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Visceral leishmaniasis: paths that converge and divide

Leishmaniasis visceral: senderos que confluyen, se bifurcan

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ABSTRACT Urban visceral leishmaniasis is an emerging zoonosis in Argentina. In the Americas the disease is produced by Leishmania infantum, with dogs as the primary reservoir and phlebotomine sandflies as the vectors. This article presents the experience acquired by professionals from the National Leishmaniasis Program in Argentina as visceral leishmaniasis has emerged and spread, especially in clinical and laboratory diagnosis, disease treatment, vector biology, reservoir management, and conflicts regarding recommendations for infected dogs. Early detection and treatment, along with decentralized and horizontal strategies, will contribute to the decrease in morbidity and mortality associated with visceral leishmaniasis. Control over the transmission and spread of the disease requires integral environmental management and responsible dog ownership. The interests and discourses put into conflict by visceral leishmaniasis are discussed in the framework of the human-dog relationship, and the search for a consensus-based risk discourse is proposed.
KEY WORDS Leishmania infantum; Lutzomyia longipalpis; Diagnosis; Clinical Medicine; Social Perception; Pets.

RESUMEN La leishmaniasis visceral urbana es una zoonosis emergente en Argentina. En América es producida por Leishmania infantum, con el perro como reservorio principal e insectos flebotomíneos como vectores. En este artículo se presenta el conocimiento acumulado a partir de su emergencia y dispersión en el país, por los referentes del Programa Nacional de Leishmaniasis, en el diagnóstico clínico y de laboratorio, tratamiento, biología de vectores, manejo de reservorio, y el conflicto generado con las acciones recomendadas en relación con los perros infectados. La detección temprana y el tratamiento precoz, con estrategias descentralizadas y horizontales, contribuirán a disminuir la morbimortalidad asociada a la leishmaniasis visceral. El control de su transmisión y dispersión requiere de un manejo ambiental integral y la tenencia responsable de perros. Se discuten los intereses y discursos en conflicto generados por la leishmaniasis visceral en el marco de la relación humano-perro, proponiendo la búsqueda de un discurso consensuado de riesgo.
PALABRAS CLAVES Leishmania infantum; Lutzomyia longipalpis; Diagnóstico; Medicina Clínica; Percepción Social; Mascotas.

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INTRODUCTION

Leishmaniasis is a term used to refer to clinical manifestations caused by different etiological agents, trypanosomatid parasites of the *Leishmania* genus (Kinetoplastid: Trypanosomatidae). The vector is a phlebotomic insect (Diptera: Psychodidae: Phlebotominae). Humans develop this disease when they are bitten by a female specimen of the vector, which has previously bitten an infected mammal. The two clinical forms of leishmaniasis within Argentina are tegumentary (cutaneous and mucosal) leishmaniasis and visceral leishmaniasis, which are caused by different parasites and have different vectors, reservoirs, eco-epidemiological panoramas and impacts on public health (1).

Tegumentary leishmaniasis (TL), which was recorded in Argentina as early as 1916, is now, and has been since 2002, in an interepidemic period with 100 to 150 cases reported per year. Most of these cases are seen in Salta and Chaco, although some limited sporadic cases and outbreaks continue to occur throughout the endemic zone, which also includes Jujuy, Catamarca, Tucumán, Formosa, Santiago del Estero, Corrientes and Misiones. TL is transmitted in forested rural and sub-urban zones. The most frequent agent associated with the outbreaks is *Leishmania braziliensis*. Although different species of mammals have been found with the infection, none has fulfilled the criteria required to be considered a primary reservoir in the country (2).

In the Americas, urban visceral leishmaniasis (VL) is caused by *Leishmania infantum* (*syn. chagasi*) and since the first verified autochthonous case recorded in the country in 2006, a total of 104 cases have been reported, primarily in Misiones, although human cases were also reported in Corrientes, Santiago del Estero and Salta. Similarly, Formosa, Chaco and the north of Entre Ríos are also vulnerable because of the presence of the vector in these regions. All the cases were treated, although diagnosis time will need to be improved in some of the transmission areas, as the annual fatality rate in the country ranges from 7% to 11%. The spread as a result of pet transportation and trafficking has led to the presence of infected dogs, the main urban reservoir, in a large part of the Argentine territory. The urban vector is *Lutzomyia longipalpis* and, in Chaco, *Migonemyia migonei* also plays a role (3-6).

