

6.**Biofilm control with T7 phages**

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Biofilm phenomena have been studied over many years and it is nowadays generally recognized that this bacterial lifestyle is dominant in all kinds of surfaces. Bacteria attached to surfaces have different behaviours compared to their planktonic counterparts mainly because biofilm cells are found embedded in a complex matrix composed of exopolysaccharides, proteins and nucleic acids. Biofilms also possess cells in different growth stages and therefore studies regarding eradication of bacteria from surfaces should not be performed with planktonic cultures. So far, only a small number of studies have been made regarding the application of phages to eradicate biofilm bacteria even though biofilms appear in a variety of environments.

In this work, phage infection of biofilms formed by dairy product spoilage causing bacteria was studied. Biofilms were formed under static and dynamic conditions for different time periods (1–7 days) after which phage solutions with different concentrations were applied. Phage infection of the biofilms was monitored through increase in the number of free phages, reduction of biomass and confocal laser scanning microscopy (CLSM) and field emission scanning microscopy (FESEM) were used to visualize the effect of phages in the biofilm structure and on its eradication. This study shows that phages are able to penetrate through the polymeric matrix and transported through the biofilm water channels and therefore phages are able to start the infection of cells in different biofilm layers, which clearly facilitates the biofilm eradication process.

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