Biofilms are now emerging as a key concern for human health, and they are extremely difficult to eradicate. Every time you brush your teeth, you clear away a sticky film, dental plaque, containing millions of microbes from hundreds of different species. In healthy people, this ubiquitous oral ‘biofilm’ of bacteria, like those in many other parts of our bodies, is usually harmless or even beneficial. However, many biofilms can opportunistically become disease-causing pathogens, for instance when one microbial species becomes too prevalent, when the biofilm becomes established in an organ it does not usually colonise, or when host immunity is compromised, even by something as simple and inevitable as old age.

Biofilms are now emerging as a key concern for human health, and they are extremely difficult to eradicate. They are highly tolerant to antibiotics: treatment may reduce the number of bacteria present but usually fails to remove the whole colony, leading to chronic, recurrent infections.

Among the opportunistically pathogenic biofilm bacteria are several species of *Streptococcus*. *Streptococci* make up some 80% of the bacteria in dental plaque and are implicated in infections ranging from tooth decay and sore throat to life-threatening diseases such as pneumonia, meningitis, and an inflammation of the heart lining called infective endocarditis. Dr Lévesque’s work focuses upon the ‘model organism’ *Streptococcus mutans*, one of the main causes of tooth decay, the most widespread infectious disease in the human population. Her work seeks to find new, more successful methods to treat biofilm infections, by understanding the underlying biology of oral *Streptococcus mutans* colonies.

Communication is key

Many scientists now consider bacteria to be ‘social organisms,’ with biofilms comprising structured communities, built up in a particular sequence, and protected within a matrix of defensive materials allowing them to survive in hostile environments such as the human body. Dr Lévesque believes that the key to understanding how biofilms behave, and thus their role in disease, lies in how the individual bacteria within the colony communicate with one another. To do this, they use a system known as ‘quorum sensing.’ In quorum sensing, small pheromone molecules, which act as signals, are released by each bacterial cell and received by others. These molecules build up in the environment as a function of the number of

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