Cell death in *Pseudomonas aeruginosa* biofilm development

**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.

**General information**

Publication status: Published
Contributors: Webb, J., Thompson, L., James, S., Charlton, T., Tolker-Nielsen, T., Koch, B., Givskov, M. C., Kjelleberg, S.
Publication date: 2003
Peer-reviewed: Yes

**Publication information**

Journal: *Journal of Bacteriology*
Volume: 185
Issue number: 15
ISSN (Print): 0021-9193
Ratings:
Scopus rating (2003): SJR 2.71 SNIP 1.148
Web of Science (2003): Indexed yes
Original language: English
Source: orbit
Source ID: 46309
Research output: Contribution to journal → Journal article – Annual report year: 2003 → Research → peer-review