



Leishmanioses dos Animais Domésticos
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Leishmaniose em cães e gatos, uma visão Europeia

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INSTITUTO DE HIGIENE E
MEDICINA TROPICAL
DESDE 1902





Leishmanioses

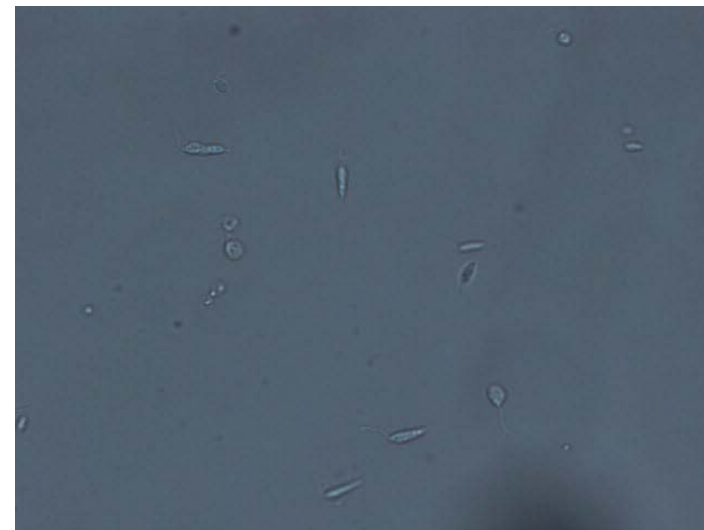
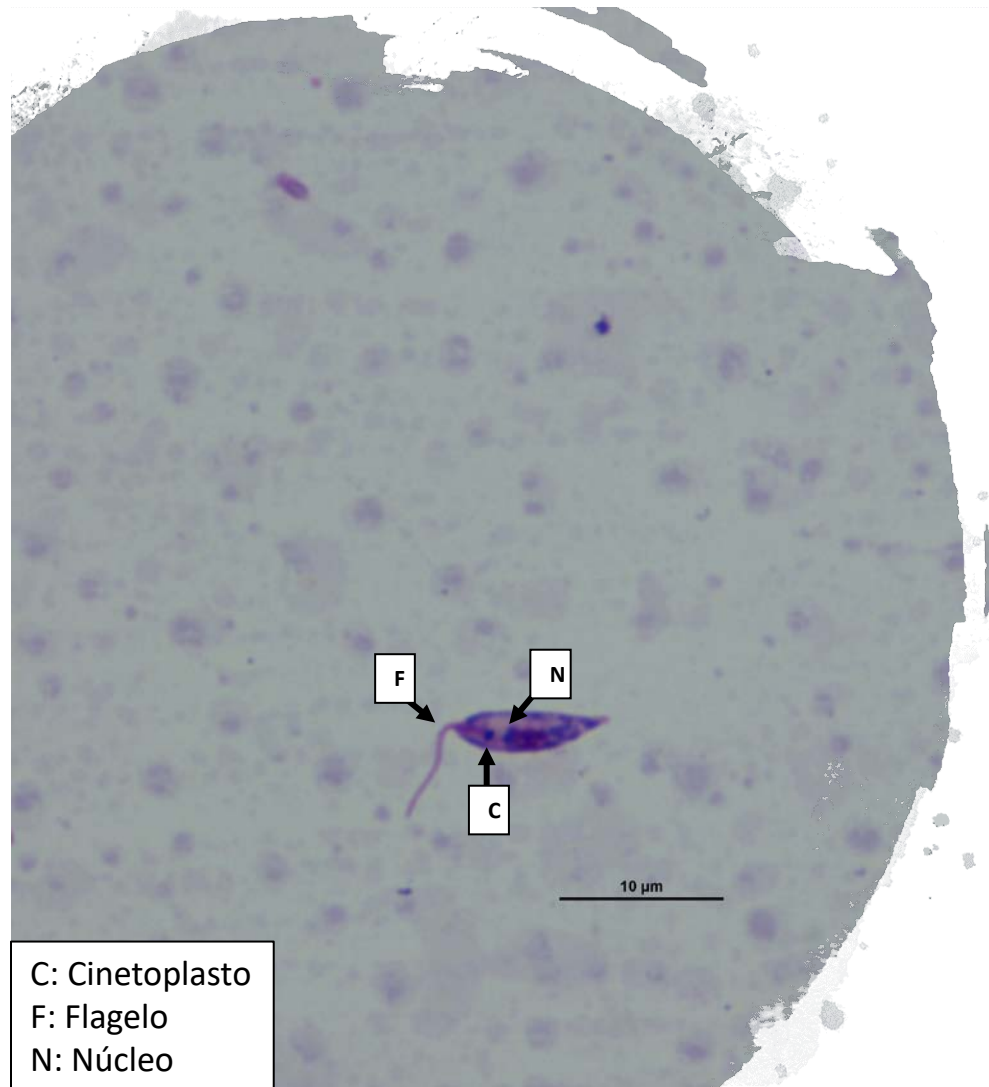
...parasitoses causadas por protozoários flagelados do género *Leishmania* que apresentam importante diversidade clínica e epidemiológica...



- ✓ **Ciclo heteroxeno:** hospedeiro vertebrado (mamífero) e invertebrado (vetor)
- ✓ Duas formas parasitárias: **promastigota** (invertebrado); **amastigota** (vertebrado)

Forma promastigota

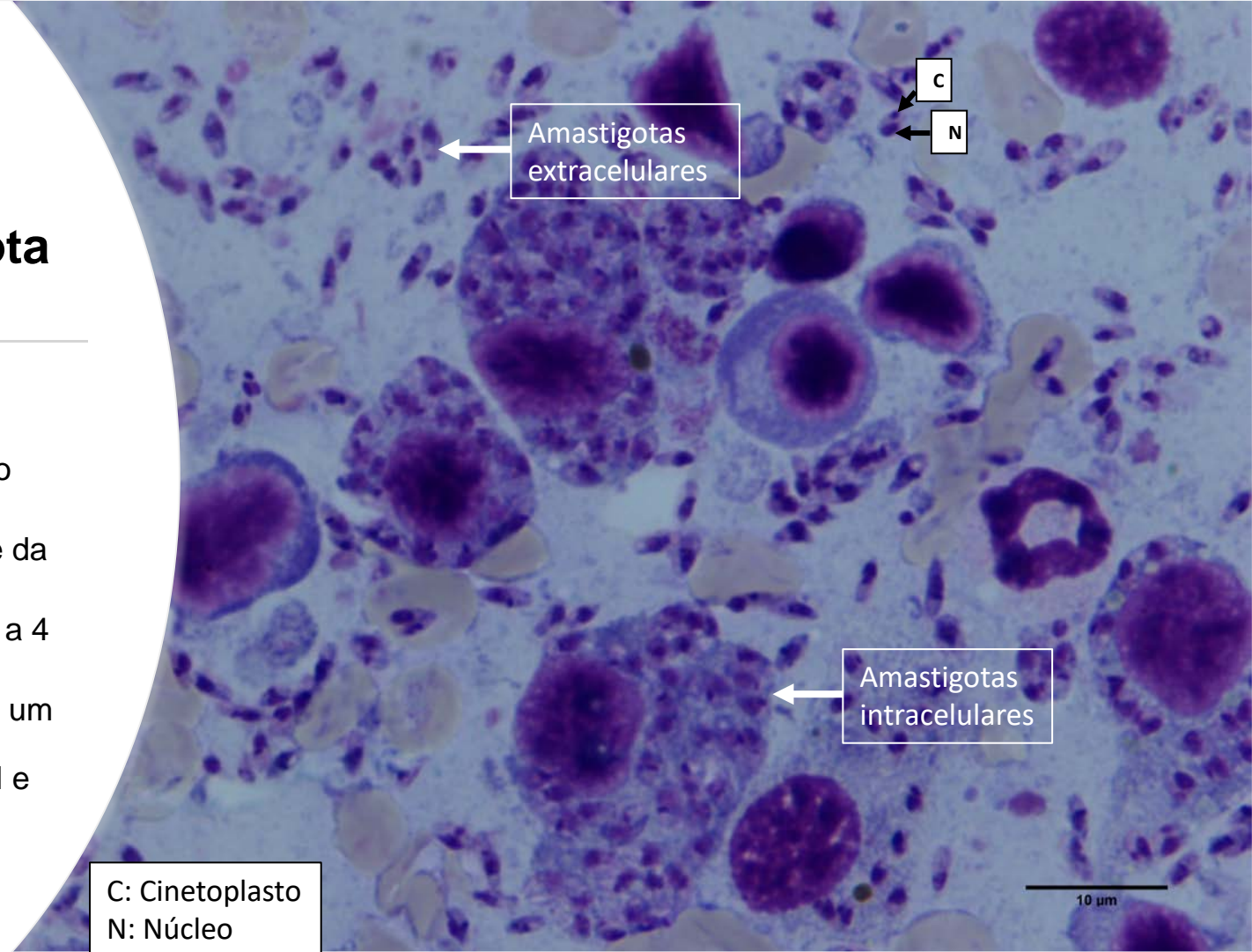
- Aparelho digestivo do vetor
- Extracelular
- Móvel, fusiforme (10-20 X 1,5-3 μm)
- Com flagelo livre, de comprimento variável
- Cinetoplasto entre o núcleo e o flagelo



Forma amastigota

- Interior das células do sistema mononuclear fagocítico do hospedeiro vertebrado
- Extracelular quando lise da célula hospedeira
- Arredondada ou oval (2 a 4 μm de diâmetro)
- O citoplasma apresenta um núcleo arredondado, excêntrico e bem visível e um cinetoplasto

C: Cinetoplasto
N: Núcleo



Leishmanioses – Transmissão*

* Transmissão mecânica, congênita, transfusão de sangue, reportada, mas sem significado epidemiológico

- **Flebotomídeos** (Diptera: Psychodidae)

Phlebotomus sp. (Velho Mundo)

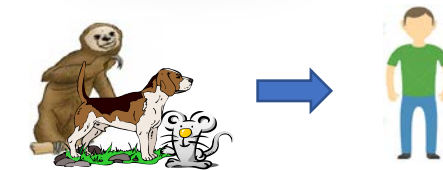
13 gêneros (incluindo *Lutzomyia* sp.) (Novo Mundo)



- De acordo com a fonte de infecção humana:

✓ **Zoonótica** → **reservatórios** são **animais domésticos** ou **silváticos**

Humanos são hospedeiros acidentais



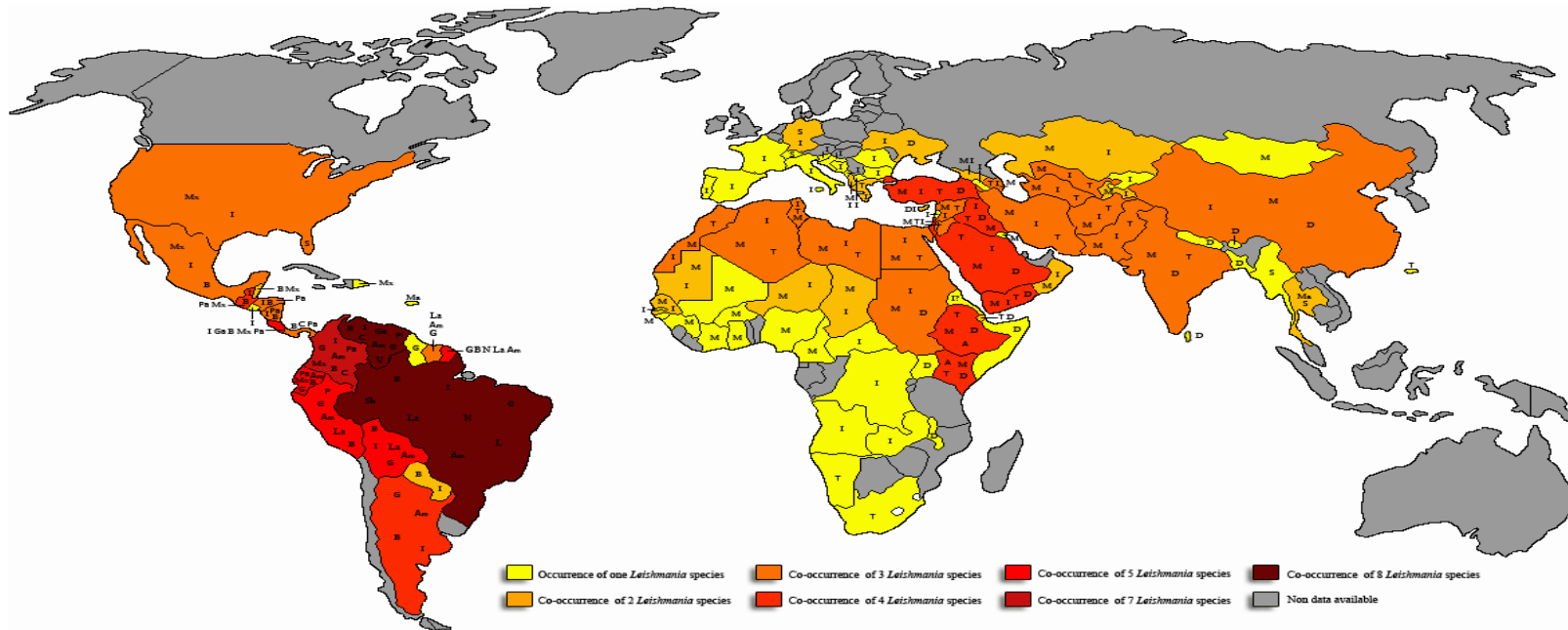
✓ **Antroponótica** → **Homem** é o **único reservatório** e fonte da infecção do **vetor**



