Diseases and Conditions now Linked to Periodontal Disease

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Periodontal disease has been linked to numerous other diseases

As advances are made in medical and dental technology and research, more and more studies are proving a longstanding theory true; "the mouth is the gateway to the body". There are a number of negative health conditions and systemic diseases that are now being linked to periodontal disease. This report outlines the correlation between periodontal disease and many of these conditions so that you, the reader, can make the necessary decisions to ensure your oral and overall health. Periodontal disease is the most preventable disease there is, and if proper measures are taken you can likely reduce your risk for a number of other very serious health concerns.

What sort of conditions and diseases are we talking about exactly? Here are a few quotes from the largest authorities on oral health to give you an idea of just how serious it can be:

- *"Researchers have found that periodontitis (the advanced form of gingival disease that can cause tooth loss) is associated with other health problems such as cardiovascular disease, stroke, and bacterial pneumonia."* **{1} - American Dental Association**

- *"Periodontal bacteria can enter the bloodstream and travel to major organs and begin new infections. Evidence suggesting that this process may contribute to the development of heart disease; increase the risk of stroke; increase a woman's risk of delivering a preterm low-birth-weight baby; and pose a serious threat to people whose health is compromised by diabetes mellitus, respiratory disease or osteoporosis."* **{2} - American Academy of Periodontology**

- *"Evidence shows a link between cardiovascular disease and key bacteria in periodontal disease. Respiratory conditions can be aggravated when bacteria from periodontal disease travel from the mouth to the lungs and lower respiratory system."* **{10} - American Dental Hygiene Association**

Systemic diseases associated with periodontal disease

Systemic diseases are diseases that affect a large number of organs and tissues, or affect the body as a whole. Here is a list of all the diseases or conditions that are currently linked to periodontal disease:

- Osteoporosis **{13, 14}**
- Cardiovascular disease (see p4)
- Cancer **{15}**
- Preeclampsia (pregnancy induced hypertension) **{16}**
- Preterm births **{17}**
- Metabolic Syndrome **{18}**
- Rheumatoid arthritis **{19}**
- Stroke (see p6)
- Erectile dysfunction **{20}**
- Bacterial pneumonia **{38}**
- Diabetes (see p5)

"Periodontal bacteria can enter the bloodstream and travel to major organs and begin new infections. Evidence suggesting that this process may contribute to the development of heart disease; increase the risk of stroke; increase a woman's risk of delivering a preterm low-birth-weight baby; and pose a serious threat to people whose health is compromised by diabetes mellitus, respiratory disease or osteoporosis."

Periodontal disease and focal infection

The concept of focal infection (local infection that can spread to other parts of the body) **{9}** has been linked to conditions of periodontal diseases as far back as 1912. **{3}** Periodontal disease is initiated by bacteria, and in instances of severe periodontal disease these bacteria can enter the blood stream and cause a condition called bacteremia. **{4}** **Once** bacteremia takes place, there are three pathways that focal infection conditions can occur in the blood stream and organs. They are:

"Put quite simply, when the tissue of the gums separates from the teeth during periodontal disease it opens up "on ramps" for harmful oral bacteria to enter your blood stream "super highway". These bacteria that form plaque on the teeth can form plaques and fatty deposits in blood vessels, or just travel to other organs or parts of the body and settle down to start multiplying."

- **Metastatic infection** **{5}**: The microorganisms that gain entrance to the blood and circulate throughout the body are usually eliminated within minutes, and typically will not cause any clinical symptoms other than a slight increase in body temperature. However, if these microorganisms find favorable conditions, they can settle and begin to multiply. **{6}**

- **Metastatic injury** **{5}**: Some bacteria have the ability to produce toxins that are considered to be the most powerful and lethal poisons known. **{7}** These bacteria shed their outer membranes after cell death, and the effect can give rise to a large number of pathological manifestations.

