Guest Editorial

Antimicrobials and Periodontal Disease: Quo Vadis?

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By now most dental health professionals are familiar with the new antibiotic prophylaxis guidelines from the American Heart Association (AHA) for the prevention of bacterial endocarditis and the American Dental Association and the American Academy of Orthopaedic Surgeons (ADA/AAOS) for the management of the dental patient with a total joint prosthesis. It should be apparent that these documents place greater restrictions on antibiotic prophylaxis. I was one who participated in the formulation of the documents; one of our major concerns was the impact of widespread overuse of antibiotics for prophylaxis and its impact on the serious global problems of microbial resistance to these agents.

At the same time, however, it was apparent that a parallel phenomenon was occurring in periodontics that appeared incongruous with if not antithetical to the guidelines of the AHA and the ADA/AAOS: the seemingly unbridled advocacy of the use of antimicrobials in the management of periodontal disease. This contrast in attitude is most pronounced when one considers that bacterial endocarditis is a life-threatening disease and periodontitis is not. The AHA has sharpened its focus on endocarditis prevention in an attempt to reduce the contribution of unwarranted antibiotic prophylaxis to the very serious difficulties with microbial resistance to antibiotics. Simultaneously, other quarters promote the use of antimicrobials on millions of patients for diseases (periodontitis and gingivitis) that can be contained rather well with mechanical means.

The lay and professional reports of microbial resistance to antibiotics should promote a long pause as we reorder our thinking about antibiotic therapy. Presently there are four reports of vancomycin-methicillin-resistant *Staphylococcus aureus* in the world, a true Andromeda strain. Approximately 15% of enterococci in hospitals are vancomycin-resistant. Enterococci and staphylococci are sharing resistance genes on the skin of hospitalized patients. Tens of thousands have died in Central Africa from Shigella that are resistant to the quinolones. In the United States, 25% of *Streptococcus pneumoniae* isolates are resistant to the penicillins via an altered penicillin-binding protein that apparently has been transferred to viridans streptococci resulting in 13% to 49% of these hospital isolates also resistant to the penicillins (one wonders how much the unrestricted use of amoxicillin-clavulanate has contributed to this altered penicillin-binding protein-resistance mechanism).

Both metronidazole and tetracycline have been prominently advocated in the management of periodontitis. Resistance to metronidazole has been detected in *Trichomonas* and *Actinobacillus actinomycetemcomitans* and most importantly in *Helicobacter pylori,* which is responsible for peptic ulcer and possibly gastric cancer. Tetracycline is a major inducer of microbial resistance and its presence in the gastrointestinal tract can promote the transfer of multiple antibiotic resistance genes 100 to 1,000 times faster than if the tetracycline were absent. The question arises as to whether other chemicals (such as those in mouthwashes and oral irrigants) not only select for resistant bacteria, but more importantly function also as inducers of resistance gene transfer among bacteria. Among antibiotics only tetracycline use has declined in the

past decades, leading to a renewed interest in its potential efficacy against very serious pathogens such as vancomycin-resistant enterococci and penicillin-resistant pneumococci.

Widespread use of antimicrobials in periodontal disease must then be seriously questioned, as this practice may both remove the antimicrobials as effective agents for far more serious disorders and/or allow them to function as inducers of microbial resistance. When antibiotics are used against bacteria, four things can happen, three of which are undesirable. The antibiotics may function as an aid to host defenses against pathogenic bacteria resulting in clinical cure, or the antibiotic may cause chromosomal antibiotic resistance mutations, select out already resistant bacteria, or cause the transfer of resistance genes to previously susceptible bacteria.

It is apparent that antimicrobials must be used very circumspectly in periodontal therapy. It is not for us to prove that these chemicals may adversely affect individual or global microbial ecology but rather for their proponents to prove that they do not. As with all other therapies, proper risk-benefit and cost-benefit ratios must be determined.

Systemic antimicrobial chemotherapy should be reserved for the rapidly progressive/refractory periodontitis patients in whom mechanical therapy has not been able to place the disease in remission. The choice of the antibiotic agent should, if possible, be dictated by culture and sensitivity tests, as microbial sensitivity to antibiotics can vary greatly depending on local patterns of antibiotic use. Local antimicrobial delivery systems await these cost- and risk-benefit determinations.

Microbes appear capable of outwitting the human race at every turn. Let us avoid giving them another chance to prove their unsurpassed ability to survive.

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