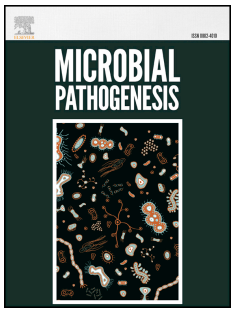
Accepted Manuscript



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PII: S0882-4010(15)30065-6

DOI: 10.1016/j.micpath.2015.12.013

Reference: YMPAT 1743

To appear in: *Microbial Pathogenesis*

Received Date: 6 August 2015

Revised Date: 18 December 2015

Accepted Date: 22 December 2015

Please cite this article as: Southern SJ, Scott AE, Jenner DC, Ireland PM, Norville IH, Sarkar-Tyson M, Survival protein A is essential for virulence in *Yersinia pestis*, *Microbial Pathogenesis* (2016), doi: 10.1016/j.micpath.2015.12.013.

Survival protein A is essential for virulence in *Yersinia pestis*

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Abstract
Plague is a highly pathogenic disease caused by the bacterium *Yersinia pestis*. There is currently no vaccine available for prophylaxis and antibiotic resistant strains have been isolated, thus there is a need for the development of new countermeasures to treat this disease. Survival protein A (SurA) is a chaperone that has been linked to virulence in several species of bacteria, including the close relative *Yersinia pseudotuberculosis*. In this study, we aimed to evaluate the role of SurA in virulence of the highly pathogenic *Y. pestis* by creating an unmarked *surA* deletion mutant. The *Y. pestis* Δ*surA* mutant was found to be more susceptible to membrane perturbing agents and was completely avirulent in a mouse infection model when delivered up to 2.1 x 10^5 CFU by the subcutaneous route. This provides strong evidence that SurA would make a promising antimicrobial target.

Keywords: *Yersinia pestis*, mutant, virulence.

1. Introduction

Yersinia pestis, the causative agent of plague, is a highly pathogenic organism probably most famous for causing the Black Death in the 14th century [1]. Despite its fame as a historical disease, plague is considered as a re-emerging problem [2]. Antibiotics are used to treat the disease as there is no licenced vaccine currently available [3]. However, with the emergence of antibiotic resistance strains [4, 5], it is vital to develop new antimicrobials against novel targets in *Y. pestis*. One strategy is to target bacterial virulence factors, essentially disarming the bacteria to prevent disease [6]. *Y. pestis* is a facultative intracellular pathogen: it is thought to use macrophages to migrate to local lymph nodes where it switches to extracellular replication [7]. This requires a specific subset of virulence factors to allow it to survive and disseminate to various sites in the body (reviewed in [8]). One such potential virulence factor is Survival protein A (SurA), a chaperone involved in the biogenesis of outer membrane proteins (OMPs) [9, 10].

SurA was initially identified as important for stationary phase *sur*vival (*sur*) in *E. coli* [11] and later identified as having peptidy-prolyl isomerase (PPIase) activity, making it part of the