Probiotics: Outweighing Pros and Cons

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ABSTRACT
In recent few years, our markets had a boom of probiotic drinks and probiotic ice creams. The media and various endorsements can often mislead the consumers. We, as healthcare providers also shoulder a duty to decide and outweigh the pros and cons of this newly developed concept.

Keywords: Probiotics, Oral health, Lactic acid bacteria.

INTRODUCTION
‘Let food be thy medicine and medicine be thy food’, the age-old quote by Hippocrates, is certainly the tenet of today. With the growing interest in self-care and integrative medicine coupled with our health embracing baby boomer population, recognition of the link between diet and health has never been stronger. As a result, the market for functional foods, or foods that promote health beyond providing basic nutrition, is flourishing.

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The oral cavity is a host for wide range of microflora. Homeostasis is maintained in the host (oral cavity) despite a wide range of pH, nutrient availability, shedding and nonshedding surface, salivary and crevicular fluid selects localized microbial climax communities to fluctuate in composition and metabolic activity. Any change in this homeostasis results in endogenous infections or susceptibility to exogenous infections. Therefore, the microflora of a diseased individual is different from a healthy individual.

In the early 1900s, research carried out by Metchnikoff, suggested that beneficial bacteria can be administered to replace harmful microbes, these beneficial bacteria were later termed as probiotics.

PROBIOTICS
Etymologically, the term appears to be a composite of the Latin preposition pro (‘for’) and the Greek adjective (biotic), the latter deriving from the noun (bios, ‘life’).

The probiotics have been recently defined as live organisms which when administered in adequate amounts confer a health benefit on the host. According to the currently adopted definition by FAO/WHO, probiotics are ‘Live microorganisms which when administered in adequate amounts confer a health benefit on the host.’ Lactic acid bacteria (LAB) and bifidobacteria are the most common types of microbes used as probiotics; but, certain yeasts and bacilli may also be helpful in providing the function of probiotics. Probiotics are commonly consumed as part of fermented foods with specially added active live cultures; such as in yogurt, soya yogurt or as dietary supplements and in many more combinations.

PROBIOTICS AND ORAL HEALTH
Probiotics for the oral cavity needs to contain a plethora of different kinds of bacteria to compete with the many kinds of potential pathogens in the oral cavity. Understanding science and the recent information of the last decade shows that antibacterial agents should be reduced or eliminated in the oral cavity. In their place, the best supplement is ‘probiotics’ which will prevent dental disease and mouth malodor.

A number of bacterial strains have been isolated and studied with a view to clinical use. The most commonly used and studied probiotics are lactobacilli and bifidobacteria. Lactobacillus rhamnosus GG (LGG) is the most widely studied probiotic bacterium. It was originally isolated from human intestine in 1985 and named after the discoverers, Sherwood Gorbach and Barry Goldin. The beneficial effects of LGG on human health were soon documented in many experimental and clinical studies. It has been shown to produce a substance with potential inhibitory activity against different bacterial species, including cariogenic Streptococcus spp.
Recently, it was shown that long-term consumption of milk containing LGG caused a significant reduction in caries risk in day-care children. Nase et al. have shown that the administration of probiotic lactobacilli (LGG) to kindergarten children in Helsinki, Finland, resulted in a reduction of their caries risk and initial caries development.5

Another study on young adults shown an inhibitory effects on salivary counts of Streptococcus mutans and yeasts by using a combination of LGG and bifidobacteria, one more study on elderly individuals shown in reduction of oral Candida and, surprisingly, the risk for hyposalivation. In both the studies cheese was used as the vehicle for administration of probiotics.6

Another clinical trial on older people proves that probiotics help in digesting food particles in the mouth and eliminate mouth odor.

CONCEPT OF FIGHTING DENTAL DISEASE USING PROBIOTIC

Dental disease is due to an ecological imbalance of pathogens to good bacteria. The condition is called dysbiosis. The oral cavity is the most abused inner area of the body that uses antibacterial agents (most common cause of dysbiosis) all day long. The constant onslaught of these chemicals has bred a mouthful of resistant bacteria. Most of these resistant bacteria are potential pathogens that can take over the environment to cause dental disease.

John Lindquist of the University of Wisconsin Department of Bacteriology found that in food there are spores of bacteria. These spores are activated when the bacteria become stressed by temperature and pH. He found that by lowering the pH during the fermentation process, bacteria disappear from the environment. His experiments showed that salt initiates stress on bacteria so that they begin to grow. As a mild alkaline to low acid environment, enteric bacteria dominate the environment. Enteric bacteria are the gram negative rods that make up many of the food pathogens. In a low acid to moderate acid environment, the enteric bacteria disappear and the gram positive cocci dominate the environment. These cocci are the cause of mucous membrane destruction and tooth decay. As the pH drops, the cocci disappear and the lactic acid bacteria dominate along with yeast and mold s. The lactobacilli are able to control the yeasts and mold s from proliferating by converting the sugars to lactic acid.