Distribuição mundial de leishmanioses humanas

Endêmicas em 98 países e 3 “estados” em 4 continentes (áreas tropicais subtropicais e temperadas)

> 1 bilhão de pessoas em risco



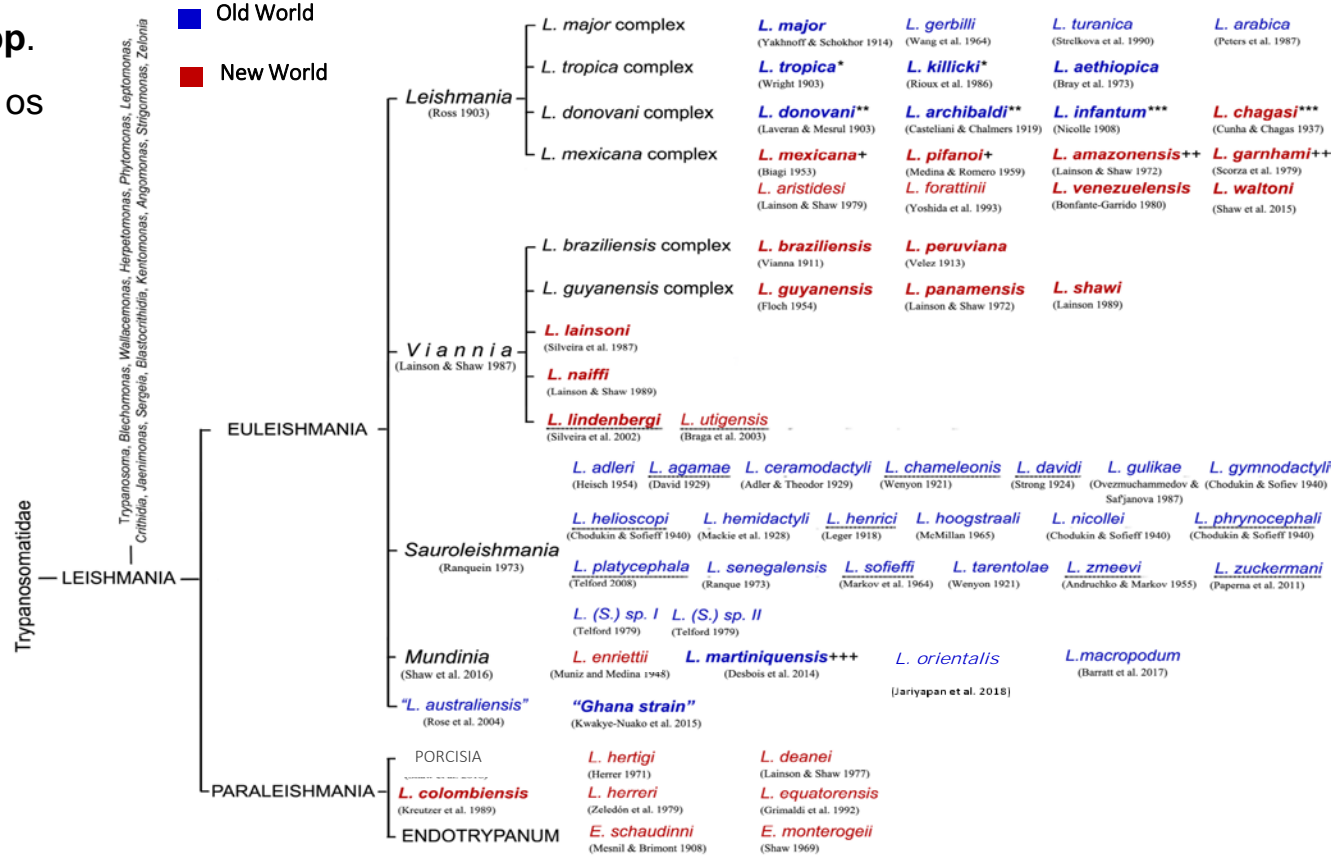
Akhoundi et al. 2017

- Incidência **0,2 -0,4 milhões** casos **LV** e **0,7 -1,2 milhões** casos **LC**
- **2ª causa de morte** mais comum (++) **LV**; cerca **20000 mortes/ano**) entre as infecções tropicais

Diversidade dos parasitas *Leishmania*

Akhoundi et al. 2017

21 *Leishmania* spp.
patogénicas para os
humanos



Formas clínicas Leishmanioses humanas

- **Leishmaniose visceral** complexo *L. donovani*

Velho Mundo: *L. donovani*, *L. infantum*

Novo Mundo: *L. infantum* (sin. *L. chagasi*)



Visceral leishmaniasis



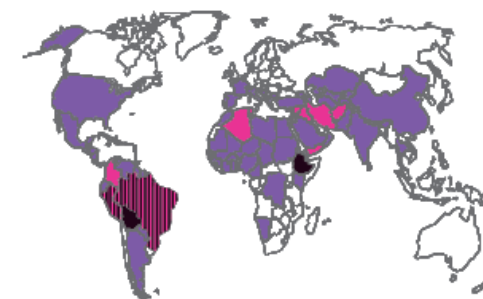
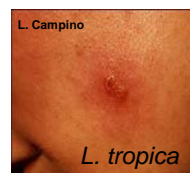
■ Countries reporting cases of visceral leishmaniasis (VL) in 2015
■ Countries collectively reporting 90% of VL cases in 2015

https://www.who.int/leishmaniasis/Unveiling_the_neglect_of_leishmaniasis_infographic.pdf?ua=1

- **Leishmaniose cutânea** localizada, disseminada por *Leishmania* spp.

Velho Mundo: *L. major*, *L. tropica*, *L. aethiopica*, ***L. infantum***

Novo Mundo: *L. braziliensis*, *L. guyanensis*, *L. amazonensis*, *L. mexicana*



■ Countries reporting cases of cutaneous leishmaniasis (CL) in 2015
■ Countries collectively reporting 90% of CL cases in 2015
■ Countries reporting cases of mucocutaneous leishmaniasis in 2015

https://www.who.int/leishmaniasis/Unveiling_the_neglect_of_leishmaniasis_infographic.pdf?ua=1

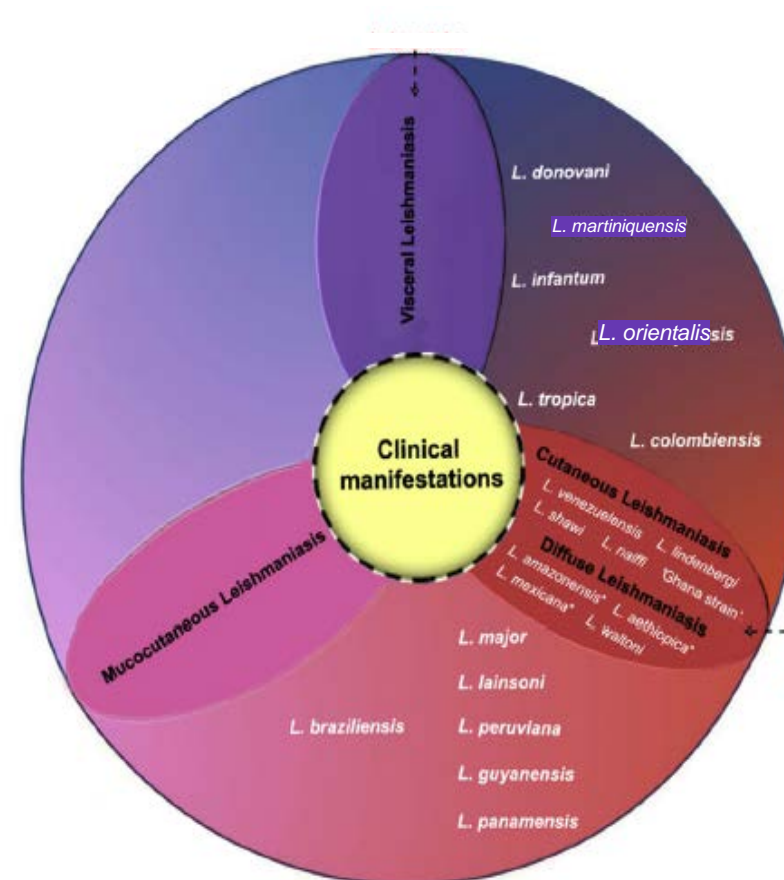
- **Leishmaniose mucocutânea** complexo *L. braziliensis*



Diversidade das manifestações clínicas

O resultado clínico da doença depende de:

- Virulência e tropismo de cada espécie de *Leishmania*
- *Background* genético e imunológico do hospedeiro



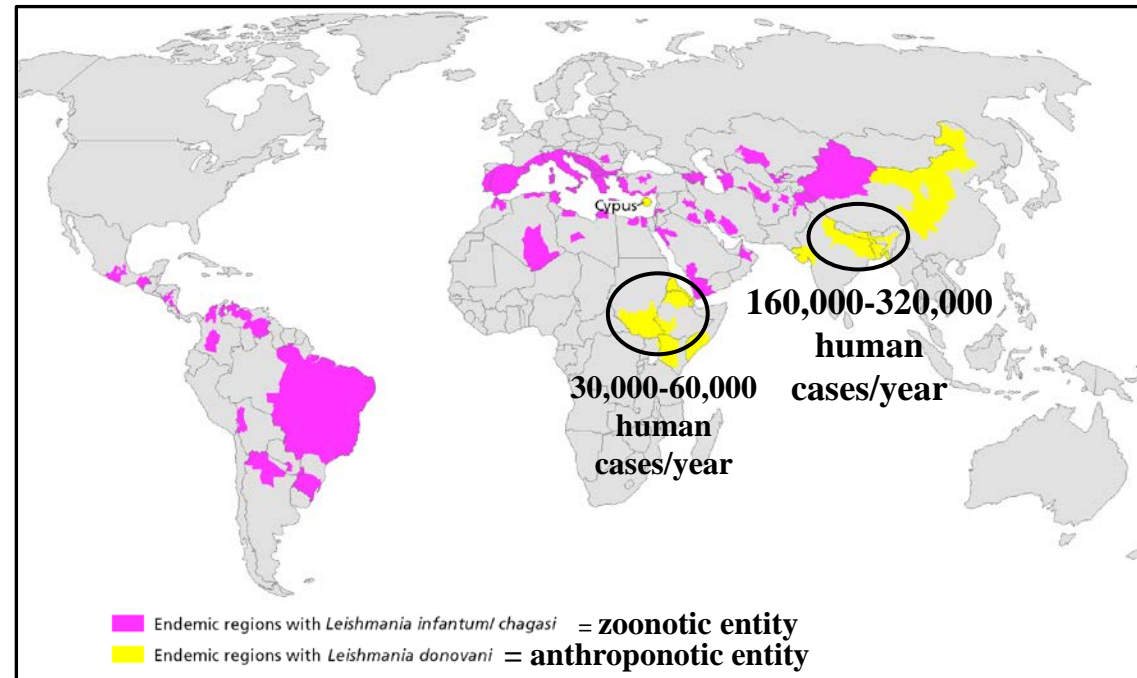
Entidades nosogeográficas

OMS → Identificar ciclos epidemiológicos e desenvolver medidas de controle apropriadas

→ Identificação **15 entidades nosogeográficas** de acordo com:

- Associação espécies *Leishmania* patogênicas – reservatório –vetor(es)
- Manifestação clínica predominante
- Distribuição num determinado território

Duas entidades nosogeográficas de **LV**



Courtesy of Dr. L. Gradoni



LV zoonótica causada por *L. infantum* é a entidade com maior dispersão a nível global

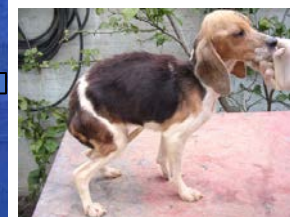


Phlebotomus (Larrousius) spp.

