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# Euthanasia for the Zoonosis Control Program

Márcia Dalastra Laurenti<sup>1</sup> and Marcio Antônio Batistela Moreira<sup>2</sup>

<sup>1</sup>Laboratory of Pathology of Infectious Diseases, School of Medicine,  
University of São Paulo, São Paulo (SP),

<sup>2</sup>Laboratory of Clinical Pathology, School of Veterinary,  
Anhembi-Morumbi University, São Paulo (SP),  
Brazil

## 1. Introduction

With regarding to public health, there are two major zoonoses in which is recommended euthanasia for dogs, rabies and visceral leishmaniasis. There are government agencies responsible for the control of these diseases as the Center for Zoonoses Control (CZC), which develops prophylactic programs such as: anti-rabies vaccination in urban and rural population of pets, public awareness, and monitoring and tracking of cases positive. According to the CZC of São Paulo, despite the human and canine rabies being virtually eradicated in the city, all infected animals should be euthanized after clinical signs such as paralysis. This decision comes by the fact of dog becomes a potential transmitter, there are no available treatment and the neurological disorders caused by the disease are progressive and irreversible, both in man and animals.

In relation to the visceral leishmaniasis, the treatment of canine disease is prohibited in Brazil, with drugs used for humans disease and are not registered in the Ministry of Agriculture, Livestock and Supply; on the grounds of risk of resistance developing for the causing agent of the disease, *Leishmania*, and increased risk of death to human patients suffering from disease. In spite of, the law is incisive with regarding to the requirement of euthanasia for seropositive dogs there is considerable discussion and controversy about the constitutionality and effectiveness of implementation.

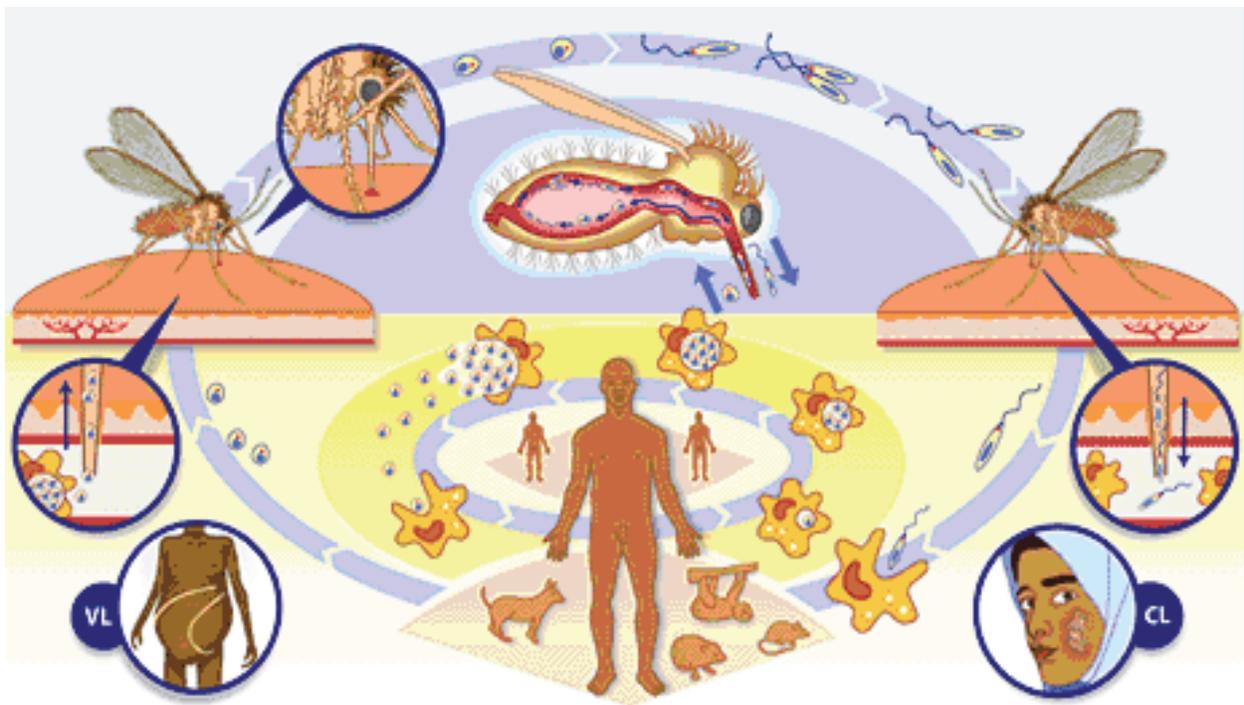
## 2. Leishmaniasis

The leishmaniasis are represented by a group of diseases with zoonotic character that affects humans and several species of wild and domestic animals. Caused by a protozoan digenetic belonging to *Trypanosomatidae* family (DOFLEIN, 1991) *Leishmania* genus (ROSS,1903), have their biological cycle performed on two hosts, a vertebrate and invertebrate. Vertebrate hosts include wide variety of mammals, among them: rodents, edentulous, marsupials, primates, including canids and humans. The invertebrate hosts are small insects belonging to Psychodidae family, Phlebotominae subfamily, *Lutzomyia* genus in the New World and *Phlebotomus* in the Old World.