- **Metastatic inflammation** **{5}**: Microorganisms that enter the blood in instances of bacteremia can react with antibodies and create complexes that may cause a variety of chronic and acute inflammatory reactions where they are deposited. **{8}**

Periodontal disease increases susceptibility to systemic disease

Periodontal disease is by far the most common oral infection, and is the subject of most studies concerning the relationship between systemic disease and oral health. Periodontal disease is caused by bacteria found in dental plaque that causes inflammation in the tissues of the gums and mouth. This inflammation can cause destruction of the tissues, periodontal ligaments, and even bone.

"166 cases and control subjects were found to have a higher risk for stroke based on poor dental status, periodontitis, and periodontal lesions"

A 1998 study **{11}** suggested that there are three different ways that a person's susceptibility for systemic diseases can be affected by periodontal disease. They are:

"…among the 11,869 men and women studied there were a total of 555 cardiovascular disease events, 170 of which were fatal. Participants who reported the poorest levels of oral hygiene (rarely/never brushing their teeth) had a 95% higher risk of a cardiovascular disease event…"

- **Shared risk factors** **{11}**: Factors that place individuals at high risk for periodontal disease may also place them at high risk for systemic diseases such as cardiovascular disease. Some examples of shared risk factors are smoking, stress, aging, race or ethnicity, and gender.
- **Subgingival biofilms** **{11}**: These biofilms present continually renewing reservoirs of negative bacteria, and they have easy access to the gingival tissues and circulatory system.
- **Periodontium as cytokine reservoir** **{11}**: Cytokines are proteins released by cells that trigger inflammation and respond to infections. **{12}** During instances of periodontal disease, oral tissues can reach a high concentration of these pro-inflammatory proteins. Because of this, they can act as reservoirs to keep spilling inflammation inducing bacteria into the bloodstream. This can also cause deposits of cholesterol.

Put quite simply, when the tissue of the gums separates from the teeth during periodontal disease it opens up "on ramps" for harmful oral bacteria to enter your blood stream "super highway". These bacteria that form plaque on the teeth can form plaques and fatty deposits in blood vessels, or just travel to other organs or parts of the body and settle down to start multiplying.

"A review of patients suffering from both diabetes and periodontal disease found that this apoptosis process can increase the inflammatory response of oral tissues to bacteria, and lead to further tissue destruction because of wound healing difficulties related to diabetes"

Cardiovascular disease

Cardiovascular disease is the leading killer of both men and women in the United States, and contributes to over 2,000 deaths every day. Periodontal disease affects nearly 75% of Americans at some point in their lives, and with the open gateway it can provide to the blood stream it only makes sense that there could be some sort of relation between the two.

In 1999, the association between periodontal disease and coronary heart disease (CHD) was evaluated in the Third National Health and Nutrition Examination Survey (NHANES III). **{21}** This study found that history of heart attack increased along with the severity of periodontal disease. The highest levels of severity of periodontal disease had 95% higher odds of having an incident of heart attack or CHD than those with no reported periodontal disease. This research confirmed many previous inconclusive studies, and proved the direct relationship between periodontal disease and heart disease. **{22}**

"Evidence has shown that people who have lost teeth, with or without dentures, change their eating habits. These studies surmised that due to difficulty chewing from tooth loss, the subjects may be avoiding nutritious foods and replacing them with high fat foods that are recognized as risk factors for cardiovascular disease."

Six studies **{23, 24, 25, 26, 27, 28}** have suggested that **symptoms of poor oral health and periodontal disease can indicate cardiovascular events**. Here are some of their findings:

"A 15 year follow up found that periodontal disease was a significant predictor of coronary heart disease in over 9,700 men and women who were surveyed."

