is caused by food choice, toxic food ingredients, nutritional deficiencies and lack of physical exercise." (25 Great Quotes About Nutrition). "Examples of possible complications include, heart disease, diabetes, obesity, hypertension, stroke, osteoporosis, many cancers (colon, prostate, mouth, throat, esophagus, lung, stomach)...Unhealthy eating habits and physical inactivity are leading causes of disability and loss of independence...According to the USDA, healthier diets could prevent at least \$71 billion per year in medical costs, lost productivity, and lost lives." (Why good nutrition is important).

**"Tell me what you eat, and I will tell you who you are." -Brillat-Savarin**

What we eat affects who we are and the way we live our lives. One main effect of poor nutrition is subpar oral health. This is a very direct relationship. All food first passes through the oral cavity and effects the teeth, gums, and mucosa within the oral cavity. "Diet and nutrition affects oral health in many ways. Nutrition, for example, influences cranio-facial development, oral cancer and oral infectious diseases. Dental diseases related to diet include dental caries, developmental defects of enamel, dental erosion and periodontal disease." (Risks to oral health and intervention). Evidently, it is of the utmost importance to maintain proper oral hygiene to prevent the onset of other severe medical and dental conditions.

An individual with a very healthy diet is more conscious about his/her well-being than someone who tends to eat unhealthy foods and an unbalanced diet. Evidence of this fact can be easily found by checking health records. A person who maintains a healthy diet will have better overall health and will most probably be a more active and happier than an individual who tends to make poor food choices. "After looking at data from 4,641 women ages 40-65, researchers from the Center for Health Studies in Seattle found a strong link between depression and obesity, lower physical activity levels, and a higher calorie intake (How Food Affects Your Moods). However, a diet that is too low in calories is not the answer either. It is not safe to consume too few calories because sufficient vitamins, minerals, and nutrients cannot be obtained. Undernutrition can produce the same effect on mood and activity level as a diet that is too high in calories. "Fad dieting isn't the answer, because cutting too far back on calories and carbohydrates can lead to irritability." (How Food Affects Your Moods). These facts are not just empty claims. There is scientific evidence behind these theories. "...Serotonin production in the brain has been associated with a more calming, anxiety-reducing effect....The foods that increase the production of serotonin in the brain are high in carbohydrates. Many kinds of food carbohydrates such as candy, cereal, and pasta, can produce a temporary increase in brain serotonin – and a subsequent calming or anxiety-reducing effect." (Mood-Food Relationships - effects, nutrition, body, diet, absorption, carbohydrate, protein, fat, eating).

Watching weight and worrying about how weight and diet affects appearance is very common. There is also an increasing awareness of how various health issues such as diabetes and high blood pressure can be traced back to poor nutrition. Contrastingly, oral health is not a common concern as the mouth is a very over looked part of the body. Diet can either have a direct affect upon contact with the teeth or mucosal tissue, or it can be ingested and cause a systemic response. "Bacteria in the mouth convert sugars from the foods you eat to acids, and it's the acids that begin to attack the enamel on teeth, starting the decay process. The more often you eat and snack, the more frequently you are exposing your teeth to the cycle of decay." (Foods and Drinks Best for Your Teeth). This is why constant snacking or sipping on tea or coffee is not the best way to take care of teeth. It is equivalent to bathing the teeth in sugar for long periods of time. There are several foods that are better for health than others. "The best food choices for the health of your mouth include cheeses, chicken or other meats, nuts, and milk.... Other food choices include firm/crunchy fruits (for example, apples and pears) and vegetables." (Foods and Drinks Best for Your Teeth). These are foods that will help to remineralize the enamel and improve the integrity of the tooth structure. Additionally, the fruits have a high water content which dilutes the effects of the sugars within them. This helps to stimulate the flow of saliva. Although, fruits are not bad for your teeth, an excess of the fructose sugars they contain can be equally harmful to the tooth structure. "Poor food choices include candy -- such as lollipops, hard candies, and mints -- cookies, cakes, pies, breads, muffins, potato chips, pretzels, french fries, bananas, raisins, and other dried fruits. These foods contain large amounts of sugar and/or can stick to teeth, providing a fuel source for bacteria. In addition, cough drops should be used only when necessary as they, like sugary candy, contribute to tooth decay because they continuously coat the teeth with sugar. The best beverage choices include water, milk, and unsweetened tea." (Foods and Drinks Best for Your Teeth).

It is important to remember when caring for the health of the oral cavity as well as the entire body, that everything should be consumed in moderation. Even foods that claim to be very good for health can have negative effects if they are eaten in abundance. In one experiment, the pH and titratable acidities of popular drinks and lesion depths in enamel and root surfaces after beverage exposure were studied. These drinks included juices, regular sodas, diet sodas, and sports drinks. Enamel and root surfaces of healthy permanent molars and premolars were exposed to the drinks for 25 hours and erosion was then measured. The lesion depths were greatest after Gatorade. The depth of the erosion for Red Bull, and Coke were high as well, but they were less than that of apple juice and Diet Coke. This evidence supports the claim that water is the best beverage. Tooth erosion is a very serious matter that can lead to pain, decay, and every expensive restorative work.





**Brush, brush, brush your teeth  
Brush them everyday.  
We put toothpaste on our brush  
To help stop tooth decay.**

**Floss, floss, floss your teeth.  
Floss them every day!  
Using the string to clean between  
Keeps the plaque away!**

**Clean, clean, clean your teeth.  
Clean them every day!  
Your teeth will sparkle for years to come  
In the most beautiful way!**

**Brush, brush, brush your teeth.  
Brush them every day!  
Happy, healthy teeth you'll have  
If it's done this way.**

(CanTeach: Songs & Poems - Teeth & Dental Health)

It is very important to keep the oral cavity, including all teeth and gums very clean. The top reasons to maintain a healthy mouth include, prevention of oral cancer, gum disease, and bad breath as well as maintenance of good physical health and healthy teeth. Bacteria can build up very quickly inside the mouth. In fact, it begins to accumulate shortly after brushing and even shortly after a professional prophylaxis. This is why it is necessary to brush and floss twice a day. According to periodontist Dr. Neha Shah, it helps to decrease the amount of bacteria and germs in the mouth so as to protect the teeth and gums from decay. "After you eat, bacteria go crazy over the sugar on your teeth, like ants at a picnic. The bacteria break it down into acids that eat away tooth enamel, causing holes called cavities. Plaque also causes gingivitis, which is gum disease that can make your gums red, swollen, and sore." (Taking Care of Your Teeth). The afore mentioned complications involved with an unclean, bacteria infested mouth

are not pleasant. In order avoid these problems, it is important to maintain a proper oral hygiene routine. "Individuals who held stable favorable dental beliefs from adolescence through adulthood had fewer teeth missing due to caries, less periodontal disease, better oral hygiene, better self-rated oral health, and more restorations." (Braodbent).

