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REPORT

Disease Prevention Begins in the Mouth

By Dale Kiefer

Oral hygiene plays a critical role in whole-body health that is sadly overlooked by most doctors.

As a front-line shield against systemic inflammation, one's oral status profoundly impacts diseases ranging from type 2 diabetes and cancer to rheumatoid arthritis and atherosclerosis.¹⁻⁸

Recent scientific studies show that many of the nutrients we now swallow also confer benefits when topically applied in the mouth.⁹⁻¹⁷

Acting as powerful allies in the fight against periodontal disease, these natural compounds can help safeguard against lethal age-related diseases that emanate from our mouths.



THE GUMS: AN IDEAL INCUBATOR FOR DISEASE

The oral cavity is a near-perfect breeding ground for microorganisms that lead to decay of gums, teeth, and bone.

Cavities and gum problems that occur in early life are just the beginning. Chronic low-grade inflammation affecting the gums (gingivitis) and inflammation affecting the gums and bones supporting the teeth (periodontitis) has been implicated in the promotion of a variety of insidious systemic disorders, such as coronary heart disease,¹⁸ arthritis,⁶ and even cancer.^{8,19}

Oral inflammation has also been clearly linked to elevated markers of inflammation, such as C-reactive protein.^{20,21} In response to these warning signs, scientists noted recently, "Evidence for a link between periodontal disease and several systemic diseases is growing rapidly."²²



GUM DISEASE AND STROKE

Gum disease sets the stage for an increased risk of stroke. A recent review of literature on periodontal disease, published in the *Journal of the American Dental Association*, concludes that periodontitis among older individuals is associated with an increased risk of developing systemic diseases such as diabetes mellitus, heart attack, and stroke.²³ Meanwhile, studies show that efforts to reduce the severity of periodontitis help reduce systemic inflammation,²⁴ and may thereby reduce the risk of cardiovascular events linked with inflammation.²⁵

WHAT YOU NEED TO KNOW: DISEASE PREVENTION BEGINS IN THE MOUTH

- Optimizing oral health represents a crucial disease-prevention strategy.
- Poor oral health, particularly periodontitis, can contribute to a wide range of serious diseases ranging from rheumatoid arthritis to stroke and even cancer.
- Bacteria thriving in the oral cavity contribute to inflammation, which can have detrimental effects throughout the body and may particularly increase the risk of atherosclerosis. Oral bacteria have even been found living inside atherosclerotic plaques.
- Natural agents such as green tea, aloe vera, lactoferrin, xylitol, folic acid, and hydrogen peroxide can help optimize oral health by targeting plaque-causing bacteria and supporting gum health.

- Coenzyme Q10 (CoQ10) shows particular promise in offsetting the inflammation that accompanies gum disease. CoQ10 offers benefits both when applied topically to the gums and when consumed as a dietary supplement. The benefits of supplemental CoQ10 begin at a daily dose of 50 mg.
- Pomegranate helps preserve periodontal health by preventing the adherence of plaque-inducing bacteria to the teeth, by directly killing oral microorganisms, and by quieting inflammation in the gums.
- Vitamins C and D may also promote healthy teeth and gums.
- A two-pronged approach that includes brushing the teeth and rinsing the mouth with natural bioactive ingredients provides the foundation of oral health—a cornerstone of whole-body wellness.

GUM DISEASE AND OBESITY

Some researchers are now suggesting that perio-dontitis may contribute to obesity by elevating C-reactive protein, which then acts as a potent inducer of inflammatory cytokines and hormones secreted by adipose tissue.²⁶⁻²⁹

Scientists have found that elevated C-reactive protein causes fat cells (adipocytes) to store more fat and burn less energy. Indeed, evidence is accumulating that there is a link between obesity, type 2 diabetes, and periodontitis. As one research team noted recently, “Obesity is a significant predictor of periodontal disease and insulin resistance appears to mediate this relationship.”²⁸ A University of Mississippi study found, “.significant correlations between body composition and periodontal disease,” and noted this finding “strengthened arguments that periodontal disease and certain obesity-related systemic illnesses are related... ²⁸

PERIODONTAL DISEASE LINKED WITH CANCER

The link between oral health and cancer remains somewhat controversial, largely because this information is so new. But a recently published study by researchers at the Imperial College of London and Harvard School of Public Health has shed new light on the matter. By carefully eliminating potential confounding factors, such as a patient’s history of cigarette smoking, these scientists sought to identify any statistically significant associations between oral health and the incidence of cancer. Their conclusion is chilling. “Periodontal disease was associated with a small, but significant, increase in overall cancer risk, which persisted in never-smokers,” write the collaborators, in the medical journal *Lancet Oncology*.¹⁹ This conclusion has profound implications. The fact that it arises from data gathered from more than 48,000 men over the course of approximately 18 years lends additional gravity to the findings.



