



# Kansas State University Research Foundation TECHNOLOGY LICENSING PROFILE

Attenuated vaccines to protect canines and humans against tick-borne Ehrlichia species infections

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**Description:** Researchers at Kansas State University are developing modified live vaccine candidates to prevent tick-borne Ehrlichia and Anaplasma species infection in dogs and humans.

**Canine Vaccine Development:** Canine ehrlichiosis is caused by three tick-borne rickettsials of the genus *Ehrlichia*: *E. canis*, *E. ewingii*, and *E. chaffeensis*. All three canine pathogens cause disease with clinical symptoms that include fever, lethargy, exercise intolerance, nasal discharge and bleeding. Although clinical symptoms of the disease subside following doxycycline therapy, the treatment may not clear the pathogens completely. Dogs recovered from clinical disease retain low infections for several years (potentially for life). Persistent infection has two important implications: 1) the disease can revert when the host immunity is suppressed, and 2) dogs with subclinical-infections serve as infection reservoirs for ticks to acquire and transmit the pathogens to naive dogs or people. Because *Ehrlichia* infect immune cells, they have higher potential to suppress host defenses and impair the health of dogs.

**Preliminary Data:** K-State recently established mutagenesis methods for *E. chaffeensis*. The inventors have identified two mutants of the organism whose growth is attenuated in dogs and deer (reservoir host of the pathogen). Furthermore, preliminary data revealed that one of the two mutants tested conferred complete protection against wild-type needle infection challenge in both dogs and deer, while the second mutant offered partial protection. This preliminary data is being used to pursue grants to conduct a larger canine study to evaluate these two *E. chaffeensis* mutants for their potential as attenuated live vaccines to protect dogs against tick infection challenges with wild-type *E. chaffeensis* (homologous) and *E. canis* (heterologous).

## Advantages:

- No vaccines currently on the market
- Treatment options are currently limited to one class of antibiotics

## Applications:

- Vaccines against Ehrlichia and Anaplasma species infections in dogs, deer, and humans
- Development of an entirely new and novel class of antibiotics

**Patent Status:** Patent Pending

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