Shewanella putrefaciens adhesion and biofilm formation on food processing surfaces - DTU Orbit (01/12/2018)

**Shewanella putrefaciens adhesion and biofilm formation on food processing surfaces**

Laboratory model systems were developed for studying Shewanella putrefaciens adhesion and biofilm formation under batch and flow conditions. S. putrefaciens plays a major role in food spoilage and may cause microbially induced corrosion on steel surfaces. S. putrefaciens bacteria suspended in buffer adhered readily to stainless steel surfaces. Maximum numbers of adherent bacteria per square centimeter were reached in 8 h at 25 degreesC and reflected the cell density in suspension. Numbers of adhering bacteria from a suspension containing 10(8) CFU/ml were much lower in a laminar flow system (modified Robbins device) (reaching 10(2) CFU/cm(2)) than in a batch system (reaching 10(7) CFU/cm(2)), and maximum numbers were reached after 24 h. When nutrients were supplied, S. putrefaciens grew in biofilms with layers of bacteria. The rate of biofilm formation and the thickness of the film were not dependent on the availability of carbohydrate (lactate or glucose) or on iron starvation. The number of S. putrefaciens bacteria on the surface was partly influenced by the presence of other bacteria (Pseudomonas fluorescens) which reduced the numbers of S. putrefaciens bacteria in the biofilm. Numbers of bacteria on the surface must be quantified to evaluate the influence of environmental factors on adhesion and biofilm formation. We used a combination of fluorescence microscopy (4’,6’-diamidino-2-phenylindole staining and in situ hybridization, for mixed-culture studies), ultrasonic removal of bacteria from surfaces, and indirect conductometry and found this combination sufficient to quantify bacteria on surfaces.

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