

Peri-Implantitis and Biofilm: Inescapable Bio-Linkage

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Introduction

Dental Implants have changed the face of dentistry over the last three decades. Dental implants have become increasingly common for the management of tooth loss. In the late 1970's, a Swedish orthopedist named Per-Ingvar Brånemark introduced what he termed osseointegrated implants to dental practice [1]. A dental implant is a titanium screw which is placed into bone to replace missing teeth. The implant mimics the root of a tooth in function. It is not only biocompatible, but actually fuses to bone by osseointegration. The growth of osseointegrated implants symbolizes one of the most significant breakthroughs in current dental practice in the oral rehabilitation of partially or fully edentulous patients [2]. As with most treatment procedures in dentistry today, dental implants not only involve scientific discovery, research and understanding, but also application in clinical practice. Dental plaque represents a classic example of both a biofilm and a microbial community, in that it displays emergent properties, i.e., plaque displays properties that are more than the sum of its constituent members [3], and microbial communities are ubiquitous in nature and usually exist attached to a surface as a spatially organized biofilm. Pathogens of the subgingival microbiota can interact with host tissues even without direct tissue penetration, and the subgingival microbiota accumulate on the oral cavity to form an adherent layer of plaque with the characteristics of a biofilm. Dental biofilm forms via an ordered sequence of events, resulting in structured and functionally organized species rich microbial community and modern molecular biological techniques have identified about 1000 different bacterial species in the dental biofilm, twice as many as can be cultured. Peri-implantitis is a site-specific infectious disease that causes an inflammatory process in soft tissues, and bone loss around an osseointegrated implant in function. The aetiology of the implant infection is conditioned by the status of the tissue surrounding the implant, implant design, degree of roughness, external morphology, and excessive mechanical load. The microorganisms most commonly associated with implant failure are spirochetes and mobile forms of Gram-negative anaerobes, unless the origin is the result of simple mechanical overload. Diagnosis is based on changes of color in the gingiva, bleeding and probing depth of peri-implant pockets, suppuration, X-ray, and gradual loss of bone height

around the tooth. Treatment will differ depending upon whether it is a case of peri-implant mucositis or peri-implantitis. The management of implant infection should be focused on the control of infection, the detoxification of the implant surface, and regeneration of the alveolar bone [4].

Recent advances with next generation anti-calculus mouth rinse such as Periogen will play a key role in preventing peri-implantitis. Anticalculus oral rinse (Periogen) is comprised of five innovative key ingredients: tetrapotassium pyrophosphate, sodium tripolyphosphate, baking soda, citric acid and a small amount of fluoride. When added to water, ingredients baking soda and citric acid add fizz in order to draw the active tartar-dissolving ingredients into solution and to establish a healthy 7.6 pH. The clinical study showed that the presence of tetrapotassium pyrophosphate and sodium tripolyphosphate in mouthwash solution significantly inhibited the development of dental calculus. Thus, the tetrapotassium pyrophosphate and sodium tripolyphosphate treatment formulated with patented balance mixture resulted in a reduction of tartar formation as a result of reduced calcification of dental plaque [5].

In near future research will focus on reducing the microbial bio-load on the implant surface. More emphasis should be laid on prevention and maturation of dental plaque into calculus which act as a reservoir for microbiological growth and proliferation.

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