Doctors, veterinarians and lab technicians are obligated to report cases of both types of leishmaniasis (National Law 15465/1960, Executive order 3640/1964, Sanitary Police Act 3959/1900, Order 27342/44 and SENASA Resolution 422/2003). After the emergence of epidemic TL, a multidisciplinary group was formed in the 1980s to study leishmaniasis in Argentina. Its members promoted the creation of the National Leishmaniasis Program in Argentina (NLP) and took on the program's leadership and reference roles. Thus, an operational health program was established to fight an emerging/reemerging disease, coordinated by researchers specialized in the subject. This aspect is particularly important given that the World Health Organization (WHO) has classified leishmaniasis as a disease for which there is no known control strategy, a neglected disease with an estimated incidence of 200,000-400,000 cases/year worldwide and an estimated fatality rate of 10% (7). Therefore, the members of the NLP meet periodically with other experts throughout the continent to review the experimental evidence and to ratify or rectify the programmatic norms based on the control strategies that have demonstrated the greatest effectiveness to date. The NLP has the necessary diagnostic and treatment tools and guarantees that these be made available free of charge to the entire population.

Thanks to the information exchange existing among countries, when in the year 2000 urban VL came to Mato Grosso do Soul, Brazil, and Asunción, Paraguay, the experts, in their double capacity as researchers and agents of the control program, raised the warning in academic and healthcare circles. Moreover, they also informed the healthcare system's perception of the disease and strategies for combating it. Nonetheless, we know that the health-disease-care process is a social one which depends on several elements, not only on scientific experts, and can also be analyzed from multiple perspectives (8,9).

With regards to urban VL in Argentina, although some isolated cases have occurred in the past (10), the urban epidemic phenomenon took place in locations with no history of transmission whatsoever. As a result, and as generally happens

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with emerging infectious health events, the first contact with the disease ("leishma what?") and its subsequent construction tends to be based upon the press's presentations and representations. Thus, VL was constructed according to the criteria of news media to a greater degree than by health information: conflict and drama, risk of widespread death, the fault of the State, the fault of unnamed corporations, the fault of climate change – and with the identification-stigmatization of those infected, their neighborhoods, their otherness. It is based on the media's construction of VL, named for the first time, that previous, confluent but unspecific knowledge, regarding for example "diseases transmitted by mosquitoes" or cutaneous leishmaniasis in endemic zones (11), is then redefined.

Consequently, while since 2000 the experts of the NLP have constructed urban VL based on the risk of emergence, transmission and vulnerability, since 2006, outside of the health care system, VL has been constructed based in the conflict that surrounds the management of the canine reservoir and euthanasia, rather than as a public health problem. Thus, the discourse generated regarding VL denotes it as an anthropozoonotic disease, but one in which public, private corporative and communitarian interests diverge; one generating competition between the State, the liberal professions, laboratories and the animal protection organizations talking on behalf of "the people"; one based in the creation of artificial antinomies such as individual/society, reservoir-patient/client-pet. In this way, an arena of legitimation-delegitimation, in which "the first case I saw" is confused with "the first case ever seen" in a dispute for prominence and the accumulation of economic and social capital, is staged upon an epidemiological event (11).

This work will describe the biomedical, bio-ecological and socio-anthropological aspects of urban VL in Argentina, considering the epidemiological problem in terms of clinical practice, laboratory diagnosis, vectors and reservoirs, as well as the conflict regarding "dog love." The intention is to inform an emerging situation, to integrate the acquired technical knowledge, and to recontextualize VL as a problem of collective health, in an attempt to show that diverging knowledge can also be read as paths that converge.

PATIENT MANAGEMENT AND PROBLEMS RELATED TO CLINICAL DIAGNOSIS AND SOCIALIZATION OF PATIENTS WITH VISCERAL LEISHMANIASIS

VL or *kala-azar* (black fever in Hindi) is a potentially severe and lethal zoonosis, caused in the Americas by *Leishmania infantum*. The symptomatic cases of VL have a lethal outcome if they are not properly and promptly treated (1,13-16).

The incubation period varies from 10 days to 24 months (with an average of 2 to 6 months) after the vector bites, although it can be longer, up to several years (1,13-16).

Generally, most of the cases occur in patients below the age of 10 (1,13-16). The disease has the different clinical forms:

1. *Asymptomatic*: diagnosed only by a positive serological result.
2. *Acute*: characterized by high fever, symptoms similar to sepsis, hematological alterations, hepatosplenomegaly, normally with good general physical condition.
3. *Classic or kala-azar:* persistent and undulating fever, massive hepatosplenomegaly; the spleen may reach the right iliac fossa, with abdominal distension. Generalized adenopathies, pancytopenia, hypergammaglobulinemia, bleeding (epistaxis, gingival hemorrhage), anorexia, weight loss, cachexia, progressive weakness and signs of protein-calorie malnutrition, like edemas and ascites may also be present. Skin alterations may be seen in the skin, which can be grayish, dark or pale, dry and scaly; the hair thins.