According to estimates by the World Health Organization, the global prevalence of the different clinical forms of the disease, cutaneous and visceral, exceeds 12 million cases with

a population of 350 million individuals in areas at risk of contracting the infection (WHO, 2001). The leishmanioses are endemic on five continents, in 88 countries located in tropical and sub-tropical regions. The notification is mandatory only in 32 of 88 countries where the disease is prevalent. Thus, the two million new cases are estimated annually, only 600 thousand are officially notified, which shows a high rate of sub-notification (WHO, 2001). Socio-economic changes and behavioral arising from the globalization process hamper not only the control of the illness but also increase the number of victims. Good examples refer to the process of urbanization course of leishmanioses, a process closely related to rural exodus, unemployment, the expansion of slums, wars, among others.

Parasites belongs to the *Leishmania* genus present two main forms: the promastigote, found in the digestive tube of invertebrate hosts females, and amastigote, observed inside cells of the Phagocytic Mononuclear System in the tissues of vertebrate hosts (Genaro, 2002). The evolutionary cycle of these parasites includes a phase in invertebrate hosts where the promastigotes multiply by binary division in the digestive tube of sand fly female, and another stage in vertebrate hosts, reservoirs mammals, in which the amastigotes forms survive, live and multiply, also by binary division within the parasitophorous vacuoles of macrophages (Figure 1).



Source: TDR Welcome/Trust

Fig. 1. Biological cycle of *Leishmania* parasite.

Infection occurs when the sand fly female bite the vertebrate, blood feeding and ingests infected macrophages. In the gut of sand flies, these macrophages released de amastigotes, which are rapidly converted into promastigotes which multiply adhered to the peritrophic matrix secreted by cells of the stomach of the insect. After the blood digestion, the peritrophic matrix breaks releasing the promastigotes that colonize different parts of the digestive tube of the vector depending on the species of the parasite. The promastigotes remain anchored to the gut epithelium in the process of binary division. After that,

biochemistry changes occur in the parasite surface, called metacyclogenesis. The parasites migrate to the anterior part of the vector alimentary tract. The vertebrate host infection is established when the sand fly female infected bite another vertebrate host and regurgitates the promastigotes in the mammalian skin. On that occasion, it is believed that most parasites are eliminated by lytic action of the complement system and by the action of neutrophils and eosinophils present in inflamed skin (Laurenti et al., 1996). However, some promastigotes that escape to nonspecific defense mechanisms of the host are phagocytized by macrophages in the skin, surviving and multiplying in the parasitophorous vacuoles. After successive binary divisions, the countless parasites cause increased on the pressure inside the macrophage lysing the host cell. The released amastigotes are phagocytized by other macrophages initiating an inflammatory reaction that is responsible for maintaining *Leishmania* in the skin or escape to viscera, depending on the species of the parasite (Genaro, 2002).

### 2.1 Cutaneous Leishmaniasis (CL)

The pathogenesis of cutaneous leishmaniasis is heavily influenced by two fundamental factors: first, related to the immunogenetic background of the vertebrate host and the second, related to virulence of *Leishmania* species, since there are several species *Leishmania* parasites causing cutaneous leishmaniasis. As a result of these interactions a spectrum of clinical histopathologic and immunological manifestation could be observed (Silveira et al., 2009) (Figure 2).