The research team also found significant associations among oral health status and lung, kidney, and pancreatic cancers, as well as cancers of the blood. The investigators note that their results need independent confirmation, but they offer this speculation regarding the implications of the findings: “.periodontal disease might be a marker of a susceptible immune system or might directly affect cancer risk.”¹⁹ In either case, periodontal disease takes on new significance, and appears to pose more of a threat to health than has previously been recognized.

Furthermore, a recent study by researchers at the Harvard School of Public Health tentatively concludes that periodontitis is associated with an increased risk of one of the most deadly cancers. “Compared with no periodontal disease, history of periodontal disease was associated with increased pancreatic cancer risk,” write the Harvard researchers, in the *Journal of the National Cancer Institute*.³⁰

The American Dental Association agrees that “oral health is important for overall health” and indicates that salivary diagnosis may offer a key tool in health assessment. “A wide range of proteins, nucleic acids, hormones, pharmaceuticals, and pathogens can be measured in saliva, making it an excellent candidate for rapid detection and screening of biomarkers for conditions like caries, periodontal disease, osteoporosis, infectious diseases, and cancer,” it says.³¹

ABOUT PERIODONTAL DISEASE

Bacteria and other microorganisms are the underlying cause of tooth decay. Bacteria break down compounds from food called fermentable carbohydrates (e.g. sucrose), producing lactic acid and other organic acids as a byproduct. These acids promote enamel and dentin demineralization. This softening of the enamel then leads to the development of dental caries (cavities).



Although bacteria naturally co-exist with us, under certain conditions they form a biofilm. A biofilm is a sort of living carpet composed of various bacteria and even fungi.¹² The microorganisms excrete a kind of glue, firmly anchoring themselves to the enamel surface of the tooth. Biofilm formation, and especially biofilm attachment, is at the root of dental disease.⁵⁷ Plaque is the common term for this living aggregation of various bacteria and fungi. Over time, plaque hardens and takes on various minerals. At this stage, the coating is called tartar. It is this hard coating that dental hygienists work to scrape away in the dentist's office.

Gingivitis occurs when dental plaque stimulates an immune response in the soft tissues surrounding the teeth. The gums become inflamed and irritated, appearing swollen and red and bleeding easily. If gingivitis is left untreated, it may progress to periodontitis, a condition in which Gram-negative bacteria destroy the supportive structures of the teeth. Periodontitis may ultimately lead to tooth loss.

Avoiding the buildup of plaque is the reason dentists encourage us to brush our teeth and to floss regularly. Brushing mechanically breaks up the film to some extent and rinsing helps remove fermentable sugars. But on the biochemical level, there is more that can be done to fight what is, after all, a biological enemy. This is where natural bioactive agents that target plaque microorganisms and promote gum healing come in.

BOTANICAL AND NUTRITIONAL AGENTS SHOW PROMISE IN ORAL HYGIENE

Given the potentially lethal risks of poor dental hygiene, it makes sense to utilize all the science available to prevent even the smallest problems in the mouth.

Several nutrients have shown very favorable effects when used as part of an oral hygiene program. Among these are coenzyme Q10 (CoQ10), green tea, aloe vera, and pomegranate. These claims have been verified by published research.^{9-11,32-35} Other beneficial ingredients for healthy teeth and gums include xylitol, lactoferrin, and folic acid.^{12,13,15,17}

MULTI-FACETED BENEFITS OF GREEN TEA

Green tea is well known for its beneficial effects throughout the body, but it is also effective in the fight against dental caries and oral disease. Studies have shown that green tea catechins exert direct antibacterial activity against *Streptococcus mutans*, one of the key microorganisms responsible for tooth decay. Green tea also helps prevent bacteria from sticking to teeth, by inhibiting a bacterial enzyme involved in this process. It also inhibits production of amylase, an enzyme used by bacteria to break starches down into sugars, which bacteria use to fuel their own growth.^{34,35}

