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Serosurvey of canine leishmaniosis in five departments near an identified human clinical case in Marseille, France

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Background
Leishmania infection in humans, caused by *Leishmania infantum*, is still present in southern France despite advances in the prevention and treatment of canine infection. The period of transmission of the parasite by sand fly vectors is extending, ranging from March to November, probably because of global warming. A total of 380 cases of human leishmaniasis were reported in the southeast of France between 1998 and 2020 [1]. Limited data on canine leishmaniosis prevalence in France necessitates a strengthening of epidemiological surveillance. In 2023, a serosurvey on canine infection was conducted in five departments near Marseille, following a local human case earlier in the year.

Case report
At the beginning of 2023, a 76-year-old female patient was referred to *IHU Méditerranée Infection* because of three nodular erythematous lesions, one on the right forehead and two on the right temple. The lesions had been evolving for three months. They were described as painless and slightly pruritic, nodules that evolved into ulceration within a few weeks. The patient lived in a house with a garden in Marseille (Bouches-du-Rhône). No recent travel was reported in the past years, including to other regions of Southern France. No contacts with animals were reported, and the patient did not own any pets at the time of presentation. In this context, one of the lesion's crusts was gently removed for molecular diagnosis, and a biopsy specimen was obtained for histopathological diagnosis. Following DNA extraction, both the crust specimen and dry swab sample tested positive for *Leishmania infantum* (99.80%; LR697137) through PCR sequencing. Moreover, the Western-Blot assay identified anti-*Leishmania* antibodies. Histopathological examination of the biopsy specimen revealed the presence of amastigotes of *Leishmania* within histiocytes. These results collectively led to the diagnosis of cutaneous *L. infantum* leishmaniasis. Although not commonly observed, cutaneous *L. infantum* leishmaniasis is well-known in endemic areas of southern Europe [2].

Materials and methods
From May to November 2023, a serological survey included 701 apparently healthy dogs, primarily from military kennels and shelters, residing in 16 localities within a 130 km radius around Marseille (departments of Hérault, Gard, Bouches-du-Rhône, Vaucluse, and Var). Serological screening employed the ELISA test (ID Screen® Leishmaniasis indirect, Innovative Diagnostics, Grabels, France). The assay validation required an optical density of the positive control (ODPC) to be ≥0.35, with a positive control (ODPC) to negative control (ODNC) ratio greater than three. The S/P ratio (%), calculated as 100 * (ODN - ODNC) / (ODPC - ODNC) for each sample (ODN), was used to determine positivity. Samples with S/P >50% were considered positive and those <50% were classified as negative in ELISA testing.

Results
Among the 701 dogs, 40 (6%) were tested positive for *L. infantum*, with varying rates in different regions: Hérault 2% (2/99), Gard 7% (4/59) [including the Cévennes 15% (4/27)], Bouches-du-Rhône 4% (15/353) [including the city of Marseille 7% (7/102)], Vaucluse 15% (16/109), and Var 4% (3/67).

Conclusions
In Marseille, where a 7% seropositivity rate indicates ongoing *Leishmania* infection in dogs, a positive dog was discovered just a few kilometers from a patient's location. This area had previously recorded infected sand fly vectors (*Phlebotomus perniciosus*) a decade ago [3]. Enzootic regions in the Cévennes and Vaucluse showed a confirmed 15% seroprevalence on tested dogs [4]. Given the role of dogs as effective

sentinels for human leishmaniasis, it is imperative to regularly conduct and expand serological surveys to ensure continuous monitoring.

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Consent to publish: Written informed consent was obtained from the patient for publication of her clinical case.

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