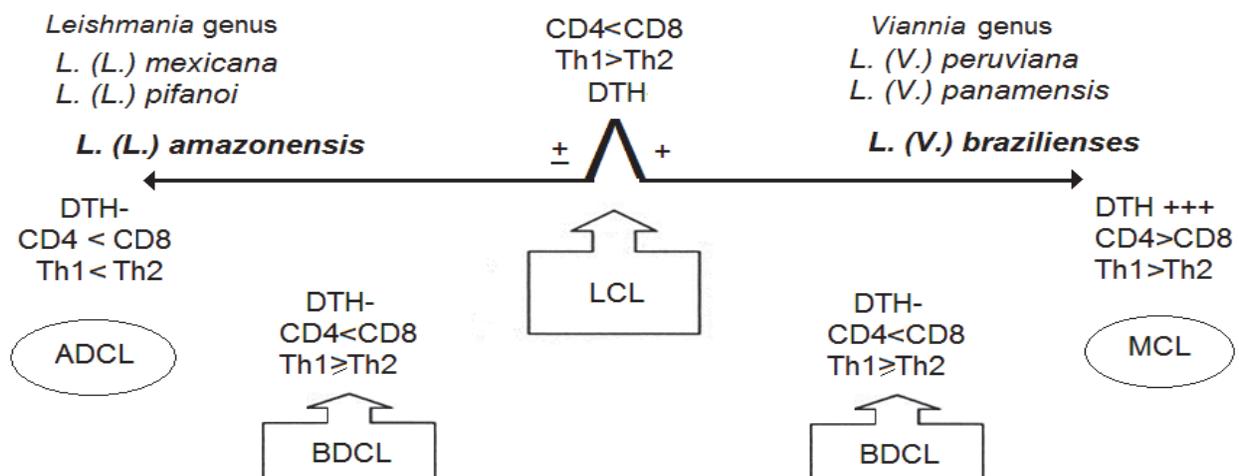


Fig. 2. New World cutaneous leishmaniasis: clinical and immunopathological classification according to Silveira et al., 2004.

The immunopathogenesis of American cutaneous leishmaniasis (ACL) has been regarded one of most interesting features concerning this parasitic protozoal disease in viewing of the complex interaction process between the variety of *Leishmania* species causing the disease and the human immune response. Actually, there are, at least, fourteen recognized *Leishmania* parasites within the subgenera *Viannia* and *Leishmania* which can give rise to clinical ACL (Lainson & Shaw, 1998; Lainson & Shaw, 2005). Recently, following new findings on the clinical and immunopathological spectrum of the disease caused by *Leishmania* (*V.*) *braziliensis* and *Leishmania* (*L.*) *amazonensis* there has been increased the interest on the immunopathogenic competences of these two *Leishmania* species; i.e. they are

implicated not only with the localized cutaneous leishmaniasis (LCL), the most common ACL form placed at the centre of the clinical spectrum and supported by a moderate T-cell hypersensitivity, but also with the mucocutaneous leishmaniasis (MCL) and anergic diffuse cutaneous leishmaniasis (ADCL), the more severe ACL forms respectively. In this regard, while MCL represents the extreme expression of T-cell hypersensitivity pole, linked to a strong species-specific T-cell immune response against to *L. (V.) braziliensis*, ADCL means, in contrast, the extreme expression of T-cell hyposensitivity pole, associated to a high *Leishmania*-specific inhibition of T-cell response (Silveira et al., 2004). Moreover, these *Leishmania* parasites can also induce an intermediary form between the central LCL and the two polar MCL and ADCL, the borderline disseminated cutaneous leishmaniasis (BDCL), which is distinguished by a partial inhibition of T-cell response (Silveira et al., 2005). Furthermore, as BDCL can be caused by parasites belong to both subgenus of *Leishmania*, *Viannia* and *Leishmania*, as well as there are some clinical and immunological characteristics that differ between *Viannia* and *Leishmania* cases, then BDCL can occupy the two places between the centre (LCL) and the two polar forms (MCL and ADCL) in the clinical spectrum of disease (Silveira et al., 2009).

### 2.1.1 Control and prophylaxis of CL

The control of cutaneous leishmaniasis is difficult, since their cycle happens mainly in forests, often extensive, preventing the use of insecticides in large-scale. Deforestation for agriculture and livestock development reduces the endemic areas, but determines the appearance of large number of cases during the process. The use of repellents and musketeers of fine mesh, in some situations it becomes possible, as individual protection to avoid the bite of sand flies. Recent colonization areas near forests, can avoid transmitting intra-and peri-domestic with the construction of houses at a minimum distance of 500 m from the forest, due to the low flight capacity of these vectors. But the ideal solution for control of CL would produce an effective vaccine (Genaro, 2002).

## 3. Visceral Leishmaniasis (VL)

Visceral leishmaniasis is a widespread chronic infectious illness, characterized by irregular fever, hepatosplenomegaly, lymphadenopathy, anemia with leukopenia, hypergammaglobulinemia with hypoalbuminemia, lost weight, edema and progressive weakness leading to cachexia and, finally, to death if the patient is not subjected to special treatment. The human visceral leishmaniasis can assume a spectral character, which determines different clinical forms, ranging from a silent asymptomatic or subclinical forms to oligosymptomatic, acute up to the classical form (Figure 3) of the disease (Badaró et al., 1986). American and European visceral leishmaniasis are considered zoonosis, while in India it is considered an anthrozoosis.