Courtesy of Dr. L. Gradoni



Cães são os principais **reservatórios domésticos** da **LV zoonótica** e responsáveis pela introdução do parasita *L. infantum* na América Latina



Courtesy of Dr. L. Gradoni

Cão: Reservatório doméstico de *L. infantum*

- ✓ **Infeção frequente** na população
- ✓ **Evolução crónica** com elevado nº de animais **sem** aparente **sintomatologia**
- ✓ Presença de **parasitas** no **sangue periférico** e **pele** ⇒ ↑ possibilidade de transmissão
- ✓ **Parasitas** isolados dos **animais** e **humanos** geneticamente **indistinguíveis**
- ✓ **Fonte alimentar** frequente dos **flebótomos vetores**
- ✓ **Infecciosos** para **vetores**

Leishmaniose canina (LCan) na Europa: Países endêmicos

Sul de Europa, países banhados pelo Mar Mediterrâneo

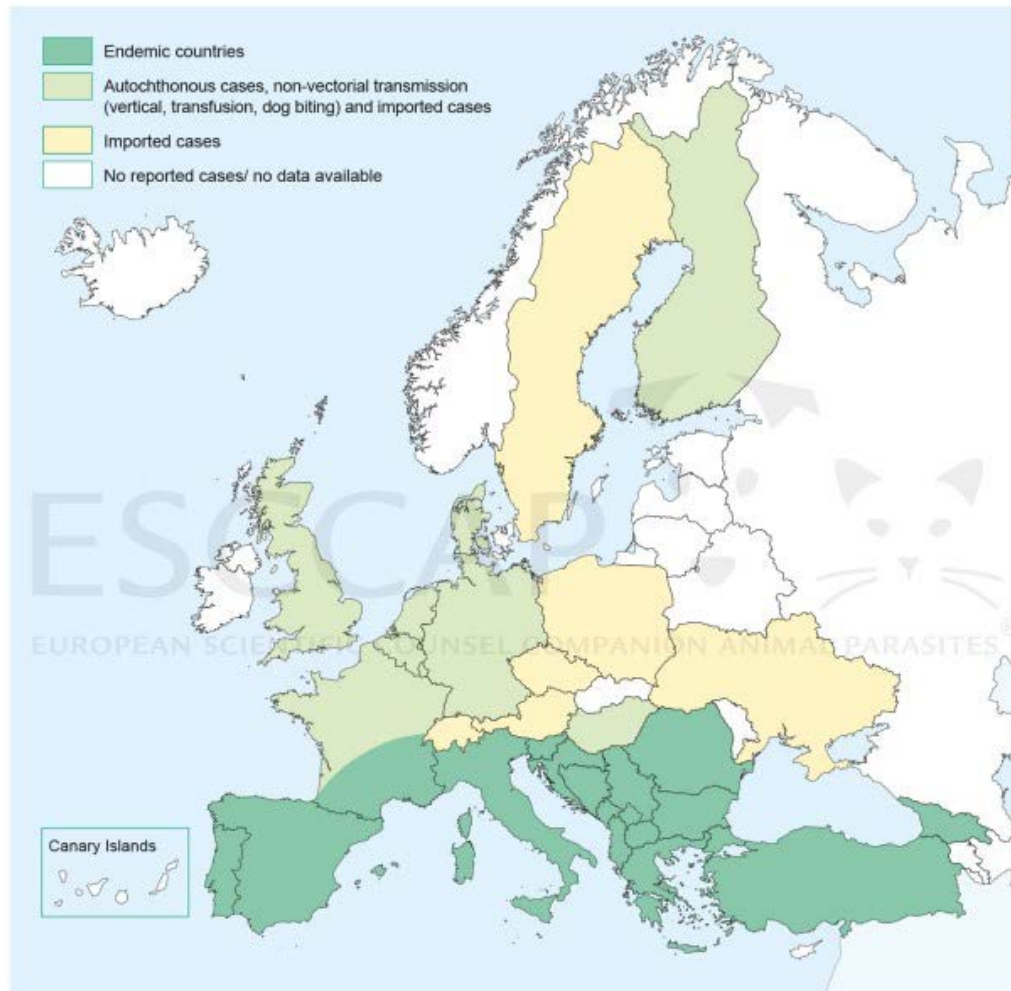


Fig. 2: Approximate distribution of canine leishmaniosis in Europe (© ESCCAP)

<https://www.esccap.org/guidelines-maps/>

Atividade flebotomínica na Europa

- **Estreita relação** entre **condições climáticas** (precipitação, temperatura e humidade) e **sazonalidade** dos **flebótomos**



RESEARCH ARTICLE

Seasonal Dynamics of Phlebotomine Sand Fly Species Proven Vectors of Mediterranean Leishmaniasis Caused by *Leishmania infantum*

Bulent Alten¹, Carla Maia², Maria Odete Afonso², Lenea Campino², Maribel Jiménez³, Estela González³, Ricardo Molina³, Anne Laure Bañuls⁴, Jorian Prudhomme⁴, Baptiste Vergnes⁴, Celine Toty⁴, Cécile Cassan⁴, Nil Rahola⁴, Magali Thierry⁴, Denis Sereno⁴, Gioia Bongiorno⁵, Riccardo Bianchi⁵, Cristina Khoury⁵, Nikolaos Tsirigotakis⁶, Emmanouil Dokianakis⁶, Maria Antoniou⁶, Vasiliki Christodoulou⁷, Apostolos Mazeris⁷, Mehmet Karakus⁸, Yusuf Ozbel⁸, Suha K. Arserim⁹, Ozge Erisoz Kasap¹, Filiz Gunay¹, Gizem Oguz¹, Sinan Kaynas¹⁰, Nikoloz Tsertsvadze¹¹, Lamzira Tskhvaradze¹¹, Ekaterina Giorgobiani¹¹, Marina Gramiccia⁵, Petr Volf¹², Luigi Gradoni^{5*}

PLOS Neglected Tropical Diseases | DOI:10.1371/journal.pntd.0004458 February 22, 2016

Temperatura (magnitude negativamente correlacionada com a latitude) ⇒ **maior determinante** do início da época de actividade dos vetores de *Leishmania*

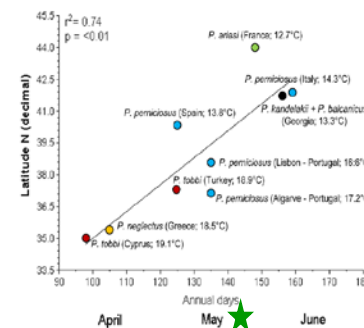


Fig 2. Relationship between latitude of collecting sites and period of appearance of sand flies in collections. Each species is shown by a different color, and the average annual temperature of each site is reported in parenthesis.

doi:10.1371/journal.pntd.0004458.g002

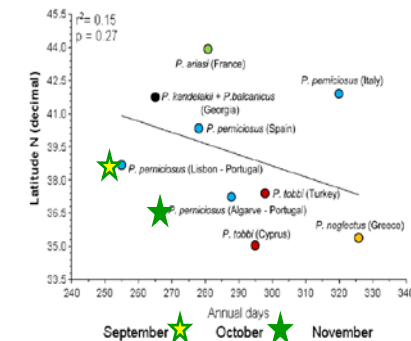


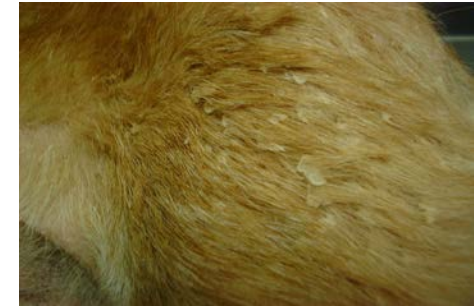
Fig 3. Relationship between the latitude of collecting sites and the last period of positive sand fly collection. Each species is shown by a different color.

doi:10.1371/journal.pntd.0004458.g003

- **Atividade flebotomínica: Maio-Outubro**
- Época **maior risco** de **transmissão** de *L. infantum*: **Junho-Setembro/Outubro**

LCan: sinais clínicos mais comuns

- ✓ **Manifestações cutâneas** (ex: alopecia, dermatite furfurácea, úlceras de difícil cicatrização)
- ✓ **Linfoadenomegalia**
- ✓ **Perda de peso, magreza**
- ✓ **Palidez das mucosas**
- ✓ **Atrofia muscular**
- ✓ **Onicogribose**



Outros sinais clínicos:

- ✓ **Hiperqueratose** nasal, almofadas plantares
- ✓ Epistáxis
- ✓ **Manifestações oculares** (uveítes, conjuntivite...)
- ✓ Poliartrite
- ✓ Esplenomegalia
- ✓ Polidipsia, poliúria



LCan = S/ sx patognomónicos

LCan = viscerocutânea



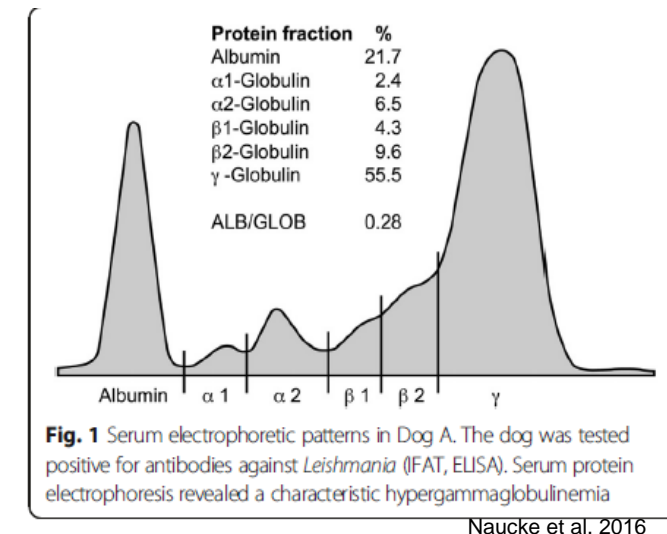
LCan: alterações laboratoriais mais comuns

- ✓ Anemia normocrômica, normocítica não-regenerativa
- ✓ Trombocitopenia
- ✓ Hiperproteinemia
- ✓ Aumento policlonal das beta e gama globulinas
- ✓ Hipoalbuminemia
- ✓ Diminuição rácio albumina/globulina
- ✓ Aumento das enzimas hepáticas
- ✓ Proteinúria (UPC \geq 0,5)



Biomarkers Associated With *Leishmania infantum* Exposure, Infection, and Disease in Dogs

Carla Maia* and Lenea Campino



Estadiamento clínico da LCan, classificações:

Table 1
Criteria used for clinical classification of dogs with CanL as proposed by different authors.

