KEYPOINTS/BOOKMARKS

B. Biofilms and Oral health: The 3 M's

- "Ecological Hypothesis" by P.D. Marsh unmasked the shift in commensal populations, redefining Robert Koch's "one bug, one disease" theory. Metagenomics highlights these population dynamics by non-culture techniques, emphasizing gene expression and phylagenetic definitions with population shifts .
- Metagenomics (Anti-Koch) redefines the "microbial landscape" that is 'us', our signature cohabitant that shifts with time (Microbial Clock) and has 360 times more bacterial genes than humans.(Gene mining)
- Organisms exist in a "triphasic world", particularly oral plaque: 1) free floating planktonic, to attached to 2) abiotic or 3) biotic surface biofilms and can alternate 'life style' or phenotype in mili-seconds. They are not mutually exclusive.
- "Structure" equals "function", encompasses the unique 3-D feature of a biofilm and its ability to withstand SRP. Plaque biofilm is a 'Hydrated Polymer' with elasticity demonstrating rhelogy or liquid-like movement. (chemistry vs. biology)
- "Pioneering microbes", attaching first to a tooth surface are usually Gram Positive, whereas secondary colonizers are Gram Negative and subsequently *Candida albicans*, the universal "co-aggregate."
- Fungi represent an unrecognized target for oral intervention given their equal frequency to oral bacteria and "universal co-aggregate" function of cross-linking to plaque bacteria via free or bridging DNA.(eDNA)

- The “Super Genome Theory” of biofilm genetics promotes Horizontal Gene Transfer (HGT), highlighting its significant resistant reservoir for oral systemic infections, defines plaque antibiotic resistance and underscores the need for new anti-plaque strategies in the CDC defined “Post Anti-biotic Era” emphasized by the 23,000 deaths attributable to MDR .

- Metagenomics and “the other” OMICs, will necessitate a new laboratory Report for oral microbial detection, incorporating combined non-culture techniques (OMICs) and a new definition of “pathogen” based upon Phyla (Shannon Index) shifts in entire plaque communities(Phyla based)

- Metagenomics and corresponding phyla-types highlighted by “systems microbiology” with new non-culture techniques, are highlighting the importance of plaque in such desperate diseases as dementia to osteoarthritis in knees. (Migratory Oral Microbiota causing diseases in extra Oral Sites)

- The anatomic location of the oral microbiota /mycobiota now includes: middle ear, eustation tube, tonsils, pharynx, esophagus , lungs and nasal passage. Corespondingly, new OMICc molecular methods have unmasked microbiota/mycobiota in Lung and Placenta essentially ruling out any sterial site in the human body, redefing the “Super Organism “

- Of the 15 phyla represented in the oral cavity, 6 represent 96% of the microbes. The HOMIM (Human Oral Micro ID Microarray) and more recently HOMINGS (Human Micro ID Next Generation Sequencing) nomenclature has redefined the oral flora and can be found at : www.homod.org .

- Biofilm 3-D architecture and rigidity is enhanced by e-DNA bound to DNA II Protein as a matrix bridging support , abundant amyloid like material (Curli), addressing topography gradients (top to bottom) , spatial complexity and both ion channels and nanowires to enhance communication.