

## Parameter on Systemic Conditions Affected by Periodontal Diseases\*

The American Academy of Periodontology has developed the following parameter on systemic conditions affected by periodontal diseases. It is well known that systemic conditions may affect the onset, progression, and treatment of such diseases (see Parameter on Periodontitis Associated With Systemic Conditions, pages 876-879). The concept of periodontal diseases as localized entities affecting only the teeth and supporting apparatus is increasingly being questioned. Periodontal diseases may have widespread systemic effects. While these effects may be limited in some individuals, periodontal infections may significantly impact systemic health in others, and may serve as risk indicators for certain systemic diseases or conditions. As part of the approach to establishing and maintaining health, patients should be informed of the possible effects of periodontal infection on their overall well-being. Given this information, patients should then be able to make informed decisions regarding their periodontal therapy. *J Periodontol* 2000;71:880-883.

### KEY WORDS

Infection/complications; periodontal diseases/complications; risk factors; systemic diseases; periodontium/physiopathology.

### CLINICAL DIAGNOSIS

#### Definition

The role of local infections in generalized disease is well established (for example, in oral-derived bacteremia and infective endocarditis). While much information is available concerning the potential effects of systemic conditions and diseases on the periodontium, less is known about the consequences of a diseased periodontium on systemic health. The periodontium may serve as a reservoir of bacteria, bacterial products, and inflammatory and immune mediators which can interact with other organ systems remote from the oral cavity. Periodontal infections may increase the risk for certain conditions by contributing to disease pathogenesis or by serving as a source of infective organisms.

#### Patient Evaluation

1. A comprehensive periodontal evaluation should be performed as described in the Parameter on Comprehensive Periodontal Examination (pages 847-848).
2. The medical history should be evaluated for existing systemic diseases or conditions, medications, and risk factors for systemic diseases.

3. Other health care providers may be consulted as indicated by the patient's systemic health status, periodontal condition, and proposed treatment. Any consultation should be documented.

### THERAPEUTIC GOALS

The therapeutic goals are to diagnose periodontal infections which may impact on the patient's systemic health; to inform the patient of possible interactions between the patient's periodontal disease and systemic condition; and to establish periodontal health which may minimize potential negative influences of periodontal infections.

Research and clinical experience indicate that periodontal infections may have an impact on the following diseases or conditions:

1. Diabetes mellitus;
2. Pregnancy;
3. Cardiovascular diseases.

Preliminary evidence suggests that periodontal infections may also be associated with pulmonary disease and other remote site infections.

### TREATMENT CONSIDERATIONS

#### Diabetes Mellitus

Periodontitis may adversely affect glycemic control in diabetes. It may also be associated with an increased

\* Approved by the Board of Trustees, American Academy of Periodontology, May 1999.

risk of cardiovascular complications associated with diabetes. Periodontal treatment, especially in patients with severe periodontitis and poorly controlled diabetes, may result in improvement in glycemic control. Treatment considerations for patients with diabetes mellitus include:

1. Diagnosis of the patient's periodontal condition.
2. Consideration of consultation with the patient's physician to advise of the presence of periodontal infection and proposed treatment.
3. Consideration of diagnosis and duration of diabetes; level of glycemic control; medications and treatment history; and risk factors for periodontitis which may influence diabetic complications.
4. Education of the patient regarding the possible impact of periodontal infection on glycemic control.
5. Periodontal therapy and patient motivation to establish and maintain periodontal health. Consideration may be given to the use of systemic antibiotics in conjunction with mechanical therapy (see Parameter on Periodontitis Associated With Systemic Conditions, pages 876-879).

### **Pregnancy**

Women with periodontitis may have an increased risk for pre-term low birth weight delivery. Treatment considerations for pregnant patients include:

1. Diagnosis of the patient's periodontal condition.
2. Consideration of consultation with the patient's physician to advise of the presence of periodontal infection and proposed treatment.
3. Consideration of gestational period; status of pregnancy; and risk factors for periodontitis which may influence pregnancy outcomes.
4. Education of the patient regarding the possible impact of periodontal infection on pregnancy outcome.
5. Periodontal therapy and patient motivation to establish and maintain periodontal health (see Parameter on Periodontitis Associated With Systemic Conditions, pages 876-879).

### **Cardiovascular Diseases**

**Coronary artery disease.** Individuals with periodontal disease may have significantly increased risk of coronary heart disease and related events such as angina pectoris and myocardial infarction. Periodontal pathogens may contribute to atherogenic changes and thromboembolic events in the coronary arteries. Similar processes may occur in other arteries. For example, periodontal disease may increase the risk of cerebral ischemia and non-hemorrhagic stroke.

**Infective endocarditis.** While bacteremias may occur in individuals with a healthy periodontium, they may be intensified in patients with periodontitis.