The onset of VL may be sudden and present vomiting, diarrhea, fever, and cough. The risk of developing a symptomatic form of the disease increases with malnutrition and HIV infection and in immunocompromised young children (1,13-16).

Infectious complications (generally of a bacterial nature) and hemorrhages are the main causes of mortality (1,13-16).

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Clinical characteristics of visceral leishmaniasis in Argentina

From 2006 to 2011 a national registry has been kept of VL in the pediatric population of Argentina at the national level. Thirty patients have been reported. The average delay from the onset of symptoms until diagnosis in these cases was two months (ranging from between 1-8 months). Most children had had between 2-3 previous consultations in primary healthcare centers, where VL was not a suspected diagnosis (4,17).

In 45 adult patients evaluated, the average delay in the diagnosis was 2 months (ranging from 1-14 months) (18). These numbers show lost opportunities in the diagnosis of this disease. According to recent reports from Brazil, receiving a diagnosis after 60 days is a risk factor for mortality. Another risk factor for complications and mortality was the median age of young children (12.5 months) and adults (45.7 years). A predictive factor for mortality in adults is a history of alcoholism and malnutrition (19,20).

Difficulties in the clinical diagnosis

Unfortunately, VL is often considered a low priority problem by governmental authorities, society and, in some cases, by patients. The factors that contribute to this perception are, among others: that those affected are low-income groups living in peripheral areas, the coexistence of other health problems which are the focus of healthcare services, limited resources in healthcare infrastructure, lack of information about the true magnitude or the nature of the problem, lack of knowledge about the most effective points of intervention, and insufficient training of health personnel regarding this disease (1).

Failure to provide early detection of the disease and implementation of an appropriate treatment is related to an increase in morbimortality. The WHO establishes as essential the training of health personnel attending populations at risk of the disease in aspects related to treatment and prevention. Primary care centers are usually the first contact with the health system that a patient has, and therefore where VL must be watched for and considered as a suspected diagnosis in endemic areas. Thus, it is important to continue the investment in the training of the human resources needed to achieve a goal of great priority: to decrease mortality by installing knowledge about this emerging disease in the differential diagnosis of feverish symptoms with compatible epidemiology. Also of importance is the accessibility of specific diagnostic methods and the regular supply of the drugs necessary for treatment (1,21).

DIAGNOSIS OF VISCERAL LEISHMANIASIS

VL shares clinical characteristics with several feverish diseases such as malaria, schistosomiasis, typhoid fever and other systemic infections. Along with the epidemiological link, the clinical signs and symptoms are useful to define whether or not the patient is suspected of having the disease, although they are not enough to establish a final diagnosis. Thus, the use of accurate laboratory methods is indispensable. Early detection, followed by an appropriate treatment, is essential for the control of the disease.

The serological diagnosis should be evaluated in association with clinical and epidemiological aspects. In Argentina, the National Leishmaniasis Program recommends immunochromatography with antigen rK39 as the serological test, which has shown high levels of sensitivity (88-96%) and specificity (96-100%) (22-24).

The serology is limited by its incapacity to differentiate between an active disease and an asymptomatic infection; serological reactivity is maintained for years, and therefore is of no use in cases of relapse. Moreover, asymptomatic patients who come from endemic zones may have serological reactivity, but may not need treatment.

The parasitological methods are the "gold standard." The direct visualization of amastigotes in tissue smears, their development in *in vitro* or *in vivo* environments, or DNA detection by polymerase chain reaction (PCR) allow for a conclusive diagnosis. Bone marrow aspiration is the method most utilized (sternal puncture in adults and iliac crest puncture in young children).

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The smear method is appropriate and simple to implement for routine diagnosis and has high specificity, but sensitivity may vary depending on the skills of the microscopist and the tissue to be analyzed (spleen 93-99%, bone marrow 53-86% or lymph node 53-65%) (25,26). A smear carried out by a skilled operator yielding a positive result confirms a leishmaniasis case (100% specificity).

Culture and inoculation in susceptible animals increase diagnosis sensitivity and allow for parasite isolation. Nonetheless, these methods are not used as routine diagnosis, because they require adequate infrastructure and trained personnel.

