

# Apical Periodontitis and Cardiovascular Disease: A Brief Review of the Literature

## BACKGROUND

The global burden of cardiovascular disease has been recognized as of utmost severity and importance for public and community health

- Heart disease is the number one leading cause of death in the United States (CDC)

Prognostic factors have been identified and are under investigation

- Smoking, diabetes, high cholesterol, obesity

The concern for oral bacteria and heart disease dates back to the 1900s

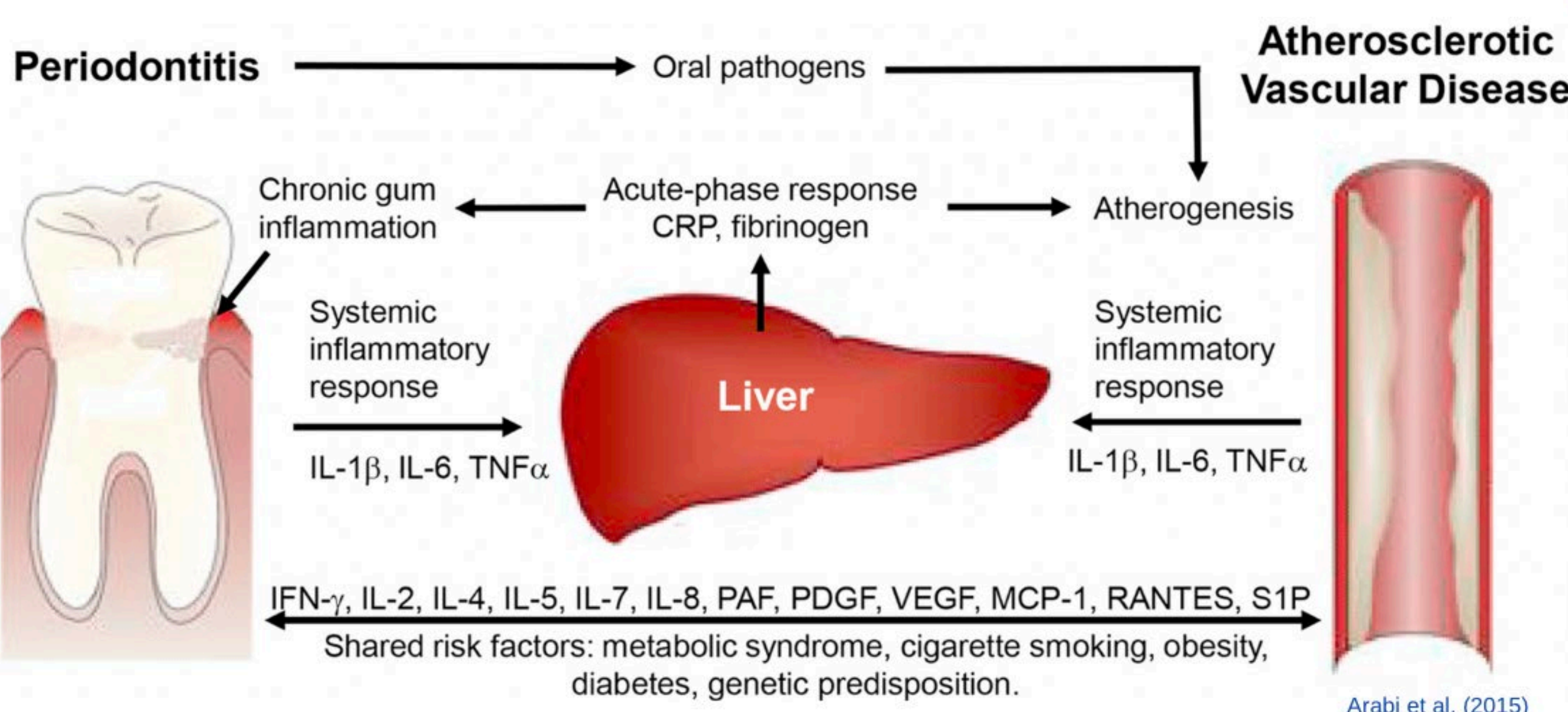
- Early findings led to recommendation of dental antibiotic prophylaxis for patients with valvular surgery

Growing evidence for the link between periodontal disease and heart disease

- Oral bacteria enter circulation inducing bacteremia
- The presence of oral bacteria have been confirmed in atheromatic lesions
- Bacteria induce a local inflammatory response, resulting in smooth muscle cell proliferation and extracellular matrix deposition which can **accelerate atherosclerosis**
  - A number of studies support this theory