### 3.1 Geographic distribution of VL

Visceral leishmaniasis occurs in several countries of the Old and New World and it is caused by *L. (L.) donovani*, *L. (L.) infantum* and *L. (L.) chagasi*. The *L. (L.) donovani* is found in regions of India, Bangladesh, Sudan, Pakistan, Nepal and parts of Eastern China. This species of the parasite can cause dermal leishmaniasis post-calazar, besides to classical visceral leishmaniasis, which is transmitted from man to man, characterizing an anthroponosis. It is

possible that in Sudan the transmission occurs in a similar way to India, but other mammals were found parasitized; among them, three species of rodents (*Aroicanthis niloticus*, *Acomys albigena*, *Rattus rattus*) and two carnivorous (*Genetta genetta* and *Cat felis*). The vector of leishmaniasis in India is the *Phlebotomus argentipes* and in the region of China is the *Phlebotomus alexandri*. The *L. (L.) infantum* show extensive distribution by the Old World, occurring in Central Asia, North and Northeast China, West Asia (Iraq, Yemen, Saudi Arabia, Iran and Afghanistan), Africa (Algeria, Ethiopia, Tunisia, Libya, Egypt, Central African Republic, Congo, Chad, Gabon, Kenya, Nigeria, Malawi, Morocco, Niger, Senegal, Somalia, Sudan, Zaire and Zambia). In Europe, *L. (L.) infantum* is found in countries belonging to the Mediterranean basin, extending to Hungary and Romania. The main host is the domestic dog, *Canis familiaris*, considered the primary reservoir of infection for humans. Wild hosts are identified as the jackal, *Canis aureus*, wolf, *Canis lupus*, and the fox, *Vulpes vulpes*. In China was also mentioned the canid, *Nyctereutes procyonides*, as reservoir. In Georgia and Azerbaijan infection affects the badgers, *Meles meles*, and the fox, *Vulpes corsak*. The sand fly responsible for the transmission and spread of the disease, according to the region, are *Phlebotomus perniciosus*, *P. ariasi*, *P. major*, *P. alexandri*, *P. chinensis*, *P. perfiliewi*, *P. tobbi*, *P. longicuspis*, *P. mongolensis*, *P. kandelaki* and *P. caucasicus* (WHO, 2001). The *L. (L.) chagasi* shows wide distribution in the New World, occurring in Argentina, Bolivia, Brazil, Colombia, Paraguay, Venezuela, Guatemala, Guadeloupe, Martinique, Mexico, Honduras and El Salvador. The wild hosts in Brazil are the foxes, *Dusicyon vetulus* and *Lycalopex vetulus*, in the Northeast, *Cerdocyon thous*, Amazon, and skunks *Didelphis marsupialis*. The domestic dog is considered as the main source of infection for humans and the main vector is *Lutzomyia longipalpis* (Brazilian Health Ministry, 2006).



Fig. 3. Classical clinical form of visceral leishmaniasis characterized by hepatosplenomegaly. Photo kindly provided by Dra. Monica Elinor Alves Gama.

### 3.1.1 Ecology and epidemiology of VL

Visceral leishmaniasis is currently emerging and reemerging diseases, both in rural areas as in urban areas. The World Health Organization estimates a global annual incidence of 500 thousand cases. Although the VL is known even today as a disease typically rural, several urban epidemic outbreaks have been reported, due to the favorable epidemiological conditions, mainly in function of the expansion of slums with high population density that have poor sanitary conditions where individuals and infected dogs from endemic areas are your choice of housing in major cities.



Fig. 4. *Leishmania (Leishmania) chagasi* wild reservoir (A) and domestic reservoir showing typical clinical features of the disease such as: weight loss (B), onychogryphosis (C), skin lesions: ulcer (D), hyperkeratosis (E) and alopecia (F).

Currently, what call attention is the increase in the number of cases of HIV co-infection, especially in southern Europe. This region of Europe HIV infection occurs in rural and suburban areas where visceral leishmaniasis is endemic. Many of these cases are associated with injection drug due to the habit of some groups of users to share disposable syringes and needles. This type of transmission has expanded to Europe's Nordic countries such as Germany, Finland, Norway, changing the classic epidemiological profile of transmission, without the presence of the insect vector and reservoir dogs.

Another aspect relevant in this context of expansion and urbanization of visceral leishmaniasis in the World and especially in Brazil is the possibility of contracting the disease through blood transfusion. This fact is aggravated since serological diagnosis for visceral leishmaniasis is not yet included in the screening of donors in all countries (Brazilian Health Ministry, 2006).

