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Bacterial community responses at the gene and molecule level during sugar catabolism in highly diverse oral *in vitro* biofilms

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The oral micro-biome representing dental plaque is highly impacted by frequent and drastic pH drops due to the rapid response of microbial fermentation of dietary carbohydrates. In caries-associated plaque samples, pH remains below the 'critical level for demineralization' for extended periods of time after a carbohydrate pulse, while in health-associated plaque pH recovers. A major hurdle to understanding the dynamic interactions of oral biofilms and low pH-virulence development associated with caries disease is the high taxonomic variability of the oral microbiome between individuals. Also, it is extremely difficult to track species and strains temporally and spatially. To circumvent these major hurdles, we developed an oral *in vitro* biofilm model system, derived from human saliva. This biofilm model proved to be reproducible and stable at both taxonomic and functional levels and contained ~130 operational taxonomic units (OTUs), covering 60-80% of the original saliva diversity. In this study we applied this model as a solid platform to answer fundamental questions of the processes within naturally diverse dental plaque, associated with both health and disease. We applied a parallel approach of sampling for community mRNA (metatranscriptomics) and secreted small molecules during sugar fermentation and biofilm formation, to acquire new information on gene transcription activities and metabolite production in low pH. The biological information captured here reveals highly regulated gene transcription activities and temporal secretion of both primary and secondary metabolites, of which a few belong to bioactive groups of compounds (e.g. alkaloids, lactones and cyclic-dipeptides).

Biography

Anna Edlund has several years of experience in the research field of microbial ecology at the School of Dentistry, UCLA and at Stockholm University, Sweden. She is an Assistant Professor at the J. Craig Venter Institute, USA. Her research has lead to the development of a unique oral *in vitro* bio-film model system where hundreds of bacteria grow together as a community. By applying cutting-edge sequencing technologies, mass spectrometry and bioinformatics tools to this model system it has been possible to identify novel genes, pathways and molecules with clinical and ecological significance.

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