

LEISHMANIASIS DUE TO *LEISHMANIA BRAZILIENSIS* IN ESPÍRITO SANTO STATE, BRAZIL. FURTHER EVIDENCE ON THE ROLE OF DOGS AS A RESERVOIR OF INFECTION FOR HUMANS

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The New World leishmaniasis are basically zoonoses and some forms are associated with sylvan habitats, where wild animals usually serve as reservoir hosts for the parasites and a variety of sandfly species have been implicated as vectors. Ecological changes associated with human activities in the forests, may result in modification of the epidemiology. For instance, when forests are destroyed and the natural habitats for the sandfly vectors and mammalian reservoirs are eliminated, the incidence of the disease tends to decrease. However, not all forms of leishmaniasis are restricted to persons entering tropical forests. American cutaneous leishmaniasis (ACL) caused by *L. braziliensis* (= *L. b. braziliensis*; *L. [Viannaia] braziliensis*) often occurs in old established communities, where the maintenance cycle seems to involve domestic animal reservoirs (canine and equine) and phlebotomine sandflies with peridomestic habitats (for review see G. Grimaldi et al., 1989, *Amer. J. Trop. Med. Hyg.*, 41: 687-725; WHO, 1990, *Techn. Rep. Ser. No. 793*, Geneva, p. 158).

Cutaneous leishmaniasis was first reported in Espírito Santo in 1913 (W. Machado & E. Rabello, 1913, *Bol. Soc. Bras. Dermatol.*, 2: 25-28). During the first epidemic, several cases of the disease were described from patients working in deforested areas or living in newly established communities. However, environmental changes often modified the occurrence of ACL in the State, where new epidemics in nonforested

areas were reported (P. A. Sessa et al., 1985, *Rev. Soc. Bras. Med. Trop.*, 18: 237-241; A. Falqueto et al., 1986, *Mem. Inst. Oswaldo Cruz*, 81: 155-163).

The species definitely associated with human infections in Espírito Santo are: *L. braziliensis*, causing cutaneous or mucocutaneous leishmaniasis; and *L. chagasi*, responsible for cases of visceral leishmaniasis (A. Falqueto et al., 1986, *loc. cit.*; G. Grimaldi et al., 1989, *loc. cit.*). Although natural infections of both sylvatic animals, such as *Proechimys iheringi*, and phlebotomine sandflies, such as *Lutzomyia gasparviannai*, were detected in Vianna municipality, the isolates were identified by molecular characterization as a new taxonomically distinct parasite of the *L. mexicana* complex (G. Grimaldi et al., 1987, *Amer. J. Trop. Med. Hyg.*, 36: 270-287). However, dogs have also been found infected with *L. braziliensis* (G. Grimaldi et al., 1987, *loc. cit.*) and were implicated as a possible domestic reservoir for the maintenance cycle of this parasite in an endemic area in Viana (A. Falqueto et al., 1986, *loc. cit.*). Here we extend these studies, describing another focus of the disease due to *L. braziliensis* in Espírito Santo, and trying to correlate the presence of infected dogs with the occurrence of ACL in humans.

The study area is located in the municipality of Itarana, in the mid-west region of Espírito Santo State, Brazil (at 19°52'S and 40°49'W). The physical geography of this region is similar to that already described for other endemic areas of ACL in the State, where the original forest environment has been altered (A. Falqueto et al., 1986, *loc. cit.*). During an epidemic outbreak of ACL in this area occurred in November 1985, we examined a total of 232 out of 245 inhabitants, coming from an old

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established community ("Vila Praça Oito") or neighbouring nonforested rural settlements, in which dogs and phlebotomine sandflies with peridomiciliary habitats were apparently involved in the transmission. We detected 26 (11%) confirmed human cases of the disease (as defined using methods for demonstrating the parasites from the lesion material), but of the 215 individuals tested with leishmanial antigens, 42 (19.5%) showed positive intradermal delayed hypersensitivity reaction (Montenegro test). No difference was detected in the results using this test, when the patients were compared in relation to clinical manifestations, age or sex. Diagnosis was based on: a) clinical appearance of the lesion; b) the positive Montenegro intradermal reaction; c) the direct demonstration of the parasite in the lesion through examination of stained smears or histologic sections; and/or d) by isolating the parasite from tissue fragments, using *in vivo* and *in vitro* systems.

A search for suspected vectors and infected dogs was conducted in the area of this study. Collections of sandflies were made periodically inside the houses and in the peridomiciliary dependencies. A sample of 148 phlebotomines was collected in a total period of 10 hours, during 5 days consecutively. Standard techniques based on insect morphology were used for the identification of sandfly species. The results showed that 112 (76%) sandflies were *Lu. intermedia*; 21 (14%) were *Lu. whitmani*; and the remaining 15 (10%) samples were represented by the following species: *Lu. migonei*, *Lu. fischeri* and *Lu. quinquefer*. On the other hand, of 56 dogs examined, 7 (12.5%) had skin ulcers, from which leishmanial parasites were isolated. Seven isolates from human cases and 4 from dogs were identified as *L. braziliensis*.

Parasite isolates were characterized by radioimmune binding assay using specific monoclonal antibodies, as well as by enzyme electrophoresis analysis (H. Momen et al., 1985, *Amer. J. Trop. Med. Hyg.*, 34: 1076-1084; G. Grimaldi, 1987, *loc. cit.*).

The most interesting evidence obtained in this study, on the role of dogs as a major reservoir of *L. braziliensis* infection for humans, came from the comparison between individuals with leishmanial infection and their cohabitation with dogs presenting cutaneous leishmaniasis (Table).

Comparing the results (Table) by a Chi-square test, the difference was statistically significant ($\chi^2 = 19.9$ with $P < 0.001$), showing that leishmanial infection in humans were more often associated with patients cohabitating with dogs presenting ACL caused by *L. braziliensis*. On the other hand, effective measures were undertaken in December, 1985 to reduce transmission/extension of the epidemic in the area. Control measures included: a) active case detection and prompt/effective treatment of patients; b) control of potential reservoir host by performing euthanasia of infected domestic dogs; and c) vector control by indoor/outdoor insecticide spraying in domestic and peridomestic areas. As a result, these intervention measures reduced transmission/morbidity drastically, since no new case was detected during a 2 years follow-up. These data support other investigations (for review see G. Grimaldi et al., 1989, *loc. cit.*), showing that the existence of a peridomiciliary cycle for *L. braziliensis* reflects the ability of this parasite and its vectors to adapt to changes in their original forested habitats, which has important public health implications.

TABLE

Association between human leishmanial infection and cohabitation with dogs with cutaneous leishmaniasis due to *Leishmania braziliensis*

	Infected ^a individuals	Non-infected individuals	Total
Cohabitation with dogs with ACL	19	23	42
Cohabitation with dogs without ACL or no dogs present	23	150	173
Total	42	173	215

(P < 0.001)

a: as determined by positive intradermal Montenegro reaction.