- A 15 year follow up found that periodontal disease was a significant predictor of coronary heart disease in over 9,700 men and women who were surveyed. **{24}**
- 921 men aged21-80 who were free of cardiovascular disease at the initial time of survey were followed-up on after 18 years. This follow-up found that a higher level of alveolar bone loss from periodontal infection **{29}** was a significant predictor for CHD and stroke. **{26}**

In 1983, a study **{30, 31}** was published that put forth the suggestion that some of the particular bacteria strains present in dental plaque could directly affect the formation of aggregated platelets. This, in turn, played a role in the formation of fatty deposits and swelling of artery walls. In 2000, these same types of deposits/blockages have been studied in a different light. **{32}** This time, 50 deposits from blockages in carotid arteries were analyzed and examined for the presence of periodontal bacteria strains.

"…some of the particular bacteria strains present in dental plaque could directly affect the formation of aggregated platelets. This, in turn, played a role in the formation of fatty deposits and swelling of artery walls."

As recently as May 2010 a health survey published in the British Medical Journal **{33}** that studied the correlation of poor oral hygiene and risk of cardiovascular disease. It found that among the 11,869 men and women studied there were a total of 555 cardiovascular disease events, 170 of which were fatal. Participants who reported the poorest levels of oral hygiene (rarely/never brushing their teeth) had a 95% higher risk of a cardiovascular disease event.

Another possible link between heart disease and periodontal disease has to do with the possible tooth loss that can accompany oral infections. Evidence has shown that people who have lost teeth, with or without dentures, change their eating habits. **{26, 27, 34, 35, 36}** These studies surmised that due to difficulty chewing from tooth loss, the subjects may be avoiding nutritious foods and replacing them with high fat foods that are recognized as risk factors for cardiovascular disease. **{37}**

Diabetes mellitus

An estimated 20 million Americans are affected by diabetes, nearly 40% of whom have not yet been diagnosed. In 1993, a sixth complication of diabetes to go along with retinopathy **{39}**, neuropathy **{40}**, macrovascular disease **{41}**, nephropathy **{42}**, and poor wound healing was proposed. The sixth complication, as proposed by Loe was periodontal disease. **{43}** Another possible complication that relates the two is a condition called apoptosis, which is a sequence of programmed events that leads to cell death. A review of patients suffering from both diabetes and periodontal disease found that this apoptosis process can increase the inflammatory response of oral tissues to bacteria, and lead to further tissue destruction because of wound healing difficulties related to diabetes. **{48}**

As recently as 2008, periodontal disease was identified as a risk for diabetics with poor metabolic control. **{44}** These studies could stand alone to prove that the connection between diabetes and periodontal disease is a two-way street, but what's more is that there is evidence that suggests that **periodontal changes are the first clinical manifestation of diabetes**. **{45}**

There are a few key links in the chain that binds diabetes and periodontal disease, which has been the subject of more than 200 articles published in the past 50 years. At times, it has been difficult to interpret the results of certain tests and studies due to the number of varieties and classifications associated with both conditions. Two facts to establish the link that remain solid are:

- Reduction of saliva or salivary flow is frequently reported in diabetics **{46}**, and a reduced salivary flow is a large risk for a number of oral infections because harmful (anaerobic) bacteria breed much more prevalently in environments with reduced oxygen and saliva.

- Diabetes exaggerates the inflammatory response of periodontal bacteria. Studies have shown that the oral bacteria in patients with periodontal disease who have diabetes are the same as that of patients who have periodontal disease but have not been diagnosed with diabetes. **{47}**

"…evidence from studies on patients of both conditions who underwent treatment for periodontal disease accompanied with antibiotic treatment showed improvement…"

"In 1993, a sixth complication of diabetes to go along with retinopathy , neuropathy , macrovascular disease , nephropathy , and poor wound healing was proposed. The sixth complication, as proposed by Loe was periodontal disease."