There are several factors that encompass a good oral care routine including brushing teeth, flossing interdental spaces, and rinsing with mouth wash. This is the perfect trifecta for maintaining healthy teeth and gums. "Brushing your teeth with fluoride toothpaste is essential to good oral health. Not only does brushing your teeth help prevent tooth decay, it also helps prevent gum disease, which is one of the leading causes of tooth loss in adults and has been linked to heart attacks and strokes. Removing tooth stains and avoiding bad breath are added benefits of brushing your teeth. The foods that we eat contain sugars and starches. When plaque, the sticky substance that forms on the teeth, combines with these sugars and starches, an acid is produced that attacks tooth enamel, which causes tooth decay." (Brushing - The Importance of Brushing Your Teeth). Additionally, it is also important to floss regularly. Flossing helps to avoid periodontal disease. Brushing only cleans the front and backs of teeth. "The tooth is a three dimensional object which has a shape similar to that of a cube. If you clean the front, back, and top with a tooth brush, you also have to clean the right and left sides by flossing. The bottom of the tooth is where the root is and if not accessible, however it is important to maintain the integrity of the tooth structure on the exposed surfaces." (Shah, Neha)

**Your teeth are important - they help you to chew,  
They help you to smile and say, "How do you do?"  
Be sure to take care of them morning and night  
By brushing and flossing, you'll keep your teeth bright.**

(Dental Health Poems)

An additional, very important, way to protect your teeth is through the use of fluoride, another factor stemming from nutrition that affects the health of the teeth and gums. Fluoride is a substance that is very beneficial to the enamel layer. Fluoride is often used as an aid to counter hypomineralization and other destructive processes that can lead to decay and caries. It is a naturally occurring mineral that is found in many foods and in water as well. When plaque bacteria and sugars in the mouth attack the enamel, minerals are lost from the tooth surface in a process called demineralization. The importance of fluorides lies in its remineralizing abilities.

A very common way to remineralize teeth with fluoride is to use a mouth wash or toothpaste that contains fluoride in it. Most over the counter mouthwashes and pastes products contain fluoride, but it is a good idea to read the label and make sure before purchasing the product. A less known way to make sure enough fluoride is being ingested is simply eating certain foods. For example, non-organic poultry, sardines, canned salmon, cereal, produce sprayed with cryolite, foods sprayed with sulfuryl fluoride, and foods cooked with fluoridated water. Additionally, there are several beverages that contain fluoride as well. These include fluoridated water, tea, wine, soft

drinks, beer, and certain fruit juices. Although these listed foods and beverages contain traces of fluoride, it does not mean that they should be consumed regularly because many of the negative effects of these products outweigh the positive effects of the fluoride content. Fluoride helps to protect the teeth after eating and drinking so that the minerals in the enamel are not completely lost. Eating and drinking substances that already contain fluoride, helps to protect the teeth until the next time the teeth can be brushed or the mouth can be rinsed.

The enamel remineralization process begins when fluoride, calcium, and phosphate are deposited onto the enamel from food and water. The combination of fluoride, calcium, and phosphate together forms fluorapatite which is a strong compound and can resist acid erosion better than hydroxyapatite. Excessive demineralization paired with inefficient remineralization leads directly to tooth decay. The intake and manual application of fluoride helps to prevent tooth decay and caries and can reverse early signs of decay as well. Sufficient fluoride intake is most critical between 6 months and 16 years of age. In children of six years of age and under, fluoride is a vital factor in the development of the permanent dentition and plays a major role in the protection of the tooth. Not only does it make it difficult for acids to demineralize the teeth, it also helps speed up remineralization and disrupts acid production. After a tooth has erupted, systemic fluoride can no longer protect the tooth however, topical fluoride foams and gels can be applied for continued defense against demineralization and decay.

### **Let food be thy medicine, thy medicine shall be thy food.- Hippocrates**

The demineralization of tooth enamel is a very serious problem, especially in this country where large amounts of sugary foods and beverages and processed foods are dietary staples. Every morsel of food and every sip of a beverage is part of a constant ongoing process of tooth erosion and attrition. Unfortunately, this is inevitably leading to a gradual loss of mineral in the tooth and consequently, tooth structure. Luckily, fluoride will serve as a kind of medicine and help maintain the strength of the tooth enamel. They will help to put back some of the minerals that have been lost. The medicinal foods in this case are those naturally enriched with fluoride. Additionally, many cities around the country have fluoridated tap water which is a wonderful way to begin protecting teeth from a young age. Lastly, fluoride varnishes and gels may be applied in a dental office for extra protection and for areas with extra sensitivity.

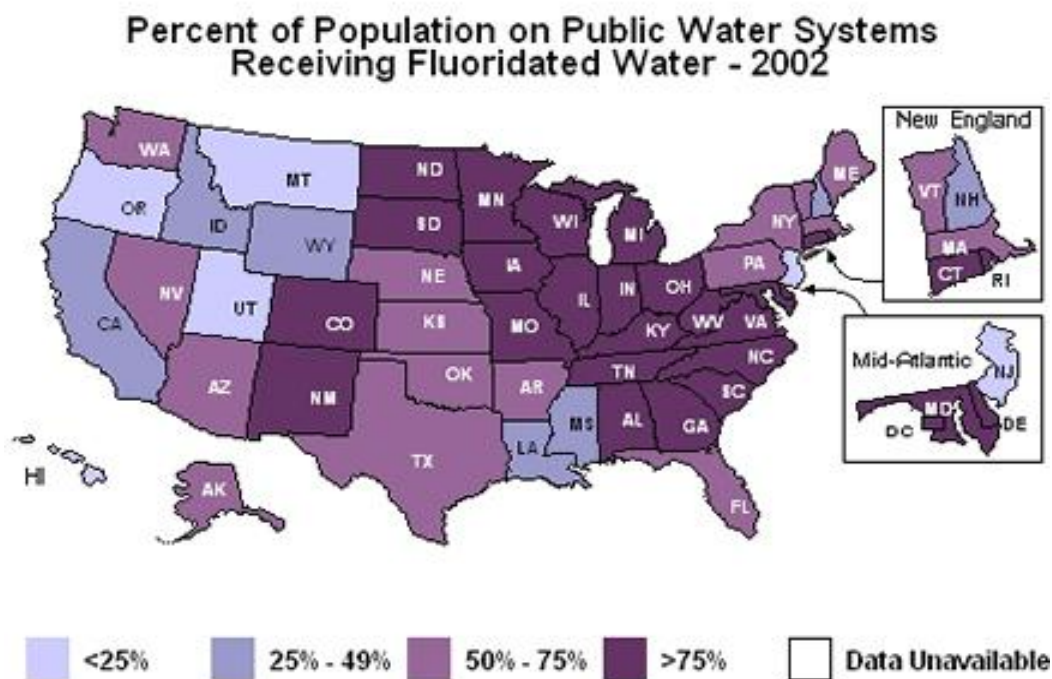
The benefits of fluoride for oral health were founded but a dentist who noticed that patients who drank water with fluoride in it on a regular basis had better oral health and less decay than those who did not. Eventually, in 1945, the practice of adding water to fluoride was established. Water fluoridation is a long-standing issue. There are many cases, both for and against this mechanism of fluoride ingestion.