Study	Clinical classification based on clinical signs	Further diagnostic testing
Mancianti et al. (1988)	1 Asymptomatic dogs: absence of clinical signs 2 Oligosymptomatic dogs: lymphadenopathy, small weight loss and/or dull fur 3 Symptomatic dogs: all or some of the characteristic signs of the disease	None
Ciarabella et al. (1997)	1 Mild signs: mild lymphadenomegaly and/or weight loss 2 Clear signs: systemic lymphadenomegaly, splenomegaly, skin disorders and weight loss 3 Severe signs: all the above signs, plus chronic cutaneous changes and/or ocular lesions and/or severe weight loss	1. And/or Anemia 2. Anemia 3. Anemia and/or kidney involvement (azotemia)
Amusatégui et al. (2003)	1 Initial stage: asymptomatic or with mild, non-specific clinical signs 2 Established disease: typical clinical signs of canine leishmaniosis 3 Advanced stage: severe organic complications (renal, hepatic, cardiac, etc.)	1. Slight dysproteinemia or a non-altered serum protein electrophoretogram, antibody titer > 1/100 ≤ 1/800 2. Dysproteinemia, antibody titer ≥ 1/400 3. Serious biochemical and hematological alterations; variable dysproteinemia and variable antibody titers.
Solano-Gallego et al. (2009) – LeishVet	I Mild disease: mild clinical signs such as localized lymphadenomegaly and papular dermatitis II Moderate disease: apart from signs listed in stage I may present: skin disorders, anorexia, weight loss, fever, and epistaxis III Severe disease: apart of the signs listed in stages I and II, may present signs originating from immune-complex lesions IV Very severe disease: dogs with clinical signs listed in stage III. Pulmonary thromboembolism	I Usually no clinicopathological abnormalities II Low to high positive antibody levels. Clinicopathological abnormalities such as mild non-regenerative anemia, hyperglobulinemia, hypoalbuminemia, serum hyperviscosity syndrome. a Normal renal profile: creatinine < 1.4 mg/dL; non-proteinuric: UPC < 0.5 b Creatinine < 1.4 mg/dL; UPC = 0.5–1 III Severe disease: clinicopathological abnormalities listed in stage II. CKD IRIS (IRIS, 2015) stage I with UPC > 1 or stage II (creatinine 1.4–2 mg/dL) IV Very severe disease: Medium to high positive antibody levels. Clinicopathological abnormalities listed in stage II, CKD IRIS stage III (creatinine 2–5 mg/dL). Nephrotic syndrome: marked proteinuria UPC > 5 and end-stage renal disease
Paltrinieri et al. (2010) – CLWG	A Exposed B Infected: dogs are clinically normal or have signs associated with other diseases C Sick (clinically evident disease): One or more clinical signs common to leishmaniosis are present. Dogs without clinical signs but with laboratory alterations D Severely sick: dogs with severe clinical illness. Concurrent problems that require immunosuppressive treatment; severe concomitant conditions; and clinical unresponsiveness to repeated courses of anti- <i>Leishmania</i> drugs E a) Sick-unresponsive b) Sick-early relapse	A. Negative cytologic, histologic, parasitological, and molecular findings and low titer antibodies against <i>Leishmania</i> spp. B. Dogs in which parasites have been detected through direct diagnostic methods and with low-titer antibodies against <i>Leishmania</i> spp. C. Dogs with positive cytologic results regardless of serologic results and dogs with high antibody titers against <i>Leishmania</i> spp. Hematologic, biochemical, and urinary alterations common to leishmaniosis D. Evidence of proteinuric nephropathy or chronic renal failure
Foglia Manzillo et al. (2013)	1 Subpatent infections: absence of clinical signs attributable to CanL. 2 Asymptomatic active infection: absence of clinical signs attributable to CanL. 3 Symptomatic active infection: presence of clinical signs attributable to CanL.	1 Subpatent infections: detection of parasite DNA in BM samples; IFAT titers < 1:160; negative lymph node culture; absence of clinicopathological signs attributable to CanL. 2 Asymptomatic active infection: detection of parasite DNA in BM samples; IFAT titers ≥ 1:160; positive lymph node culture; absence of clinicopathological signs attributable to CanL. 3 Symptomatic active infection: detection of parasite DNA in BM samples; IFAT titers > 1:160; positive lymph node culture; presence of clinicopathological signs attributable to CanL.

LeishVet

Canine Leishmaniosis Working Group



Clinicopathological findings in sick dogs naturally infected with *Leishmania infantum*: Comparison of five different clinical classification systems

A. Meléndez-Lazo^a, L. Ordeix^{a,b}, M. Planellas^{a,b}, J. Pastor^{a,b}, L. Solano-Gallego^{a,c}

^aDepartament de Medicina i Cirurgia Animal, Facultat de Veterinària, Universitat Autònoma de Barcelona, Edifici V, Campus UAB, Bellaterra 08193, Spain
^bPandolfi Hospital Clínic Veterinari, Universitat Autònoma de Barcelona, Carrer de l'Hospital s/n, Bellaterra 08193, Spain

Estadiamento clínico definido:

- ✓ Sinais clínicos e
- ✓ Alterações laboratoriais e/ou
- ✓ Diagnóstico etiológico



Tratamento mais adequado à fase da doença

Estadiamento clínico da LCan: Leishvet e CLWG

Estadiamento clínico definido:

- ✓ **Sinais clínicos** (CLWG e LeishVet)
- ✓ **Alterações laboratoriais** (CLWG e LeishVet)
- ✓ Presença de anticorpos anti-*Leishmania* (LeishVet)
- ✓ **Resultados diagnóstico etiológico** (CLWG)

LeishVet e CLWG

Recomendações de tratamento e prognóstico

⇒ Importância para os clínicos e tutores (qualidade de vida do animal)

Solano-Gallego et al. *Parasites & Vectors* 2011, 4:86
<http://www.parasitesandvectors.com/content/4/1/86>



REVIEW

Open Access

LeishVet guidelines for the practical management of canine leishmaniosis

Laia Solano-Gallego^{1*}, Guadalupe Miró², Alek Koutinas³, Luis Cardoso⁴, Maria Grazia Pennisi⁵, Luis Ferrer⁶, Patrick Bourdeau⁷, Gaetano Oliva⁸ and Gad Baneth⁹

Reference Point

JAVMA, Vol 236, No. 11, June 1, 2010

Guidelines for diagnosis and clinical classification of leishmaniasis in dogs

Saverio Paltrinieri, DVM; Laia Solano-Gallego, DVM, PhD; Alessandra Fondati, DVM, PhD; George Lubas, DVM; Luigi Gradoni, PhD; Massimo Castagnaro, DVM; Alberto Crotti, DVM; Michele Maroli, PhD; Gaetano Oliva, DVM; Xavier Roura, DVM, PhD; Andrea Zatelli, DVM; Eric Zini, DVM, PhD

Estadiamento clínico da LCan

Veterinary Parasitology 165 (2009) 1–18



Review

Directions for the diagnosis, clinical staging, treatment and prevention of canine leishmaniosis

L. Solano-Gallego^{a,1,*}, A. Koutinas^{b,1}, G. Miró^{c,1}, L. Cardoso^{d,1}, M.G. Pennisi^{e,1},
L. Ferrer^{f,1}, P. Bourdeau^{g,1}, G. Oliva^{h,1}, G. Baneth^{i,1}



4 estádios: ... doença ligeira a doença muito severa

Table 4 Clinical staging of canine leishmaniosis based on serological status, clinical signs, laboratory findings, and type of therapy and prognosis for each stage [27]

Clinical stages	Serology *	Clinical signs	Laboratory findings	Therapy	Prognosis
Stage I Mild disease	Negative to low positive antibody levels	Dogs with mild clinical signs such as peripheral lymphadenomegaly, or papular dermatitis	Usually no clinicopathological abnormalities observed Normal renal profile: creatinine < 1.4 mg/dl; non-proteinuric: UPC < 0.5	Scientific neglect/allopurinol or meglumine antimoniate or miltefosine/allopurinol + meglumine antimoniate or allopurinol + miltefosine**	Good
Stage II Moderate disease	Low to high positive antibody levels	Dogs, which apart from the signs listed in stage I, may present: diffuse or symmetrical cutaneous lesions such as exfoliative dermatitis/onychogryphosis, ulcerations (planum nasale, footpads, bony prominences, mucocutaneous junctions), anorexia, weight loss, fever, and epistaxis	Clinicopathological abnormalities such as mild non-regenerative anemia, hyperglobulinemia, hypoalbuminemia, serum hyperviscosity syndrome Substages a) Normal renal profile: creatinine < 1.4 mg/dl; non-proteinuric: UPC < 0.5 b) Creatinine <1.4 mg/dl; UPC = 0.5-1	Allopurinol + meglumine antimoniate or allopurinol+ miltefosine	Good to guarded
Stage III Severe disease	Medium to high positive antibody levels	Dogs, which apart from the signs listed in stages I and II, may present signs originating from immune-complex lesions: vasculitis, arthritis, uveitis and glomerulonephritis.	Clinicopathological abnormalities listed in stage II Chronic kidney disease (CKD) IRIS stage I with UPC > 1 or stage II (creatinine 1.4-2 mg/dl) [79]	Allopurinol + meglumine antimoniate or allopurinol + miltefosine Follow IRIS guidelines for CKD [80]	Guarded to poor
Stage IV Very severe disease	Medium to high positive antibody levels	Dogs with clinical signs listed in stage III. Pulmonary thromboembolism, or nephrotic syndrome and end stage renal disease	Clinicopathological abnormalities listed in stage II CKD IRIS stage III (creatinine 2-5 mg/dl) and stage IV (creatinine > 5 mg/dl) [79] Nephrotic syndrome: marked proteinuria UPC > 5	Allopurinol (alone) Follow IRIS guidelines for CKD [80]	Poor

Guidelines for treatment of leishmaniasis in dogs

Gaetano Oliva, DVM; Xavier Roura DVM, PhD; Alberto Crotti, DVM; Michele Maroli, PhD;
Massimo Castagnaro, DVM; Luigi Gradoni, PhD; George Lubas, DVM; Saverio Paltrinieri, DVM;
Andrea Zatelli, DVM; Eric Zini, DVM, PhD

4 estádios:

Exposição ao parasita a doença severa

Table 1—Staging of disease for treatment of dogs with leishmaniasis.

Stage of leishmaniasis	Features
A: Exposed	Includes dogs with negative cytologic, histologic, parasitological, and molecular findings and low-titer ³ antibodies against <i>Leishmania</i> spp. Dogs are clinically normal or have signs associated with other diseases. Usually, dogs in this category are those living or that have lived during 1 or more transmission seasons in a geographic region in which the presence of <i>Leishmania</i> vectors (sand flies) has been confirmed.
B: Infected	Includes dogs in which parasites have been detected through direct diagnostic methods (eg, microscopic evaluation, organism culture, or PCR assay) and with low-titer ³ antibodies against <i>Leishmania</i> spp. Dogs are clinically normal or have signs associated with other diseases. In endemic areas, detection of <i>Leishmania</i> DNA via PCR assay in skin or peripherally obtained blood samples collected during the infection transmission period, in the absence of evident lesions, may not be sufficient to consider a dog infected.
C: Sick (clinically evident disease)	Includes dogs with positive cytologic results regardless of serologic results, dogs with high antibody titers ³ against <i>Leishmania</i> spp, and rarely, infected dogs. One or more clinical signs common to leishmaniasis are present. ³ Given the varied clinical manifestations of the disease, observed signs suggestive of disease can differ from the common clinical signs, as long as they can be clearly associated with ongoing infection. When physical examination does not reveal clinical signs, dogs in this category should still be defined as sick when hematologic, biochemical, and urinary alterations common to leishmaniasis ³ are detected. Laboratory changes other than those considered common can also be indicative of disease, provided that they are associated with the infection.
D: Severely sick	Includes sick dogs with severe clinical illness, as indicated by 1 of the following: evidence of proteinuric nephropathy or chronic renal failure; presence of concurrent problems (eg, ocular disease causing functional loss or joint disease impairing mobility) related or unrelated to leishmaniasis that require immunosuppressive treatment; severe concomitant conditions including various coinfections or neoplastic, endocrine, or metabolic diseases; and clinical unresponsiveness to repeated courses of anti- <i>Leishmania</i> drugs.

Table 4
Clinical staging of canine leishmaniosis based on serological status, clinical signs, laboratory findings, and type of therapy and prognosis for each clinical stage.

