Cell death in Pseudomonas aeruginosa biofilm development

Bacteria growing in biofilms often develop multicellular, three-dimensional structures known as microcolonies. Complex differentiation within biofilms of Pseudomonas aeruginosa occurs, leading to the creation of voids inside microcolonies and to the dispersal of cells from within these voids. However, key developmental processes regulating these events are poorly understood. A normal component of multicellular development is cell death. Here we report that a repeatable pattern of cell death and lysis occurs in biofilms of P. aeruginosa during the normal course of development. Cell death occurred with temporal and spatial organization within biofilms, inside microcolonies, when the biofilms were allowed to develop in continuous-culture flow cells. A subpopulation of viable cells was always observed in these regions. During the onset of biofilm killing and during biofilm development thereafter, a bacteriophage capable of superinfecting and lysing the P. aeruginosa parent strain was detected in the fluid effluent from the biofilm. The bacteriophage implicated in biofilm killing was closely related to the filamentous phage Pf1 and existed as a prophage within the genome of P. aeruginosa. We propose that prophage-mediated cell death is an important mechanism of differentiation inside microcolonies that facilitates dispersal of a subpopulation of surviving cells.
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 3.83 SJR 2.471 SNIP 1.154
Web of Science (2011): Impact factor 3.825
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 2.64 SNIP 1.144
Web of Science (2010): Impact factor 3.726
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 2.71 SNIP 1.181
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 2.639 SNIP 1.088
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 2.653 SNIP 1.148
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 2.665 SNIP 1.137
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 2.66 SNIP 1.164
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 2.497 SNIP 1.188
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 2.71 SNIP 1.148
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 2.412 SNIP 1.111
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 2.661 SNIP 1.182
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 2.728 SNIP 1.157
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 2.688 SNIP 1.205
Original language: English
Source: orbit
Source-ID: 46309
Research output: Research - peer-review > Journal article – Annual report year: 2003