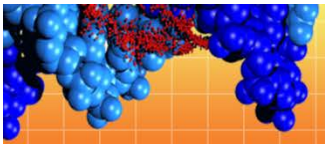

CENTER FOR BIOINFORMATICS & COMPUTATIONAL BIOLOGY

BIOINFORMATICS 2016 FALL SEMINAR SERIES

Hosted by: Department of Computer and Information Sciences,
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http://bioinformatics.udel.edu/Seminars/Current

MONDAY, October 17, 2016
3:30pm
DBI Room 102

Looking to metabolism in order to revitalize our antibiotic medicine cabinet

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ABSTRACT: The research of my group is motivated by the global public health threat of antibiotic resistance. Alarmingly, the frequency of antibiotic-resistant infections has continued to climb, whereas the pipeline of new antibiotics has continued to decline. This "perfect storm" motivated the federal government in 2015 to formulate a National Action Plan for Combating Antibiotic-Resistant Bacteria, within which, two of the goals were to slow the emergence of resistant bacteria and accelerate basic and applied research for new anti-infectives. The two focal areas of our work contribute to these goals, with one centered on identifying novel anti-infective targets and the other directed at improving the efficacy of current antibiotics. Specifically, in one area we apply principles and techniques from metabolic engineering to understand how bacteria defend themselves against immune antimicrobials, such as nitric oxide and hydrogen peroxide. Notably, sensitization of pathogens to immune effectors constitutes an anti-infective approach that could produce treatments that are orthogonal to current antibiotics, and thus able to restock the antibiotic medicine chest. In our other research area, we examine why antibiotics fail to sterilize bacterial populations under best-case treatment scenarios: bacteria are sensitive to the antibiotic, the antibiotic concentration is well above that necessary to kill bacteria, and resistant mutants are not present in the population. This phenomenon is known as bacterial persistence, and it is thought to contribute to infection relapse following efficacious antibiotic treatment. Further, it is thought to provide a reservoir of bacteria from which resistant mutants can arise during chronic infections. Our work on bacterial persistence has centered on metabolic aspects of the phenomenon, and understanding how metabolism influences entry into, maintenance of, and exit from persister states. We envision that such knowledge will identify ways to prevent this mode of antibiotic failure, and thereby improve the potency of current antibiotics. In this talk, I will summarize our work in these areas and discuss how the knowledge we have uncovered can contribute to the fight against antibiotic resistance.