Clinical stages	Serology ^a	Clinical signs	Laboratory findings	Therapy	Prognosis
Stage I: mild disease	Negative to low positive antibody levels	Dogs with mild clinical signs such as peripheral lymphadenopathy, or papular dermatitis (Ordeix et al., 2005; Bottero et al., 2006)	Usually no clinicopathological abnormalities observed; normal renal profile: creatinine < 1.4 mg/dl; non-proteinuric: UPC < 0.5	Scientific neglect/ allopurinol alone/ allopurinol + meglumine antimoniate or miltefosine	Good
Stage II: moderate disease	Low to high ^b positive antibody levels	Dogs, which apart from the signs listed in stage I, may present: diffuse or symmetrical cutaneous lesions such as exfoliative dermatitis/onychogryphosis, ulcerations (planum nasale, footpads, bony prominences, mucocutaneous junctions), anorexia, weight loss, fever, and epistaxis (Petanides et al., 2008)	Clinicopathological abnormalities such as mild non-regenerative anemia, hypergammaglobulinemia, hypoalbuminemia, serum hyperviscosity syndrome (Petanides et al., 2008). Substage—(a) normal renal profile: creatinine < 1.4 mg/dl; non-proteinuric: UPC < 0.5. (b) Creatinine < 1.4 mg/dl; UPC = 0.5–1	Allopurinol + meglumine antimoniate or miltefosine	Good to guarded

Reference Point

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CLWG

Estádio C, cães doentes

✓ ≥ 1 sinal clínico

✓ e/ou alterações hematológicas, bioquímicas, urinárias
sugestivas de leishmaniose

Table 4

Clinical staging of canine leishmaniosis based on serological status, clinical signs, laboratory findings, and type of therapy and prognosis for each clinical stage.

Clinical stages	Serology ^a	Clinical signs	Laboratory findings	Therapy	Prognosis
Stage III: severe disease	Medium to high positive antibody levels	Dogs, which apart from the signs listed in stages I and II, may present signs originating from immune-complex lesions: vasculitis, arthritis, uveitis and glomerulonephritis	Clinicopathological abnormalities listed in stage II Chronic kidney disease (CKD) IRIS stage I with UPC > 1 or stage II (creatinine 1.4–2 mg/dl) (IRIS, 2006a)	Allopurinol + meglumine antimoniate or miltefosine Follow IRIS guidelines for CKD (IRIS, 2006b)	Guarded to poor
Stage IV: very severe disease	Medium to high positive antibody levels	Dogs with clinical signs listed in stage III. Pulmonary thromboembolism, or nephrotic syndrome and end stage renal disease	Clinicopathological abnormalities listed in stage II CKD IRIS stage III (creatinine 2–5 mg/dl) and stage IV (creatinine > 5 mg/dl) (IRIS, 2006a) Nephrotic syndrome: marked proteinuria UPC > 5	Allopurinol (alone) Follow IRIS guidelines for CKD (IRIS, 2006b)	Poor

^a Dogs with negative to medium positive antibody levels should be confirmed as infected with other diagnostic techniques such as cytology, histology/immunohistochemistry and PCR.

^b High levels of antibodies are conclusive of a diagnosis of CanL and are defined as three- to four fold increase of a well established laboratory reference cut-off.

Reference Point

JAVMA, Vol 236, No. 11, June 1, 2010

Guidelines for diagnosis and clinical classification of leishmaniasis in dogs

Saverio Paltrinieri, DVM; Laia Solano-Gallego, DVM, PhD; Alessandra Fondati, DVM, PhD; George Lubas, DVM; Luigi Gradoni, PhD; Massimo Castagnaro, DVM; Alberto Crotti, DVM; Michele Maroli, PhD; Gaetano Oliva, DVM; Xavier Roura, DVM, PhD; Andrea Zatelli, DVM; Eric Zini, DVM, PhD

CLWG

Estádio D, cães severamente doentes

- ✓ Evidência de nefropatia ou insuficiência renal crônica
- ✓ Problemas concomitantes associados/não à leishmaniose e que requerem tratamento imunossupressivo

CanL: Diagnóstico etiológico

Parasitológico

- Exame direto
- Exame cultural
- PCR

Serológico

- IFI - Imunofluorescência indireta
- Outras (CIE, ELISA, DAT, WB ...)
- Imunocromatografia (ex: rK39 dipstick)



C. Maia



C. Maia



C. Maia



Available online at www.sciencedirect.com



Veterinary Parasitology 158 (2008) 274–287

veterinary
parasitology

www.elsevier.com/locate/vetpar

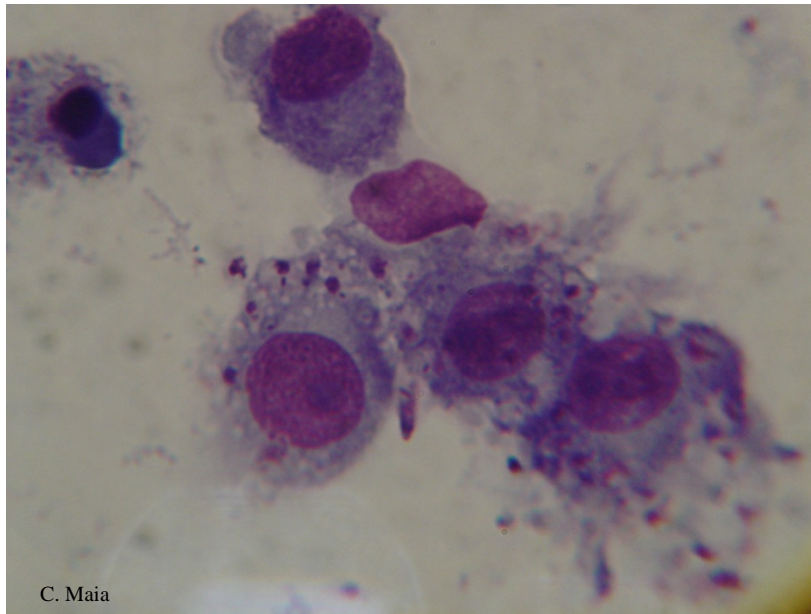
Review

Methods for diagnosis of canine leishmaniasis and
immune response to infection

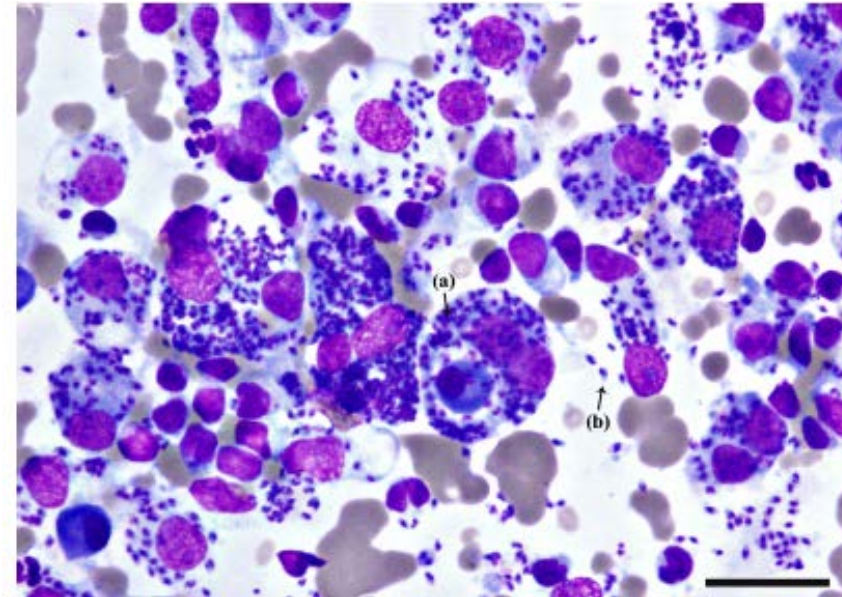
C. Maia, L. Campino*

Exame directo

- ✓ Observação microscópica de amastigotas a partir citologias, decalques esfregaços, biópsias de baço / fígado / gânglio / pele / medula

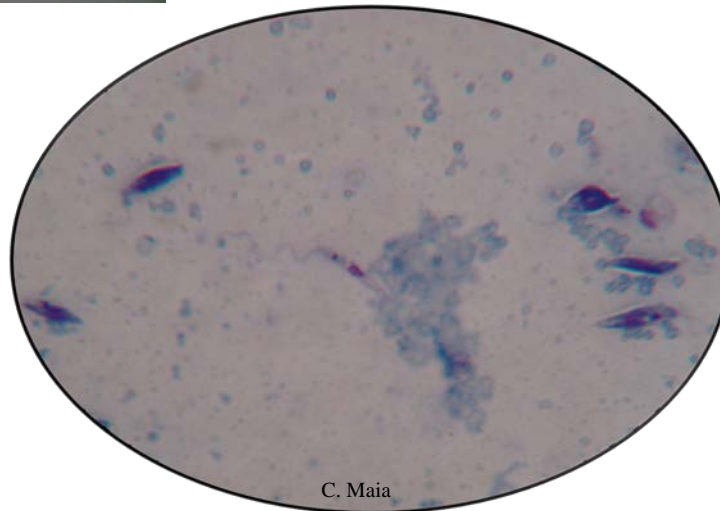
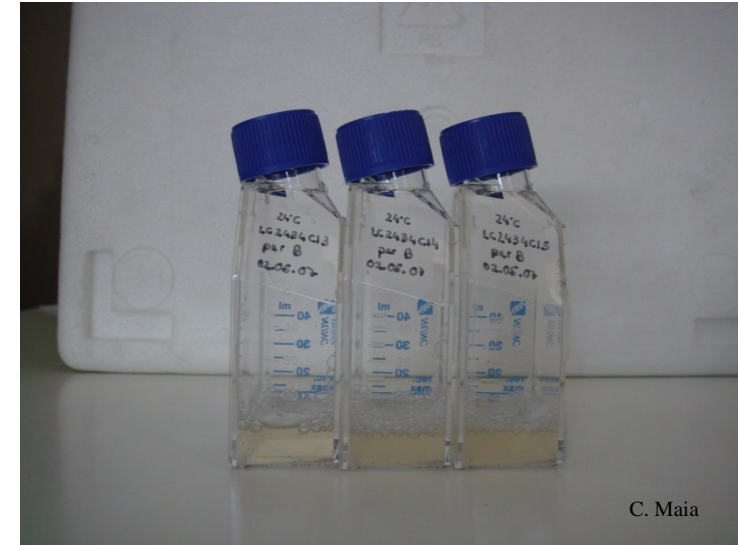


Pereira et al. 2019



Exame cultural

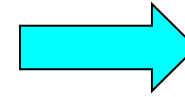
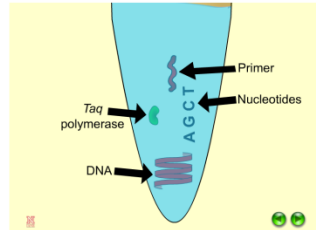
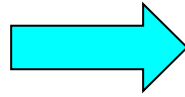
- ✓ Observação microscópica de culturas de promastigotas



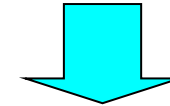
PCR - Reação em Cadeia da Polimerase

H₂O
Tampão
MgCl₂
dNTPs
Primers 1 e 2
Taq Polimerase

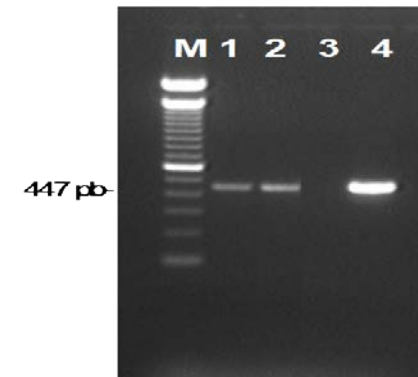
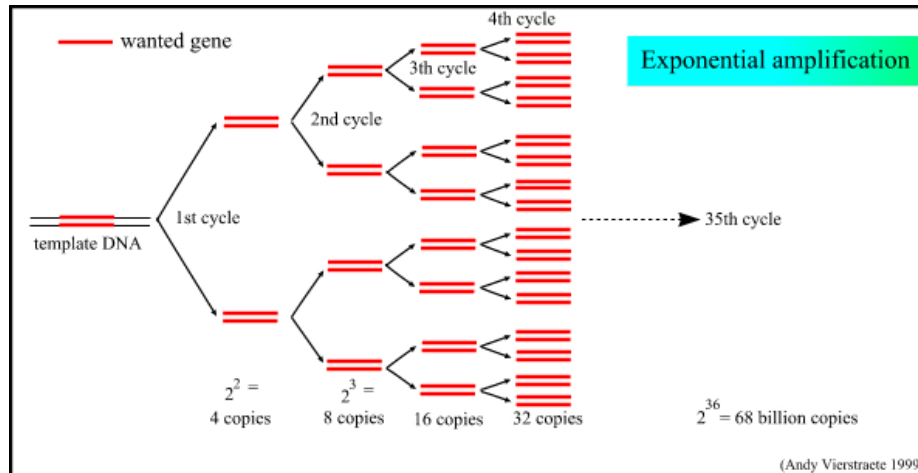
+ DNA amostra



