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***Francisella novicida* as a model to study tick transmission**

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**Aims:** Many bacterial pathogens that impact human and animal health are transmitted by ticks. However, little is known about the mechanisms by which these pathogens are able to transition from the mammalian to the vertebrate host. Using a well-characterized *Francisella novicida* transposon mutant library and *Dermacentor andersoni* ticks, the goal of this research was to develop an in vivo negative selection assay to identify the genes required for tick colonization.

**Methods:** BALB/c mice were inoculated subcutaneously or intraperitoneally with one or more *F. novicida* mutants. *Dermacentor andersoni* nymphs were then fed on the bacteremic mice. Blood and ticks were cultured on selective media. Culture results were confirmed by mutant-specific PCR. Quantitation of the relative amounts of each *F. novicida* mutant in the mouse or tick was done by real-time PCR.

**Results:** The infection rate in *D. andersoni* nymphs that fed on *F. novicida*-infected mice varied from 12 to 100 %, depending on the level of bacteremia during the time of feeding. The presence of *F. novicida* within the ticks reflects colonization rather than transient infection because the number of colony forming units within the tick increases after feeding, ticks remain infected after molting to adults, and *F. novicida* colonies can be visualized in midgut epithelial cells. When mice are infected with two *F. novicida* mutants, the proportion of each mutant comprising the bacteremia in the mouse is reflected in the tick infection. To further validate the utility of this model, *F. novicida* strains with mutations in outer membrane proteins or chitinase will be screened for their ability to colonize the tick.

**Conclusions:** This is the first work demonstrating the ability of *F. novicida* to colonize *D. andersoni* ticks. The *F. novicida* mutant library provides a powerful tool to identify the genes required for transition from the mammalian host to the tick vector, which is essential for maintenance of many tick-borne bacterial pathogens.