Summary of Findings from: The American Journal of Cardiology and Journal of Periodontology Editors' Consensus: Periodontitis and Atherosclerotic Cardiovascular Disease.
Friedewald VE, Kornman KS, Beck JD, et al.
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Clinical Recommendations: Patients with Periodontitis

Although the treatment of periodontitis reduces systemic markers of inflammation and endothelial dysfunction, no prospective periodontitis intervention studies have evaluated CVD outcomes. It seems reasonable, however, on the basis of current data, to acknowledge that because untreated or inadequately controlled moderate to severe periodontitis increases the systemic inflammatory burden, periodontitis *may* independently increase the risk for CVD.

I. Patient Information
Recommendation A: Patients with moderate to severe periodontitis should be informed that there may be an increased risk for atherosclerotic CVD associated with periodontitis. Confidence and evidence level: 2C

Recommendation B: Patients with moderate to severe periodontitis who have one known major atherosclerotic CVD risk factor, such as smoking, immediate family history of CVD, or history of dyslipidemia, should consider a medical evaluation if they have not done so in the past 12 months. Confidence and evidence level: 3D

Recommendation C: Patients with periodontitis who have ≥2 known atherosclerotic CVD major risk factors should be referred for medical evaluation if they have not done so in the past 12 months. Confidence and evidence level: 2D

II. Medical and Dental Evaluations
In concert with the following recommendations, it is recommended that patients with periodontitis assess their risk for future (next 10 years) CVD events (e.g., stroke, myocardial infarction) by completing either the Reynolds Risk Score (*http://www.reynoldsriskscore.org*) or, for risk assessment for CAD events only, the National Cholesterol Education Program Risk Calculator (*http://hp2010.nhlbihin.net/atpiii/calculator.asp?usertype=prof*), based on the Framingham Heart Study.

Recommendation A: Medical evaluation of patients with periodontitis should include assessment of atherosclerotic CVD risk, including past CVD events, and family histories

of premature atherosclerotic CVD disease or sudden coronary death, diabetes mellitus, systemic hypertension, or dyslipidemia. Confidence and evidence level: 2D

Recommendation B: Medical evaluation of patients with periodontitis should include a complete physical examination and annual measurement of blood pressure at rest (seated for 5 minutes with the feet on the floor and attention to appropriate blood pressure cuff size). Confidence and evidence level: 2D

Recommendation C: Medical evaluation of patients with periodontitis should include a blood lipid profile (total cholesterol, LDL cholesterol, HDL cholesterol, and fasting triglycerides) and blood glucose measurement. A plasma hsCRP determination is optional but should be considered, because recent studies have suggested that elevated plasma hsCRP may have added value by helping determine how aggressively standard risk factors should be treated, especially lifestyle changes. Confidence and evidence level: 2D

III. Risk Factor Treatment: Abnormal Lipids

Recommendation A: Patients with periodontitis and ≥1 abnormal serum lipid and/or elevated plasma hsCRP are recommended to follow a multifaceted lifestyle approach to reduce atherosclerotic CVD risk according to the National Cholesterol Education Program Adult Treatment Panel III guidelines. Confidence and evidence level: 1C

According to Adult Treatment Panel III guidelines, emphasis on weight loss and physical activity to enhance weight reduction in subjects with elevated serum LDL cholesterol should be undertaken. Goals for LDL cholesterol levels are based on CVD risk assessment: (1) one atherosclerotic CVD risk factor and LDL cholesterol >160 mg/dl: target LDL cholesterol <160 mg/dl; (2) ≥2 atherosclerotic CVD risk factors and LDL cholesterol >130 mg/dl: target LDL cholesterol <130 mg/dl; an optional target is LDL cholesterol <100 mg/dl if factors such as age, metabolic syndrome, abnormal plasma hsCRP, or abnormal coronary calcium score (75th percentile) are present; (3) atherosclerotic CVD disease is present or there are CAD risk equivalents, such as diabetes mellitus: target LDL cholesterol <100 mg/dl or an optional target of <70 mg/dl if atherosclerotic CVD is present and there are high-risk features, such as diabetes mellitus, metabolic syndrome, heavy cigarette smoking, or acute coronary syndromes.