There are a lot of beneficial effects of fluoride, but high doses are not necessarily advantageous. Many times fluoride tablets are prescribed for those who are at a high risk for dental caries. In such cases, the individual may overdose on fluoride. This is because the enamel is absorbing fluoride from toothpaste, mouthwash, tablets, and possibly various foods. Only controlled amounts of fluoride, about 20 mg per day, are



favorable within the oral cavity. Should intake exceed 20 mg per day, harmful health effects may occur. Higher doses of fluoride have been known to weaken bones and ligaments and cause muscle weakness, as well as nervous system problems. In children, high doses of fluoride can cause tooth discoloration. This defect in primary teeth is known as fluorosis and is generally characterized by brown molting of the teeth. This often appears as patchy, chalky white spots of the surface of the tooth. In very severe cases, the lesions can even turn black and the enamel can start to loose shape, as if it is melting.

Still, “The consensus among dental experts is that fluoridation is the single most important intervention to reduce dental caries, not least because water is an essential part of the diet for everyone in the community, regardless of their motivation to maintain oral hygiene or their willingness to attend or pay for dental treatment.” (Water Fluoridation). Even though it is generally accepted that fluoride is helpful, as with any controversial topic, there are those who do not believe that water should be fluoridated. Additionally, there is no agreement on the amount of fluoride that should be present in public drinking water. As a result, not all areas of the country have equal fluoride concentration in the public drinking water (shown in picture below).



Source: Water Fluoridation Reporting System 2002

(Lawsuits threatened over forced fluoride – informationliberation)

There are various arguments against fluoridation in water. One of the most interesting is the claim that it is unethical. “fluoridation is unethical because, it violates

the individual's right to informed consent to medication, the municipality cannot control the dose of the patient, the municipality cannot track each individual's response, it ignores the fact that some people are more vulnerable to fluoride's toxic effects than others, ... it violates the Nuremberg code for human experimentation." (Fluoride Action Network | The Absurdities of Water Fluoridation). An additional source has developed an elaborate list of 50 reasons why, fluoride should not be added to public drinking water (<http://www.fluoridealert.org/articles/50-reasons/>). After reading these reasons listed, even the biggest fluoride enthusiast may begin to question the validity behind water fluoridation. While it is meant for the greater good, it is possible that it can do a lot of unintentional harm as well. Just as a doctor would not blindly prescribe a drug or chemical to a patient, one cannot assume that the same uncontrolled dosage and fluoride concentration in water is suitable for all ages, genders, and races. After all, fluoride is a drug used for medicinal purposes. Moreover, it is now possible to obtain small amounts of fluoride doses from other sources.

**"Alice came to a fork in the road. 'Which road do I take?' she asked.**

**'Where do you want to go?' responded the Cheshire Cat.**

**'I don't know,' Alice answered.**

**'Then,' said the Cat, 'it doesn't matter.'**

**— Lewis Carroll, *Alice in Wonderland***

Luckily, hope is not lost for supporters of fluoride therapy. For those who need it, it is still possible to obtain the required dosage of fluoride from regular dental visits and fluoride supplements. Nevertheless, the dosage and concentration must be monitored to avoid health complications. Topical fluoride is a very important source of prevention of tooth decay. This is because topical fluoride reaches the teeth directly. This form of fluoride works to inhibit the metabolism of the types of bacteria that cause decay. Thus, topical fluoride helps to slow down the formation of carious lesions. It is most effective when delivered in multiple, frequent, low doses. For example, several times a day through food, water, and oral hygiene care products. Topical fluoride can be either self-applied or professionally applied. If it is professionally applied, it is done in a dentist's office. Self-applied varnish can be found in over the counter oral hygiene care products such as tooth pastes and mouth rinses..

Professionally applied fluoride treatments are administered in the form of gel, foam, rise, and varnish. Topical varnishes have proven to be the most effective and are the most recommended. This is because they are for more localized use as opposed to the whole mouth. The best analogy to explain this concept is as follows. It does not make sense to take medication to treat a foot when the problem is a hand. Similarly, it does not make sense to treat every single tooth when there is just one problem area. The varnish is applied and allowed to dry for about one minute and then the patient is dismissed. Over the next 24 hours, the layers of the tooth work to absorb the vitamin and minerals in the varnish and start to remineralize the tooth surface. A varnish must be reapplied at regular intervals in order to maintain its efficacy. The fluoride concentration of varnish is about 20 times greater than that of toothpaste that is why it is only available to dental professionals. As the fluoride is applied, it will work to strengthen the structure of the tooth. "Fluoride varnish is painted directly to the tooth

surface (on to enamel or cementum). Its purpose is to hold fluoride in closed contact with the tooth for a period of time. It hardens into a clear or yellowish film coating in the presence of saliva.” (Topical Fluoride Varnish Application.). The patient should not brush at night following the fluoride application, but normal brushing should resume that next morning. The fluoride will make the teeth more resistant to acid attacks. All currently used topical fluoride agents deposit soluble fluoride as calcium fluoride on enamel. Calcium fluoride serves as a source of fluoride for the formation of fluorapatite.

“Fluoride varnish painted on to enamel or cementum hardens to a clear or slightly yellowish film. It acts by a slow release of fluoride to the underlying tooth surface. Increased fluoride ion concentration that results after fluoride varnish, actually enhances mineral deposition, reduces the rate of demineralization and promotes remineralization. The greater fluoride concentrations attainable with varnishes produce deposits of calcium fluoride in the porous structure of the enamel. These reservoirs gradually release fluoride into dental plaque, saliva and tooth structure when the pH drops.” (Topical Fluoride Varnish Application.) Fluoride varnish is advantageous in the following ways. It adheres to the teeth quickly, and it is also slowly released to the tooth surface over time. This helps to provide on-going protection. Varnish is quick and easy to apply which is ideal for anxious, nervous, and special needs patients, as well as children. Varnish also tastes better than foams and gels. Additionally, it doesn’t not require any trays, dental equipment or trigger a gag relax.



