

## The sensor kinase MprB is required for *Rhodococcus equi* virulence

MacArthur, Iain; Parreira, Valeria R; Lepp, Dion; Mutharia, Lucy M; Vazquez-Boland, José A; Prescott, John F

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### **Abstract:**

*Rhodococcus equi* is a soil bacterium and, like *Mycobacterium tuberculosis*, a member of the mycolata. Through possession of a virulence plasmid, it has the ability to infect the alveolar macrophages of foals, resulting in pyogranulomatous bronchopneumonia. The virulence plasmid has an orphan two-component system (TCS) regulatory gene, *orf8*, mutation of which completely attenuates virulence. This study attempted to find the cognate sensor kinase (SK) of *orf8*. Annotation of the *R. equi* strain 103 genome identified 23 TCSs encoded on the chromosome, which were used in a DNA microarray to compare TCS gene transcription in murine macrophage-like cells to growth *in vitro*. This identified six SKs as significantly up-regulated during growth in macrophages. Mutants of these SKs were constructed and their ability to persist in macrophages was determined with one SK, MprB, found to be required for intracellular survival. The attenuation of the *mprB*<sup>-</sup> mutant, and its complementation, was confirmed in a mouse virulence assay. *In silico* analysis of the *R. equi* genome sequence identified an MprA binding box motif homologous to that of *M. tuberculosis*, on *mprA*, *pepD*, *sigB* and *sigE*. The results of this study also show that *R. equi* responds to the macrophage environment differently from *M. tuberculosis*. MprB is the first SK identified as required for *R. equi* virulence and intracellular survival