

**Immunomodulatory Effects of *Brucella abortus* S19 on Cytokine Production that Promote
Spontaneous Abortion in Swiss White Mice**

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ABSTRACT

Brucellosis is the most common zoonotic disease in the world. It has been implicated in spontaneous abortions in animals and man. Spontaneous abortion is the loss of the uterine product prior to the viability of the foetus. There is a progressive shift towards Th2 (antibody) profile in pregnancy with a concurrent diminishing role for Th1 (cellular) immune response in successful pregnancy. A Th1 profile is considered unfavourable to pregnancy. The immune mechanisms that lead to spontaneous abortion in *Brucella* infection are not known. *Brucella* lives intracellularly and elicits a Th1 response. By use of a murine model and the S19 vaccine strain of *Brucella abortus*, this study created these conditions to examine if this is the mechanism by which *Brucella* causes spontaneous abortions. Serum samples were collected and analyzed by Cytometric Bead Array. Five cytokines were targeted; IL-2, IFN- γ and TNF- α represented the Th1 cytokines while IL-4 and IL-5 represented the Th2 cytokines. IL-2 was analyzed but its levels fell below detectable threshold. Data was analyzed using the Paired T- test and $p < 0.05$ was considered significant. IFN- γ and TNF- α infected (test) uninfected (control) and groups had no significant differences in the mean levels of cytokine levels. IL-4 had significant differences between control and test groups in all three trimesters of pregnancy ($t=13$, $P= 0.036$, 0.0071 and 0.0277). IL-5 levels had significant difference between the control and test groups in the second trimester of pregnancy ($t =14$, $P= 0.0075$) These results show that the maternal immune system is skewed towards a Th2 response during pregnancy even when infected with intracellular bacteria like *Brucella* that would normally elicit a Th1 response. The implication of this study is that while the mechanisms by which *Brucella* causes spontaneous abortion remains unknown, it is clear that *Brucella* elicits a strong hummoral response from mice during pregnancy and this immunomodulatory action is mediated through IL-4 suppressing IFN- γ , hence protecting the

foetus from the harmful effects of a cellular response. Therefore, Th2 cytokine levels can be used as a marker for successful pregnancy in *Brucella* infection.