

535c Real-Time Monitoring of *Streptococcus Mutans* Dental Biofilm Formation Using Quartz Crystal Microbalance

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Streptococcus mutans is a known etiological agent in dental caries (tooth decay) and metabolizes sugars to produce organic acids such as lactic acid which contribute to the cariogenic process. Its metabolism of sucrose produces glucans, a “sticky” substance that *S. mutans* uses to secure and shelter its biofilm environment. Previous research has focused on static measurements. We present real-time, non-invasive monitoring data of *S. mutans* biofilm attachment using a quartz crystal microbalance (QCM) capable of detecting mass accretion at the resolution of nanograms. QCM is a technology which correlates the shift of resonant frequency of an AT-cut quartz crystal to the change in mass that is attached onto the crystal surface and is usually used for rigid films. Modifications to correlations of frequency change and mass accumulation were determined for application of QCM to viscoelastic films such as a biofilm. Kinetic information on the growth of the biofilm as a function of sucrose concentrations of 0, 0.01, 0.05, 0.1, 0.25, 0.5, and 1% (v/v) were obtained for investigation of the biofilm attachment and growth dynamics. In addition, QCM monitoring of various mutants of *S. mutans* with *ciaH*, *luxS*, *gtfB* or *gtfC* genes removed which are responsible for mutacin production, quorum sensing, or glucans production, were found to significantly affect biofilm architecture and ability to generate stable biofilms. Results of these experiments will be discussed. This project was supported through a NIH grant.