## RECENT LITERATURE

Author	Major Conclusions	Limitations
Koletsis et al. (2021) Systematic Review and Meta-Analysis	<ul style="list-style-type: none"> <li>Indications for an association between AP and CVDs do exist but they are not grounded in high-quality evidence</li> <li>Associations between AP and CVDs should be considered biologically plausible</li> <li>Despite weak evidence, cardiologists should consider endodontic infections as potential proxies for adverse effects in patients with CVDs</li> </ul>	<ul style="list-style-type: none"> <li>Future studies should rule out potential confounders such as underlying diabetes</li> <li>Majority of 10 studies were cross-sectional with additional biases (e.g. self-report of endodontic lesions)</li> </ul>
Sebring et al. (2021) Matched case-control	<ul style="list-style-type: none"> <li>The presence of any primary periapical lesion in individuals aged &lt;65 years and the proportion of root filled teeth in patients aged &gt;65 years significantly associated with risk of first MI</li> </ul>	<ul style="list-style-type: none"> <li>Could reflect behavioral pattern of poor self-care and low health prevention awareness (no causal or temporal relationship)</li> <li>AP assessed using panoramic radiographs</li> </ul>
Cowan et al. (2020) Cohort, population-based, prospective	<ul style="list-style-type: none"> <li>No evidence that self-reported history of ET was associated with CVD after adjustment for confounders</li> </ul>	<ul style="list-style-type: none"> <li>Self-reported history of root canal treatment at a single point in time, ET occurring later in study was not accounted for</li> <li>RCT used as a proxy for AP (marker for prior chronic dental infection) has inherent issues</li> </ul>
An et al. (2016) Pair-matched, cross-sectional design of hospital records	<ul style="list-style-type: none"> <li>AP significantly associated with CVD, hypercholesterolemia, race, missing teeth, caries experience, and number of root canal treatments</li> <li>Adjusted logistic regression model showed statistically significant positive associations between AP and CVD (patients with AP more likely to have CVD than those without AP by 5.3-fold)</li> </ul>	<ul style="list-style-type: none"> <li>Definition of CVD is broad and includes conditions other than those that are infectious or inflammatory</li> <li>Population-specific characteristics of hospital study such as culture, SES, behavioral, overall health status</li> <li>Use of 2D radiographs for AP identification</li> </ul>



## OVERALL IMPRESSIONS

Research over the last 10 years has mixed results

- A number of confounders and sources of bias due to the multifactorial nature of CVD and challenges of assessing AP

There is biological plausibility of a relationship between lesions of endodontic origin and incidence or exacerbation of inflammatory CVDs

- P. endodontalis* (typical endodontic pathogen) can invade vascular endothelial and smooth muscle cells (Liljestrand et al. 2020)

Need for well-designed longitudinal studies to establish causality and temporal relationship

## WHAT ABOUT OTHER SOURCES OF ORAL BACTERIA?

Alternative-origin oral cavity related chronic inflammatory conditions might be additional triggering factors in the advent of CVDs

- Root canal infection and inflammation of periapical tissues after pulp necrosis (Apical Periodontitis)

## APICAL PERIODONTITIS

Apical periodontitis (AP) is an inflammatory disease caused by the establishment of microbial infection within the root canal system of the tooth, resulting in **inflammatory periapical tissue response and apically framed bone destruction**, as is also evident as a radiolucency in periapical radiographs

Theory: AP may be related to elevated systemic concentrations of inflammatory mediators or reactive peripheral blood cells, impacting general cardiovascular status



AAE Colleagues for Excellence (2013)

## CLINICAL IMPLICATIONS

Another tool to help dentists educate patients about the importance of preventative dental care

Role of dentists in identifying and treating apical periodontitis, especially for patients with established CVD or family history

Evidence supporting the need for communication and collaboration between dentists, PCPs and cardiologists

## PUBLIC HEALTH IMPACT

CVDs have been associated with the path and prognosis of COVID-19 patients, with autopsy confirming a cytokine-mediated exacerbation and related inflammation in CVD patients also positive for COVID-19

- Call for further endorsements on the investigation and research against any potential risk factor for CVDs

With adequate research, AP could join the list of prognostic factors influencing CVDs

## SOURCES

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