Phosphorylation of proteins and bacterial pathogenicity

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Résumé

The importance of reversible protein phosphorylation to cellular regulation cannot be overstated. In eukaryotic cells, protein kinase/phosphatase signaling pathways regulate a staggering number of cellular processes including cell proliferation, cell death, metabolism , behavior and neurological function, development and pathogen resistance.
While protein phosphorylation as a mode of eukaryotic cell regulation is familiar, many are less familiar with protein kinase/phosphatase signaling networks that function in prokaryotes. Of particular interest, the persistence of bacterial infections in humans and the emergence of antibiotic-resistant strains emphasize the need for novel therapeutic approaches.

In order to sustain treatment of bacterial infections in humans, identification of novel drug targets is pivotal. Thus, a greater understanding of molecular mechanisms underlying bacterial disease pathogenesis is essential for the identification and further development of novel drug targets.

The discovery of eukaryotic-like signaling systems, such as STPKs (Serine/Threonine Protein Kinases) and phosphatases in bacterial pathogens has sparked an interest in understanding their function. This is partly due to the fact that eukaryotic protein kinases are currently the largest group of drug targets, second only to G-protein-coupled receptors. Therefore, studies on the importance of prokaryotic STPKs in human pathogens have gained interest owing to the prospect that these signaling components may be useful in future anti-infective therapies and that a complete understanding of their role is a prerequisite for future evaluation of these enzymes as antimicrobial targets. The increased understanding of their widespread occurrence and the importance of the processes they control emphasize the significance of these eukaryotic-like signaling systems in prokaryotes and especially in pathogens.

Although STPKs and phosphatases regulate important functions in bacterial pathogens, our understanding of the signal transduction mechanism is still in its infancy. The contribution of these signaling enzymes to bacterial growth and pathogenesis is multifaceted as can be expected for any signaling system. In our group, we are exploring the mechanism for how these signaling enzymes mediate diverse functions in a coordinated fashion as it remains to be completely understood.

Mots-Clés: bacterial kinases, pathogenicity, phosphorylation

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