Université de Montréal

MICROBIOLOGIE, INFECTIOLOGIE ET IMMUNOLOGIE

CONFERENCE

April 16th at 11.30AM
Room N-833
Université de Montréal, Pavillon Roger-Gaudry.
2900 boul. Édouard Montpetit (Chemin de la tour), Montréal.

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The fundamental aerobic bioenergetics of *Enterococcus faecalis*

Enterococci are ubiquitous microbes that inhabit diverse niches ranging from soil to the gastrointestinal tracts of humans, cattle, and poultry, where they adapt to aerobic, microaerobic, and anaerobic environments. Two species, *Enterococcus faecalis* and *Enterococcus faecium*, are also major nosocomial pathogens and are included in the World Health Organization ESKAPE priority pathogen list. Targeting bacterial metabolism is increasingly recognized as a promising strategy to combat antimicrobial resistance (AMR), as disruption of core energy pathways can influence bacterial survival, adaptation, and tolerance. One pathway of growing interest is the electron transport chain (ETC), which contributes to energy production, aerobic adaptation, and reactive oxygen species (ROS) generation. Notably, *E. faecalis*, but not *E. faecium*, can establish a complete ETC when supplied with exogenous hemin; however, this pathway remains poorly characterized despite associations with bloodstream infection and pathoadaptation. In this study, we investigated the role of aerobic respiration in the metabolism and energetics of *E. faecalis* under varying nutrient and oxygen conditions. Using metabolic profiling, oxygen consumption assays, growth analyses, and untargeted metabolomics we identified a significant shift in the metabolome associated with aerobic adaptation. We further established membrane potential microscopy methods in *E. faecalis* which revealed an intrinsically low resting membrane potential. This phenotype was linked to the reverse activity of the F-type ATPase/synthase, which serves as the primary generator of the proton gradient. Finally, we examined how the ETC activity influences antimicrobial susceptibility using isogenic deletion strains. Together, this work highlights the importance of bioenergetics in shaping metabolic resilience and highlights potential metabolic targets in clinically relevant bacteria.