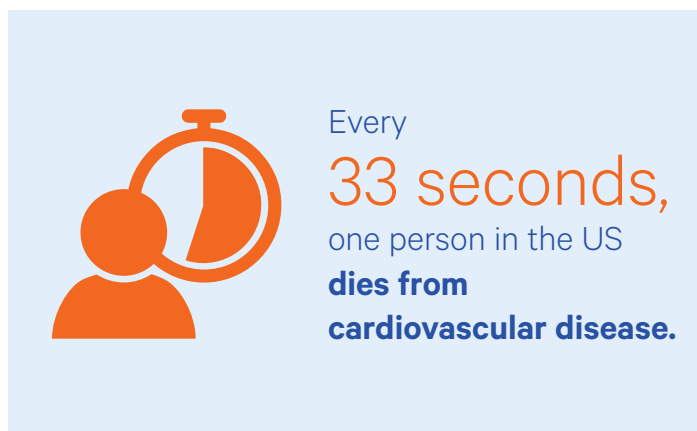
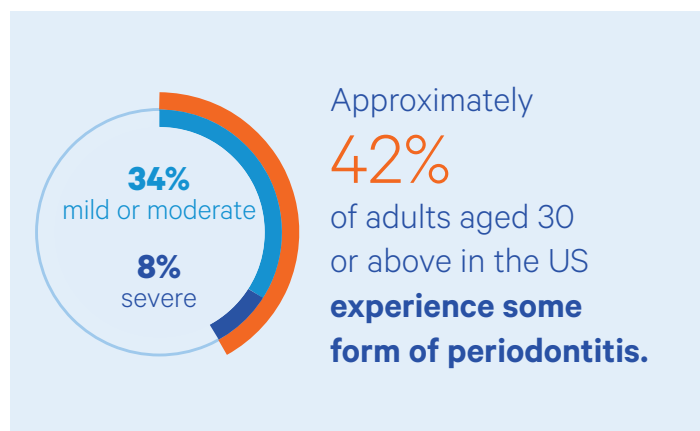


# The Heart of the Matter

## Links Between Cardiovascular Health and Oral Health

### Cardiovascular Health

Every 33 seconds, [one person in the United States \(US\) dies](#) from cardiovascular disease (CVD). In the US, CVD is the [leading cause of death](#), accounting for more than 900,000 deaths in 2020.<sup>1</sup> About [80% of CVD deaths](#) occur as a result of heart attacks and strokes, and about 33% of these deaths occur among individuals under 70 years old. The cause of CVD varies according to the type. For example, plaque buildup in the arteries ([atherosclerosis](#)) can cause coronary artery disease and peripheral artery disease. Common [risk factors](#) for CVD include high blood pressure, high cholesterol, tobacco use, type 2 diabetes, family history, and a lack of physical activity.



### Oral Health

Periodontal (gum) disease (PD) is [one of the most common inflammatory diseases in humans](#); it is the sixth-most-common disease worldwide. [Approximately 42% of adults aged 30 or above](#) in the US experience some form of periodontitis. More than one-third (34%) of adults experience mild or moderate periodontitis, while nearly eight percent experience severe periodontitis. PD is the result of infection and inflammation of the gums and bone that surrounds the teeth. The early stage of PD is known as gingivitis, where the gums become red and swollen, and may even bleed. However, as this condition progresses, it is often referred to as [periodontitis](#), where the gums can pull away from the tooth itself, bone loss can occur, and teeth may loosen or fall out. PD can not only cause inflammation of periodontal tissue but can also produce [inflammatory mediators](#) that affect blood circulation, and therefore cardiovascular health.

<sup>1</sup> CVD is an umbrella term for a [group of disorders](#) of the heart and blood vessels, including coronary heart disease, cardiovascular disease, and rheumatic heart disease among other conditions.

## The Relationship Between Oral Health and Cardiovascular Disease

While the literature supporting the link between [dental caries](#) and CVD is less abundant, [substantial evidence supports the link between PD and increased risk for CVD](#). Individuals with PD have [two to three times the risk](#) of experiencing a heart attack, stroke, or a severe cardiovascular event. Bacteria from the mouth can move into the bloodstream, elevating a [C-reactive protein](#) and [causing inflammation in the blood vessels](#) that leads to an increased risk of CVD. PD is linked to [atherosclerosis](#), a form of CVD caused by the buildup of fatty plaques in various arteries; specifically, [periodontal bacteria has been found in atherosclerotic plaques](#). Ultimately, [atherosclerosis can cause coronary artery disease](#) — the most common type of heart disease, which [can lead to heart attack and heart failure](#). [Several systematic reviews](#) demonstrate a higher prevalence of coronary artery disease, risk of myocardial infarction (heart

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attack), and other coronary events among patients with periodontitis. Additional evidence points to an [independent association between PD and incident stroke risk](#), specifically cardioembolic and thrombotic stroke. Overall, the link between PD and increased risk for CVD reinforces the link between oral health and overall health.

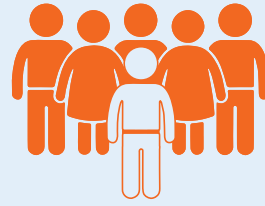
## The Relationship Between Oral Health and Infective Endocarditis

[Infective endocarditis](#) (IE) is an infection caused by bacteria entering the bloodstream and settling in the heart lining, a heart valve, or a blood vessel. Though uncommon, with an [incidence of about 5 per 100,000 people per year](#), individuals with a previous heart condition such as a congenital heart disease, heart valve disease, or a former heart valve surgery are at greater risk of developing IE. This condition may result in a [leaky valve, heart block \(when the electrical signal that controls the heartbeat is partially or completely blocked\), heart failure](#), and other complications. Without treatment, IE can be fatal. Infections can come from a variety of sources, including poor oral hygiene, minor injuries to the lining of the mouth or gums from harsh tooth brushing, and dental procedures. However, the [American Heart Association \(AHA\)](#) recognizes that IE is more likely to occur because of daily exposure to bacteria (in those with poor dental hygiene) than exposure during a dental procedure. [The AHA states](#) that one can reduce the risk of IE by maintaining good oral health via routine professional dental care and maintaining dental health at home via the utilization of dental devices such as toothbrushes, floss, and other bacterial plaque-removal devices.