Lifestyle changes that should be undertaken are reduced intake of saturated fats (<7% of total calories) and low levels of trans fats and dietary cholesterol (<200 mg/day); enhancement of LDL lowering with optional dietary strategies, such as ingesting plant stanols or sterols (2 g/day) and increased viscous (soluble) fiber (10 to 25 g/day); weight reduction; increased physical activity; and limited alcohol ingestion ("*Moderation* is defined as the consumption of up to one drink per day for women and up to two drinks per day for men. Twelve fluid ounces of regular beer, 5 fluid ounces of wine, or 1.5 fluid ounces of 80-proof distilled spirits count as one drink. This definition of moderation is not intended as an average over several days but rather as the amount consumed on any single day.") However, alcohol does not add to atherosclerotic CVD risk and may convey

some protective effect against future CVD events. Patients who need to lose weight should be cautioned, however, that alcohol is high in caloric content. Subjects who do not drink alcohol should not be advised to begin drinking alcohol for the purpose of CVD risk modification, because other risks of alcohol consumption, such as higher frequencies of accidents and medical illnesses, outweigh the possible CVD-preventive benefits of alcohol.

Recommendation B: Drug therapy for elevated LDL cholesterol should be prescribed in patients with periodontitis in whom target LDL cholesterol levels are not achieved with lifestyle changes. Confidence and evidence level: 2D

IV. Risk Factor Treatment: Cigarette Smoking
Recommendation: All patients with periodontitis who smoke tobacco should discontinue this habit because this is a major risk factor for atherosclerotic CVD and periodontitis. Confidence and evidence level: 1C

V. Risk Factor Treatment: Hypertension
Recommendation A: All patients with periodontitis and elevated blood pressure should be treated to target levels as defined by the seventh report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC-7). Confidence and evidence level: 1C

JNC-7 defines hypertension as follows: (1) *prehypertension*: systolic blood pressure 120 to 139 mm Hg or diastolic blood pressure 80 to 89 mm Hg; (2) *stage 1 hypertension*: systolic blood pressure 140 to 159 mm Hg or diastolic blood pressure 90 to 99 mm Hg; and (3) *stage 2 hypertension*: systolic blood pressure >160 mm Hg or diastolic blood pressure >100 mm Hg. Using JNC-7 recommendations, the target blood pressures in patients with periodontitis are (1) <140/90 mm Hg in all patients with periodontitis and ≤2 major risk factors for CAD and (2) <130/80 mm Hg in patients with previous atherosclerotic CVD, diabetes mellitus, chronic renal disease, or ≥3 major risk factors.

Recommendation B: All patients with periodontitis and elevated blood pressure should undertake lifestyle changes. Confidence and evidence level: 1A

Elevated blood pressure can be significantly decreased by lifestyle changes, including (pressures in parentheses indicate changes that can be anticipated with adequate patient compliance) weight reduction in subjects who are overweight (systolic blood pressure reduction 5 to 20 mm Hg), a diet high in potassium and calcium (the American Heart Association DASH diet; systolic blood pressure reduction 4 to 8 mm Hg), a diet low in sodium (systolic blood pressure reduction 2 to 8 mm Hg), physical activity (systolic blood pressure reduction 4 to 9 mm Hg), and moderation of alcohol intake (systolic blood pressure reduction 2 to 4 mm Hg).

In addition to lowering blood pressure, lifestyle modifications also increase the efficacy of antihypertensive drug therapy and decrease the risk for atherosclerotic CVD.

Recommendation C: All patients with periodontitis and elevated blood pressure not controlled to target levels with lifestyle changes should be treated with pharmacologic therapy. Confidence and evidence level: 2D

The following drug classes are approved for the initial treatment of hypertension: thiazide-type diuretics, angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, direct renin inhibitors, β blockers, and calcium channel blockers (see recommendation D).

