Survey of *Dirofilaria immitis* antigen and antibodies to *Leishmania infantum* and *Toxoplasma gondii* in cats from Madeira Island, Portugal

Michelle Neves[1], Ana Patrícia Lopes[2], Carolina Martins[3], Raquel Fino[3], Cláudia Paixão[3], Liliana Damil[3], Clara Lima[4], Ana Margarida Alho[5], Henk D. F. H. Schallig[6], Jitender P. Dubey[7] and Luís Cardoso[2]

Abstract

Background: *Dirofilaria immitis*, *Leishmania infantum* and *Toxoplasma gondii* are zoonotic parasites which can affect domestic cats. Considering the lack of published data from the local feline population, this study aimed to assess infection with or exposure to these pathogens in cats from Madeira Island, Portugal.

Methods: One hundred and forty-one domestic cats (77 males and 64 females; median age: 2 years) were sampled at a veterinary medical centre in Funchal, from September 2018 to January 2019. Serum samples were tested for *D. immitis* antigen, with an enzyme-linked immunosorbent assay kit, and for antibodies to *Leishmania* spp. or to *T. gondii*, with the direct agglutination test and the modified agglutination test, respectively.

Results: Five cats (3.5%; 95% confidence interval, CI: 1.2–8.1) were positive to *D. immitis*; no cats were seropositive to *Leishmania* spp. (0%; 95% CI: 0–2.6%); and 43 cats (30.5%; 95% CI: 23.0–38.8%) were seropositive to *T. gondii*. Prevalence of the *D. immitis* antigen was significantly different between cats that received ectoparasiticides and those which did not (0 *vs* 12.2%; $P = 0.009$). Prevalence of antibodies to *T. gondii* was significantly different between juvenile and adult cats (12.8 *vs* 38.0%; $P = 0.007$). There were two cats concurrently positive to *D. immitis* and *T. gondii*, but no statistical association between these two dependent variables was found ($P = 0.641$).

Conclusions: To our knowledge, this is the first report of the presence of parasites *D. immitis* and *T. gondii* in the feline population of Madeira Island. Knowledge on the epidemiological situation of these and other zoonotic pathogens should raise awareness, both at the veterinary medical and public health levels, and contribute to promoting prevention and control.

Keywords: Agglutination tests, Enzyme-linked immunosorbent assay, Epidemiology, Europe, Feline, Serology, Vector-borne pathogens, Zoonotic