Gel/foam fluoride, is another form of professionally applied fluoride. It is not advisable to use it on children younger than 12 years directed by the doctor. The product is used in the dentist’s office. “The gel is placed in two trays (one tray for the upper teeth, and one tray for the bottom teeth), which are then placed in the patient’s mouth. The patient is then asked to bite down on the trays for 4 minutes” (Fluoride Action Network | Fluoride Gels). There is also a gel form that can be self-applied. It is applied once a day or as directed by the dentist after brushing. The gel must be left on for one minute and then spit out. The patient must be instructed to refrain from eating or drinking for at least 30 minutes after application. Fluoride gels are highly concentrated products so they must be used with care. “Fluoride gels produce an enormous spike in blood fluoride levels for up to 14 hours, exposing every tissue in the body to fluoride concentrations that have been found to damage, in short-term exposures, the kidney, the male reproductive system, and glucose metabolism.” (Fluoride Action Network |

Fluoride Gels). Gels and foams are designed to treat multiple teeth, or the whole mouth at one time. Additionally, the patient may not eat or drink up to one hour after the application so that the work of the fluoride is not interrupted. Some adverse effects of these alternative methods include, staining on teeth, allergic reactions, and overdose symptoms. Fluoride can temporarily stain teeth because of the chemicals present in the gels and varnishes. Also, the gums may become itchy or swollen due to allergic reactions. Lastly, symptoms of overdosing on fluoride include stomach pains, nausea, burning of swelling of mouth, diarrhea, increased salivation, shaking, seizures, and muscle weakness.



A very convenient form of self-applied fluoride is toothpaste. Fluoride toothpastes can be used for those who are over 3 years of age and fluoride mouth rinses can be used by those who are over 6 years of age. Many types of toothpaste today contain fluoride. Toothpaste is a paste or gel used to clean the teeth. Toothpaste can promote good oral health and also helps with the removal of plaque. Toothpaste has various ingredients including flavoring agents, whitening agents, baking soda, abrasives, de-

sensitizing agents, anti-tartar agents, surfactants, antimicrobial agents, and fluoride. "Fluoride is the most popular active ingredient in toothpaste due to its proved ability to prevent cavities. Most toothpaste brands use *Sodium fluoride* (NaF); some brands use *Sodium Monofluorophosphate - SMFP* (Na<sub>2</sub>PO<sub>3</sub>F). The concentration of fluoride in a toothpaste for adults is 1000 to 1450 ppm max." (Oral hygiene : The Toothpaste - History - Ingredients – Types).



Fluoride rinse, is also very effective form of at home fluoride treatment. The patients should use "this rinse once daily (usually at bedtime) or as directed by your dentist/doctor. After brushing your teeth, place 2 teaspoonfuls (10 milliliters) of the solution into your mouth, swish vigorously for 1 minute, and spit it out. Do not swallow the medication unless instructed to do so by your dentist/doctor." (Medicine Net-Sodium Fluoride).



**Proverbial saying: "Too much of any/good thing, is a bad thing."**

This is an age old saying that is often found confusing. How can a good thing be a bad thing? After some thought, it is clear that too much of a good thing can be a bad thing. In a philosophical sense, without sorrow, there is no happiness. Thus, too much happiness is a bad thing because without periods of sorrow, true happiness cannot be

known. From a medical point of view, there are many vitamins, antibiotics, and pain relievers that are deemed to be good. They help the body maintain its health and fight off ailments. This is a good thing, but, an overdose of any one of these could be catastrophic and can lead to toxicity and it can even be fatal. Similarly, from a dental point of view, there are different effects that can result from an overdose of fluoride.

One interesting case of adverse effects from fluoride treatment was encountered in Patient A. Patient A is a 7 year old child who as an infant suffered from various infections for which amoxicillin was prescribed. It has been established that children who are prescribed amoxicillin show signs of hypomineralization in the developing structure of their tooth enamel, making the enamel weak. It has also been established that fluoride is an effective remineralizing agent that is an important part of a child's in office, and home care oral hygiene routine. Though, not obvious, there is a link between amoxicillin and fluoride treatments and the diagnosis of fluorosis. The daily use of amoxicillin weakens the enamel to such an extent that the surface becomes very permeable. The enamel layer begins to absorb fluoride in large quantities because the mineral is given during office visits every couple of months. Also, fluoride is present in food, water, toothpastes, and mouthwashes, all of which come in contact with the enamel on a daily basis. At first, fluoride helps to rebuild the enamel structure however, in time the tooth begins to develop brown stains and the tooth's appearance changes, making it look like it is melting, both of which are clinical signs of fluorosis. Enamel fluorosis is not a disease but it does affect the way the teeth appear. There can be white streaks or brown spots on the teeth, and the teeth can become porous as well. The discoloration results from more severe cases of fluorosis. This does not affect the functionality of the tooth, but it can lead to significant embarrassment and stress to the child affected with this unfortunate abnormality. Fluorosis is mainly a concern for deciduous teeth and is not as common in permanent dentition. This way, the primary teeth eventually exfoliate and new, healthy tooth can take its place.

Sadly, this is not the only problem that comes along with fluorosis. Since the teeth become very porous, they are also more prone to decay. The tough enamel exterior is compromised and cannot protect the remaining tooth layers from bacteria and from the erosive effects of food and drinks. As a result, the child may have to suffer through several restorative procedures in the primary dentition.



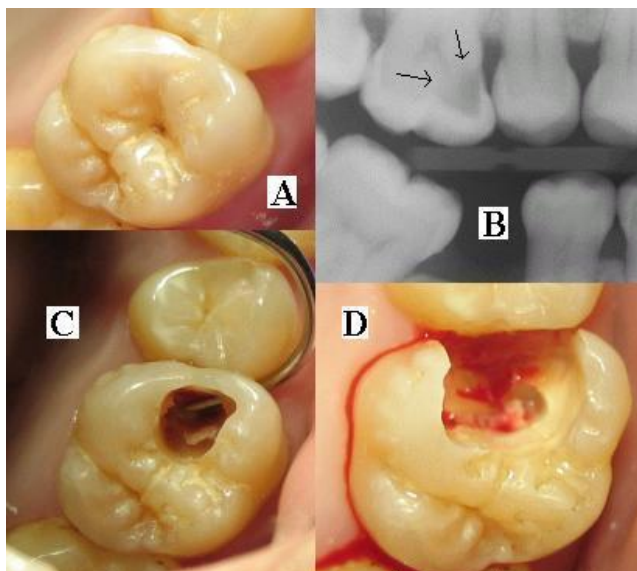


(Prevention)

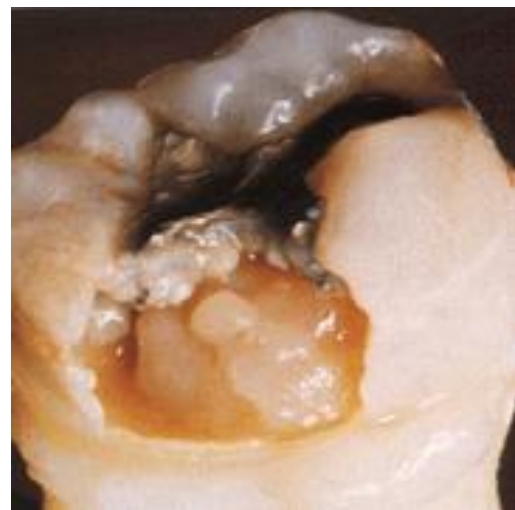


(Courts Rule in Favor of Fluoride)

There are also several consequences of not having enough fluoride. Fluoride is supposed to help replace the minerals in teeth that have been lost over time. If one does not get enough fluoride supplements to the dentition, then minerals continue to be lost on a daily basis and not enough are being replaced. The saliva serves the purpose of enamel replacement as well, but it does not have the ability to act as efficiently as fluoride. Because of this gradual loss, the teeth are more prone to decay. “Fluoride has played a major role in the marked reduction in caries incidence and prevalence. Under normal conditions there is a constant exchange of ions between the enamel surface and the surrounding saliva, resulting in a dynamic equilibrium. This equilibrium is disturbed when organic acids are produced by bacterial metabolism of fermentable carbohydrates. The acids lower the pH of plaque fluid on the enamel surface, penetrate the enamel subsurface, and then cause enamel crystals to dissolve and leave the enamel. This process is called demineralization.” (Benefits of Fluoride and Understanding Dental Caries). Below are several pictures of different forms of carious lesions.