PCR is useful for the diagnosis and typification of circulating strains. DNA detection of the parasite in bone marrow aspirates has higher sensitivity than the microscopic test. Samples to be processed may be the following: lesion biopsies, lymph node aspirates, bone marrow punctures, blood smears stained with Giemsa, parasite cultures, and organs of infected animals (27,28).

VL is an important opportunistic disease in immunocompromised patients, especially those infected with HIV. In immunocompetent individuals, the sensitivity of serological techniques is 87-93%, while seronegativity is over 40% in patients with VL and HIV coinfection. For these cases the parasitological diagnosis is highly relevant (29). A negative serological result does not rule out a VL diagnosis in HIV-infected patients. However, a low titer positive result has diagnostic value together with the clinical profile. The visualization of parasites or DNA detection in tissue samples constitutes the method of choice, although PCR is more sensitive and allows for a post-therapeutic follow-up (30-32).

Figure 1 shows the diagnostic algorithm for VL in which serological and parasitological tests are recommended. Even though in an epidemiological outbreak it is possible to begin treatment after compatible clinical findings and reactive serology for VL, it is advisable to refer tissue samples to the lab for the visualization of amastigotes or the detection of parasite DNA.

Making the diagnosis more horizontal allows for the integration and permanent collaboration of the laboratories carrying out the diagnosis with provincial and national experts. Training in smear reading helps to minimize the false positive and negative results, and decreases the amount of time needed for the diagnosis, thus allowing for an early therapeutic response. Laboratories in the network should form part of a program to control both the procedure and the results.

BIOLOGY OF THE VECTORS

The insects that serve as vectors for leishmaniasis are dipters of the *Pshycodidae* family (*Phlebotominae* subfamily), often called sandflies or phlebotomines. They are of a small size: between two and four mm. They are holometabolic organisms; their life cycle, which lasts about 11 weeks, consists of 4 stages: egg, larva, pupa and adult. The first three stages occur in humid ground, rich in the organic matter they feed on, while in the aerial adult stage the insects feed on liquids of plant origin. The females only consume blood for the development of the eggs. Normally, the adults have vespertine habits, although they can also have a short peak of activity at sunrise.

The main vector of the parasite that causes VL in the Americas is *Lutzomyialongipalpis* (33,34). The first record of this species in Argentina is of a female specimen found in Candelaria (Misiones) in 1951 (35). The species was not again seen until 2000, when four male specimens were captured in Corpus (Misiones) (36). Given this finding along with the appearance of VL cases in neighboring countries (Paraguay and Brazil), a yellow alert was issued with the objective of establishing an entomological surveillance system in the border area. Through this system, *Lutzomyialongipalpis* was found in Clorinda (Formosa) (3) in 2004, which led the issuing of an orange alert for all of the Argentine territory. In 2006, the first autochthonous case of human VL appeared in the city of Posadas (Misiones), in which the parasite, the vector and the reservoir were found to coexist, thereby confirming the transmission of VL in the country (red alert) (4). Later studies were able to prove the fast spread south of the parasite *L. infantum* – vector *Lu. longipalpis* – infected reservoir *Canis familiaris* complex within the northeast region of the country (37,38). The current distribution includes the provinces of Formosa, Misiones, Corrientes, Chaco and Entre Ríos up to the city of Chajarí (6). In Latin America, the southernmost city in which

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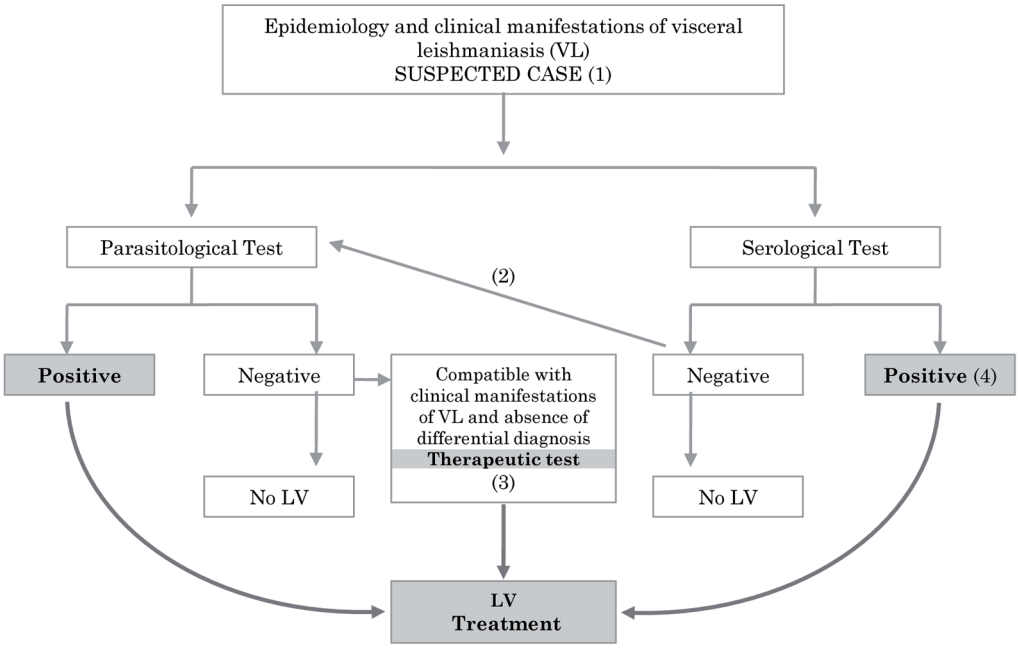