## Oral Health in Children with Heart Conditions

Infected and unhealthy gums can increase the risk of developing IE among individuals with existing cardiovascular issues. This issue is of particular concern for children, as [children with heart conditions may be at increased risk for IE](#) from oral bacteria. According to the Centers for Disease Control and Prevention (CDC), [a survey of parents](#) with children who had a heart condition found that about one in ten children with a heart condition had teeth in fair/poor condition and about one in six had at least one sign of poor oral health. [Oral health was notably worse](#) for children with a heart condition who also had an intellectual or developmental disability, lived in poverty, or did not have insurance. In this same survey of parents, about [one in six children](#) with a heart condition had not received preventive dental care (i.e., dental cleaning or check-up) within the past year. Poor oral health and missed preventive dental care among children with a heart condition can result in more severe consequences, such as IE. These findings call attention to the importance of prioritizing the oral health of children with heart conditions as we consider the links between oral health and cardiovascular health.

**The strong evidence linking periodontal disease and cardiovascular disease, whether or not directly causal, reinforces the importance of good oral health to maintaining good heart health.**



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## Questions Remain about a Causal Relationship Between CVD and PD

While there is substantial evidence supporting the link between PD and CVD, [the causality of this association remains in question](#). Currently, there is a lack of high-quality research with CVD endpoints (e.g., cardiovascular mortality); instead, most studies utilize surrogate markers or biomarkers (e.g., indicators of cardiac damage and blood clots) as CVD endpoints. Additionally, there are ethical issues involved in conducting randomized controlled trials that include withholding CVD treatment to determine a causal relationship between periodontal treatment and CVD endpoints. That being said, the strong evidence linking PD and CVD, whether or not directly causal, reinforces the importance of good oral health to maintaining good heart health.

## Research Can Help Fill in the Knowledge Gaps

Future researchers evaluating the link between PD and CVD should consider the idea of long-term interventional studies [integrating patients' periodontal status](#) to uncover more information on the link between PD and CVD. A systematic review of recent findings related to the causal link between periodontitis and cardiovascular disease suggests the establishment of a ["large-scale, well-annotated longitudinal database that considers oral health parameters"](#) to work around ethical barriers and help establish causality. Additional research can evaluate claims data on CVD outcomes, comparing those who receive PD treatment and those who do not, to better understand the link between CVD and PD.

## Taking Action

Understanding the link between CVD and PD requires both medical and dental professionals to take action to mitigate the risks of disease onset. For example, [dental professionals are well-positioned](#) to screen for CVD risk indicators, such as high blood pressure (hypertension), and to better inform patients of the links between their oral health and CVD. Dentists are also well-equipped to refer patients to general medical care teams or other medical services to ensure that their patients receive the appropriate care. Medical professionals, including cardiologists and family physicians, can play a larger role in encouraging their patients to receive routine teeth cleanings (prophylaxis). Overall, [cooperation between dental and medical communities](#), and increased efforts to take action to reduce the risk of the association between CVD and PD, are critical to improving health outcomes.

## Conclusions

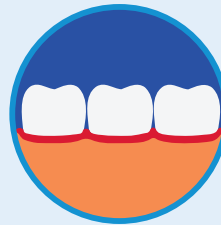
Given the links between oral health and cardiovascular health, it is essential to practice good oral hygiene to benefit our overall health. [Routine dental care and proper oral hygiene](#), including brushing and flossing twice per day, can help to prevent and mitigate PD. Currently, adults in the US who identify as Black, Latino, or Native American, in addition to low-income individuals, children, and pregnant women are all at [higher risk of oral disease](#). Similarly, adults in the US who identify as Black, Hispanic, American Indian/Alaska Native, as well as individuals with a lower income, are at [higher risk for CVD](#). The [severe consequences of untreated gum disease and the disproportionate rates of PD and CVD among underserved populations](#) reinforce the need for efforts to improve access to routine dental care. Additionally, due to the greater risk of infection from bacteria in the mouth among children with heart conditions, it is important for parents and caregivers, as well as children themselves, to ensure that they are maintaining good oral health to improve overall health. With CVD remaining the leading cause of death in the US, we must continue to consider the role of our oral health in the health of our hearts.

### Suggested Citation:

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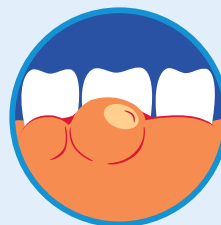
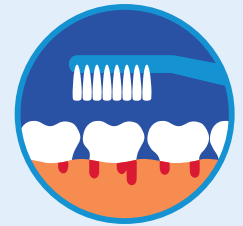
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## Warning Signs of Periodontal Disease



**Gums that are red,** swollen, or sore to the touch

**Gums that bleed** when eating, brushing, or flossing



**Signs of pus** or infection around the gums and teeth

**Gums that seem to be “pulling away”** from the teeth



**Bad breath** or a bad taste in your mouth

**Teeth that are loose** or seem as if they are moving away from other teeth