(Caries, pulpitis, periodontitis)



(Dental caries)

The examples of carious lesions displayed above are the same types of lesions that developed in the oral cavity of Patient B. This is not solely because of a lack of fluoride. There are many other factors that play a role in the decay of teeth. Patient B came from India, a country where the water is not fluoridated and fluoride supplements such as toothpaste and mouth rinse are not used in the villages. Having spent most of his young life in his home country, he was not familiar with the practice of brushing with a tooth brush and toothpaste. Patient B has family in the United States who were kind enough to bring him into the dentist for the first time. Only then was he educated about the importance of oral health. After gradually implementing a proper daily oral hygiene routine his teeth began to obtain the necessary minerals from fluoride supplements. Unfortunately, by this point it was too late to save a good number of the teeth which had to either be restored or extracted and replaced with an implant.

It is not common to think about such things as fluoride and mineral absorption. It is not a frequent topic discussed with patients either. Regardless, something so small can still have a big effect on the teeth and the way they develop. Improper fluoride control in both Patients A and B resulted in terrible, expensive and painful consequences. The most interesting part here is that one patient suffered from excess fluoride and the other from a deficiency. Still, both patients developed problems in their dentition demonstrating through a cause and effect relationship that proper fluoride control is crucial in order for patients to maintain suitable oral health.

**“Despise no new accident in your body, but ask opinion of it.”**

**- Francis Bacon**

A major cause and effect relationship that is overlooked too often is that between medicine and body. All of the items that enter the body throughout the day go through the digestive system and cause different reactions in the body. This can include, and is not limited to hormone secretions, chemical secretions and nutrient absorptions. Medicines are the biggest culprit in inducing bodily functions or altering normal bodily functions. These modifications and alterations are either the intended effect of the drug, or a side effect of the drug.

As previously discussed, in today's fast paced world, fast food has become a staple in most diets. Unfortunately, with fast food, illness like hypertension and cardiovascular disease are not far behind. Many individual find themselves taking several medications for the various ailments that they have developed throughout life. All of these medications have side effects that may affect the patient in an unintended way. For example, Lipitor is a drug that is prescribed to help lower the risk of heart attack and stroke. Cardiovascular disease is very common and there are several individuals who take this drug. The active ingredient in Lipitor is, atorvastatin calcium which has been known to cause xerostomia, more commonly known as dry mouth. A little known fact about xerostomia is that it can lead to several other complications in the mouth. Saliva is an important part of the oral cavity. It is a natural antiseptic, facilitates mastication (chewing), and helps to maintain a homeostatic oral flora. “Saliva is the best natural defense against decay. The acid from bacteria can be neutralized by saliva. A reduced flow of saliva can increase your risk of decay.” (Frequently Asked Question).

Additional complications that arise from a decrease in saliva are increased bacterial and fungal growth and gingivitis. It can also lead to a dried out tongue, and cracked lips.



Patient C is an individual who is diagnosed with high blood pressure and has a prescription for an antihypertensive drug to help maintain a healthy blood pressure. Unfortunately, one of the side effects of the drug is xerostomia. Patient C was unaware that this dry mouth condition was caused by her high blood pressure medication. The patient tried to correct the problem by drinking copious amounts of water throughout the day but this was not effective. Additionally, the patient also noticed an increase in the number of cavities that she had to have restored since she began taking the medicine. After a medical history review at her general dentist's office, it was uncovered the cause of the xerostomia, was the medication. Not only did patient C learn that the reason for the increase in tooth decay, but a solution for the dry mouth was implemented as well. The saliva helps to neutralize the bacteria that cause tooth decay. In the case of patient C, the saliva is not present to serve one of its many purposes. This is why this patient would greatly benefit from fluoride supplements. The fluoride would be able to help counteract the damage caused by acidic conditions that develops from food, drinks, and bacteria.

Patient D is a young woman who believes that brushing only once a day and not flossing is enough to maintain proper oral health. The patient often develops layers of plaque and biofilm on several tooth surfaces which are not removed from 24 or more hours. Because of this poor oral health care routine, the patient has developed plaque induced gingivitis. The patient has very sensitive teeth and gums with several points of bleeding on probing. The patient does not show any intention of altering her oral hygiene home care habits. These factors classify Patient D as a patient who is at risk for developing tooth decay and caries as well as periodontitis. As such, fluoride supplements will also prove to be beneficial for Patient D.

Patients A, B, C and D will be greatly benefited from drinking fluoridated water, taking fluoride supplements and even from professionally applied fluoride varnishes and gels. This is because these patients are very prone to decay and developing carious lesions. The fluoride will help to prevent the decay that these patients have been put at risk for because of the other medical conditions they have developed.

**“Those who think they have no time for healthy eating, will sooner or later have to find time for illness.”**

**~ Edward Stanley**

The medical conditions and choices the patients made lead to unfortunate effects in the oral cavity. Fluoride therapy is suggested for these patients as a form of disease prevention and as a treatment for existing conditions.

