Emerging science of the Human Microbiome is radically changing our understanding and approach toward oral health, systemic immunity, and total body wellness.

Oral Microbiome Homeostasis: The New Frontier in Oral Care Therapies

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The 2000 Report on Oral Health by the U.S. Surgeon General declared that oral health reflects general health and it is essential to achieve a state of wellness. Conversely, it went on to report that oral diseases and disorders, in and of themselves, negatively impact health and wellbeing throughout life, and more scientific research remains critical to reducing the impact from the burden of oral diseases throughout the body [1]. That time has come. In the last decade, virtually everything we thought we knew about the origins and causes of oral disease has been turned upside down. The dental research community learns more every day about the unique and fascinating makeup of the oral microbiome, the unique natural ecology of the mouth, and the vital role this plays in oral and overall health. The term microbiome was coined by Joshua Lederberg "to signify the ecological community of commensal, symbiotic, and pathogenic microorganisms that literally share our body space and have been all but ignored as determinants of health and disease" [2]. The human mouth is the residence of one of the most diverse microbiomes in the entire human body comprised of over 600 prevalent taxa at the species level, with distinct subsets predominating in different habitats, and an estimated 20 billion resident microbes existing in the oral cavity at any one time [3].

Month after month, new research is published that expands what we know about the tiny resident organisms living in the mouth’s microbiome, and sheds more light on how bacteria and other microorganisms may be implicated in non-oral health outcomes such as heart disease, stroke[4], or complications with pregnancy [5]. Microbiome communities occur naturally throughout nature and the body from thin wet spaces between layers of rock, to our hair, skin, eyes, entire digestive tract, lungs and urogenital system. The number of these organisms in these communities in and on our bodies is believed to be 10x greater than our own human cells and the genetic information they possess being 100x greater. This new understanding of the essential synergistic and symbiotic relationship that exists between man and microbe has been the focus of the Human Microbiome Project supported by the National Institute of Health. It has also redefined our “humanity” to be that of a microbiome/human “superorganism” [6].

For decades, dental professionals have subscribed to an oral healthcare approach that holds the necessity to disinfect or even sterilize the mouth at its foundation. This “scorched earth policy” stems from research first conducted by Robert Koch in the late 1800’s. At that time, Koch began to assign specific bacteria to specific diseases, leading to a broadening of his ideas, which eventually made its way into the general medical and dental curricula. Prior to the new research that is emerging, few dentists would argue with the need to ‘kill germs on contact’ in order to deal with the more common oral degenerative conditions, such as gum disease and tooth decay. Generations of oral care products, aimed at both the general public and dental profession, have made their way into our society—products that advertise their superiority in eradicating bacteria inhabiting the mouth. Thankfully, this approach never succeeded. According to some experts, and based on the emerging science, this could have unleashed an “ecological Armageddon”. In the same way that antibiotic overuse disrupts the helpful, friendly bacteria in the gut, a similar scenario occurs when we try to disinfect, or worse sterilize, the oral cavity [7].

Pioneering research performed by both Dr. P.D. Marsh of the Leeds Dental Institute in the U.K., and Dr. D. Relman of Stanford University points to a new paradigm in our understanding of oral degenerative conditions. Their research depicts the mouth as an ecosystem—a network or community of microorganisms that live in cooperation with one another and, most importantly, live in...
oral microbiome loses homeostasis, the health of beneficial microorganisms is supported in this essential ecosystem. In return, the presence of pathogenic, planktonic organisms, or analogously, “weeds” which never get a chance to grow. To state it more simply, the application of nutrient-dense “food” to an unbalanced biofilm, helps the “good guys” get healthier “crowding out the weeds” on their own, thus restoring an essential balance to a very important community for vibrant oral health and wellness.

CS Bioscience, a company that has been a leader in research and development in the application of the new emerging science of the oral microbiome in oral care therapeutics, has developed a proprietary and all-natural bioeffective dental formulation comprised of key nutritional components, homeopathic microminerals, and herbal ingredients [14]. This unique approach has demonstrated very strong efficacy in comparison to competitive oral care products based on previous scientific beliefs (i.e. “killing plaque”). An initial product being introduced, a toothpaste substitute claims to nourish the helpful, friendly, odorless bacteria that constitute a balanced biofilm, keeping it from degenerating into an unbalanced state, causing the oral microbiome to lead to oral breakdown. Pilot clinical research has demonstrated that this formulation promoted a “clear, thin, slippery” biofilm, asign of a healthy oral microbiome [15]. Multiple study participants reported that their teeth felt “smooth and slick hours after brushing, even overnight.” Other users claimed their “teeth still felt clean in the morning” after using the product for several days. Where gums are robustly resistant to the challenges that lead to puffiness and bleeding, this “nourishing” approach in oral care therapeutics supports the oral environment’s natural ecology back into balance promoting healthier gums [16]. Another benefit has also been this particular formulation’s ability shown to relieve conditions for those who suffer from xerostomia and oral mucositis commonly experienced during cancer treatment such as radiation therapy and chemotherapy. Dry conditions and burning mouths are also pathways that lead to tooth decay. This new frontier of oral care products that addresses the new understanding of the oral microbiome is just beginning to be explored. Therapeutic results never demonstrated by previous approaches in oral care products.
has opened up the prospect of reversing the epidemic incidence of oral disease, specifically periodontal disease. The links of oral disease to many debilitating systemic illnesses, including fatal coronary heart and cerebrovascular diseases, [17] premature low weight birth and pre-eclampsia during pregnancy, [18,19] respiratory disease, Alzheimer’s disease and even cancer [20] has profound implications for healthcare. The strong correlation between oral disease and systemic wellness also has enormous implications in reducing healthcare costs. A 2006 study by Aetna and Columbia University’s College of Dental Medicine on 145,000 patients found up to a 21% reduction in healthcare costs associated with the treatment of major systemic diseases, cardiovascular disease, cerebrovascular disease and diabetes, when oral health is improved [20]. A similar study repeated in Japan produced a nearly identical statistic. The healthcare costs in the United States related to these systemic conditions are over three quarters of a trillion dollars annually placing improvement in the nation’s oral health on the “front line” of future healthcare strategies.

References


14. DISCLAIMER: The author would like to disclose his position as cofounder/chairman of CS Bioscience, an oral care biosciences company that has performed more than 16 years of research and development in the oral microbiome science arena. The opinions or views expressed in this journal article are those of the authors and do not necessarily reflect the opinions and recommendations of the publisher, journal, guest editors, or supporters.


