MICROBIOLOGIE, INFECTIOLOGIE ET IMMUNOLOGIE

Université de Montréal

CONFÉRENCE

« Conférence prononcée en anglais – Lecture given in English »

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Diffusion en ligne via la plateforme Zoom
https://umontreal.zoom.us/j/99054525357?pwd=YzdpbmFPUEkwMTFXVkszRDNyWVhCdz09
Meeting ID: 990 5452 5357
Passcode: 075278

Coordination between peptidoglycan remodeling and chromosome segregation during bacterial spore development

During bacterial sporulation, an asymmetric septum generates two transcriptionally distinct cells, a larger mother cell and a smaller forespore. Approximately 75% of the forespore chromosome must be translocated across the division septum into the forespore by the DNA translocase SpoIIIE. Simultaneously, septal peptidoglycan is remodeled by hydrolytic and synthetic enzymes, driving the first stages of spore envelope formation. How DNA is translocated through the asymmetric septum has been debated for decades.

Using transposon-sequencing in *Bacillus subtilis,* we identify genes that link chromosome translocation and peptidoglycan remodeling. Phenotypic characterization of cells lacking these genes, using time-course chromosome translocation and compartmentalization assays, revealed that the forespore cytoplasm leaks into the mother cell and the fully-translocated forespore chromosome is effluxed back into the mother cell, in a manner that depends on peptidoglycan hydrolysis. Remarkably, in cells lacking these genes and the SpoIIIAH-SpoIIQ zipper-like interaction across the septum, the septum retracts shortly after forespore-specific transcription is initiated, completely abolishing compartmentalization and development.

These data support a model whereby SpoIIIE anchored at the edges of a septal pore, stabilized by newly-synthesized peptidoglycan and protein interactions across the septum, coordinates chromosome translocation with septal peptidoglycan remodeling to ensure chromosome segregation and developmental compartmentalization.

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