**Research has shown that problems with oral health can warn of trouble elsewhere in the body. Dental health is directly linked to overall physical health. It can help detect early signs of conditions from diabetes and pregnancy complications to heart disease and cancer.**

**- Kevin Seitz**

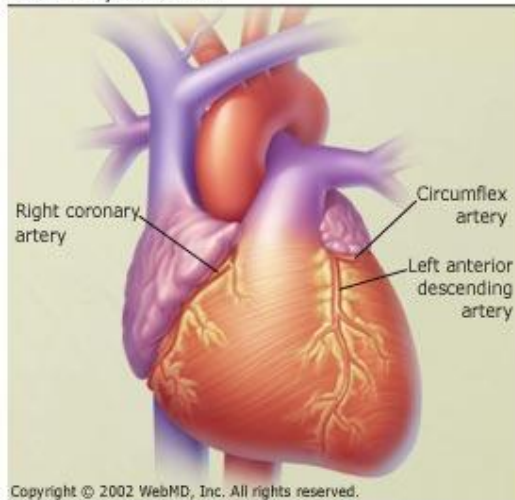
**We're in a situation now where weight and extreme weight and heart disease is the biggest killer in this country today.**

**- James Oliver**

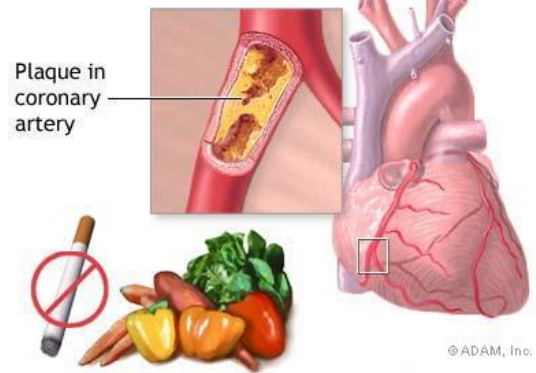
Cardiovascular disease (CVD) is the number one killer in the U.S. The most common cause of heart disease is the narrowing or blocking of the coronary arteries, which are the blood vessels that supply blood to the heart. This is not the only cause of CVD, however. Other kinds of heart problems include valve malfunction, heart may stop pumping well, and some people are even born with heart disease. Many of these diseases are related to a process called atherosclerosis. This is a condition in which plaque builds up in the walls of the arteries and makes it more difficult for blood to flow through. Consequently, this increases the individual's blood pressure. Atherosclerosis can also stop blood flow which can lead to a heart attack or stroke. Just as there are many other heart problems, these other problems lead to other diseases. This includes heart failure, arrhythmia, and heart valve problems.



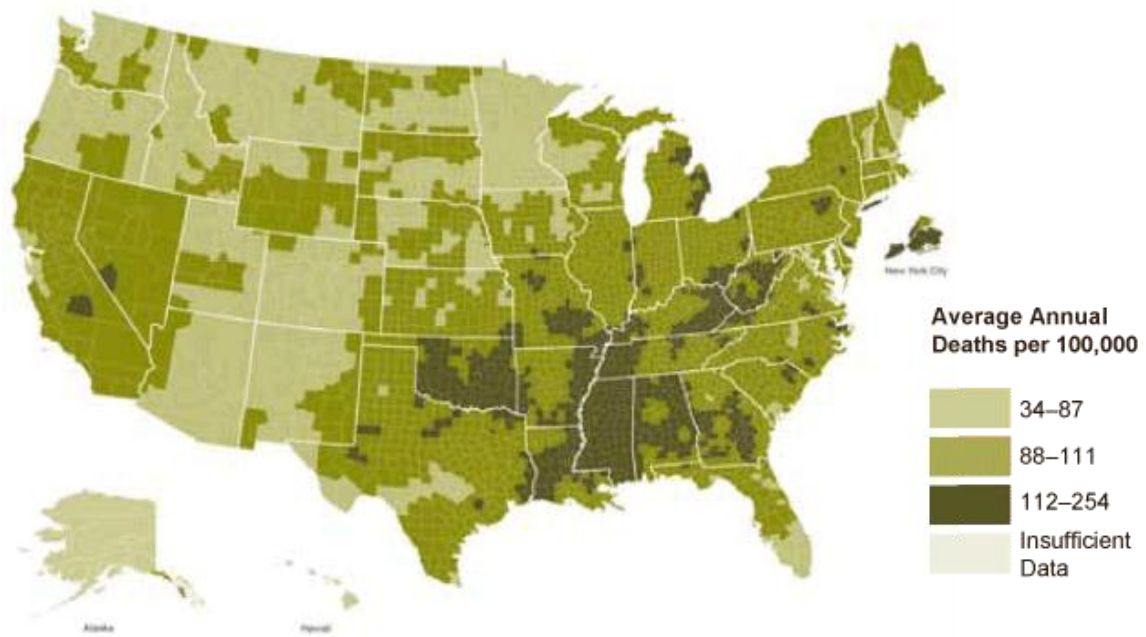
## Coronary Arteries



Quitting smoking, a healthy diet and exercise may reduce your risk of heart disease



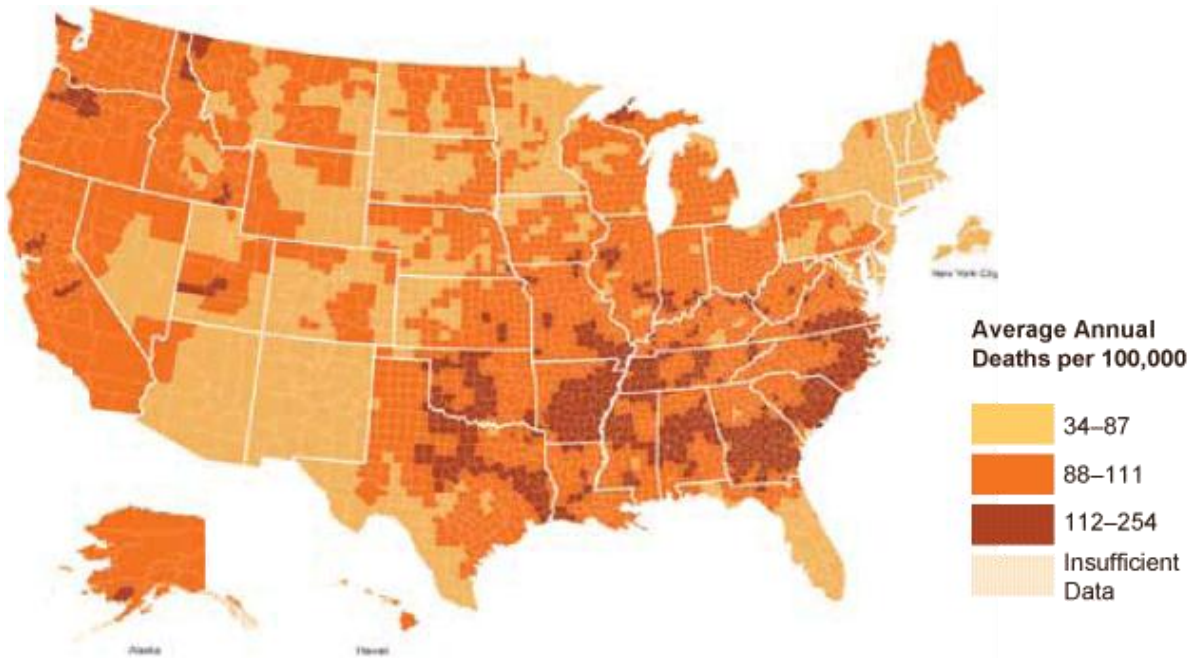
## Heart Disease Death Rates



2002-2007, Adults Ages 35+, by County

CDC Vital Signs - U.S. States Info: High Blood Pressure and Cholesterol

## Stroke Death Rates



2002-2007, Adults Ages 35+, by County

### CDC Vital Signs - U.S. States Info: High Blood Pressure and Cholesterol

There are several reason one may develop heart disease. Risk factors for CVD include:

Age – the risk for CVD increases with age

Gender – Men are at a greater risk for CVD than women

Genetic factors and family history – heart disease tends to run in the family and certain genetics factors increase the risk for CVD

Race and ethnicity – The African American population is at the highest risk for developing CVD

Lifestyle factors – smoking, alcohol, poor diet and physical inactivity are increase the risk for CVD.

