GREAT ORAL HEALTH

Naturally Advanced Oral Care

Oral Probiotics–Fighting Fire with Fire!

One of the hottest topics in medicine, healing and with researchers is the vast, complex and microbial world that makes up our microbiome. These microbiota are critical to our health, our emotional well being and our very survival.

Probiotics have been best defined as “live microorganisms which when administered in adequate amounts confer a health benefit on the host.”

Increasingly over the past years, we have come to understand the critical importance of an active, healthy and balanced microbiome or microbiota–the ecological community of microorganisms that share our body space.

The discovery of pathological bacteria, and the subsequent adoption of sanitation have done much to improve our lifespans and quality of life. But the over zealous use of antibacterial agents, chemicals, antibiotics as well as poor food choices have lead to the disrupted ecologies within our bodies, particularly in the gut and the oral cavity.

It is a fact, Man needs an active and balanced ecology of bacteria both internally and externally in order to live well and to be healthy.

The oral cavity is no exception to this principle and the mouth has a very active ecology of microorganisms. Problems arise when some of these, such as the S. Mutans strain, gain strength in the colony and their life cycle byproducts (such as enamel eating acid or sulfurous gases) lead to serious problems such as dental caries, periodontal disease and chronic bad breath.

With poor oral health now connected to serious physical conditions beyond the mouth–from heart disease to chronic inflammation–this is not a condition to be taken lightly.

Good, consistent oral hygiene is a key to keeping the problems under control but a powerful improvement would be to attack the problems at their source–bacterial overgrowth. Simply killing off the “bad bacteria” is a poor solution, as ALL bacteria (good and bad) are attacked and killed as well.

The Fundamental Theory of the Use of Probiotics and Oral Health

The theory underlying the efficacy of oral probiotic bacteria is that they function by competing against oral pathogens for nutrients, growth factors and site of adhesion.

Once they adhere to the oral cavity, the probiotic bacteria aggregate and inhibit the adhesion of the harmful microorganisms by producing bacteriocins or other antimicrobial compounds such as acids or peroxides.

Therefore probiotics can help to prevent the inflammation of oral cavity and the oral tissue destruction by oral pathogens. To do so, the probiotic must adhere successfully to the surfaces of oral cavity in order to avoid or reduce its rapid exclusion from the oral cavity.

Those microorganisms that have the ability to co-aggregate are thought to have a greater advantage over non co-aggregating organisms, which are easily removed from the mouth.

First the probiotics competes with the oral pathogens for adhesion site.

Then they colonize the oral surface and as they aggregate the oral surface, they compete with extant oral pathogens for nutrients, growth factors and they also produce antimicrobial compounds–including organic acids, hydrogen peroxide, carbon peroxide, diacetyl, low molecular weight antimicrobial substances, bacteriocins, and adhesion inhibitors.

Dental Caries: Numerous scientific studies on treating dental caries support the use of probiotics to reduce dental caries risk factors (2) (3) (4) (5) (6) (7) (8) (9). It is also important that the oral probiotics used, are safe and do not introduce additional caries risk factors, such as the production of sugars. Studies on the strains L paracasei and L reuteri, for example, demonstrated that they do not ferment sucrose and so they are considered relatively safe probiotics in a caries-prophylactic perspective (10).

- Studies have shown L paracasei to be a key probiotic strain against dental caries risk factors. L paracasei exhibited antimicrobial capacity, backed by the fact that subjects without caries are colonized by Lactobacilli, which possesses a significantly increased capacity to suppress growth of mutans streptococci, compared to subjects with arrested or active caries whom lacked the Lactobacilli (11).
- An evaluation of the long-term effects of L paracasei consumption in 122 children was done over a 12 month period. The study found that significantly reduced S Mutans counts and increased lactobacilli levels existed in children who consumed a probiotic with L paracasei strains. At the end of this study, the test children had fewer caries lesions and a significant reduction (4.5 times) of the development of new caries lesions was observed in the high caries risk group (2).
- Importantly, L paracasei shows the ability to co-aggregate to S mutans that are in suspension in saliva. This works to prevent re-adhesion to plaque thus providing the means to reduce a key caries risk factor (12).
- A short-term clinical trial showed that L paracasei has the capacity to significantly reduce the count of S mutans (5). In vitro, L paracasei and other lactobacilli have shown an inhibitory effect against S mutans and other periodontal pathogens (13).
- Lactobacillus species can produce different antimicrobial components such as: organic acids, hydrogen peroxide, carbon peroxide, diacetyl, low molecular weight antimicrobial substances, bacteriocins and adhesion inhibitors to work against Streptococcus and other pathogens (14).
- A study found that the presence of L acidophilus can cause reduction in the adherence of streptococcal strains (15)
- L reuteri can reduce the population of S mutans (9). L reuteri produces reuterin, which is a broad-spectrum antimicrobial substance that works against various pathogens (16).
- In vitro, studies have been done on the capacity of coaggregation between probiotic bacteria and caries-associated strains (this relates to the capacity to inhibit mutans streptococci). L acidophilus, L paracasei and L reuteri show such capacity (17) (18), which means that they have the ability to prevent adhesion of caries-related bacteria to tooth surfaces.
- S salivarius M-18 is another probiotic strain that has been shown to compete (crowd out) the S mutans[I] strains in the colonization of oral surfaces, indicating that it can provide oral health benefits (3).
- Moreover, L salivarius, after a short-term administration trial [II], is capable of increasing the salivary buffering capacity and decreasing the S Mutans counts (4). This means that its use as a probiotic can enhance the remineralization process and prevent the development of new caries lesions.
- The oral administration of L salivarius, in tablet form resulted in a reduced plaque index and probing pocket depth in patients who were smokers as compared to a placebo group [III].

[I] *Randomized double-blind placebo controlled trial http://www.mdpi.com/2304-6767/3/2/43/htm*
[II] *Randomized double-blind placebo controlled trial http://link.springer.com/article/10.1007/s12602-013-9148-9*
[III] *Randomized double-blind placebo controlled trial http://onlinelibrary.wiley.com/doi/10.1111/j.1600-051X.2008.01306.x/abstract*

Bad Breath Treatment: Malodour afflicts 65% of Americans who expend more than $1 billion a year on over-the-counter halitosis products, many of which are ineffective because they only mask the problem.

Halitosis is primarily a bacterial disorder of mouth. Its main source is the posterior of the tongue which is the most common site for bacteria to colonize and produce malodorous substances such as volatile sulphur compounds (VSCs). VSCs are the by-products of microbial degradation of proteins, blood, mucins found in saliva, and the traces of food retained in the oral cavity.

While there are other causes for halitosis the most common reason is the imbalance of the normal microflora of the oral cavity.

Streptococcus salivarius K-12 has excellent capacity to allivate halitosis by preemptively colonizing the oral cavity as a competitive bacterium thereby reducing the number of malodour-causing bacteria. Streptococcus salivarius is a pioneer colonizer of oral surfaces and is a predominant nondisease-associated member of the oral microbiota of healthy humans (19).

Streptococcus salivarius K-12 is known to produce at least two bacteriocins and clinically, in vitro, S salivarius strains showed inhibitory activity against various halitosis-associated bacteria (20) (21) (22).

L salivarius has also anti-halitosis properties, in a clinical study it showed capacity to decrease oral malodour parameter after 2 weeks of administration (23).[I]

[I] *Open label trial http://www.oooojournal.net/article/S1079-2104(10)00209-X/abstract*

Periodontal Use and Gum Disease: Periodontal disease starts with plaque formation, then leads to the inflammation of dental tissues and the associated connective tissue.

Probiotics have proved to lower the pH of the saliva and to produce antioxidants that absorb key elements required for the formation of plaque–now the associated plaque-forming bacteria is unable, or inhibited, to form plaque. In this manner, probiotics indirectly work to prevent periodontal diseases. The findings from numerous studies show encouraging results in the use of probiotics to treat gingivitis, periodontitis and to control plaque levels. Additionally, studies have shown that oral probiotics can cause a significant reduction in the number of periodontopathogens present in plaque .