Furthermore, Asian researchers showed recently that green tea reduces the invasiveness of oral cancer and decreases the production of a protein associated with oral cancer proliferation.^{36,37} Additionally, American researchers report that green tea arrests the growth and causes self-destruction (apoptosis) of oral carcinoma cells in the laboratory.³⁸

In Japan, researchers conducted a study in which green tea was applied to the teeth of subjects with periodontal disease for eight weeks. Symptoms of periodontitis improved in subjects receiving green tea catechins and there was objective evidence that green tea killed a significant proportion of the bacteria causing periodontitis in these test subjects.³⁹



COQ10 HELPS FIGHT ORAL DISEASE

Best known as a potent cardioprotective nutrient, CoQ10 has also been shown to improve symptoms of periodontitis when applied topically in the oral cavity.^{9,32,33} Japanese researchers conducted a placebo-controlled clinical trial in men with established periodontitis. After nine weeks of CoQ10 application, investigators found evidence of "significant improvements" in periodontal status, which were not seen in control subjects.⁹

An early study on CoQ10's effectiveness against periodontitis impressed the study's authors so much, they wrote, "Healing was so excellent five to seven days' post-biopsy that the biopsy sites were difficult to locate. The healing was viewed as extraordinarily effective."⁴⁰ It has been suggested that CoQ10 benefits oral health by reducing the oxidative stress associated with low-grade inflammation of gums and bone.⁴¹

CANCER'S ORAL HEALTH LINK

Tooth loss or gum disease may increase your risk of cancer, scientists say. A recent review of studies examining this link by Harvard researchers revealed a significant increase in risk of the following types of cancers, which persisted in non-smokers:⁸

- A two to three-fold increase in oral cancer from tooth loss.
- A strong association between tooth loss and a type of cancer in the middle to lower stomach called noncardia gastric cancer, even after controlling for the common gut bacterium, *Helicobacter pylori*.
- A more than two-fold increase in the risk of pancreatic cancer.

The review did not find a strong link between lung cancer risk and tooth loss or periodontal disease, as the researchers thought any excess risk may have been confounded by cigarette smoking,⁸ although one study has found such an association.¹⁹

In offering an explanation for their findings, the Harvard scientists believe that gum disease may cause general inflammation in the body, which can promote tumor growth. Or, they say, it could be a sign of a weakened immune system. Either way, they conclude that “periodontitis may be a marker for a type of immune function that has implications for tumor growth and progression.”⁸

COMPLEMENTARY INGREDIENTS FOR DENTAL HEALTH

Numerous other natural agents can be incorporated into a dental health program to protect healthy teeth and gums. For example, the natural sweetener xylitol not only has a pleasing sweet taste, it has also been found to help prevent tooth decay.¹³ Squalene boosts the immune system's ability to tackle invading microorganisms,¹⁴ while lactoferrin specifically halts the growth of bacteria implicated in periodontitis.¹⁵

Hydrogen peroxide is an antiseptic commonly used to minimize gingivitis, fight plaque, and promote a clean, fresh mouth.¹⁶ Aloe vera (*Aloe barbadensis*) has long been used in folk medicine to soothe burns and promote wound healing. Modern science has shown that aloe has anti-inflammatory properties and does, in fact, promote wound healing and may provide soothing and healing properties to the gum tissues.^{10,42,43}

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NUTRITIONAL SUPPORT FOR THE GUMS

In addition to brushing and/or rinsing with botanical-fortified dentifrices (preparations for cleaning the teeth), supplementation with vitamin C may also help support gingival health. Vitamin C is crucial for the maintenance of healthy connective tissue, such as the gums. In fact, one of the clinical signs of scurvy, the disease associated with vitamin C deficiency, is bleeding gums.⁴⁴ (Vitamin C should not be applied to the teeth topically as ascorbic acid may erode enamel.)

The B vitamin, folic acid promotes gingival health by reducing redness and bleeding of these delicate tissues.¹⁷

Vitamin D is also important for oral health.⁴⁵ Since many people do not generate adequate levels of the “sunshine hormone,” supplementation with vitamin D may be necessary to help ensure gum health.