Although there are certain factors that predispose an individual for developing a form of CVD, there are prevention methods as well. There are ways in which life style modification can help to decrease the risk for CVD. These life style changes include, eating a healthy diet, maintaining a healthy weight, exercising regularly, refraining from smoking, and lastly, limiting alcohol use. As important as it is make life changes to protect from CVD, it is equally important to be able maintain these changes after a



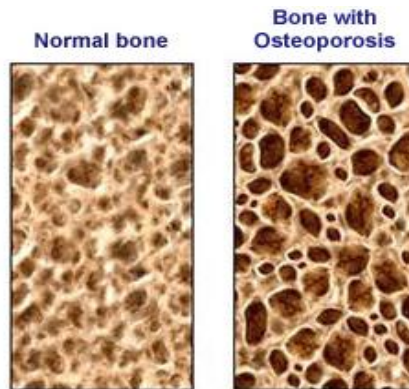
cardiac episode. This way, further damage to the cardiovascular system and other related systems is prevented.

A newly found contributing factor to an increase in risk for CVD is fluoride intake. “Groundbreaking new research has linked sodium fluoride to cardiovascular disease, the leading cause of death worldwide. Researchers found that fluoride consumption directly stimulates the hardening of your arteries, a condition known as atherosclerosis that is *highly correlated* with the #1 killer. Sodium fluoride is currently added to the water supply of many cities worldwide, despite extreme opposition from health professionals and previous studies linking it to decreased IQ and infertility.” (Renter, Elizabeth). In this study, scientists examined the relationship between fluoride intake and the calcification of arteries. After studying more than 60 patients, a significant positive correlation was found. This study highlights the fact that mass fluoride exposure may be to blame for the cardiovascular disease epidemic. This does not mean however, that small doses of fluoride will lead to heart disease. This is only an indication for large doses of systemic or whole blood fluoride.

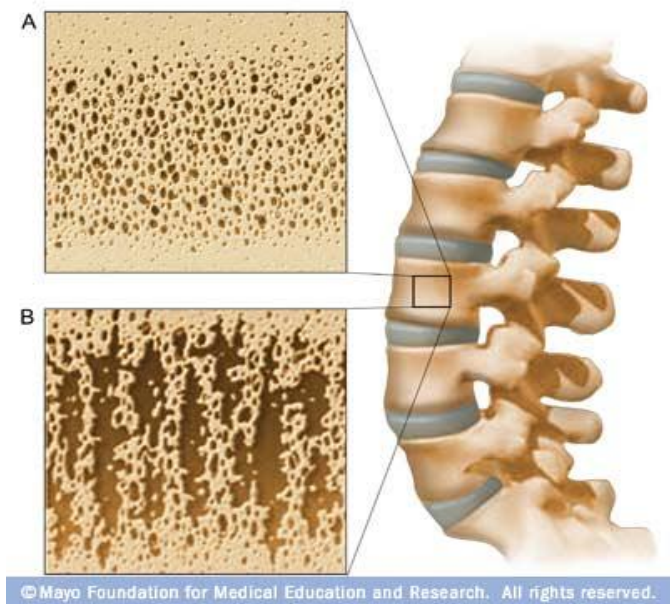
### **“The first wealth is health.” ~ Emerson**

There are many ways to maintain health throughout the body. Maintaining proper health is a wonderful way to ensure happiness as well. Without health, it is very difficult to stay happy because illness robs one of the fundamental joys of life. It becomes more difficult to enjoy family time and company of loved ones. It also becomes more difficult to continue hobbies and activities. This can cause even more depression for a patient than the illness alone because other favorable aspects of life are being taken away. This is why health is a form of wealth. If you have health, then you have a great advantage because you have the ability to do many things in life that those who do not have good health cannot.

Maintaining strong teeth and bones plays a big role in health. Teeth and bones have the same basic structure. Just as it is necessary to keep teeth healthy, the bones in the body need to be considered as well. Without properly functioning bones in the body, it is not possible to perform most daily activities that are often taken for granted. Even the smallest movements will not be possible to do. One bone disorder which has a severely negative effect on bones is osteoporosis. Osteoporosis is a silent disease that makes bones weak and brittle. This means that they are more likely to break. Osteoporosis is a condition in which there is a decrease in the density of bone, which decreases its strength and results in fragile bones. Osteoporosis leads to porous bones that are compressible, like a sponge. This disorder weakens the bone and results in frequent fractures. Anyone can develop osteoporosis, but it is a disease that is more common in women. It is so common that half of all women and a quarter of all men who are older than 50 years of age will break a bone as a result of osteoporosis. There are many risk factors for osteoporosis. These include, getting older, being small and thin, genetic predisposition, certain medications, ethnicity, and having low bone density. In order to keep bones strong, it is necessary to eat a diet that is rich in calcium and vitamin D. It is also important to avoid smoking and to exercise on a regular basis.



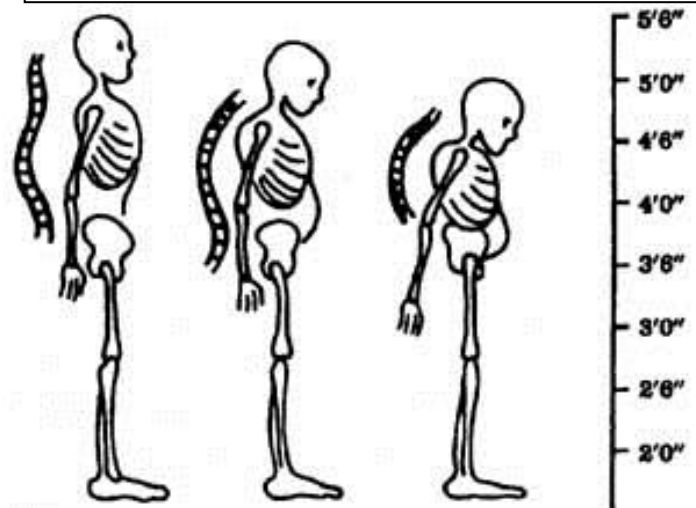
(Osteoporosis...What's the best way to reduce the risk and prevent bone loss - there is no finish line enjoy the ride)



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Kendall, P.