1. If possible, all patients under clinical suspicion and with an epidemiological link must be tested via serological and parasitological methods.
2. In immunocompromised patients, serology has low sensitivity (patients with transplants or infected with HIV). The parasitological diagnostic methods are indicated for these patients.
3. The therapeutic test can be performed in patients with a clinical profile compatible with visceral leishmaniasis and in the absence of differential diagnoses.
4. In an outbreak situation, severe cases with an epidemiological link, suspicious clinical profile and reactive rK39 may be administered specific treatment.

Figure 1. Diagnostic algorithm for suspected cases of human visceral leishmaniasis.
Source: Own elaboration.

specimens of the VL vector have been found is Salto, in the Oriental Republic of Uruguay (39), which lies across the river from the Argentine city of Concordia (Entre Ríos). Although no specimens of the vector have been found so far in Concordia (6), this could be a warning that the current distribution of *Lu. longipalpis* observed in Argentina is not necessarily the definitive distribution.

In all the cities studied, *Lu. longipaplis* proved to be a species well-adapted to the urban environment. Its distribution was observed to be heterogeneous, with areas of great abundance mixed with areas of low abundance or even absence (40). These areas, dynamic both in space and time, are defined primarily by micro-environmental characteristics (41).

In the Chaco region of Argentina, given the absence of *Lu. Longipalpis*, the presence of infected reservoirs and the sporadic occurrence of human cases, a different species of phlebotomines was proposed as a possible vector of *L. infantum*: *Mygonemyia migonei* (5).

In terms of the control and prevention of this continuous spread of the vectors, it is necessary to bear in mind that interventions involving solely the use of insecticides showed almost no effectiveness, allowing only for foci blockages of limited coverage and short duration (42). Considering the quick and wide spread of the vectors, the increasing amount of human cases, the growing distribution of cases and the increase in canine cases, it becomes even more evident that the problem of leishmaniasis should be handled comprehensively, carrying out integrated actions of prevention and control over the environment and understanding the environment as a set of natural, cultural and social values in order to work towards health through disease prevention.

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RESPONSIBLE PET OWNERSHIP AND RESERVOIR MANAGEMENT

As was previously stated, the main reservoir of VL is the domestic dog (43,44). One of the strategies in the integrated control of the disease is to control the reservoirs in order to interrupt the geographic circulation and distribution of the parasites.

Prevention is therefore related to the responsible ownership of canines. For the World Organisation for Animal Health (OIE), responsible dog ownership is

> ...the situation whereby a person [...] accepts and commits to perform various duties for the satisfaction of behavioural, environmental and physical needs of a dog and to the prevention of risks (aggression, disease transmission or injuries) that the dog may pose to the community, other animals or the environment. (45)

It is necessary to strengthen local management for the promotion of responsible ownership; these actions work towards prevention through a change of habits in the population. Responsible ownership has implications in different spheres of everyday life, which therefore involves working with aspects related to people's ways of life and with the conditions in which they develop. Veterinary physicians should help raise awareness and, concurrently, responsible ownership should be included in curricular contents both in primary and secondary schools.

A national law must be created in order to contemplate the norms established by international organizations (OIE-PAHO/WHO), based on an comprehensive program covering civic education about responsible animal ownership and including the following: identification and registration of animals and owners; use of official immunization records; regulations regarding establishments that sell or care for companion animals, breeders, dog walkers, veterinary establishments, shows, shelters or boarding centers for canines; stray dog control; environmental preservation; health risks; creation and improvement of pre-existing centers for zoonosis control; and fines for offenders (45). In 2011, the Argentine Executive Power created, through the Executive Order 1,088/11, the National Program for the Responsible Ownership and Health of Dogs and Cats [*Programa Nacional de Tenencia Responsable y Sanidad de Perros y Gatos*] (46); part of the program's goals would be implicated in the actions mentioned above.