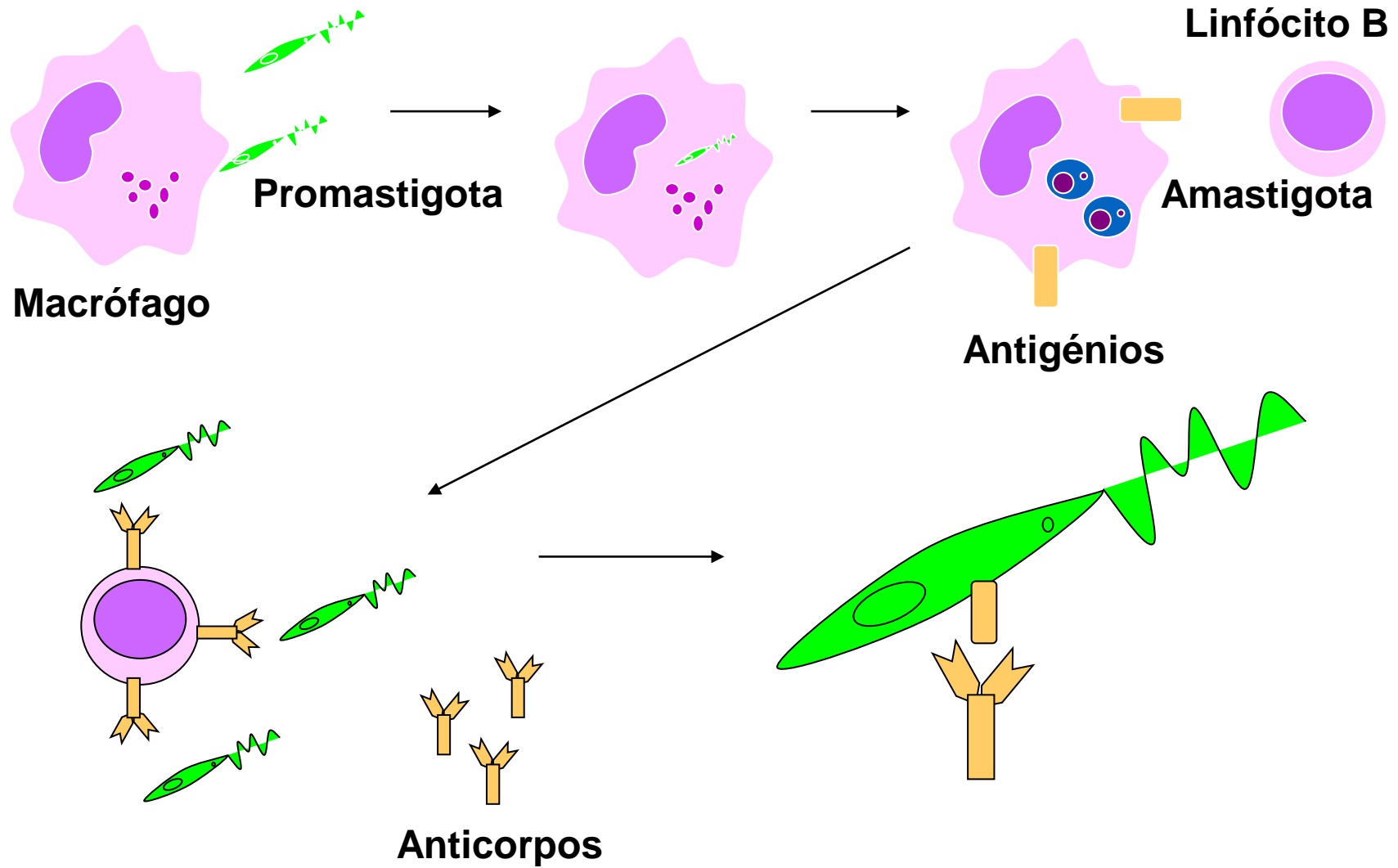
Amplificação de DNA de
Leishmania num
Termociclador



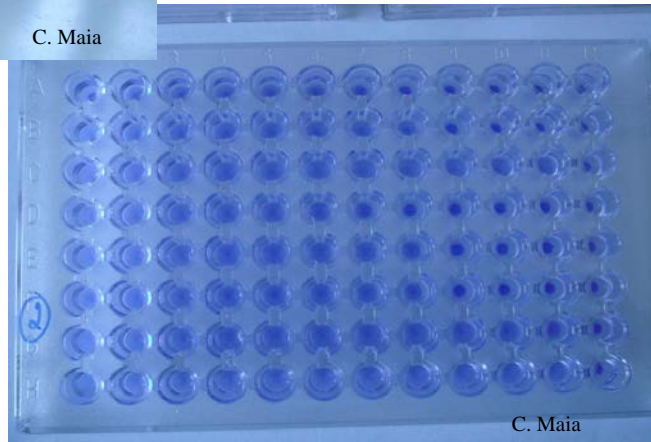
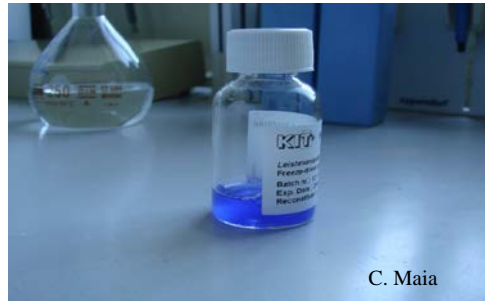
Visualização do produto amplificado por
electroforese em gel de agarose corado
com brometo de etídio/greensafe



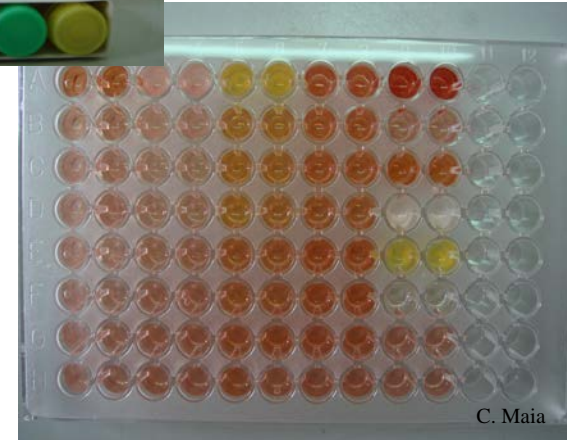
Imunologia da infecção



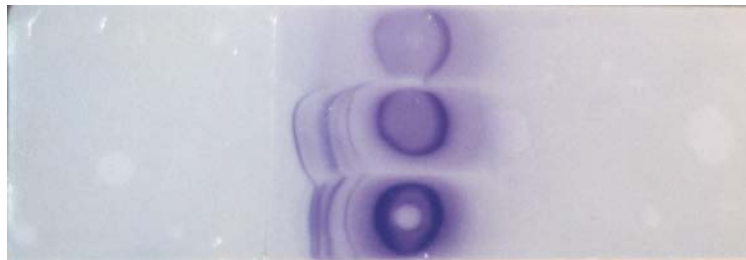
DAT



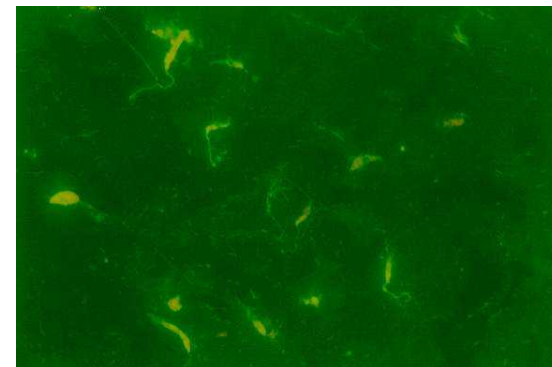
ELISA



CIE



IFI



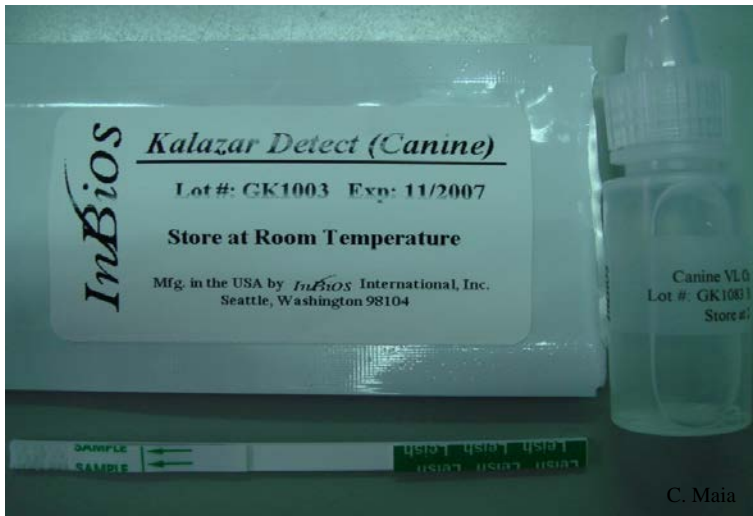
Imunocromatografia



C. Maia



C. Maia



C. Maia



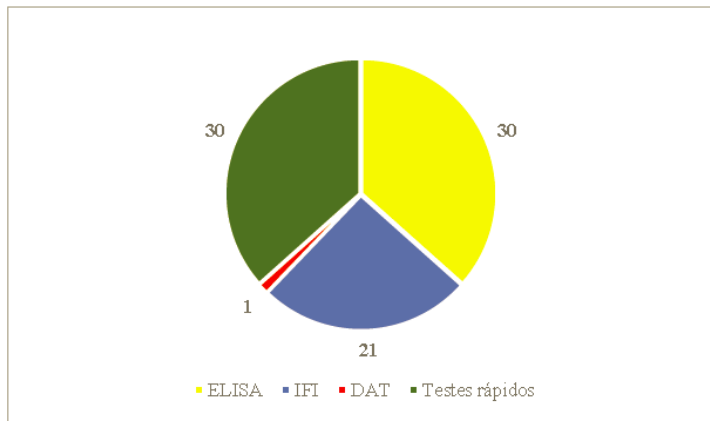
C. Maia

Leishmaniose canina: diagnóstico e medidas profiláticas utilizadas em Portugal

Carla Maia, DVM, MSc, PhD; Lenea Campino, MD, MSc, PhD

Técnicas mais utilizadas no dx laboratorial:

1. Serologia (++) testes rápidos, ELISA; IFI)
2. Associação de técnicas
3. PCR
4. Observação microscópica (LN ++; MO e Pele)

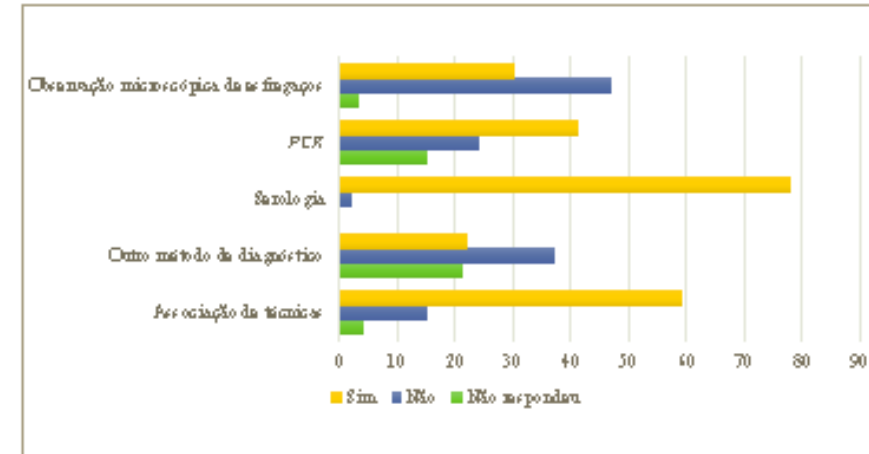


4. Técnicas serológicas utilizadas no diagnóstico da leishmaniose canina

novembro 2013 - janeiro 2014

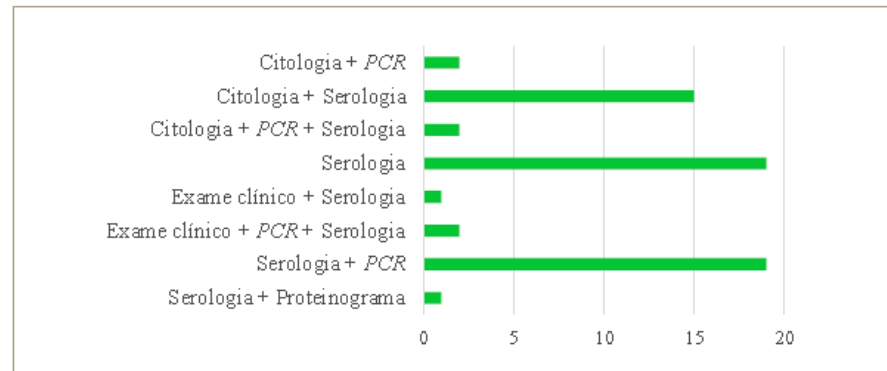
680 questionários enviados aos CAMV

80 (11,76%) respostas



2. Métodos laboratoriais utilizados no diagnóstico da leishmaniose canina. (n=80)

59/80 CAMV: combinação de técnicas



9. Combinação de métodos de diagnóstico (n=59)

Tratamento LCan

Table 3.2 Drugs most commonly used for the treatment of canine leishmaniasis

Drug	Dose and duration	Side effects
Allopurinol	10–30 mg/kg/BID, at least 6–12 months; PO	Xantine urolithiasis
Meglumine antimoniate (alone or with allopurinol)	75–100 mg/kg/SID, 4–8 weeks; SC	Injection site reaction, nephrotoxicity, vomiting
Miltefosine (alone or with allopurinol)	2 mg/kg/SID, 4 weeks; PO	Diarhea, teratogenic, vomiting

