

# White Papers

## ORAL INFLAMMATION

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## Oral Inflammation and Patient Management

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The effects of oral inflammation are not limited to oral health.<sup>1</sup> The previous five installments in this series of articles have addressed various aspects of the relationship between oral inflammation and systemic conditions.<sup>2-6</sup> For example, periodontal disease may increase the risk for cardiovascular disease,<sup>4</sup> respiratory diseases,<sup>5</sup> osteoporosis,<sup>6</sup> preterm delivery and low birth weight newborns;<sup>4</sup> it can also accelerate the progression of diabetes.<sup>3</sup> In this respect, it is critical to manage oral inflammation not only for oral health, but also to maintain the general health of patients.

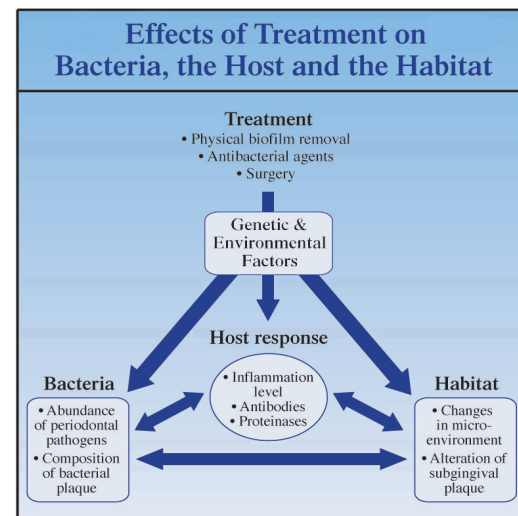
### Oral Inflammation

Oral inflammation is the basis of gingivitis and periodontitis; it is caused by bacteria that initiate the destruction of gingival tissue and compromise periodontal attachment.<sup>7,8</sup> Bacteria adhere to oral surfaces and aggregate to produce plaque, or dental biofilm, that are complex and physically structured microbial communities able to harvest several pathogenic species in large numbers.<sup>9,10</sup> Dental biofilm is largely composed of polysaccharides that form a physical barrier which protects bacteria from the effects of antibiotics, antiseptics, and host defense mechanisms.<sup>10</sup>

The pathogenic bacteria in the periodontium have the ability to evade the host defense mechanisms that would routinely control such infections and prevent disease.<sup>8</sup> This breakdown in the host defense mechanism appears as an inflammatory response, which can itself contribute to tissue pathology, promoting the release of tissue-derived enzymes that destroy the extracellular matrix and bone.<sup>8</sup> Antigens released by bacterial cells stimulate the production of antibodies which are not effective at killing bacteria within biofilm, but may form immune complexes that further damage surrounding tissues.<sup>9</sup>

The main underlying concepts for the treatment of oral inflammation are summarized in the figure at right. Therapy is targeted at three interdependent components to prevent initiation or halt progression of oral inflammation. Treatment requirements and

effectiveness are modulated by genetic and environmental factors. The first component is to remove dental biofilm and reduce the levels of bacteria, which also changes the composition of the oral microflora. The second component involves the modulation of the host response (inflammation) by limiting the production of antibodies and the release of proteinase caused by bacterial tissue invasion. The last component involves alteration of the oral microhabitat by modifying the physical features that facilitate the growth and accumulation of bacteria.



Adapted from Socransky and Haffajee, 2002<sup>10</sup>

Several factors can contribute to oral inflammation (see table overleaf). Some factors can be modified to minimize the risk of oral diseases and improve control of oral inflammation, while others will help to define an individual treatment plan for optimal oral health.<sup>11</sup>

### Management of the Patient with Oral Inflammation

The optimal strategy to eliminate dental biofilm from the oral cavity has four dimensions: physical removal of dental biofilm; destruction of the remaining bacteria using antimicrobial agents; routine oral hygiene habits; and patient education.<sup>10</sup>

### Instrumentation and Physical Removal of Biofilm

Dental biofilm offers remarkable resistance to host defense mechanisms and antibacterial agents. The most effective method to disrupt dental biofilm is through mechanical means, such as the use of power and hand instrumentation, and oral physiotherapy aids such as toothbrushes, floss, and other interdental devices.<sup>7,10</sup> Mechanical alteration of dental biofilm disrupts the bacterial structure and is essential in dislodging bacteria, reducing plaque, preventing dental calculus, and maintaining subgingival bacteria at a level below that which is capable of initiating inflammation.<sup>7</sup>