Among the measures for controlling the canine population, surgical sterilization or neutering has one of the strongest impacts on public health systems and is likely one of the actions most widely known by society in general (47). It is important to bear in mind that the coverage must be high in order for neutering to keep the canine population stable (48), which is sometimes difficult for local systems. Therefore, as was previously mentioned, an adequate control strategy must always be accompanied by changes in the behaviors and conduct of the human population.

When dogs with Vl are treated pharmacologically, a clinical improvement is observed but the dogs continue to be a source of parasites for the vectors. Treating dogs with drugs used for humans may additionally produce strains resistant to those drugs (1). In the European continent, where treatment in dogs was carried out intensely, an increase in the prevalence of human and canine VL has been observed in the last years (49,50). Other types of measures, such as repellent collars or pipettes, are useful for protecting healthy animals (51,52) but they do not guarantee the interruption of transmission via dogs already infected.

Euthanasia of infected dogs is advisable as a way of eliminating the parasites available to vectors. Its effectiveness is greater when applied during the appearance of the first cases, thus preventing the disease from installing itself in the zone. Although in some foci a decrease in the incidence of human VL cases has been observed after massive euthanasia of canines (53,54), in other areas this measure was insufficient to eradicate canine VL (55,56). The main reasons why this failed as a control method are:

1. little acceptance on the part of the general population;
2. low coverage because of the low sensitivity of diagnostic tests;
3. delay in the detection and euthanasia of the dogs;
4. the euthanized animals are frequently replaced by non-infected dogs which are susceptible to contracting the disease in a short period of time (57).

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The management of the urban VL reservoir is complex and needs to be developed in an integrated and intersectoral way. It is essential that every control measure applied be accompanied by public policies that provide legislative support for the actions carried out.

DOG LOVE

The family and nature are two socially differentiated spheres. The VL reservoir, the dog, is the most common domestic animal in Argentina (58). Domestication is a historical and gradual process of evolutionary adaptation, in which humans select specific characteristics in animal or vegetable populations. The dog was among the first species to be domesticated, approximately 15,000 years ago. As it is an animal from which no profit is obtained, it is classified as a companion animal (59). In the domestic ownership of animals, the order of nature crosses into the order of humans/culture (60). In the following paragraphs, this approach will be the key to understanding VL emergence in Posadas and its surveillance in the northeast region of Argentina (NEA).

Environment and environmentalization in the emergence of visceral leishmaniasis in Posadas

From the 1980s to the present, the "environmentalization" (61) of Misiones progressed concurrently on two different fronts: the urban anti-dam movement in Posadas (62,63) and the policies for the preservation of the Paraná rainforest and its fauna in the rest of the province (64). We maintain that, as part of this environmentalization, when VL emerged in Posadas in 2006 (4), the domestic status of the dog and the dog's role in the environment were being redefined. Ferrero (64) has described the progressive decrease in the activity of hunting with dogs, as it became considered inappropriate in terms of environmental protection. In accordance with this environmentalization in the citizenship of Posadas residents, there was a change in the social profile or type of dogs sought: a preference for puppies of small breeds for company (65) or strong dogs for the protection of personal assets was seen (66).

Companion dogs or watchdogs live inside or guard the house, adopting the hegemonic place of the female (within the domestic sphere) and transforming the consumption of the home in which they live (towards middle class consumption patterns). In this context, illegal breeding and cross-border trafficking meet the demand of an increasing market. The connection between certain dog breeds and the amount of money a household spends on them allows us to entertain the idea that not all health risks come from poverty (67).

Social types of dogs

We found 4 socio-cultural types of dogs in Posadas.

Type 1: The most unprotected dogs in society. A nonprofit association, *El Refugio*, shelters 200 dogs on a parcel of land without infrastructure loaned for that purpose. It is located in the periphery of Posadas and has given 5,273 dogs up for adoption between 2001-2011 (68). Sixteen animals were diagnosed with VL and the association is a strong activist against euthanasia.

Type 2: Legal and illegal breeding centers for companion dogs and watchdogs (65,66). Dogs which are kept for procreation and selling are profitable animals rather than domestic companion animals, which is why they should be governed by a specific healthcare regulation (59); dog care centers would belong to the same regulatory status.

Type 3: Search dogs. Because Misiones is a province with international borders, the security forces have dogs which can detect narcotics or large amounts of money in cash to aid them in border control.

