CENTER *for* APPLIED MOLECULAR MEDICINE

University of Southern California Physical Sciences in Oncology Center

2015 Monthly Seminar Series

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"The Fluid Mechanics of Bacteria-Cilia Associations"

FRIDAY, FEBRUARY 27, 2015

NOON - 1:00 P.M.

Q & A to follow

PIZZA AND BEVERAGES WILL BE SERVED FOR ATTENDEES AT 11:45 A.M.

HARKNESS AUDITORIUM

HSC - Clinical Sciences Building, **2nd Floor**
2250 Alcazar Street, Los Angeles, CA

ABSTRACT:

Bacteria, beneficial and pathogenic alike, commonly interact with host cells along mucosal epithelia. These surfaces are often lined by dense fields of motile cilia that serve both a biomechanical function, generating mucociliary flows, and a biochemical function, detecting and presenting molecular signals. These functions have long been known to maintain a barrier to pathogenic bacteria, but growing evidence suggests that they also provide an entryway and habitat for co-evolved symbionts. A central challenge for the host tissues lies in determining a means to effectively deflect toxic molecules and undesirable (motile and non-motile) particles away from the tissue surfaces, while selectively recruiting members of the normal microbiota. The strategies employed should be robust with respect to variability in the environmental conditions and should limit the chances of encounter with pathogens and toxins. We hypothesize that the host tissues use cilia-generated flows to manipulate bacteria-host interactions by affecting the transport of chemical signals and bacterial motility. This standpoint challenges the conventional view in biology that attributes bacterial recruitment mostly to active bacterial behavior and passive diffusion. In this talk, I will present two distinct models that examine (1) the fluid mechanics of ciliated surfaces with emphasis on their role in mixing and transport of passive particles, and (2) the effect of geometric confinement on the collective behavior of bacterial populations. I will conclude by commenting on how these sets of models can be linked in the future in order to connect the biological function of ciliated surfaces in association with environmental bacteria to the physics of mass transport and bacterial motility in cilia-generated flows.

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Hosted by USC PSOC. For additional information contact: Rosa Rangel at rosa.rangel@med.usc.edu or 323-442-3849