This all ties in with the generally held consideration that three factors are responsible for the occurrence of periodontal disease: 1) the presence of a susceptible host, 2) the presence of pathogens and 3) low levels of beneficial microbiota. By competing with, or killing off, pathogens and by increasing levels of beneficial microbiota oral probiotics provide effective treatment against two of these three factors and so work to prevent the occurrence of disease.

Lactobacillus reuteri has clinically been shown to be efficacious in reducing both gingivitis and plaque in patients with moderate to severe gingivitis. In a 2005 double blind, placebo-controlled study on 59 randomly selected patients with modern-to-severe gingivitis, they evaluated the oral benefits of two different strains of L. reuteri. All of the patients first received a plaque removal pretreatment. They were then divided into three groups and twice daily one group received a placebo and the other two groups received different strains of L. reuteri. After two weeks, the results showed a significant reduction in plaque scores for both the probiotic receiving groups with no reduction in the plaque scores for placebo group (24).This finding was confirmed by other studies on the use of L reuteri to inhibit the formation of plaque and deliver anti-inflammatory and antimicrobial effects.

Beneficial Periodontal Results from Lactobacillus Strains:

- The use of L reuteri can be recommended as a useful adjunct or alternative to periodontal treatment (25) especially in patients with chronic periodontits (26)
- A short-term administration of L reuteri has been shown to reduce the bleeding on probing and levels of pro-inflammatory cytokins in gingival crevicular fluid (27)
- After the administration of daily tablets, L reuteri demonstrated the clinical capacity to significantly reduce the count of Prevotella intermedia and Porphyromonas gingivalis–which are periodontal pathogens (28)
- In vitro, L acidophilus strongly inhibits Porphyromonas gingivalis–that is a known periodontal pathogen (29).
- L acidophilus has inhibitory effects on the secretion of IL1B, IL6 and IL8–which are cellular inflammatory responses induced by P gingivalis (30)
- L salivarius, when administrated for 4 weeks, showed beneficial effects on bleeding and on probing depths from periodontal pockets (23)
- In vitro, L salivarius and L paracasei showed inhibitory effects against Phorphyromonas gingivalis and Aggregatibacter actinomycetencomitans (13)

Yeast Infections and Oral Candida: C. albicans is a leading cause of fungal infection in oral cavity; it is particularly common in the elderly and in immuno-compromised patients.

While many encouraging results have been seen, further studies are needed on the effectiveness of probiotics in controlling oral candida.

- An in vitro study showed that S thermophilus inhibits adhesion by Candida albicans (31)
- S salivarius K-12 inhibits adhesion by Candida albicans to denture acrylic surfaces and to oral mucosa. This finding pointed it out as a useful probiotic for oral care (32)
- L paracasei and L reuteri showed total and moderate capacity to inhibit candida growth in vitro (17)
- In a 2010 study, Candida growth was reduced by all the lactobacilli strains tested but the effect was weaker than for S mutans reduction. The strongest inhibition on Candida albicans was displayed by L reuteri and two L plantarum strains (39)

Oral Probiotics and Ear/Throat Infections: Italian researchers studied 40 adults with a history of frequent strep throat infections and/or tonsillitis. They were divided into two groups and for 90 days, one group was given the oral probiotic BLIS K12, while the other group went untreated. All patients were then followed for 6 months after the 90-day treatment period. The oral probiotic group saw an 80% reduction in infections during the treatment period and a 60% reduction over the full 6 months. The placebo group saw no change in the incidence of strep throat and tonsillitis (40).

Another study investigating the use of BLIS K12 for throat infections and ear infections among children showed similar results. One group was given the oral probiotic for 90 days and the other two groups took a placebo or nothing. Those that took BLIS K12 showed a 90% reduction in throat infections and there was a 40% reduction in ear infections. In addition, during a six-month follow-up period when the children were not taking the oral probiotics, those who had taken the oral probiotics for the 90-days had a 65% overall reduction in reported ear and throat infections (41).

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