Type 4: A puppy given as a gift. Donation networks are informal spaces of non-permanent social relationships, which may be distributing animals infected with parasites (66). Companion animals have greater geographical mobility. A puppy that was given as a gift to a student from Posadas who then moved to Santo Tomé was involved in VL emergence in the province of Corrientes. It is also common for residents in Posadas to take their pets to the beaches in Ituzaingó (Corrientes).

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Each of these dog types would require specific healthcare regulations, as it is highly important to participate in the reproductive control of infected animals, the health certification of puppies and the circulation (national and cross-border) of animals.

Moral dilemmas of epidemiological surveillance

These social types of domestic dogs imply particular social relationships and economic interests which emerge in different ways as a result of the implementation of epidemiological surveillance.

Health surveillance includes voluntary participation, but needs to opt for regulatory criteria. All branches of the law – environmental, criminal, international, commercial and civil – have interests regarding companion animals (59). As dog breeding and boarding centers are a profitable activity, they may be subject to federal laws; however, in Latin America, the health regulation of companion animals lies under municipal jurisdiction (59).

The Universal Declaration of Animal Rights (1978), clearly based upon the Universal Declaration of Human Rights (1945), marks a turning point for the control of anthropozoonosis. According to the Declaration, and in order to protect the obligations of the human owners with respect to their companion dogs, the analyzed municipal regulations provide for the identification, census and registration of the animals. The identification of both dog and owner is a necessary regulation in order to prohibit abandonment and to demand compliance with animal rights (59,69). Recognizing the rights of nature is certainly a narcissistic wound to anthropocentrism (70); however, do these rights include the parasites that make humans sick? Given a human being and an abandoned dog infected with leishmaniasis, do both have the same rights if treating the dog could create parasites which can become resistant to the only available treatment for humans? Moreover, if the infected dog has an owner, can that owner and the veterinarian who treats the dog autonomously decide between treatment and euthanasia?

CONCLUSION

In the preceding sections we touched upon the body of knowledge regarding urban VL accumulated by the academic and program experts, starting with the first emergency alert in Argentina and its communication to health teams. However, from the text it could also be inferred that experts in VL, as well as those of any emerging pathogen, have to do more than designate, standardize and coordinate disease surveillance, guarantee access to a prompt diagnosis and timely treatment, and generate adequate prevention measures with actions based in scientifically validated evidence. The communicational dynamics of emerging and epidemic diseases seem to imply that when a disease abandons the health sections in the media and begins dominating the general information sections, and then multiplies into quotes resignified within diverse Internet contexts, perception is constructed based upon conflict. In the case of VL, this conflict is focused on the canine issue. Therefore, if the responsibility as public health professionals is to be properly assumed, the legitimated voices of the system must also partake in the permanent exercise of recontextualizing the discussion, attentive to changes in the epidemic in time and space, striving for balance, avoiding extreme stances, undertaking the voluntary exercise of listening to the different agents, and searching for paths of consensus and compromise between what is necessary and what is feasible.

In the field of science, the emergence of a novel situation gives rise to experts searching desperately for new sources of funding, for new work models, and for individuals who are reified as cases or samples. Even when doing so comes up against the immediate interests of these experts, from a health perspective work must be oriented towards assigning the problem the real importance it deserves in each epidemiological scenario, without magnifying it, thereby redirecting efforts towards the true needs of the system and public health.

In the political-public health arena, acute and collective events of biological diseases do not provoke but rather put into evidence social ills, faults in the healthcare system, inequalities, chronic signs and symptoms of the structural pathologies affecting those events. Therefore, in addition to

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the specific work of research into health services in order to improve the system, time must be invested in recovering a responsible discourse to counter denials such as "there's no problem," attempts at naturalization such as "it's always been here" and "it's here to stay," and the short-term cult of success resulting from partial interventions in phenomena we know to have multiple factors. Operationally, it is necessary to reiterate the necessity of evaluating communication and intervention "campaigns," to highlight that the allocation of responsibilities does not imply a homogeneous distribution of these responsibilities (from the individual to the State), and to recall that in capitalist society communications media have "news" objectives that are different from those of health education (11).