Going back 30 years, studies were conducted that reported that children with type 1 diabetes had a higher level of gum inflammation than children without diabetes, but who had similar levels of dental plaque. **{49}** A few years later, another study confirmed that patients with poorly controlled diabetes had more prevalent, and more severe gum bleeding than even those who still had diabetes, but controlled it better. **{50}** Research also suggests that there are more instances of bone loss and loss of attachment of the gums to the teeth in adults with diabetes. **{51, 52}**

The good news for those who suffer from periodontal disease, diabetes, or both is that evidence from studies on patients of both conditions who underwent treatment for periodontal disease accompanied with antibiotic treatment showed improvement not only in their periodontal status, but also in their glycemic control. **{53, 54, 55}**

Ischemic stroke

A stroke is damage to the brain due to a reduction in blood supply. When a blood vessel that delivers oxygen and nutrients to the brain becomes obstructed, the condition is called ischemic stroke, or cerebral ischemia. Another type of stroke is called hemorrhagic stroke, and it occurs when a blood vessel supplying the brain bursts and causes bleeding into the brain. In any stroke event, the nerve cells of the affected part of the brain become deprived of oxygen and can die off within minutes, and cause a number of different body impairments.

"There were significant relationships between calculus/tartar, probing pocket depth, and stroke."

Numerous articles **{60}** have been published that establish the link between stroke and periodontal disease. Multiple pathways exist for direct relation between the two, which include:

"Seven of nine studies evaluating periodontal disease as a risk factor for stroke showed significant associations"

- Inflammation
- Bacteremia
- Vascular injury

Because ischemic stroke is the type that can be caused by blockage or obstruction in the blood vessels, the following case-control studies that were designed to test the link between stroke and periodontal disease evaluated ischemic and hemorrhagic stroke separately. They also excluded any people who had cardiovascular disease before the initial examination. **Seven of nine studies evaluating periodontal disease as a risk factor for stroke showed significant associations**. **{57}**

The first report evaluated 40 cases of ischemic stroke and 40 randomly selected control subjects who were matched for sex and age. There were significant relationships between calculus/tartar, probing pocket depth, and stroke. **{55}** Another more recent study found similar results among a larger subject base. 166 cases and control subjects were found to have a higher risk for stroke based on poor dental status, periodontitis, and periodontal lesions. **{56}** Another study that found positive association between periodontal disease and ischemic stroke found that the risk was even higher when they limited their research to only cases of fatal stroke. **{58}**

"Researchers studied the results of health questionnaires that were sent to 41,380 men aged 40-75 every 2 years over a 12 year period… The result was that over this 12 year period, there were 349 documented ischemic strokes among the subjects. Men who had experienced tooth loss from periodontal disease had a 57% higher risk of stroke than those who had not lost teeth due to periodontitis."

Because a number of early studies were inconclusive in proving this relationship, researchers at Harvard medical school found that more definitive results may be determined by studying a more concise and much larger group. **{59}** Researchers studied the results of health questionnaires that were sent to 41,380 men aged 40-75 (primarily white dentists, veterinarians, pharmacists, optometrists, osteopathic physicians, and podiatrists) every 2 years over a 12 year period. These questionnaires contained questions about medical history, health behaviors, and other negative health events. The result was that over this 12 year period, there were 349 documented ischemic strokes among the subjects. Men who had experienced tooth loss from periodontal disease (began the study with 25 or fewer teeth) had a 57% higher risk of stroke than those who had not lost teeth due to periodontitis.

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http://www.medterms.com/script/main/art.asp?articlekey=22185

{40} Neuropathy: Any and all disease or malfunction of the nerves.
http://www.medterms.com/script/main/art.asp?articlekey=11749

{41} Macrovascular disease: Disease of the large blood vessels, including the coronary arteries, the aorta, and the sizable arteries in the brain and in the limbs. Macrovascular disease is by contrast to microvascular disease. In persons with diabetes, chronic hyperglycemia (assessed by glycosylated hemoglobin level) is related to the development of microvascular disease; however, the relation of glycosylated hemoglobin to macrovascular disease is less clear.
http://www.medterms.com/script/main/art.asp?articlekey=39259

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