Two distinct epidemiological cycle of VL is observed, a wild cycle and domestic or per-domestic cycle. In the wild cycle are involved as vector, *Lutzomyia longipalpis*, and as a reservoir, the foxes (Figure 4A), which inhabit niches still undisturbed by man in forest or wilderness areas. Dogs are considered the domestic reservoir and have been found infected in all outbreaks of human disease; they are considered the main source of parasites in the chain of transmission of VL (Figure 4B). While the wild reservoir shows no clinical signs of the disease pointed to an adaptative relationship between parasite-host, the domestic reservoir shows important clinical manifestations of the disease with severe visceral involvement that causes the animal death. Among the main clinical features observed in canine visceral leishmaniasis, it is observed weight loss, lymphadenopathy, hepatosplenomegaly, onychogryphosis, skin lesions (ulcers, hyperkeratosis and alpecia), among others (Figure C-F) (Feitosa et al, 2000). The domestic cycle can occurs on rural or peri-urban environment, where *Lutzomyia longipalpis* is involved as the vector, which breeds and remains in the peri-domestic environment transmitting the infection to man and dog. The dog has an important role in maintaining of local infection, serving as a source of infection to the sand fly. The transmission occurs subsequently to the man, who is also able to serve as a source of infection for the vector. These two cycles can overlap, since man and the dog into wild environment may acquire the infection by the sand fly bite, and when return to domestic environment serves as a source of infection to local sand fly, starting the transmission in the domestic area. The reservoir presented intense cutaneous parasitism, so they are excellent source of infection to the sand fly, favoring the maintenance of the cycle of the disease (Genaro, 2002).

### 3.1.2 Prophylaxis of VL

If the control of visceral leishmaniasis is continuous and well conducted, can produce good results; however to the results obtained are durable, there is a requirement of permanent and effective epidemiological surveillance, otherwise gradually the outbreaks arise avoiding previous work. Since that the epidemiological role of dog is established as domestic reservoir and *Lutzomyia longipalpis* as vector, the control can be based on three fundamental points: treatment of human cases, elimination of infected dogs and combating vector.

The use of euthanasia to the control of canine visceral leishmaniasis began with Adler and Tchernomoretz, 1946 after failing to succeed with human treatment and concluded that the best form to disease control would be the elimination of dog. The program carried out in China (Leng, 1982) was based on a triad: the treatment of positive human cases, use of

insecticides (DDT) and disposal of dogs in some locations. Using these methods for the control, the anthroponotic leishmaniasis almost finished and the zoonotic leishmaniasis continued and continues in China. They concluded that the removal of dogs helped in the control of leishmaniasis, but it was only one of the control measures.

The Brazilian program for control of VL advocates the canine serologic surveys, targeting to know canine epidemiological situation of the disease in areas with active transmission or with potential to transmission and at the same time, identify the positive dogs to later disposal. However, there are controversial data concerning to this subject. Some studies showed that there are no significant differences between regions where euthanasia was only used as a control measure, when compared to others in which the dog was not eliminated (Dietze et al., 1997), by the other side another study related the reduction of human VL incidence correlated to dog euthanasia but not exclude the possibility to consider other factors that may influence this relationship (Nunes et al., 2010). The difference is the use of the insecticide that presents good results in the control of leishmaniasis. Another point was emphasized by Braga et al. (1998), the importance of sensitivity and specificity parameters of the diagnostic assay, when evaluating the impact of the dog elimination in front of the employed methodology.

After two decades of attempts to control of VL in Brazil, the number of cases in the country increased sharply and broke into urban areas. The Brazilian program, started more than 40 years, is composed by integrating three measures of public health: the free distribution of specific treatment to human patients, the control of domestic reservoirs and the control of the vector. The control of reservoirs has been done by serological diagnosis of domestic dogs where transmission of *L. (L.) chagasi* for human occurs. For this, was structured a network of immunofluorescence assay (IFA) using eluate of filter paper; all dogs with positive result have been euthanized. However, dogs evaluate by IFA employing eluate when reevaluated by IFA using serum samples, 72% of the animals were negative (Silva et al., 2011). This result can be partially explained by the sample tested, serum and eluate, as previously reported by Figueiredo et al., (2010). Moreover, 59% of animals identified by IFA using eluate showed negative results for *L. (L.) chagasi* infection, characterizing a false positive result by IFA employing eluate. However, in areas where the circulation of other trypanosomatids occurs, parasitological confirmation of seropositive dogs is of great important in several aspects to avoid cross reaction. By the other side, according to Figueiredo et al. (2010), dogs infected by *Leishmania* could not be identified by IFA in dried blood on filter paper, possibly maintaining the transmission cycle in endemic area.

In respect of serologic methods employed in epidemiological investigations with the aim of knowing the prevalence of the disease in endemic areas or with potential for transmission of the VL, the parameters of sensitivity, specificity and predictive values of serological techniques employed are of the extreme importance to avoid erroneous interpretations, with false positive or negative. Although the serology is only an indirect method of measuring the infection, not defining the degree of parasitism, the presence of the disease, or even the potential for transmission that the dog may have to the vector. Decrease the number of false positive results would be very important for the efficiency and reliability of the program, avoiding the elimination of the dogs that do not provide risk in the transmission of infection.