Treatment considerations for patients at risk for or with existing cardiovascular diseases include:

1. Diagnosis of the patient's periodontal condition.
2. Consideration of consultation with the patient's physician to advise of the presence of periodontal infection and proposed treatment. The American Heart Association guidelines should be followed for patients at risk for infective endocarditis.
3. Consideration of diagnosis and status of cardiovascular disease; treatment and medications; and risk factors for periodontitis which may influence coronary artery disease.
4. Education of the patient regarding the possible impact of periodontal infection on the cardiovascular system.
5. Periodontal therapy and patient motivation to establish and maintain periodontal health (see Parameter on Periodontitis Associated With Systemic Conditions, pages 876-879).

### **OUTCOMES ASSESSMENT**

The desired outcome of therapy is to prevent adverse systemic consequences of existing periodontal infection via:

1. Knowledge of the patient's medical history and systemic status, the periodontal condition, and the possible interactions between oral and systemic health or disease.
2. Reduction of clinically detectable plaque and periodontal pathogens to a level compatible with periodontal health.
3. Reduction of clinical signs of gingival inflammation.
4. Reduction of probing depths.
5. Stabilization or gain of clinical attachment.
6. Control of acute periodontal infections.
7. Addressing the risk factors for periodontal disease as they affect the systemic condition.

### **SELECTED RESOURCES**

1. Aldridge JP, Lester V, Watts TLP, Collins A, Viberti G, Wilson RF. Single-blind studies of the effects of improved periodontal health on metabolic control in Type 1 diabetes mellitus. *J Clin Periodontol* 1995;22: 271-275.
2. Andersen WC, Horton HL. Parietal lobe abscess after routine periodontal recall therapy. Report of a case. *J Periodontol* 1990;61:243-247.
3. Bartlett JG. Anaerobic bacterial infections of the lung. *Chest* 1987;91:901-909.

4. Beck JD, Garcia R, Heiss G, Vokonas PS, Offenbacher S. Periodontal disease and cardiovascular disease. *J Periodontol* 1996;67:1123-1137.
5. Beck JD, Offenbacher S, Williams R, Gibbs P, Garcia R. Periodontitis: A risk factor for coronary heart disease? *Ann Periodontol* 1998;3:127-141.
6. Collins JG, Windley HW III, Arnold RR, Offenbacher S. Effects of a *Porphyromonas gingivalis* infection on inflammatory mediator response and pregnancy outcome in hamsters. *Infect Immun* 1994;62:4356-4361.
7. Collins JG, Smith MA, Arnold RR, Offenbacher S. Effects of *Escherichia coli* and *Porphyromonas gingivalis* lipopolysaccharide on pregnancy outcome in the golden hamster. *Infect Immun* 1994;62:4652-4655.
8. Dajani AS, Taubert KA, Wilson W, et al. Prevention of bacterial endocarditis. Recommendations by the American Heart Association. *JAMA* 1997;277:1794-1801.
9. Dasanayake AP. Poor periodontal health of the pregnant woman as a risk factor for low birth weight. *Ann Periodontol* 1998;3:206-212.
10. DeStefano F, Anda RF, Kahn HS, Williamson DF, Russell CM. Dental disease and risk of coronary heart disease and mortality. *Br Med J* 1993;306:688-691.
11. Drangsholt MT. A new causal model of dental diseases associated with endocarditis. *Ann Periodontol* 1998;3:184-196.
12. Gibbs RS, Romero R, Hillier SL, Eschenbach MD, Sweet RL. A review of premature birth and subclinical infection. *Am J Obstet Gynecol* 1992;166:1515-1528.
13. Goteiner D, Sonis ST, Fasciano R. Cavernous sinus thrombosis and brain abscess initiated and maintained by periodontally involved teeth. *J Oral Med* 1982;37:80-83.
14. Grau AJ, Buggle F, Ziegler C, et al. Association between acute cerebrovascular ischemia and chronic and recurrent infection. *Stroke* 1997;28:1724-1729.
15. Grossi SG, Genco RJ. Periodontal disease and diabetes mellitus: A two-way relationship. *Ann Periodontol* 1998;3:51-61.
16. Grossi SG, Skrepcinski FB, DeCaro T, et al. Treatment of periodontal disease in diabetics reduces glycated hemoglobin. *J Periodontol* 1997;68:713-719.
17. Grossi SG, Skrepcinski FB, DeCaro T, Zambon JJ, Cummins D, Genco RJ. Response to periodontal therapy in diabetics and smokers. *J Periodontol* 1996;67:1094-1102.
18. Hayes C, Sparrow D, Cohen M, Vokonas PS, Garcia RI. The association between alveolar bone loss and pulmonary function: The VA dental longitudinal study. *Ann Periodontol* 1998;3:257-261.
19. Herzberg MC, Meyer MW. Dental plaque, platelets, and cardiovascular diseases. *Ann Periodontol* 1998;3:151-160.
20. Herzberg MC, Meyer MW. Effects of oral flora on platelets: Possible consequences in cardiovascular disease. *J Periodontol* 1996;67:1138-1142.
21. Hill GB. Preterm birth: Associations with genital and possibly oral microflora. *Ann Periodontol* 1998;3:222-232.
22. Hillier SL, Martius J, Krohn M, Kiviat N, Holmes KK, Eschenbach DA. A case-control study of chorioamnionic infection and histologic chorioamnionitis in pre-maturity. *New Engl J Med* 1988;319:972-978.
23. Kinane DF. Periodontal diseases' contributions to cardiovascular disease: An overview of potential mechanisms. *Ann Periodontol* 1998;3:142-150.
24. Lamster IB, Grbic JT, Mitchell-Lewis DA, Begg MD, Mitchell A. New concepts regarding the pathogenesis of periodontal disease in HIV infection. *Ann Periodontol* 1998;3:62-75.
25. Loesche WJ, Schork A, Terpenning MS, Chen Y-M, Dominguez BL, Grossman N. Assessing the relationship between dental disease and coronary heart disease in elderly U.S. veterans. *J Am Dent Assoc* 1998;129:301-311.
26. Johanson WG, Pierce AK, Sanford JP, Thomas GD. Nosocomial respiratory infections with gram-negative bacilli. The significance of colonization of the respiratory tract. *Ann Intern Med* 1972;77:701-706.
27. Marks PV, Patel KS, Mee EW. Multiple brain abscesses secondary to dental caries and severe periodontal disease. *Br J Oral Maxillofac Surg* 1988;26:244-247.
28. Mattila KJ. Dental infections as a risk factor for acute myocardial infarction. *Eur Heart J* 1993;14(Suppl. K):51-53.
29. Mattila KJ, Nieminen MS, Valtonen VV, et al. Association between dental health and acute myocardial infarction. *Br Med J* 1989;298:779-781.
30. Mattila KJ, Valle MS, Nieminen MS, Valtonen VV, Hietaniemi KL. Dental infections and coronary atherosclerosis. *Atherosclerosis* 1993;103:205-211.
31. Mealey BL. Periodontal implications: medically compromised patients. *Ann Periodontol* 1996;1:256-321.
32. Miller LS, Manwell MA, Newbold D, et al. The relationship between reduction in periodontal inflammation and diabetes control: A report of 9 cases. *J Periodontol* 1992;63:843-848.
33. Nishimura F, Takahashi K, Kurihara M, Takashiba S, Murayama Y. Periodontal disease as a complication of diabetes mellitus. *Ann Periodontol* 1998;3:20-29.
34. Offenbacher S, Jared HL, O'Reilly PG, et al. Potential pathogenic mechanisms of periodontitis-associated pregnancy complications. *Ann Periodontol* 1998;3:233-250.
35. Offenbacher S, Katz V, Fertik G, et al. Periodontal infection as a possible risk factor for preterm low birth weight. *J Periodontol* 1996;67(Suppl.):1103-1113.
36. Page RC. The pathobiology of periodontal diseases may affect systemic diseases: Inversion of a paradigm. *Ann Periodontol* 1998;3:108-120.
37. Saal CJ, Mason JC, Cheuk SL, Hill MK. Brain abscess from chronic odontogenic cause: report of case. *J Am Dent Assoc* 1988;117:453-455.
38. Sammalkorpi K. Glucose intolerance in acute infections. *J Intern Med* 1989;225:15-19.
39. Scannapieco FA, Mylotte JM. Relationships between periodontal disease and bacterial pneumonia. *J Periodontol* 1996;67:1114-1122.
40. Scannapieco FA, Stewart EM, Mylotte JM. Colonization of dental plaque by respiratory pathogens in medical intensive care patients. *Crit Care Med* 1992;20:740-745.
41. Soskolne WA. Epidemiological and clinical aspects of periodontal diseases in diabetics. *Ann Periodontol* 1998;

- 3:3-12.
42. Syrjänen J, Peltola J, Valtonen V, Iivanainen M, Kaste M, Huttunen JK. Dental infections in association with cerebral infarction in young and middle-aged men. *J Int Med* 1989;225:179-184.
  43. Syrjänen J, Valtonen V, Iivanainen M, Kaste M, Huttunen JK. Preceding infection as an important risk factor for ischaemic brain infarction in young and middle aged patients. *Br Med J* 1988;296:1156-1160.
  44. Taylor GW, Burt BA, Becker MP, et al. Severe periodontitis and risk for poor glycemic control in patients with non-insulin-dependent diabetes mellitus. *J Periodontol* 1996;67:1085-1093.
  45. Thorstensson H, Kuylensteirna J, Hugoson A. Medical status and complications in relation to periodontal disease experience in insulin-dependent diabetics. *J Clin Periodontol* 1996;23:194-202.
  46. Williams RC, Mahan CJ. Periodontal disease and diabetes in young adults. *JAMA* 1960;172:776-778.
  47. Yki-Järvinen H, Sammalkorpi K, Koivisto VA, Nikkilä EA. Severity, duration and mechanism of insulin resistance during acute infections. *J Clin Endocrinol Metab* 1989;69:317-323.