Ionic Modulation of Bacterial Virulence and Its Role in Surgical Infection.


Authors: Alverdy JC

Abstract

BACKGROUND: Bacterial virulence is a dynamic property of pathogens that is expressed in a context-dependent manner. For a bacterial pathogen, the expression of virulence is a tradeoff, as there is an energy cost that can disturb other functions. As a result, virulence is activated only when bacteria sense the need for it.

METHODS: Recent work from our laboratory has identified many of the local cues in the environmental context that activate bacterial virulence during surgical injury, resulting in bacterial invasion, tissue inflammation, and, in some cases, lethal sepsis.

RESULTS: After surgical injury, cytokines, opioids, and end-products of ischemia can activate bacterial virulence circuits, such as the quorum-sensing signaling system, directly. However, when key ions are present, such as phosphate and iron, certain pathogenic bacteria become insensitive to these incoming host cues.

CONCLUSION: In this review, we provide molecular insight into the process by which certain surgical infections may be prevented by ionic modulation of the local microenvironment.

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