(Osteoporosis and High Blood Pressure | Earnest Holistic Health)



An interesting, little known fact is that fluoride supplements are beneficial for individuals who are at high risk for osteoporosis. "In general, decreased BMD (bone mass density) is associated with increased risk of fracture. However, the usual relationship between BMD and fracture risk does not always hold true when very high doses of fluoride are used to treat osteoporosis. Most available therapies for osteoporosis (e.g., estrogen, calcitonin, and bisphosphonates) decrease bone loss (resorption, resulting in very small increases in BMD." (Linus Pauling Institute at Oregon State University). Doses of fluoride can help to increase the bone mass density of the lumbar spine. This has not been consistently demonstrated, but it is definitely a factor in helping to prevent osteoporosis. "Some controlled studies using lower doses, intermittent dosage schedules, or slow release formulations (enteric coated sodium fluoride) have demonstrated a decreased incidence of vertebral fracture along with increased bone density of the lumbar spine." (Linus Pauling Institute at Oregon State University). This is why those who have a family history of osteoporosis and those who are at risk, should consult a doctor about taking fluoride supplements. It can help to prevent very serious injuries. There is no guarantee, but it cannot hurt. "Despite fluoride therapy increasing bone density, it probably cannot restore connectivity in patients with severe bone loss. Thus, fluoride therapy may be less effective in osteoporotic individuals who have already lost substantial trabecular connectivity." (Linus Pauling Institute at Oregon State University).

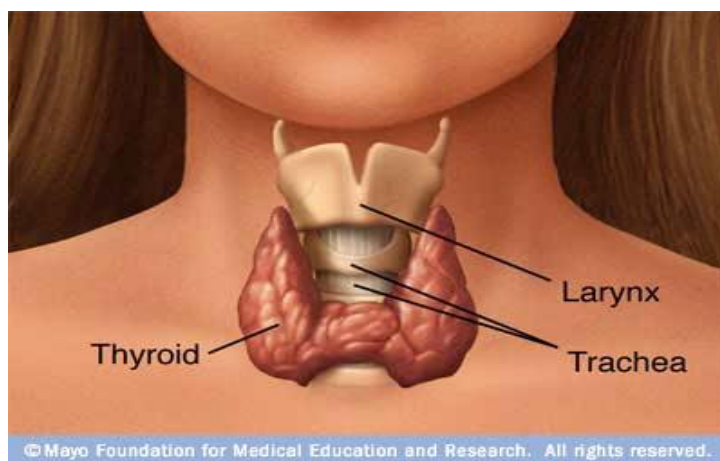
Patient E is a woman who has a family history of osteoporosis. She is a small framed woman whose bones continue to become more and more brittle. She presented to the clinic complaining of pain and sensitivity in her teeth. Patient E has a history of carious lesions. Because of her oral health issues, Patient E has been given several fluoride treatments and has been instructed to use a fluoridated mouth rinse. Upon closer evaluation, Patient E indicates that she has been taking fluoride supplements as well because she thinks that it will help even more with her teeth and her pending diagnosis of osteoporosis. Luckily, Patient E already has developed permanent dentition and cannot be affected by fluorosis. Upon reevaluation during a recall visit, the patient confirmed that she was diagnosed with osteoporosis. The fluoride supplements proved ineffective for this patient.

**“The endless cycle of idea and action,  
Endless invention, endless experiment,  
Brings knowledge of motion, but not of stillness;  
Knowledge of speech, but not of silence;  
Knowledge of words, and ignorance of the Word.  
All our knowledge brings us nearer to our ignorance,  
All our ignorance brings us nearer to death,  
But nearness to death no nearer to God.  
Where is the Life we have lost in living?  
Where is the wisdom we have lost in knowledge?  
Where is the knowledge we have lost in information?  
The cycles of Heaven in twenty centuries  
Bring us farther from God and nearer to the Dust.”**

**- T.S. Elliot**

The medical field seems to be a never ending cycle. Even though certain things seem to work to help one area of the body, it is possible that they will harm other areas. This is because all the systems in the body are connected but require different things to keep them running smoothly.

A thyroid gland is a gland that makes and stores hormones that help regulate several other important bodily functions such as the heart rate, blood pressure, body temperature, and the rate at which food is converted into energy. Thyroid hormones are essential for every cell in the body to function. They help with growth and development and regulate the rate of chemical reactions as well. Since all metabolically active cells require thyroid hormones for proper functioning, thyroid malfunction can have a wide range of effects on every system. A thyroid gland malfunction encompasses both hyperthyroidism and hypothyroidism.



Mayo Clinic medical information and tools for healthy living - [MayoClinic.com](https://www.mayoclinic.com)

There was a time when fluoride was prescribed as a drug to reduce the activity of the thyroid gland in patients with hyperthyroidism. Doctors selected fluoride as a

suppressant because it is linked to goiter (enlarged thyroid) development. This is exactly what fluoride treatment did. It was successful in reducing thyroid hyperactivity. Unfortunately, this led to the development of a new issue. “concerns have arisen about whether current fluoride exposures could be contributing to the increased prevalence of under-active thyroid (clinical and/or subclinical hypothyroidism) in the United States and other nations. Supporting this possibility are a number of studies from China, India, and Russia that have found alterations in thyroid hormones, including reduced T3 and increased TSH, in populations exposed to elevated levels of fluoride in the workplace or in the water.” (Fluoride Action Network | Thyroid). Hypothyroidism is when the thyroid gland does not make enough of the T3 and T4 hormones. “These hormones are required by all metabolically active cells, and their reduced presence can thus produce a range of ill effects, including fatigue, muscle/joint pain, depression, weight gain, menstrual disturbances, impaired fertility, impaired memory, and inability to concentrate. When T3 and T4 levels begin to fall, the pituitary gland responds by increasing production of “Thyroid Stimulating Hormone” (TSH) as a means of getting the thyroid to produce more T3 and T4.” (Fluoride Action Network | Thyroid). The studies that research the impact of fluoride on the thyroid hormone levels are consistent in showing that fluoride does suppress the activity of the gland. The most common effect of the thyroid that relates to fluoride treatment is an increase in TSH levels. This proves that fluoride can contribute to a hypothyroid condition.

Another way in which fluoride has proven to be harmful for the thyroid hormones is as follows. “In China, researchers have repeatedly found that an iodine deficiency coupled with fluoride exposure produces a significantly more damaging effect on neurological development than iodine deficiency alone.” (Fluoride Action Network | Thyroid). Fluoride impact has been shown to worsen the impact of iodine deficiency. The reason this is an issue for the thyroid is that iodine is the basic unit of T3 and T4 hormones. Thus, adequate iodine intake is necessary for the thyroid gland to function properly. “Iodine deficiency has re-emerged as a public health concern in the United States. Fluoride’s ability to worsen the effects of an iodine deficiency could thus be highly relevant to populations in the U.S. The National Research Council has therefore called upon the scientific community to begin investigating the interactive effects of fluoride and iodine in U.S. populations. So far, no such research has been conducted.” (Fluoride Action Network | Thyroid).

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