The correlation between the clinical status of the dogs and its infectivity for the vector should also be considered in the discussions for the adoption of measures to the control of VL since Pinelli et al.(1994) observed that asymptomatic and symptomatic animals had

severe immune response, quite distinct, favor or not the vector infection. Anyway, it is important to mention the report of Barata et al. (2005) showed infection in the laboratory reared vector which feeding in seropositive dogs from different clinical forms of the disease. Cutaneous parasitism is found in intact skin of dogs naturally infected by *L. (L.) chagasi*, irrespective of the presence or absence of clinical signs suggestive of visceral leishmaniasis (Madeira et al., 2004).

According to the technical report of the Ministry of Health of Brazil (Costa & Vieira, 2001), the program for the disposal of domestic dogs presents the lowest scientific-technical support between the three strategies of control program, and recommends that the systematic serological screening followed by dogs elimination should be suspended. Serological examination was recommended for dogs only from endemic areas who presents suspicious symptoms; however the serological test in eluate of blood on filter paper should be replaced by conventional serology; and that the elimination of dogs should be restricted only to the situations in which the diagnosis of visceral leishmaniasis was confirmed by parasitological exams. In addition, the treatment of dogs with drugs available for the human patients is not recommended, both for inefficiency as a measure of public health due to infectivity of treated dogs to the sand fly as for the risk of developing resistance to long-term medication.

Another point to be considered is that the elimination of the seropositive animals for the control of human VL provides the increase in the dog younger population, which is more susceptible to *Leishmania* infection (Nunes et al., 2008). Thus, it is necessary to investigate other methods for this zoonosis control in addition to the euthanasia of ill animals. The simple sacrifice itself proves to be ineffective and injure the owner and the life of the animals.

The increase in the number of VL cases and transmission of *L. (L.) chagasi* in metropolitan areas indicate the existence of factors that could contribute to the inefficiency of control programs, which have suffered questions, mainly on the adoption of measures such as the elimination of dogs serologically positive.

#### 4. Rabies

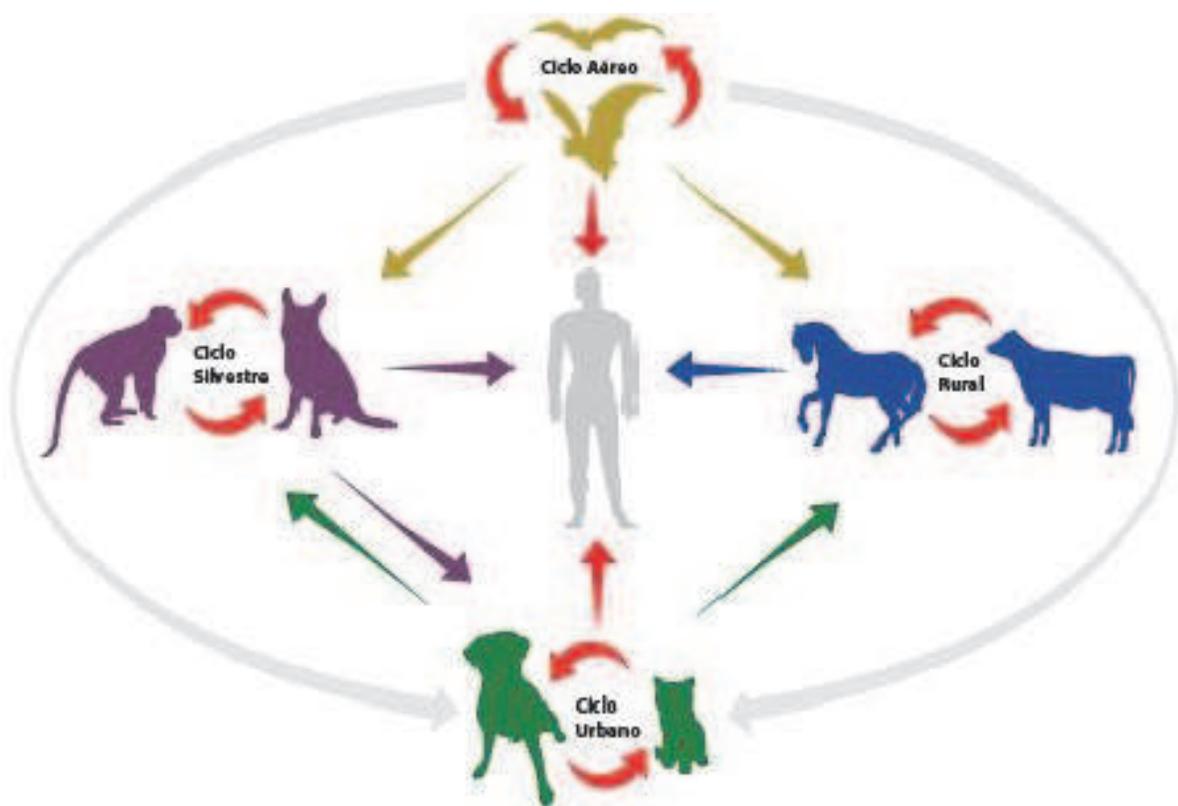
Rabies is transmitted by an anthrozoosis deposition of contaminated material and inoculation with the rabies virus by biting, scratching or licking the skin in healthy animals or humans. This infectious agent is a RNA virus of the *Rhabdoviridae* family, *Lyssavirus* genus present in saliva and secretions of infected animals.