Recommendation D: Patients with periodontitis prescribed calcium channel blockers for hypertension or any other indication should be monitored for worsening of periodontitis in association with gum hyperplasia. Confidence and evidence level: 1D

Gingival hyperplasia has been reported with all three classes of calcium channel blockers. This effect is reported most often with nifedipine, occurring in up to 6% of patients, and less often with diltiazem, amlodipine, and verapamil. The mechanism is unknown but may be due to increased gingival collagen production by fibroblasts. However, there are no specific reports of the effect of calcium channel blockers on the severity of periodontitis.

VI. Risk Factor Treatment: Metabolic Syndrome

Metabolic syndrome is diagnosed when ≥3 of the following features are present: (1) increased waist circumference (men ≥40 in [≥102 cm], women ≥35 in [≥88 cm]), (2) increased serum triglyceride level (150 mg/dl [1.7 mmol/L]) and/or drug treatment for elevated triglycerides (most commonly fibrates and nicotinic acid), (3) decreased serum HDL cholesterol level (men <40 mg/dl [1.03 mmol/L], women <50 mg/dl [1.3 mmol/L]) and/or drug treatment for decreased serum HDL cholesterol, (4) elevated blood pressure (≥130 mm Hg systolic and/or ≥85 mm Hg diastolic) or antihypertensive drug treatment of patients with histories of hypertension, and (5) elevated fasting glucose (blood glucose ≥100 mg/dl) and/or drug treatment for hyperglycemia.

Recommendation: Patients with periodontitis meeting criteria for metabolic syndrome should be identified, and all risk factors for atherosclerotic CVD should be treated, beginning with lifestyle changes aimed at weight reduction. Confidence and evidence level: 1D

Metabolic syndrome is closely linked to insulin resistance and is a secondary target of lipid therapy because the risk factors for metabolic syndrome are highly concordant and, in aggregate, enhance the risk for atherosclerotic CVD at any serum level of LDL cholesterol. *Many patients with periodontitis meet criteria for the metabolic syndrome.* Because measures of systemic inflammation are a common feature of periodontitis and metabolic syndrome, it may be particularly important to identify patients who meet these criteria for CVD prevention strategies.

VII. Special Considerations in the Treatment of Atherosclerotic CVD in Patients with Periodontitis

No reported studies present evidence that patients with periodontitis and atherosclerotic CVD should receive different treatment from other patients with CVD, with the possible exception of the use of calcium channel blockers. Recent studies suggest that standard treatments of periodontitis in patients with CVD are effective. The panel did make special note that additional studies are needed regarding the effect of other drugs used in cardiovascular medicine on periodontitis. There is, however, no conceptual basis for concern that any current standard treatment for periodontitis should be altered in patients with concurrent atherosclerotic CVD.

Clinical Recommendations: Patients with Atherosclerotic Cardiovascular Disease with or without a Previous Diagnosis of Periodontitis

I. Patients with Atherosclerotic CVD and Previous Diagnosis of Periodontitis
Recommendation: Periodontists and physicians managing patients with CVD should closely collaborate to optimize CVD risk reduction and periodontal care. Confidence and evidence level: 1D

II. Patients with Atherosclerotic CVD and No Previous Diagnosis of Periodontitis
Recommendation A: Periodontal evaluation should be considered in patients with atherosclerotic CVD who have signs or symptoms of gingival disease, significant tooth loss, and unexplained elevations of hsCRP or other inflammatory biomarkers. Confidence and evidence level: 2D

Recommendation B: Periodontal evaluation of patients with atherosclerotic CVD should include a comprehensive examination of periodontal tissues, as assessed by visual signs of inflammation and bleeding on probing, loss of connective tissue attachment detected by periodontal probing measurements, and bone loss assessed radiographically. If patients have untreated or uncontrolled periodontitis, they should be treated with a focus on reducing and controlling the bacterial accumulations and eliminating inflammation. Confidence and evidence level: 2D

Recommendation C: When periodontitis is newly diagnosed in patients with atherosclerotic CVD, periodontists and physicians managing patients' CVD should closely collaborate to optimize CVD risk reduction and periodontal care. Confidence and evidence level: 1D