The researchers also shown that antibacterial agents that are mostly alkaline that raise the pH are initiators of dental disease from resistant bacteria. Assuming that daily use of antibacterial toothpaste, antiseptic mouthwash, breath freshener, hydrogen peroxide, salts, dental materials, dental products and even tap water, all make the oral cavity a prime environment for resistant bacteria to cause dental disease.7

MECHANISM OF ACTION OF PROBIOTIC

Following are the mechanisms by which probiotic acts:

a. Magnetic field: Changes in the polarity of the cell membrane of protein particles that form dental plaque. Bacteria has a magnetic field that spins around the outer surface of the cell. In an alkaline solution, the spin is in the direction of the South pole to attract calcium to the outer surface. The spin is reversed by changing the alkaline solution to an acid solution. The spin is now in the direction of the North pole and the spin repels calcium. Probiotics can change the spin around plaque bacteria to repel calcium.

b. Antioxidants: The key factor to an alkaline environment is the propensity for oxidation. Oxidation is caused by oxidants. To prevent oxidants from oxidizing, use antioxidants. Oxidation is the grabbing of electrons from other chemical compounds. In the mouth, the grabbing of electrons forms rust with inorganic compounds. The rust is in the form of dental plaque and calculus deposits on teeth. Resistant bacteria develop in an alkaline environment because the electricity stresses them into activating existing resistant genes or creating new resistant genes. Antioxidants neutralize the electricity so that susceptible bacteria can grow and eliminate the resistant bacteria. Antioxidants breakdown mineral deposits so that they become water soluble. In the case of dental plaque, calcium carbonate is broken down into calcium bicarbonate that is water soluble. Dental stains are due to oxidation of both organic and inorganic compounds. Antioxidants are best to remove the stains and prevent the new stains from forming.

c. Lowering the pH: Lowering the pH eliminates most of the food pathogens. Using lactic acid bacteria and certain beneficial yeast and mold s eliminates the tooth decay pathogens. Lowering the pH to fewer than 7 in saliva prevents plaque formation. Apple cider vinegar will lower the pH yet it will also promote growth of bacteria. Probiotics may be the only product that lowers the pH and controls growth of resistant bacteria and other potential pathogens.

d. Biodegradation: Eliminate the food resources and the pathogens have no food to turn into toxins. Probiotics have the bacteria that can digest all the food substances, carbohydrates, proteins, fats and fiber. Dr Metnikoff of Russia found that beneficial fermentation bacteria are able to digest spoiled putrescence food particles to compete against pathogens. The beneficial bacteria turn the food into lactic acid, which is beneficial for good health. Probiotics produce the enzymes to digest and breakdown malodor s in the mouth. Certain bacteria are able to change sulfur compounds, nitrogen compounds, phosphorus compounds and any other toxic gases and turn them into useful gases needed for metabolism.

e. Direct competition: One on one combat by probiotics is the use of enzymes to inhibit the growth of pathogens. Bacteriocins and other antibiotic enzymes will directly inhibit growth of specific pathogenic bacteria.

f. Outnumbering the pathogens: Probiotics used in high concentrations will slant the population toward beneficial bacteria. The beneficial bacteria starve the resistant pathogens so that they can not grow. Introduce susceptible bacteria to compete with the pathogens and the susceptible bacteria will eventually eliminate the resistant pathogens.8
The oral cavity contains over 400 different bacteria, many will be resistant to antibacterial agents. Resistant genes have been passed among the bacteria by gene transfer. Many of the harmless bacteria have been changed into potential pathogens. The oral cavity needs to contain a plethora of different kinds of bacteria to compete with the many kinds of potential pathogens in the oral cavity. Understanding science and the recent information of the last decade shows that antibacterial agents should be reduced or eliminated in the oral cavity. Clinical trials have been done to prove that antioxidant powder inhibits progression of periodontal disease. Clinical trials on older people prove that probiotics help digest food particles in the mouth and eliminate mouth odor. Probiotics and antioxidant powder make the perfect combination to maintain good dental health. Holistic health care workers have been using probiotics for over 60 years to treat dysbiosis of the gut. Hence, is the time to use probiotics to treat dysbiosis of the gut. The combination of different bacteria makes an ideal probiotics for the mouth. There are over 400 different species of bacteria known in the oral cavity. We must assume that many of these species are resistant bacteria because of the daily abuse of antibacterial oral hygiene products. To compete with these bacteria, the probiotics must have different kinds of bacteria.

IDEAL REQUISITES OF A PROBIOTIC
• There must be bacteria to compete for all the four major food substances of carbohydrates, proteins, fats and fiber
• There must be bacteria to breakdown gases of sulfur, nitrogen and phosphorus
• There must be antibiotic and bacteriocin producers to keep the pathogens under control
• The final ingredient must be able to keep the different species from competing against each other
• Finally, the probiotic product should be an antioxidant because oxidation is the cause of stains, plaque and malodors.

The ideal product for the oral cavity is competition of good bacteria against bad bacteria, enzymes to digest all foods and odors and antioxidant action. The bonus is that fermentation bacteria lower the pH to where most of the known pathogens simply disappear. The time has come when antibacterial agents should be used only in the case of emergency. This will keep resistant bacteria from causing disease.

CONCLUSION
To conclude, we can say that the concept of Elie Metchinkoff is now supported by increasing evidence that some members of the gut flora indeed are beneficial for health. However, in oral microbiology and oral medicine this area of research is in its infancy. Further research is needed to determine how various probiotic strains are able to prevent the growth of oral microorganisms other than caries pathogens and Candida investigated till date. Randomized controlled trials are needed to assess the best means of administrering probiotics and the dosages needed for different preventive or therapeutic purposes. Probiotics are nevertheless, a new and interesting field of research in oral microbiology and oral medicine.

REFERENCES