This virus is composed of two units in its structure: ribonucleoprotein and viral envelope. There are also five proteins, including the viral envelope glycoprotein, of the most important due to stimulation of the immune system and production of neutralizing antibodies, which are able to confer protection against the disease. The virus affects the central nervous system (CNS) causing encephalitis, leading to around 100% of lethality and the high cost in preventing individuals at risk of illness and death. Despite being a disease studied since antiquity is still a public health problem. All mammals are considered sources of infection and therefore can transmit it to humans. The main animal species evolved in the transmission are: dogs, cats, bats, wild dog, marmosets, foxes, cattle, horses, pigs, goats, among others. Until a few years ago it was considered three transmission cycles (urban, rural, and wild) and is currently included another cycle observed among bats, denominated the air (Figure 5). Rabies is an urban problem in developing countries is characterized by the presence of disease in domestic animals such as pet dogs and cats. Rabies is mainly rural

transmitter the hematophagous bat (*Desmodus rotundos*) that transmits the disease to herbivores, as these are the most common food source. Cycle in wild disease is transmitted to animals like fox, wolf, monkey, coon, skunk, among others. These animals can be a source of food for the hematophagous bat. It can capture bats and suffer injury or attacked by domestic animals. The air cycle is important for virus among species of bats, because these are the only mammals that fly. All species of bats, sucking are not susceptible to the virus. This disease has worldwide distribution. Only a few islands like Japan or Hawaii, there is no movement of the virus, even among the wild species considered natural reservoirs.

The incubation period is variable between different species of mammals. In humans this period can vary from two to ten weeks, on average 30 to 45 days. This variation is justified by the extent of the injury, viral inoculation and the virus strain. The infected animal usually begins transmission before presenting signs and symptoms of this disease. This period is well characterized in dogs and cats beginning two to four days prior to clinical manifestations and death occurring after five days of observation of clinical manifestations of disease.

The rabies virus multiplies in the initial period, at the site of inoculation and then reaches nerve endings. Dissemination occurs by retrograde axonal flow in centripetal movement to reach the CNS. That path remains protected by the sheath of nerves, not by stimulating an immune response. On reaching the CNS can replicate at various locations in the dog and cat, the target region is the hippocampus (Ammon's horn) and dentate gyrus (pyramidal neurons), spinal cord horses and cattle in the cerebellum (Purkinje cells). Only when a large amount of virus is produced stimulates the immune system and spreads to several sites, particularly the salivary glands, can also be found in the eyes, hair follicles and sweat glands.



Source: Pasteur Institute –SES/SP

Fig. 5. Epidemiological cycles of rabies transmission in Brazil

#### **4.1 Signs and symptoms in animals**

The clinical condition of the animal is divided in prodromic phase, furious rabies, paralytic and atypical. The prodromic phase is characterized by a period of one to two days, the animals are uneasy with mild or apparent changes in behavior, dogs and cats, do not answer the call of the owners, have attention deficit, do not feed and can be isolated, seek hideouts. Large animals can move away from the group, not eating and isolate themselves. Passing this stage enter into a framework known as furious anger, where they show aggression, attack other animals that commonly live together and even the owner that are used to entertain. Other changes such as hunting boats and giving imaginary flies bite in the air, wander aimlessly, howling incessantly, unable to drink water by the pharyngeal nerve palsy recurrent, drooling, biting and attacking the cages, make changes as ophthalmic strabismus can also be observed. This phase is marked by aggressiveness and hyperexcitability due to encephalitis. The stage called paralytic rabies is characterized by the development of paralysis, especially in the hind limbs, followed by the jaw and forelimbs. When atypical rabies, characterized by slight changes in the behavior, is observed, there are difficulties to diagnose.