BID twice a day, *PO* per os, *SC* subcutaneous, *SID* once a day

Leishmanioestático

Leishmanicidas

“off-label”

Parasitol Res (2009) 105:155–162
DOI 10.1007/s00436-009-1375-3

ORIGINAL PAPER

Comparative study on the short term efficacy and adverse effects of miltefosine and meglumine antimoniate in dogs with natural leishmaniosis

Marta Mateo · Laurence Maynard · Claudia Vischer · Paolo Bianciardi · Guadalupe Miró

Resultados parasitológicos sem diferenças significativas entre os dois Tx leishmanicidas

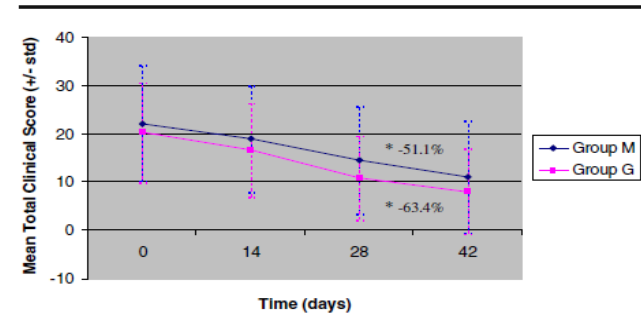


Fig. 1 Evolution over time of the mean total clinical scores

Table 5 Parasitological results on bone marrow smears at D42 (analysis was only performed for dogs with positive bone marrow smears at pre-inclusion) demonstrating no significant difference between Group M and Group G ($p > 0.05$)

Bone marrow cytology	Group M (n=30) ^a N (%)	Group G (n=23) ^a N (%)	p value ^b
Negative	27 (90.0)	21 (91.3)	1.0
Positive	3 (10.0)	2 (8.7)	

Tratamiento LCan



Table 4 Clinical staging of canine leishmaniosis based on serological status, clinical signs, laboratory findings, and type of therapy and prognosis for each stage [27]

Clinical stages	Serology *	Clinical signs	Laboratory findings	Therapy	Prognosis
Stage I Mild disease	Negative to low positive antibody levels	Dogs with mild clinical signs such as peripheral lymphadenomegaly, or papular dermatitis	Usually no clinicopathological abnormalities observed Normal renal profile: creatinine < 1.4 mg/dl; non-proteinuric: UPC < 0.5	Scientific neglect/allopurinol or meglumine antimoniate or miltefosine/allopurinol + meglumine antimoniate or allopurinol + miltefosine**	Good
Stage II Moderate disease	Low to high positive antibody levels	Dogs, which apart from the signs listed in stage I, may present: diffuse or symmetrical cutaneous lesions such as exfoliative dermatitis/onychogryphosis, ulcerations (planum nasale, footpads, bony prominences, mucocutaneous junctions), anorexia, weight loss, fever, and epistaxis	Clinicopathological abnormalities such as mild non-regenerative anemia, hyperglobulinemia, hypoalbuminemia, serum hyperviscosity syndrome Substages a) Normal renal profile: creatinine < 1.4 mg/dl; non-proteinuric: UPC < 0.5 b) Creatinine <1.4 mg/dl; UPC = 0.5-1	Allopurinol + meglumine antimoniate or allopurinol+ miltefosine	Good to guarded
Stage III Severe disease	Medium to high positive antibody levels	Dogs, which apart from the signs listed in stages I and II, may present signs originating from immune-complex lesions: vasculitis, arthritis, uveitis and glomerulonephritis.	Clinicopathological abnormalities listed in stage II Chronic kidney disease (CKD) IRIS stage I with UPC > 1 or stage II (creatinine 1.4-2 mg/dl) [79]	Allopurinol + meglumine antimoniate or allopurinol + miltefosine Follow IRIS guidelines for CKD [80]	Guarded to poor
Stage IV Very severe disease	Medium to high positive antibody levels	Dogs with clinical signs listed in stage III. Pulmonary thromboembolism, or nephrotic syndrome and end stage renal disease	Clinicopathological abnormalities listed in stage II CKD IRIS stage III (creatinine 2-5 mg/dl) and stage IV (creatinine > 5 mg/dl) [79] Nephrotic syndrome: marked proteinuria UPC > 5	Allopurinol (alone) Follow IRIS guidelines for CKD [80]	Poor



Outros fármacos utilizados no tratamento: domperidona

Preventive Veterinary Medicine 115 (2014) 56–63



Contents lists available at ScienceDirect
Preventive Veterinary Medicine
journal homepage: www.elsevier.com/locate/prevetmed

A single-centre, open-label, controlled, randomized clinical trial to assess the preventive efficacy of a domperidone-based treatment programme against clinical canine leishmaniasis in a high prevalence area

David Sabaté^{a,*}, Jorge Llinás^b, Josep Homedes^a, Mariano Sust^c, Lluís Ferrer^d

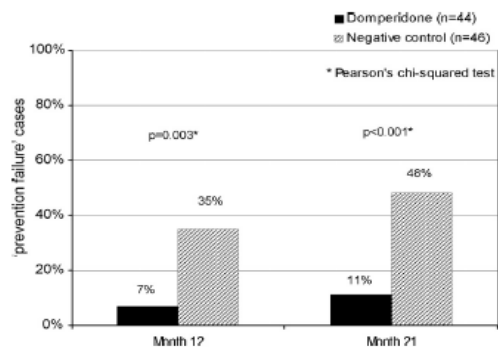


Fig. 2. Comparison of cumulative percentages of dogs with an anti-*Leishmania* antibody titre (IFAT) $\geq 1:80$ and at least one clinical sign of canine leishmaniasis ('prevention failure' cases) in the two study groups, 12 and 21 months after enrolment in a clinical trial to assess the preventive efficacy of a domperidone-based treatment programme consisting on quarterly repeated 30-day treatments with domperidone at 0.5 mg/kg bw/day against canine leishmaniasis.

Comparação presença de Acs e sx clínicos

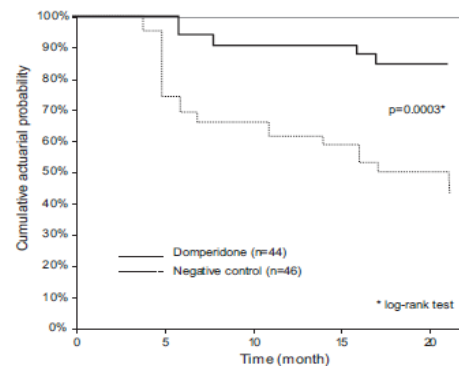


Fig. 3. Evolution (Kaplan Meyer estimates) of cumulative probability of remaining healthy (seronegative without clinical signs of canine leishmaniasis) in the two study groups during the 21-month follow-up period in a clinical trial to assess the preventive efficacy of a domperidone-based treatment programme consisting on quarterly repeated 30-day treatments with domperidone at 0.5 mg/kg bw/day against canine leishmaniasis.

Probabilidade de manutenção da condição saudável

0,5 mg/kg/SID 1m repetir c/a 4 meses; PO

- ✓ Fármaco antidopaminérgico "modificador da motilidade gastrointestinal"
- ✓ ↑ prolactina sérica
- ✓ Imunomodulador: **estimulação resposta Th1**
- ✓ Efeitos secundários:
 - Galactorreia
 - Distúrbios GI



Risco de cães tratados com domperidona desenvolverem a doença **7 X <** do que em cães não tratados

Avaliação baseada apenas na presença **Acs** e **sx**.....

Tratamento LCan

- 😊 **Melhora clínica e dos parâmetros laboratoriais**
- 😊 **Animais tratados são menos infecciosos para os vetores (++) antimoniato de meglumina e alopurinol)**

Table 4. Reduction of Infectiousness in Treated Dogs Evaluated by Xenodiagnosis

Dog sample size	Clinical improvement	Treatment protocol	Infectiousness to sand flies	Parasite burden (tissue and method)
2	Yes	Antimonials	Reduction	Not assessed
4	Yes	Antimonials + allopurinol	Lack of infectiousness	No change
10	Yes	Antimonials	Reduction	No change (popliteal lymph)
36	Yes	Antimonials (liposomal formulation)	Reduction	Reduction (bone marrow)
26	Yes	Antimonials +allopurinol, antimonials, allopurinol	Reduction	Reduction (bone marrow)
52	Yes	Liposomal antimonials, allopurinol, liposomal antimonials + allopurinol	Reduction	Reduction (bone marrow)

Miro et al. 2017

😞 **Nenhum Tx leva à cura parasitológica**

⇒ não há eliminação total dos parasitas ⇒ risco epidemiológico

Segarra et al. *Parasites & Vectors* (2018) 11:103
<https://doi.org/10.1186/s13071-018-2705-z>

Parasites & Vectors

RESEARCH

Open Access

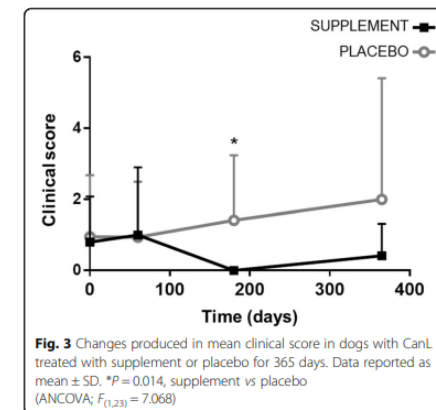


Prevention of disease progression in *Leishmania infantum*-infected dogs with dietary nucleotides and active hexose correlated compound

Sergi Segarra^{1*}, Guadalupe Miró², Ana Montoya², Luis Pardo-Marín³, Joan Teichenné⁴, Lluís Ferrer⁵ and José Joaquín Cerón³

Extracto cultivados do micélio de cogumelos (*Lentinula edodes*)

- ✓ Estimulação do sistema imunitário
- ✓ Reforço da imunidade celular



Leishmaniose canina: Esquemas terapêuticos utilizados no tratamento de cães em Portugal