POWER OF POMEGRANATE

Pomegranate is currently finding important applications in the field of dental health. Clinical studies have shown that this popular antioxidant superstar attacks the causes of tooth decay at the biochemical level, with remarkable vigor.^{12,46-49} When used regularly in combination with toothpaste that has been reinforced with bioactive botanical extracts and CoQ10, pomegranate-containing mouthwash may fight dental plaque and tartar formation by inhibiting the activities of the microorganisms that cause plaque. Additionally, pomegranate compounds possess anti-inflammatory properties that may help soothe irritated tissues.^{50,51}

Pomegranate gets to the root of the problem by literally hitting bacteria where they live. Fascinating research shows that pomegranate extract suppresses the ability of these microorganisms to adhere to the surface of the tooth.¹² The trick is to inhibit a common species of *Streptococcus*, preventing it from producing chemicals that create favorable conditions for fungi and other microorganisms to thrive. Plaque may involve four or more different microorganisms combining forces to colonize the surface of the teeth. Remarkably, nature's own pomegranate fights the organisms' ability to adhere by interfering with production of the very chemicals the bacteria use as “glue.”⁵²

In fact, a recent study conducted by Brazilian researchers showed that pomegranate extract was more effective against the adherence of biofilm microorganisms than a pharmaceutical antifungal, when three or four microorganisms were involved.¹² The results of this study suggest that “this phytotherapeutic agent might be used in the control of adherence of different microorganisms in the oral cavity,” concluded researchers.¹²

A study conducted at the Human Nutrition Center at Ohio State University in 2007 examined the effects of using a mouthwash containing pomegranate extract on the risk of gingivitis.⁵³ Investigators noted that pomegranate's active components, including polyphenolic flavonoids (e.g., punicalagins and ellagic acid), are believed to prevent gingivitis through a number of mechanisms including reduction of oxidative stress in the oral cavity,⁵⁴⁻⁵⁶ direct antioxidant activity; anti-inflammatory effects;^{57,58} antibacterial activity;⁵⁹ and direct removal of plaque from the teeth.⁴⁷ They also noted that a published pilot study has already shown that pomegranate extract can reduce the clinical signs of chronic periodontitis.⁴⁶

For the Ohio State study, researchers recruited 32 healthy young men and women, who were randomly assigned to rinse with pomegranate mouthwash, or placebo, three times daily for four weeks. Subjects were instructed to rinse for five minutes per rinse. Saliva samples were evaluated for a variety of indicators related to gingivitis and periodontitis. Subjects rinsing with pomegranate solution experienced a reduction in saliva total protein content,⁵³ which is normally higher among people with gingivitis⁶⁰ and may correlate with plaque-forming bacterial content.⁶¹

Pomegranate-treated subjects also experienced significant decreases in the salivary activity of the enzyme aspartate aminotransferase. This enzyme is considered a reliable indicator of cell injury and is elevated among patients with periodontitis.⁶² Pomegranate rinsing also lowered saliva activities of alpha-glucosidase, an enzyme that breaks down sucrose (sugar),⁶³ while it increased activities of ceruloplasmin, an antioxidant enzyme.⁶⁴ “The pomegranate extract-induced increase in ceruloplasmin

activity can be expected to strengthen antioxidant defenses,” noted investigators. Subjects who rinsed with placebo solution did not experience any of these changes.⁵³ Taken together, researchers concluded that these changes in saliva content indicated that routine rinsing with a pomegranate mouthwash, “ .could promote oral health, including affecting processes related to gingivitis.”⁵³

FIGHTING LETHAL INFLAMMATION IN GUM DISEASE

The human mouth is home to literally billions of bacteria that are constantly seeking to invade more deeply into our tissues. In order to keep the “bugs” at bay, our bodies fight back using a host of immune defenses such as white blood cells⁶⁵ and inflammatory signaling molecules called cytokines⁶⁶ that increase blood flow and the delivery of oxygen to help in the fight.

When the inflammatory process gets out of hand, or if the germs begin to win the battle, trouble follows closely. And because our gums are so amply supplied with blood flow, both the by-products of inflammation and even the bacteria themselves can rapidly enter the bloodstream, setting the stage for disaster.

GUM DISEASE AND CARDIOVASCULAR HEALTH—VITAL NEW DATA

Poor dental health results in deadly inflammation that not only leads to tooth decay and gum disease, but also triggers inflammatory changes in blood vessels throughout the body, contributing to atherosclerosis and its deadly consequences. Researchers have found that a number of inflammatory markers help link gum disease and atherosclerosis.

