

Canine Valley Fever Vaccine Project September 2019 Update

Several years ago, investigators at the University of Arizona created delta-cps1. This is a mutant strain of Valley Fever fungus that is missing a large gene. Delta-cps1 does not cause disease in several strains of mice, including those with no lymphocytes and mice that have had their bone marrow suppressed by chemotherapy. We have discovered that the delta-cps1 strain is unable to grow in the host very long and mainly dies off in the first week or two. This is a desirable feature of a “live” vaccine so dogs and people don’t get sick from getting the vaccine. Delta-cps1 dies quickly, but not before it causes a very strong immune response in mice. Studies have shown:

- Protection of two very susceptible kinds of mice from virulent Valley Fever strains
- Protection lasts at least 6 months (a long time in “mouse years”) between vaccination and infection
- 100% survival over 6 months of vaccinated mice that were infected with a lethal dose of *Coccidioides* spores (Valley Fever).

The Canine Valley Fever Vaccine Project is a joint public/private venture that includes the **Valley Fever Center for Excellence (University of Arizona)** through an **NIH grant [R01-AI-132140]** to develop a vaccine to prevent Valley Fever in humans with a canine vaccine as part of the pathway to reaching people. Our commercial partner, **Anivive Lifesciences** (Long Beach, CA) is investing heavily in the project over and above the NIH grant, with innovative approaches to multisite development strategies and creative problem solving to overcome the inherent difficulties in developing, stabilizing, licensing, and producing a live vaccine for a small market.

Great progress has been made in the last two years toward making a dog vaccine available to help prevent Valley Fever in dogs.

Formulation Studies (University of Kansas)

Formulation is the determination of what ingredients go into each vial of vaccine to stabilize for storage so the vaccine can be shipped to veterinarians and kept on hand until administered to dogs. Formulations have to

- Protect the delta-cps1 vaccine strain from loss of viability or damage during storage
- Protect the delta-cps1 live spores from loss of viability due to the drying process. Dry products have a longer shelf life and proper drying preserves the viability of live vaccines.
- Contain ingredients that are safe for dogs and are unlikely to cause adverse effects

The UK team has worked furiously to arrive at a short list of protectants for the vaccine spores. These are being tested in drying processes in vials to determine viability of the spores after the drying. We will then test the formulations in mice to make sure they are protective and do not cause adverse effects.

USDA licensing

Veterinary vaccines are licensed by the USDA Center for Veterinary Biologics. . Hennessy Research Associates (Kansas City, MO) has partnered with Anivive to license and

manufacture the vaccine. The UA, Anivive, and HRA will work closely to provide the licensing package to the USDA to get approval to start manufacturing test lots of vaccine so we can begin safety studies in dogs.

Vaccine protection in dogs

Preliminary data in a group of dogs vaccinated with delta-cps1 vaccine shows great promise that the vaccine will protect dogs from natural infection. Data have not been released yet, but have shown that a prime and booster vaccine provide a high level of immunity.

Canine safety study

A canine safety study of the test lots of vaccine is being tentatively planned for some time in 2020. It is anticipated that the study will be performed in more than one state and will involve a large number of dogs. Dogs will be vaccinated in the manner that the final product is expected to be used. Dogs will be monitored for adverse effects to the vaccine. The safety data are a critical component of USDA's evaluation of delta-cps1 for licensing.

Check back periodically to see if YOUR dog can participate in the Canine Valley Fever Vaccine Safety Study.