#### **4.2 Signs and symptoms in humans**

In humans the clinical picture may be divided into the following phases: neurology prodromic, coma and death. The symptoms are nonspecific in early stages such as fever, headache, malaise, anorexia and sore throat. Sensitivity can occur at the site of biting, burning, numbness and itching. Then there are the manifestation in the CNS such as anxiety, restlessness, disorientation, hallucinations and seizures. It is commonly characterized by hydrophobia and spasms of swallowing difficulty, in which the person is thirsty, but cannot drink water. Struggling to swallow the saliva occurs which enhances dehydration. The disease progresses to severe psychomotor agitation, altered by seizures. The patient goes into coma, failure occurs breathe and death within five to eight days after onset of symptoms. Rabies is a notifiable shown.

#### **4.3 Control rabies**

The control of rabies in pets (dogs and cats) requires a series of measures such as: periodic vaccination against rabies; keep post vaccination against rabies fixed for the second dose in primed; vaccination of cats, among others; seize animals, keep them with quality of life and vaccinate them against rabies right away or when the redemption will be donated; performing euthanasia ethical method, the dogs that do not fit the above mentioned items; send material for laboratory diagnosis Rabies in quantity and frequency appropriate for observing the behavior of this virus; making epidemiological research in positive cases headed for prophylaxis of exposed persons; performing with focus lock vaccination actions and seizure of stray animals, within 72 hours; promote observation of aggressive dogs and cats for ten days from the date of the accident; stimulate the development of education initiatives and health promotion, using the held responsible.

Rabies is a fatal disease and only the development of the disease will take the animal to death, but euthanasia, conducted in an ethical manner, will alleviate the suffering of this animal is affected because this disease has no treatment in veterinary medicine.

The measure of control with greater relevance to rabies control is population control. This control should be accomplished through the castration of domestic animals, especially those

who are wandering the street and placed collected for donation and mainly awareness of people to understand the true meaning of responsible ownership. The criteria of responsible ownership should be widely disseminated mainly in schools, because children will disseminate information to family practice and charge what they learned. The possession charge means: giving attention and affection for the animal; the animal out on the street should be conducted with collar and leash with individual controls and the strength to stop him; offering food and good quality water; bathe regularly; from three months to take the animal to receive the rabies vaccine and implement a booster dose after 30 days; routinely take the animal to the vet; take the animal with two months to vaccine other diseases; keeping the animal in space and where appropriate cannot attack other people or animals; if the animal impairs a person performs his observation for ten days; occur when mating these animals get homes for all puppies and not abandon them.

So we can decrease the use of the method of euthanasia to control and combat rabies

Some reports in Brazil, the USA and other countries approach a satisfactory response to treatment in human patients who had the disease. The research evaluating of the treatment effectiveness associated with awareness, the vast majority of people collaborate to minimize the euthanasia of pets.

## 5. Conclusions

From what has been discussed in this chapter with regard to leishmaniasis, we can conclude that euthanasia of dogs as one of the main measures used in the control of human disease has not proven very effective. Even with sacrifice of a high number of animals, the number of human cases has not decreased and the disease has spread even to urban areas. This is because other reservoirs may be involved in the biological cycle of the parasite and also because the very fast replacement of the dogs. It shows the need to establish other policies for control of the disease, associated or not to the euthanasia of dogs, such as vector control. In addition, efforts should be made towards prevention of the dog disease, such as the use of repellents to prevent the sand fly bite, and the development of effective vaccines candidates. Regarding to the rabies, the main control measure, animals vaccination has been shown effective in controlling the zoonosis, and the euthanasia is conducted only for sick animals since the treatment is not recommended.

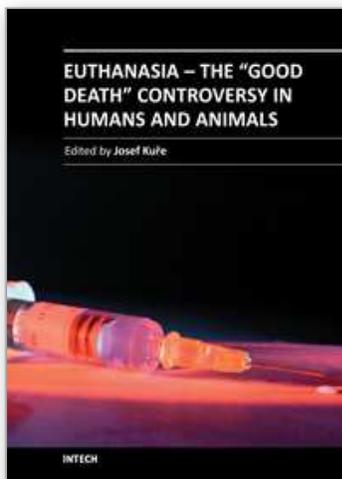
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## **Euthanasia - The "Good Death" Controversy in Humans and Animals**

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No one really wants to die, or do they? From classical times to our post-modern era of medical high tech, societies have struggled with the thorny issue of euthanasia, and what it entails. Who shall be entitled to a "good death" and in what form shall it arrive? This book provides the reader with insight and enlightenment on the medical, philosophical, social, cultural and existential aspects of "good death" amid our digitized, individualized and ageing society, hampered by rising health care costs but unchained from one standardized level of care.

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Phone: +86-21-62489820  
Fax: +86-21-62489821

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