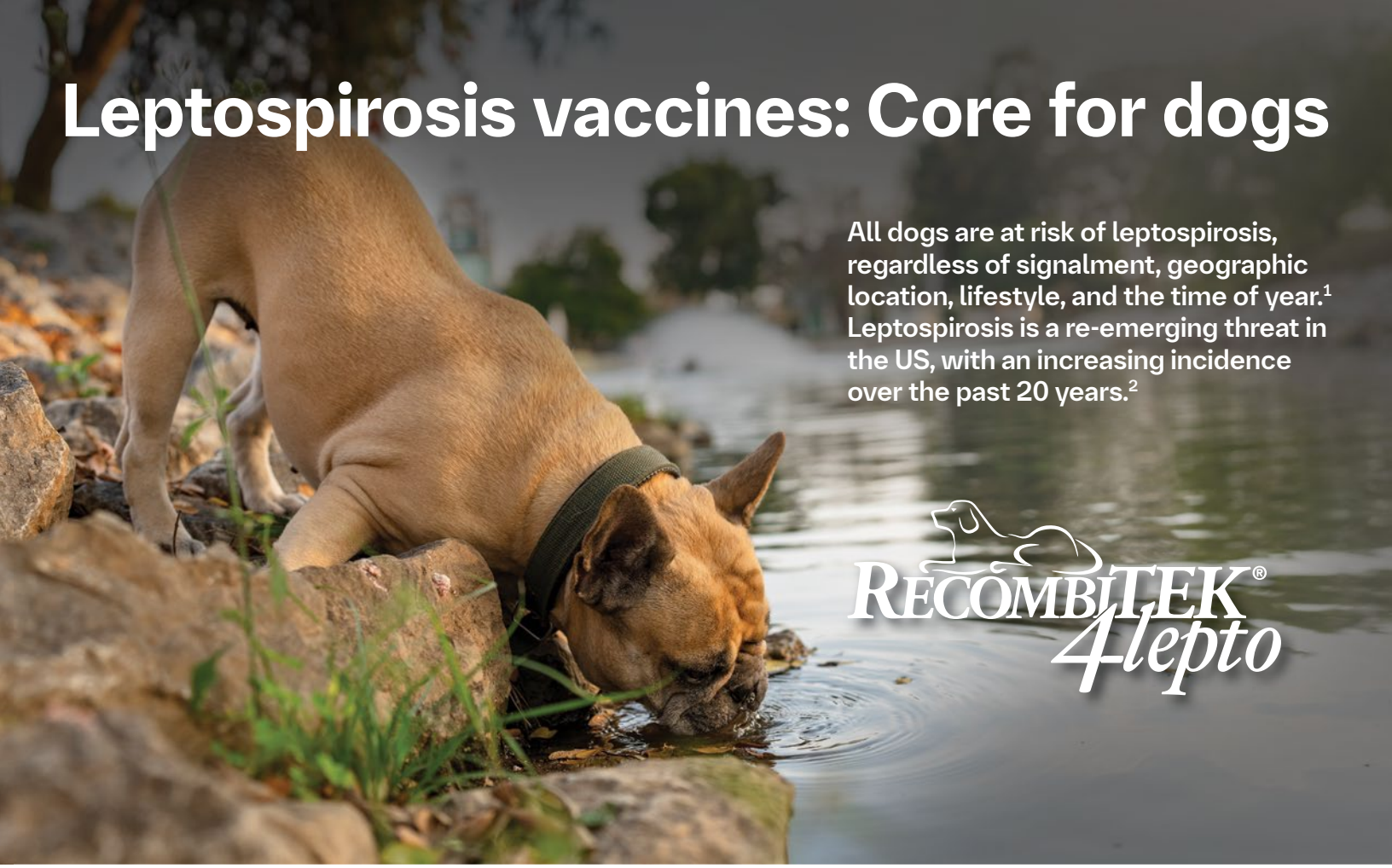
Leptospirosis vaccines: Core for dogs



All dogs are at risk of leptospirosis, regardless of signalment, geographic location, lifestyle, and the time of year.[1] Leptospirosis is a re-emerging threat in the US, with an increasing incidence over the past 20 years.[2]

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The prevalence might surprise you:

In a US prevalence study of 87,355 microscopic agglutination tests (MAT) performed from 2000-2014:

14.1% of dogs *tested POSITIVE for leptospirosis.*[3]

Increased prevalence in small dogs may be due to lack of vaccination.[6]

Historically, large, young adult male dogs of sporting or working breeds were at increased risk of leptospirosis, presumably due to increased exposure risk from reservoir hosts or contaminated rural environments.[4] However, urban/suburban dogs may be at a greater exposure risk than rural dogs.[5] This is due to several contributing factors, including:

- ✔ Increased population density
- ✔ Increased exposure to an abundance of wildlife reservoir species such as rats and raccoons, which have greater access to food and less predation in urban environments
- ✔ Inadequate waste management combined with slower storm water drainage

Signalment changes in the past 40 years[6]

- ✔ Increased prevalence of leptospirosis in *small breed dogs* (under 15 lbs.), especially in terrier groups
- ✔ Increased incidence in young adult dogs (2-3.9 years old), compared to puppies (<1 year old)

How it is transmitted

Leptospirosis is caused by infection with leptospiral spirochetes of the species ***Leptospira interrogans sensu lato.***[4]

Reservoir hosts

Each serovar is adapted to one or more mammals as a primary host, also called the definitive or reservoir host. These hosts can harbor a persistent infection without severe signs of disease.[4] ***Many of these reservoir hosts can be found in urban environments in high densities,*** such as rodents, raccoons, skunks, and opossums.[1] Once infection takes place, the bacteria are maintained in the renal tubules of the host.[4] They are then ***shed in the host's urine*** contaminating the surrounding freshwater, mud, and soil.[4]

L. canicola

L. icterohaemorrhagiae

L. pomona

L. grippotyphosa

Incidental hosts

When a specific serovar is not adapted to live chronically in a species of mammal, the mammal is considered an ***incidental host.***[4] ***These hosts tend to develop clinical disease*** – they either clear the pathogen or they die. Rarely do they develop a chronic carrier state.[4]

The dog serves as the reservoir host only for the pathogenic L. interrogans serovar canicola.[4] However, dogs serve as incidental hosts for many other common and pathogenic serovars including *L. icterohaemorrhagiae*, *L. grippotyphosa*, and *L. pomona*.[8]

Zoonosis

In North America, leptospirosis in humans is primarily transmitted indirectly through exposure to contaminated water.[9]

Disinfection and exposure prevention protocols are recommended for veterinary practitioners when handling patients who are suspected to have leptospirosis.[9]

Did you know?

There was a human outbreak of leptospirosis in New York City in 2021. Fourteen cases were reported and one person died as a result of infection.[7]

In thirteen of the fourteen reported cases, each one had a history of exposure to rats.

Transmission

In the environment, Leptospira can survive from weeks to months, favoring moist, warm and neutral to slightly alkaline pH conditions.[4] There is a positive correlation between canine leptospirosis cases and average rainfall, and large-scale human leptospirosis outbreaks have occurred after heavy rains and flooding.[4,5]

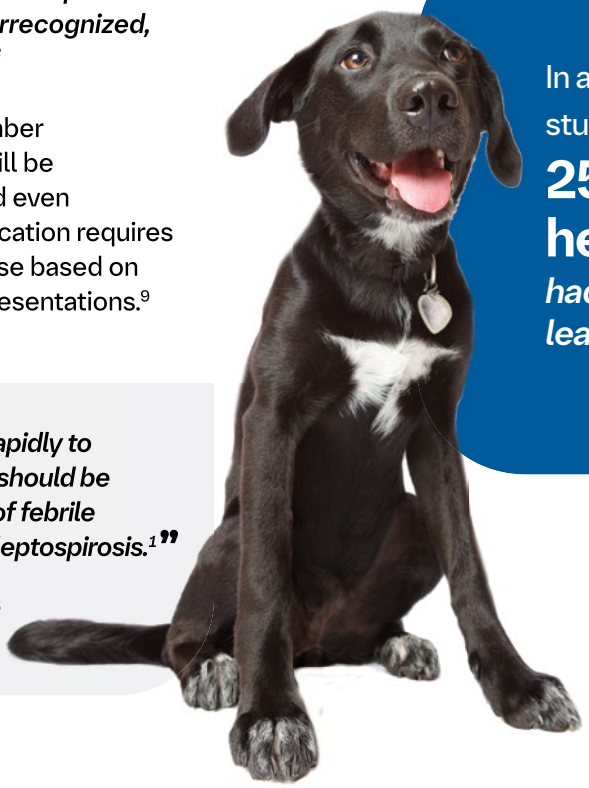
Infection occurs when the leptospires penetrate abraded skin or mucous membranes.[4] ***The most common mode of transmission is indirect, where the mammal comes in contact with contaminated water.***[1] Transmission can also occur directly between hosts in close contact, through urine, venereal routes, placental transfer, bites or ingestion of infected tissues.[4]

