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ORIGINAL RESEARCH

Antibacterial activity of a lectin-like *Burkholderia cenocepacia* protein

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Abstract

Bacteriocins of the LlpA family have previously been characterized in the γ-proteobacteria *Pseudomonas* and *Xanthomonas*. These proteins are composed of two MMBL (monocot mannose-binding lectin) domains, a module predominantly and abundantly found in lectins from monocot plants. Genes encoding four different types of LlpA-like proteins were identified in genomes from strains belonging to the *Burkholderia cepacia* complex (Bcc) and the *Burkholderia pseudomallei* group. A selected recombinant LlpA-like protein from the human isolate *Burkholderia cenocepacia* AU1054 displayed narrow-spectrum genus-specific antibacterial activity, thus representing the first functionally characterized bacteriocin within this β-proteobacterial genus. Strain-specific killing was confined to other members of the Bcc, with mostly *Burkholderia ambifaria* strains being susceptible. In addition to killing planktonic cells, this bacteriocin also acted as an antibiofilm agent.

Introduction

While some members of the β-proteobacterial genus *Burkholderia* exhibit attractive properties for biodegradation of environmental pollutants or growth promotion of plants (Suárez-Moreno et al. 2012), several species represent a threat to animal and human health. The *Burkholderia pseudomallei* group includes the causative agents of human melioidosis, *B. pseudomallei*, and of animal glanders, *Burkholderia mallei* (Galyov et al. 2010). The *Burkholderia cepacia* complex (Bcc), encompassing 17 species, is home to opportunistic pathogens, such as *Burkholderia multivorans* and *Burkholderia cenocepacia*, that cause respiratory infections in cystic fibrosis patients and immunocompromised individuals (Sousa et al. 2011; Vial et al. 2011; Suárez-Moreno et al. 2012). Bcc bacteria are difficult to combat due to high intrinsic antibiotic and biocide resistance, biofilm-forming behavior, and prevalence of multidrug-resistant strains (Horsley and Jones 2012).

A possible strategy to devise alternative anti-*Burkholderia* strategies is to exploit the antibacterial activity of molecules involved in competition among *Burkholderia* strains and the potentially novel molecular targets involved (Chandler et al. 2012). Production of the polyketide enacyloxins by