A recent review of the literature showed that patients with gum disease and elevated markers of systemic bacterial exposure were nearly twice as likely to have cardiovascular disease compared with those who did not have gum disease.¹⁸

In another study, Swedish researchers found that twice as many patients with gum disease had atherosclerotic plaques than healthy patients. In addition, patients with gum disease had much higher levels of leukotrienes (lipid-derived inflammatory mediators) in their gum fluid compared with healthy patients.

Furthermore, patients with atherosclerotic plaques had higher leukotriene levels in their gum fluid than those without plaques.⁶⁷

And, disturbingly, for the first time, researchers have actually found germs from diseased gums to be living inside atherosclerotic plaques, confirming that inflammation-causing oral bacteria are involved in atherosclerosis.⁶⁸

Gum disease also contributes to dangerous lipid profiles.⁶⁹ Levels of very-low density lipoproteins (VLDL), one of the most dangerous forms of blood lipids, have been found to be prevalent in patients with severe gum disease.

COQ10—POWERFUL GUM DISEASE PREVENTION AND WHOLE-BODY PROTECTION

Fortunately, scientists have discovered that a tiny molecule that looks after your heart can also provide powerful protection for gum health.^{9,32}

A plethora of studies have uncovered the benefits of coenzyme Q10 (CoQ10) in offsetting the inflammation that accompanies gum disease and its adverse effects throughout the body. These studies have reached a number of important conclusions:

- People with inflammatory diseases of the gums almost always have lower CoQ10 activities,^{33,41,70-72} suggesting that either topical or systemic antioxidant supplements might help suppress the effects of inflammation.
- Patients with gum disease frequently also have CoQ10 deficiencies in their white blood cells, which probably indicates a “systemic nutritional imbalance.”⁷³
- In patients with gum disease, CoQ10 treatment reduces bleeding and bacterial activity at gum sites subjected to standard periodontal treatment compared with non-CoQ10-treated sites.⁹
- CoQ10 treatment produces significant clinical improvement in periodontal disease,^{32,74} while reducing the long-term likelihood of tooth loss.⁴⁰
- An antioxidant nutrient mix containing CoQ10 reverses the effects of experimentally induced oxidant stress in human bone-forming cells taken from gum tissue.⁷⁵ This nutrient mix also stimulates the synthesis of a powerful hormone that restores natural bone formation in gum tissue.⁷⁵

These findings have tremendous implications for the retention of normal teeth as well as in the prevention of the total-body

effects of gum disease. The weight of all of this evidence points to CoQ10 as a potent means of intervening in the oxidation-inflammation-oxidation cycle that we now know underlies so much of the spectrum of age-related chronic illness.

Coenzyme Q10 can help promote gum health both when used as a dietary supplement and when applied locally to gum tissues. Supplemental CoQ10's gum health benefits may begin at a dosage of 50 mg/day,³² though many individuals may choose higher doses to address their unique health concerns.

DOUBLE-PRONGED ATTACK ON PLAQUE

Commercial toothpastes rely largely on mechanical abrasion to remove the sticky film on teeth that, left unchecked, develops into plaque. Over time, plaque provides the perfect environment for the erosion of tooth enamel, leading to cavities. Mouthwashes may contain antibacterial compounds, flavorings, and other cosmetically appealing ingredients, but, until now, none have included the power of pomegranate.

Fortunately, pomegranate extract suppresses the activity of various oral bacteria and fungi, which join forces to cause tooth decay. When combined with toothpaste formulated with bioactive compounds, such as green tea leaf extract, aloe vera gel, CoQ10, lactoferrin, folic acid, and xylitol, this powerful dentifrice duo actively fights the root causes of plaque and gum disease.

CONCLUSION

Good oral hygiene is not simply a matter of maintaining appearances. In the absence of vigilant oral care, plaque and tartar will build up, resulting in gingivitis and possibly progressing to periodontitis. And periodontitis has been associated with increased risks of conditions ranging from heart disease to stroke and even pancreatic cancer. By harnessing natural bioactive components, such as pomegranate, green tea, CoQ10, lactoferrin, aloe vera, folic acid, and xylitol, these modern dentifrices have improved the odds of winning the battle against dental degradation and related systemic illnesses.

If you have any questions on the scientific content of this article, please call a Life Extension Health Advisor at 1-800-226-2370.



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