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New frontiers in bacteriology 2013: Biofilms , the international language of infectious diseases

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Abstract

The Normal Flora (NF) is the most complex, diverse and integrated Organ System of H. *sapiens*, involving microbiota (16S) and mycobiota (18S) , with greater than a 1,000 phylotypes (called Operational Taxonomic Units); these are mostly organized into a recalcitrant 3-D architecture of a mixed species biofilm, attached to biotic, (sloughing mucosal surface) and abiotic surfaces (often, Indwelling Medical Devices-IMDs) . This Human Microbial Signature (HMS) is distinct for each person, addressing a 4 stage microbial clock, that is today best defined utilizing phyla based "cluster analysis " and metagenomics. The HMS changes with age and is a potential predictor of health or disease, oral and systemic, most recently recognized in 3 distinct Enterotypes in stool flora.

Biofilm Associated Diseases (BAD) are often associated with an unbalanced biofilm bioburden (Ecological Hypothesis) , and linked to a growing number of serious oral and systemic diseases as an unrecognized global problem, paralleling the dramatic changes in the microbiota/mycobiota with age, from birth to death. These 30 diseases include diabetes, obesity, chronic infections, low birth weight babies, endocarditis, lower respiratory infection, but emphasize atherosclerosis, cardiovascular disease and arthritis. This is particularly evident for elderly patients prior to hospitalization. Disease mediation is both 1) microbial bioburden and 2) inflammatory associated, the later via chronic inflammation employing molecular mimicry. Biofilm Pathogenicity is linked to the 4 cyclic Stages (I-IV) with "colonization resistance" and Multi-Drug Resistance (MDR) most clinically evident.

Utilizing quantitive 3-D animated microscopic images and SEM, teaching emphasis will address the collateral damage of an unbalanced microbial flora to diseases associated with IMDs, high-lighting new international strategies , utilizing daily, 1) mechanical debridement , 2)aseptic washes, 3) selected pre and probiotics (Replacement Therapy) and 4) anti-infectives , returning the NF Organ System to healthy microbes, birth to death [Tailored-Comprehensive Care] (T-CC). For optimum benefit, however, these 4 options must be coupled to the human microbial clock, best defined by "cluster analysis" and metagenomics utilizing OTUs..

Biography

Professor Thomas, Department of Pathology, is presently Senior Clinical Microbiologist (WVUH) and Director of the Biofilm Research Laboratory for Translational Studies in Medicine, Dentistry and Industry at West Virginia University School of Medicine (WV, USA).He created the International University Biofilm Research Consortium in 2002 to further global investigations and education (www.hsc.wvu.edu/som/pathology/thomas) and has published extensively on diverse microbial topics, emphasizing studies utilizing his VEL Simulator (Ventilator –Endotrach-Lung Model). He has over 75 publications, 7 book chapters and multiple "booklets." His teaching is globally renowned as he was awarded the Universities Highest Teaching Award in 2005, and The Student Research Award, in 2002, 2007, and 2009. Professor Thomas integrates four academic and educational positions at West Virginia University: School of Medicine, Pathology, School of Dentistry, Periodontology, School of Pharmacy, and Graduate School, Department of Microbiology and Cell Biology. His most recent leadership position is the Chairman of the 'Aged Care Initiative 'Why Not Me?' which he developed for coordinating a two pronged approach to reduce VAP , inpatient and out patient . He also holds teaching positions at Rutgers University and internationally is a Visiting Professor (Honorary) at Cardiff University, School of Dental Medicine and National University of Singapore, School of Dentistry. As a member of the Scientific Advisory Council of the American Dental Association, Professor Thomas is recognized by his peers as a significant contributor in the ongoing evolution of health care practices.