



DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING

CEVE Seminar Series

Quorum-sensing Interference

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The pathogenic bacterium *Pseudomonas aeruginosa* uses acyl-HSL quorum-sensing signals to regulate genes controlling virulence and biofilm formation. We found that paraoxonase 1 (PON1), a mammalian lactonase with an unknown natural substrate, hydrolyzed the *P. aeruginosa* acyl-HSL 3OC12-HSL. In in vitro assays, mouse serum-PON1 was required and sufficient to degrade 3OC12-HSL. Furthermore, PON2 and PON3 also degraded 3OC12-HSL effectively. Serum-PON1 prevented *P. aeruginosa* quorum-sensing and biofilm formation in vitro by inactivating the quorum-sensing signal. Although 3OC12-HSL production by *P. aeruginosa* was important for virulence in a mouse sepsis model, Pon1-knock-out mice were paradoxically protected. These mice showed increased levels of PON2 and PON3 mRNA in epithelial tissues suggesting a possible compensatory mechanism. Thus, paraoxonase interruption of bacterial communication represents a novel mechanism to modulate quorum-sensing by bacteria. The consequences for host immunity are yet to be determined.

Bio: *Dr. Joseph Zabner, M.D.* is a Professor in the Department of Internal Medicine at the University of Iowa. His research interests are in gene transfer to human airway epithelia in particular to develop gene therapy for cystic fibrosis. Dr. Zabner also has an interest in the fluid composition of the airway surface liquid, and how it affects innate immunity. His clinical interests are in cystic fibrosis and non-cystic fibrosis bronchiectasis. A major effort in his laboratory is to investigate the effect of paraoxonases on *P. aeruginosa* virulence and biofilm formation.

Friday, November 17, 2006
4:00 PM
Ryon Lab, Room 201
Refreshments will be served at 3:45 PM