#### Risk Factors Contributing to Oral Inflammation

- Aging
- Concomitant use of medication
- Diabetes
- Gender
- Genetics
- HIV infection
- Nutrition
- Pregnancy
- Smoking
- Specific periodontal pathogens
- Stress
- Substance abuse
- Systemic conditions (e.g., immunosuppression)

From the American Academy of Periodontology, 2001<sup>7</sup>

Alteration of the microenvironment surrounding the subgingival microbiota can affect numbers, proportions, and prevalence of bacterial species present in the oral cavity. Some physical features predisposing to the accumulation of plaque, such as over-contoured crowns, open or overhanging margins, narrow embrasure space, open contacts, caries, or tooth malposition, should be preventively corrected to improve the patient's ability to remove the biofilm.<sup>11</sup> Gingival deformities hindering biofilm control should be corrected by adequate surgery to reduce the potential for plaque accumulation.<sup>10,11</sup> Daily removal of supragingival plaque reduces gingival inflammation and also controls the amount of subgingival plaque. It also can significantly reduce the proportion of known periodontal pathogens such as *B. forsythus*, *P. gingivalis*, and *A. actinomycetemcomitans*.<sup>10</sup>

### Antibacterial Agents

Despite frequent mechanical cleaning, the rapid multiplication rates of bacteria warrant consistent efforts to decrease these pathogens to baseline levels.<sup>10</sup> Use of topical oral rinses containing antibacterial agents, such as chlorhexidine (Peridex<sup>®</sup>, PerioGard<sup>®</sup>) or essential oils (Listerine<sup>®</sup>), or of an antibacterial dentifrice (Colgate<sup>®</sup> Total<sup>®</sup>),

will help to prevent or delay bacterial accumulation and dental biofilm formation.<sup>8</sup> Daily brushing with Colgate Total, which is the only toothpaste in the U.S. that contains the antibacterial agent triclosan, has been shown to reduce the growth of oral bacteria and the formation of plaque.<sup>12</sup> It uses a patented copolymer to improve retention of the bactericide triclosan to oral surfaces, providing 12-hour antibacterial action. In addition, it provides direct inhibition of potent inflammatory mediators, thus affecting the inflammation process as well.<sup>10,12</sup> Topical agents improve the control of supragingival plaque, which will also have indirect effects on subgingival plaque.<sup>7</sup>

### Individualized Patient Oral Hygiene Program

A long-term treatment plan for managing chronic oral inflammation should include regular maintenance care by an oral healthcare professional for thorough elimination of dental biofilm and calculus, and to perform periodic evaluation of the periodontal status.<sup>7</sup> Frequency of visits—every three to six months—depends on the patient's condition and risk factors, and the extent of bacterial infection, oral inflammation, and periodontal disease. Diagnosis of the periodontal condition is based on traditional clinical assessments, including the presence of clinical signs of inflammation (gingival bleeding), probing depth, loss of clinical attachment, radiographic findings and various symptoms such as pain, ulceration, and amount of observable plaque and calculus.<sup>13</sup> An accurate diagnosis of periodontal disease severity is essential for selecting an appropriate treatment and maintenance strategy for a given patient. For the patient with gingivitis, a combination of routine personal plaque control in combination with professional removal of plaque, calculus, and local contributing factors may be needed to reduce inflammation. At-home use of an antimicrobial toothpaste containing triclosan/copolymer (Colgate Total) has been shown to improve the outcome of a gingivitis treatment regimen and reduce oral inflammation.<sup>8,12</sup>

### Self-Care Communication and Education

Control of oral inflammation essentially relies on preventive measures to inhibit dental biofilm accumulation, and can be achieved by maintaining good oral hygiene involving daily flossing and brushing with an antibacterial antiplaque toothpaste. Patient education and support are essential for successful prevention or treatment of gingivitis and oral inflammation, and personalized oral hygiene instruction should be provided, taking into account each patient's profile. Patient non-compliance to treatment is a frequent cause of failure to prevent

inflammation and periodontal disease.<sup>11</sup> Consequences of a lack of attention to the daily treatment regimen should be explained to patients to reinforce their motivation to perform the required daily preventive measures.<sup>11</sup>

An individualized treatment plan is needed to monitor the maintenance of the oral environment and the progression of oral inflammation. Frequent follow-up evaluation of a patient's condition to determine the need for further treatment is recommended.<sup>11</sup> Communication between practitioners and patients is an essential aspect of oral inflammation management. Oral healthcare professionals should advise patients on how to modify risk factors to reduce oral inflammation. Cessation of smoking, a key risk factor for oral disease, should be advocated.

A good plaque control program, coupled with regular periodontal maintenance by an oral healthcare professional and reduction of risk factors, can effectively manage oral inflammation in the majority of patients.

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