In the sectors with explicit or implicit economic interests – for VL those especially related to dogs (laboratories, product venders, breeding centers, professional business organizations and their political or press representatives) – it is common to go from a negation of the warning (disease awareness) when there is no response to its exaggeration for commercial purposes (disease mongering), arguing that it is a long-standing problem, that is "everywhere all the time." In this case, the discussion must be recontextualized by making reference to the experimental evidence shown to be the most effective to date, which requires an important dose of social competence on the part of the experts of the system in order to identify what, where and in what terms the issue should be discussed. The main points of such discussion may be summarized as follows:

a. To differentiate objectives of individual and collective health: treated dogs that improve their clinical symptoms but continue to be a source of parasites for much longer, dog treatments that may induce parasite resistance to the drugs used to treat human VL, repellent as individual protection when the impact in transmission is a function of the degree of repellent coverage in the entire exposed population of reservoirs (herd effect).
b. To indicate solutions offered commercially that require additional experimentation or that imply direct or indirect costs inaccessible for a health program: vaccines (in phase II, requiring subsequent applications or specific tests to differentiate immunized from infected individuals), massive repellents (field implementation cost, royalties, packaging and advertising), and massive fumigations that in addition to their financial cost have not proven to be effective for vector control (42).
c. To demand the methodological rigor of experimental tests in the face of empiricism, publicity-based handling of data (graphics of visual impact), or a lopsided discourse. The experimental endpoint must be the interruption of the transmission or the mitigation of human morbimortality; the promotion of anti-vector products makes sense in places where the vector exists and not in big cities that have a population with purchasing power but no vectors. To make clear that effective strategies of vector control were based in the use of DDT or other prohibited products. And, in relation to the treatment of dogs, to provide information regarding the percentage of relapses and the parasite persistence.
d. To be vigilant regarding discourses that use socioeconomic conditions or place of origin as determinants. Citizens from another country or province are identified as imported cases and are framed in the media as a threat; however, the importation of purebred dogs for reproduction purposes that causes the spread of parasites is overlooked. Humans are stigmatized as immunosupressed, alcoholic, elderly, poor and undernourished (negligent people rather than neglected people with neglected diseases), humans are made into "others" and blamed in order minimize the risk posed by infected dogs, a closer "other" for which we are responsible.

This permanent exercise in recontextualization with respect to different actors with specific interests brings us to the last voices that must be heard, without necessarily having the last word on the subject: professionals that consider the concept of human-animal health an objective of global survival, protectionist ONGs capable of rational discussion, and fundamentally the heterogeneous voice of the community. These agents take in all the aforementioned discourses and then juxtapose and reelaborate them according to

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their own knowledge and the legitimate affection they have for their pets. Therefore, professionals in the NLP collaborate with National Program for Responsible Ownership, and in this work and in our research groups we constitutively integrate the vision of the social sciences into the biomedical and bioecological sciences. However, in the midst of our work is also found the mass media, magnifying existing controversies, placing different sources of information all on the same level, offering instant prestige to Internet "experts," delegitimizing the authority of official experts *per se* for being the voices of the State, focusing on the quantification of cases and their individual identification, promoting individualism in a society at risk globally (71), encouraging the medicalization of everyday life (food, leisure, affection, the pet as a health objective) but at the same time discrediting traditional medicine by promoting alternative strategies without validation (healthism) (11).

Therefore, with the objective of creating a program for health and not just for disease, basic and necessary points of agreement must be found, paying attention to the voices expressing good will. In this search to contextualize both discourse and actions, assuming the responsibilities of the State as the guarantor of the citizens' health, it is necessary to transform the perception of knowledge that diverges into knowledge that converges, and reach the community with a common discourse on risk. These minimum points for VL include:

a. That the State guarantees a prompt diagnosis and appropriate treatment for human VL, by horizontalizing and supervising the actions.
b. To acknowledge VL as a human disease that is potentially lethal, not only as a canine problem.
c. To communicate the risk associated with an infected animal whether or not the animal has symptoms, without minimizing the risk, understanding that this knowledge is also a human right, and including as part of this risk the transportation of pets via social and commercial networks.
d. To generate effective, sequential, multisectoral actions adapted to each epidemiological scenario, in which the effective fight against the vector implies a healthy public and private environment, and not "campaigns" with expensive insecticides launched from the financial, environmental and health sectors, which are short-lived and have little effect.

AUTHORSHIP

The introduction and the conclusion were written by Oscar Daniel Salomón, "Patient management and problems related to clinical diagnosis and socialization of patients with visceral leishmaniasis" by Silvina Ruvinsky and Tomás Orduna, "Diagnosis of visceral leishmaniasis" by Concepción Luna, Adelina Riarte and Angel Sinagra, "Biology of the vectors" by María Soledad Santini, "Responsible pet ownership and reservoir management" by Natalia Casas and Paola Amiotti, and "Dog love" by Andrea Verónica Mastrángelo. The opinions stated in each section are the responsibility of their respective author(s).

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