Anaerobiosis, A New Way Of Confronting Pseudomonas Aeruginosa Airway Infection

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Abstract
Pseudomonas aeruginosa, an opportunistic pathogen, establishes chronic infection in the respiratory tract of patients suffering from pneumonia and bronchiectasis including cystic fibrosis. Biofilm formation and production of virulence factors, a process controlled by quorum sensing, are considered to be the major determinants in P. aeruginosa pathogenesis. Airway mucus layer lining the patient airway was determined to be anaerobic due to the hypersecretion of mucus. Given that currently used antibiotics are less effective under anaerobic environments, these findings lead us to change the way we confront P. aeruginosa infection. Under a strict anaerobic in vitro growth condition, P. aeruginosa formed more robust biofilm compared to those developed aerobically. Subsequent studies revealed that such robust biofilm formation is associated with anaerobiosis-induced cell shape change. Secretion of elastase, a product of LasI-R QS system was significantly suppressed under the same growth condition. Together, these observations suggest that P. aeruginosa may increase its survival fitness inside the patient airway, especially at the chronic stage, by reducing the production of virulence factors and increasing the capability to form biofilm. This seminar will discuss molecular basis behind such anaerobiosis-induced virulence modulations and propose a new therapeutic approach to treat P. aeruginosa airway infection.

Selected Publications: