Infectious Diseases Labs

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Asst Prof John Chen

Infectious Diseases Translational Research Programme
Department of Microbiology and Immunology
Yong Loo Lin School of Medicine, NUS, Singapore

Join zoom meeting **here**
Meeting ID: 952 0290 6022
Passcode: 363002

Thursday, 25 August 2022
2:00pm to 3:00pm (SGT)

Webinar is open to all
No registration required

Dual Pathogenicity Island Transfer by a Novel Form of Lateral Transduction

Lateral transduction (LT) is the process by which temperate phages mobilize large sections of bacterial genomes. This mechanism transfers chromosomal DNA at extremely high frequencies, exceeding that of most mobile genetic elements transferred via conjugation or generalized transduction. Despite its importance, LT has only been observed during prophage induction and not after phage infection. Here we report that the superantigen-carrying staphylococcal pathogenicity islands (SaPIs) employ a related but more versatile and complex mechanism of gene transfer that overcomes the limitations of phage-mediated LT, enabling them to drive chromosomal hypermobility while transferring intact with additional virulence genes co-opted from the chromosome. We found that after phage infection or prophage induction, activated SaPIs replicate in situ and switch between parallel genomic tracks to form concatamers while still attached to the chromosome. Because of this unusual lifecycle, SaPIbov1 can piggyback its LT of staphylococcal pathogenicity island vSa, which encodes 11 toxin genes, allowing both islands to be mobilized intact in a single infective particle and transferred to the same host cell. These results are the first to show a functional transducing agent mobilized together with chromosomal DNA. Our findings highlight previously unknown roles of pathogenicity islands in bacterial virulence and show that their evolutionary impact extends beyond the genes they carry.

John Chen is an assistant professor at the National University of Singapore. He received his undergraduate degree from Princeton University and his post-graduate degrees from the Columbia University. Following his graduate studies, he completed his post-doctoral work at the New York University School of Medicine. Currently, he leads a research group that is interested in the role of mobile genetic elements in bacterial evolution. His lab studies bacteriophages and pathogenicity islands, with a focus on their fundamental biology, the mechanisms by which they shape pathogen genomes, and how they can be engineered and exploited for safer and more effective antimicrobial therapeutics.

Questions? Contact us at **seminars@idlabs.a-star.edu.sg**

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