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Short Communication

A Novel Concept to Promote the Health of Dental Implants: Host-Modulation Therapy

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DESCRIPTION

Of particular interest to the readers of this journal, "Physical Medicine and Rehabilitation", recent studies (and experience) in the field of "Oral and Dental Rehabilitation", indicate that Host-Modulation Therapy (HMT), originally developed as adjunctive treatment for the management of microbial-induced inflammatory periodontal disease (periodontitis) around natural teeth, is also likely applicable to promote the health of soft tissues, and jaw bone (mandible/maxilla) supporting dental implants. As background, Host-Modulation Therapy, or HMT, was proposed soon after the wide-spread recognition that the inflammatory response in periodontitis was initiated by specific anaerobic gram-negative microorganisms in the dental biofilm (dental plaque), including, but not only Porphyromonas gingivalis, Tannerella forsythia, and Treponema denticola [1]. Soon thereafter, however, the ability of the inflammatory response (triggered by the host tissues responding to the microbial metabolites and toxins notably lipopolysaccharide/endotoxin) to destroy the largely collagenous periodontal connective tissues (the gingiva, periodontal ligament, and alveolar bone matrix), was linked to excessive production and activity of proteolytic enzymes notably the matrix metalloproteinases. These mediators particularly include the collagenases, MMP-8 and MMP-13, the gelatinase/type IV collagenase, or MMP-9, as well as other neutral proteinases (which are optimally active at physiologic or neutral pH in tissue fluids), including cathepsin G, and leukocyte elastase. The details of these pathologic, host-mediated mechanisms in periodontal diseases were recently described [2-4].

However, dental implants have become a dominant treatment strategy to manage the loss of teeth in adults which is largely the result of periodontitis, not (as is the case in children) due to dental caries or "tooth decay" [5]. In this regard, it has been estimated that 25%-44% of dental implants, which are increasingly and commonly used to replace natural teeth in patient's jaws, will be significantly compromised by the all-too-common inflammatory/collagenolytic diseases, perimucositis and periimplantitis [2,4]. Moreover, it is well-recognized in the field that the impact of these two inflammatory diseases, particularly the latter which involves the oral mucosa and the maxillary and mandibular bone supporting the implants, is more severe for periimplantitis than inflammatory disease around natural teeth (periodontitis), and reversal of this inflammation takes longer in perimplant tissues [2,6-9]. In addition, this common dental disease, periodontitis, has long been known to promote (if severe enough) systemic inflammation which can increase the risk for severe medical diseases, such as CVD, stroke, and arthritis [2,6]. However, to the best of our knowledge, the impact of periimplantitis on systemic inflammation has not yet been addressed in clinical (or animal) studies. Thus, the authors now propose that if systemic inflammation is demonstrated in patients with periimplantitis, then studies should be done to determine the efficacy, both locally in the mouth, and systemically in blood samples (to measure inflammatory diagnostic markers, such as high-sensitivity C-reactive protein, interleukins, and prostanoids), of HMTs such as NON-antibiotic-dose doxycycline ("NAD" ie., Periostat®, Oracea®, both FDA-approved) and other HMTs, such as resveratrol [3,4] and curcumins [10-13]. In this regard, anecdotal observations in clinical practice (Joseph Bacigalupo, DDS, Garden City, NY), based on adjunctive treatment of patients with dental implants administered long-term NAD, indicated efficacy in reducing the incidence and severity of periimplantitis (Table 1). However, well-controlled double-blind placebo-controlled clinical trials are needed to (a) confirm this "clinical observation", and (b) to scientifically determine whether systemic inflammation is a complication of periimplantitis, and is reduced or prevented by this HMT.

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Patient No.	Age (yr)	Gender	No. of implants/ duration	Duration of HMT	Prevented Pe.I.	Reduced Pe.I.	Pe.I. Currently: clinical radiographic evidence
#1	73	M	5/9 years †	6 years		•	None
#2	50	F	1/12 years †	4 years	•		None
#3	84	F	2/19 years †	17 years	•		None
#4	65	F	4/19 years †	3 years		•	None
#5	62	M	1/11 years	3 years	•		None

Note: † 5 patients of Dr. Joseph Bacigalupo, Garden City, N.Y. (mean age=66.8 years) with 13 implants in place for a mean of 14 years, were treated with Periostat® for an average of 6.6 years. All 5 patients currently show no clinical or x-ray evidence of Pe.I. (note that 4 of 5 Pe.I. patients are or were smokers †, are elderly, and both issues are risk-factors). In this group, using a conservative estimated rate of 25% for the incidence of periimplantitis, there should have been at least several implants affected by some degree of disease, but no clinical or radiographic evidence was observed (J. Bacigalupo, personal communication). Modified from [2,12,13].

Table 1: Management of Periimplantitis (Pe.I.) by oral (systemic) host-modulation therapy† in a private practice.

CONFLICT OF INTEREST

Lorne Golub is listed as an inventor on several patents on host-modulation therapies and these have been fully assigned to his institution, The State University of New York at Stony Brook.

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