The difficult diagnosis

Despite the increasing prevalence and exposure risks, leptospirosis tends to be underrecognized, underdiagnosed, and undertreated.[8]

Athough leptospirosis impacts a number of different organ systems,[4] it may still be difficult to identify by pet owners and even veterinarians. This is because identification requires a high clinical suspicion for the disease based on knowledge of the range of clinical presentations.[9]

> ***"Because leptospirosis can progress rapidly to acute kidney injury (AKI), the disease should be considered in dogs with acute onset of febrile illness, especially if unvaccinated for leptospirosis.[1]"***
>
> 2023 ACVIM Small Animal Consensus Statement on Leptospirosis



In a 2007 Michigan prevalence study based on MAT results:

25.9% of healthy dogs

had antibody titers against at least one Leptospira serovar.[10]

Currently available diagnostic tests[4,9]

In-clinic Serologic Assays	Serology using Microscopic Agglutination Test (MAT)	Polymerase Chain Reaction (PCR)
Description • A qualitative test; detects the presence or absence of IgM or IgM/IgG antibodies (depending on the test) • Does NOT provide antibody titers **Interpreting results** • Negative results may occur early in the course of disease: repeat test 1 week later to see if animal seroconverts. • Four-fold (or greater) rise in antibody titers between acute and convalescent sera suggests leptospirosis. • False positives may occur with a history of vaccination or previous exposure. • It may be beneficial to retain samples to compare with a convalescent sample using MAT.	**Description** • A quantitative test; provides titers of the different *Leptospira* serovars **Interpreting results** • Positive titers within 1 week of illness may reflect post-vaccinal titers or prior subclinical infection. • Low positive/negative titers after 1 week or more means leptospirosis is unlikely. • Four-fold (or greater) increase in titers for over 1-2 weeks suggests leptospirosis. • This test should not be used to identify the infecting serovar, because a single serovar can yield high titers to different serovars over time due to cross-reactivity.	**Description** • A qualitative test; detects the presence of leptospiral DNA (from either dead or live bacteria)[4] • Does NOT identify the infecting serovar[4] • Best performed on blood and urine samples concurrently • Potential for rapid diagnosis early in course of infection at peak leptospiremia[4] **Interpreting results** • Sensitivity of PCR is not well-established. • May vary depending on the course of illness; higher specificity early in the course of illness and in dogs that have not received treatment with antimicrobials.

Why it is important to vaccinate

Vaccination is recommended annually (for all dogs), regardless of breed, because leptospirosis is a zoonotic disease, can be severe or fatal despite treatment, and exposure can occur regardless of age, geography, or lifestyle.[1]

Low vaccination rates for leptospirosis may be driven by owner hesitancy, or a concern about vaccine adverse reactions. However, one study observing over 100,000 dogs showed a low rate of adverse reactions in dogs given a leptospirosis vaccine (0.53% or 53/10,000).[10] Lepto vaccines are safe, effective and provide at least a 1-year duration of immunity.[4]

AAHA recommends vaccines against canine leptospirosis as core:[12]

American Animal Hospital Association (AAHA) guidelines for administration of Leptospira 4-serovar vaccine[12]

- ✔ ***Initial vaccination for dogs < 16 weeks of age:***
  Two doses, 2-4 weeks apart, starting at 12 weeks of age
- ✔ ***Initial vaccination for dogs >16 weeks of age:***
  Two doses, 2-4 weeks apart, regardless of dog's age
- ✔ ***Revaccination (booster):***
  A single dose within 1 year following the last dose in the initial vaccination series. Administer subsequent boosters annually.

Did you know?

The RECOMBITEK® 4 lepto vaccine is the only **nonadjuvanted** canine lepto vaccine with a 15-month duration of immunity against *L. grippotyphosa*.[13]

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