

SHORT COMMUNICATION

Antimicrobial activity of prodigiosin is attributable to plasma-membrane damage

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ABSTRACT

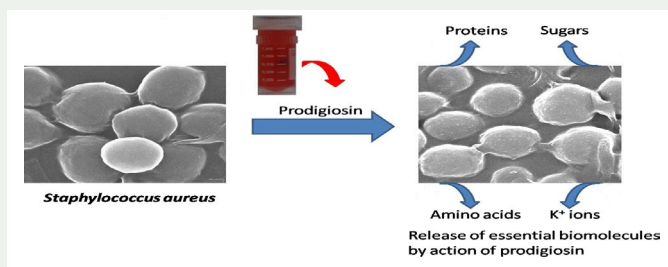
The bacterial pigment prodigiosin has various biological activities; it is, for instance, an effective antimicrobial. Here, we investigate the primary site targeted by prodigiosin, using the cells of microbial pathogens of humans as model systems: *Candida albicans*, *Escherichia coli*, *Staphylococcus aureus*. Inhibitory concentrations of prodigiosin; leakage of intracellular K⁺ ions, amino acids, proteins and sugars; impacts on activities of proteases, catalases and oxidases; and changes in surface appearance of pathogen cells were determined. Prodigiosin was highly inhibitory (30% growth rate reduction of *C. albicans*, *E. coli*, *S. aureus* at 0.3, 100 and 0.18 µg ml⁻¹, respectively); caused leakage of intracellular substances (most severe in *S. aureus*); was highly inhibitory to each enzyme; and caused changes to *S. aureus* indicative of cell-surface damage. Collectively, these findings suggest that prodigiosin, log P_{octanol-water} 5.16, is not a toxin but is a hydrophobic stressor able to disrupt the plasma membrane via a chaotropic-mediated mode-of-action.

ARTICLE HISTORY

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KEYWORDS


Antimicrobial activity; competitive interactions; mode-of-action; membrane leakage; microbial pigment prodigiosin; *Staphylococcus aureus*; *Serratia marcescens*



1. Introduction

Micro-organisms synthesise structurally diverse pigments, including melanins, carotenoids, violacein, and prodigiosin; some of which exhibit a range of biological activities. Prodigiosin (Figure 1), synthesised by the Gram-negative bacterium *Serratia marcescens*, is an

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