Carla Maia, DVM, MSc, PhD, Lenea Campino, MD, MSc, PhD

dezembro 2011- março 2012



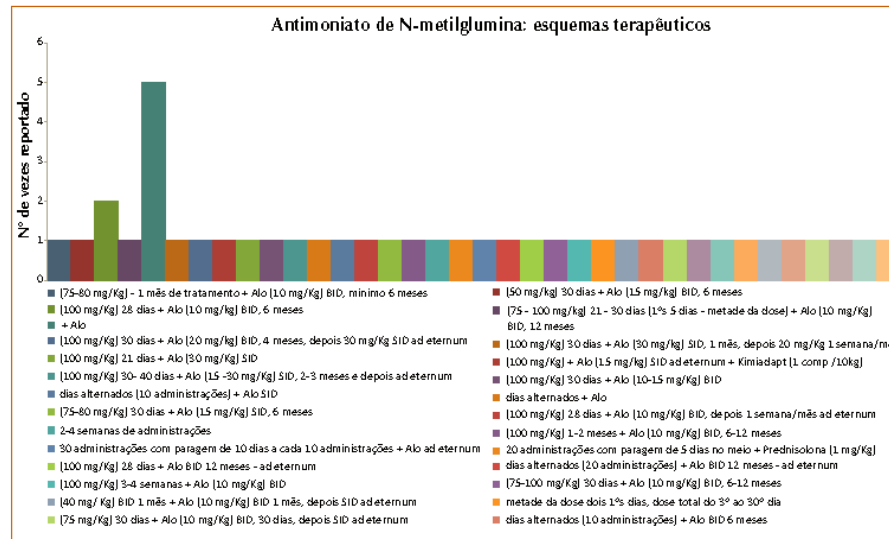
QUADRO 1
Números de centros de atendimento médico veterinário contactados, participantes e percentagem de adesão por distrito de Portugal continental

Distrito	Nº de CAMV participantes	Nº de CAMV contactados	Percentagem (%) de adesão
Aveiro	4	25	16,00
Beja	2	3	66,67
Braga	3	18	16,67
Bragança	3	3	100,00
Castelo Branco	2	4	50,00
Coimbra	2	13	15,38
Évora	1	7	14,29
Faro	7	24	29,17
Guarda	2	2	100,00
Leiria	1	12	8,33
Lisboa	20	118	16,95
Portalegre	1	3	33,33
Porto	6	60	10,00
Santarém	3	8	37,50
Setúbal	5	40	12,50
Viana do Castelo	2	9	22,22
Vila Real	2	4	50,00
Viseu	2	11	18,18
Total	68	364	18,68



QUADRO 3
Fármacos utilizados no tratamento da LCan pelos CAMV participantes

Combinações terapêuticas	Fármacos				
	Antimoniato de metilglucamina	Miltefosina	Alopurinol	Aminosidina	Levamisol
Monoterapia			12	1	
Alopurinol	2	1		2	
Levamisol	33	25	3		
Alopurinol + Levamisol		2			
Alopurinol + Levamisol + Benzazepil		1			
Alopurinol + Azatioprina				1	
Alopurinol + Kimiadapt [®]	1	1			
Alopurinol + Antimoniato de metilglucamina				1	
Benzazepil					1
Domperidona	1	1			
Kimia da pt [®]			1		
Prednisolona	1				
Total	38	31	16	5	1



Ausência de protocolos estandardizados

Monitorização LCan

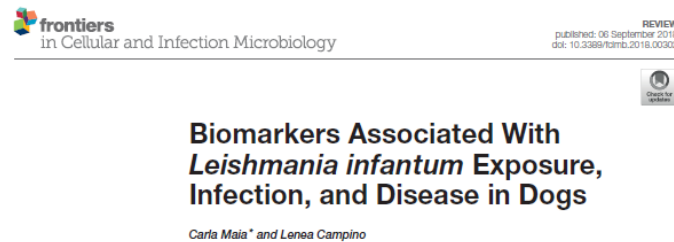
- Monitorização com intervalos de 3-6 meses:
- ✓ Título de anticorpos anti-*Leishmania*
- ✓ Carga parasitária
- ✓ Função hepática e renal
- ✓ Proteinograma, hemograma

Table 2. Monitoring Infected Dogs^a

Parameters	Sick treated dogs	Clinically healthy infected dogs
	Frequency	
<ul style="list-style-type: none"> • Clinical history and physical examination • CBC, biochemical profile ± serum electrophoresis • Complete urinalysis ±UPC 	<ul style="list-style-type: none"> • After the first month of treatment and then every 3–4 months during the first year. • Later on, every 6–12 months in dogs fully recovered clinically with treatment 	Every 3–6 months
<ul style="list-style-type: none"> • Quantitative serology^b 	<ul style="list-style-type: none"> • Not before 6 months after initial treatment and every 6–12 months 	
<ul style="list-style-type: none"> • Real-time PCR (optional) 	<ul style="list-style-type: none"> • At the same time as serology 	

^aAbbreviations: CBC, complete blood count; UPC, urinary protein:creatinine ratio.

^bSome dogs have a significant decrease in antibody levels (i.e., a more than three twofold dilutions difference between monitoring samples) associated with clinical improvement within 6–12 months of therapy. A marked increase in antibody levels (i.e., a more than three twofold dilutions difference between monitoring samples) should be interpreted as a marker of relapse, especially in dogs following the discontinuation of treatment.



Common findings in dogs with poor prognosis	Hematocrit	Lymphopenia
	Proteinogram	Hypoalbuminemia Hyperproteinemia
	Urinalysis	Proteinuria (urinary protein creatinine ratio-UPC ≥ 0.5) Azotemia (which may be associated with systemic hypertension)
Less common findings	Increased activity of gamma-glutamyl transferase and N-acetyl-b-N-glucosaminidase (associated with tubular injury)	
	Increased apoptosis and reduced oxidation status and reactivity of neutrophils	
Treatment and post-treatment monitoring	Proteinogram	Decrease in globulin concentrations
	Biochemical parameters	Decrease of acute phase proteins values
	Urinalysis	Decrease of proteinuria within 4–8 weeks after treatment with allopurinol and meglumine antimoniate
Remarks:	Serum creatinine and proteinuria should be tested:	At the end of the treatment and then 1 year after treatment (dogs in IRIS stage 1) At the end of the treatment and then every 6 months (dogs in IRIS stage 2) Frequently during treatment and then every 3 months (dogs in IRIS stage 3) Frequently during treatment and then every 6 weeks (dogs in IRIS stage 4)
	Albumin/Globulin ratio will remain low in dogs with persistent glomerular damage and proteinuria Complete regression of electrophoretogram alterations only 3–4 months after treatment	

Profilaxia LCan

✓ Protecção contra picadas de flebótomos (cães saudáveis, infetados e doentes)

- Repelentes tópicos (spray, spot-on, coleiras) contendo/impregnado com **piretróides** (e.x., permetrina, deltametrina, flumetrina)
⇒ actividade repelente e insecticida
- **Isozaxolinas** sistémicas (e.g., afoxolaner e fluralaner)
⇒ actividade insecticida



Anti flea icons created by Freepik - Flaticon



Dog icons created by Pixel perfect - Flaticon



Dog icons created by Pixel perfect - Flaticon

Tratamento em massa ⇒ efeito insecticida proporciona **interrupção** da **transmissão** dos **parasitas aos cães e aos humanos**

(e.x., eficaz para controlar a leishmaniose visceral humana no Irão e no Brasil)



- Domperidona
- Manter animais no interior das casas desde entardecer até amanhecer
- Rastreio anual antes da época de transmissão
- Vacinação (Letifend®)



Imunoprolifaxia LCan na Europa

Table 1

Main features of commercially available canine *Leishmania* vaccines.

Vaccine's features	LetiFend®
Composition	Recombinant chimeric protein Q without adjuvant
Induces strong and long-lasting Th1-dominated immunity	No recently re-evaluated data did not detect significant stimulation of cellular responses)
Prevents the establishment of an initial infection	Partially? (non-significant reduction in protection as determined by parasitological methods)
Controls infection progression towards disease	Partially (64% clinical protection at 24 months post-vaccination)
Promotes the abrogation of <i>Leishmania</i> transmissibility	Not tested for this feature
References	Cotrina et al. (2018)

Dantas-Torres et al. 2020



A large-scale field randomized trial demonstrates safety and efficacy of the vaccine LetiFend® against canine leishmaniosis

Javier Fernández Cotrina^a, Virginia Iniesta^a, Isabel Monroy^a, Victoria Baz^a, Christophe Hugnet^b, Francisco Marañón^{c,*}, Mercedes Fabra^c, Luis Carlos Gómez-Nieto^a, Carlos Alonso^d

Table 2
Days with presence of *Leishmania* in lymph nodes or bone marrow at Day 730.

Group	Positive PCR (n)	Positive smear (n)	Total parasite positive (n)	Total parasite negative (n)	Total parasite positive (%)
Placebo	29	25	30	156	16.1%
Vaccine	12	9	16	155	9.4%

Data is expressed as the number (n, %) of positive dogs for *Leishmania* spp. in lymph nodes and/or bone marrow at the last time point of the study (Day 730) measured by PCR and/or smear test. $p = 0.0564$ (Chi-square test with Yate's correction).

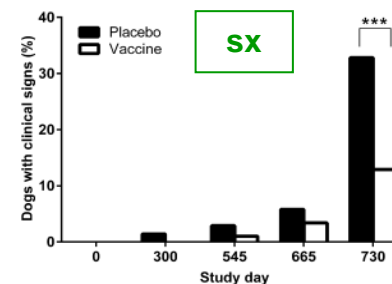


Fig. 4. Proportion of dogs with clinical signs throughout the study period. Data is expressed as the percentage of dogs showing clinical signs related to leishmaniosis. *** $p < 0.001$ (Chi-Square Test).

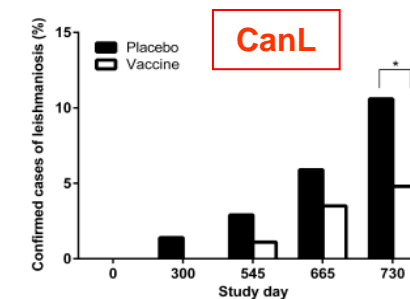


Fig. 5. Proportion (%) of dogs that progressed to leishmaniosis cases throughout the study period. Data is expressed as the percentage of dogs diagnosed as case of leishmaniosis. * $p < 0.05$ (Chi-Square test).

Medidas preventivas LCan: regiões endêmicas



Table 6. Preventative Recommendations Based on Risk of *L. infantum* Infection

Geographic area	Clinical status	Different scenarios	Travel history	Lifestyle	Preventative applications	Additional recommendations
Endemic and fringe areas	Any Seronegative	4	Outdoors		Repellents all year round or during the known sand flies season. Vaccination ^c (optimal)	Domperidone could be considered (if not vaccinated) Periodic testing if breeding or blood donor
		5	Indoors		Repellents as in 4. Vaccination ^c (optional)	Domperidone could be considered (if not vaccinated) Periodic testing if breeding or blood donor
	Seropositive Healthy ^a	6a	Any		Repellents all year round	Do not use for breeding or as blood donor Periodic check Test other household dogs.
	Seropositive Sick ^b	6b				Do not use for breeding or blood transfusion to other dogs. Staging Treatment as needed. Test other household dogs.

Miro et al. 2017

⇒ Inseticidas/repelentes:

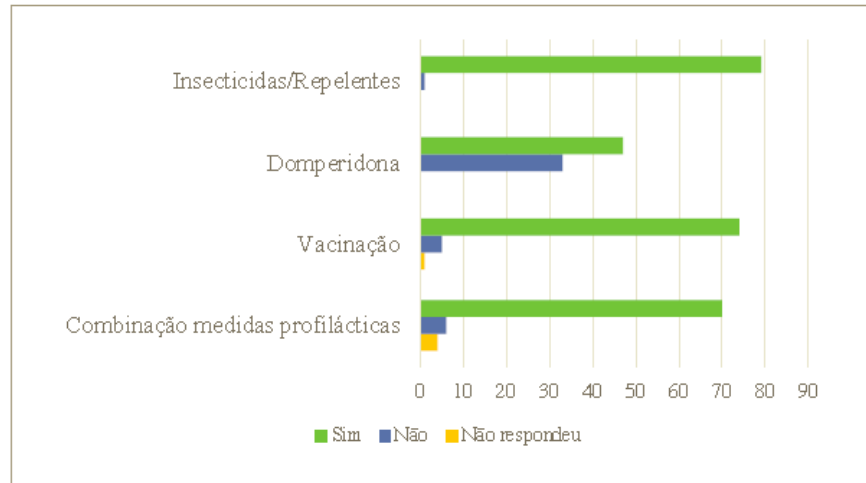
- Durante **toda** a época de **atividade flebotomínica** inclusive em animais vacinados
- Durante **todo o ano** em **cães infetados**

Leishmaniose canina: diagnóstico e medidas profiláticas utilizadas em Portugal

Carla Maia, DVM, MSc, PhD; Lenea Campino, MD, MSc, PhD



novembro de 2013 e janeiro de 2014

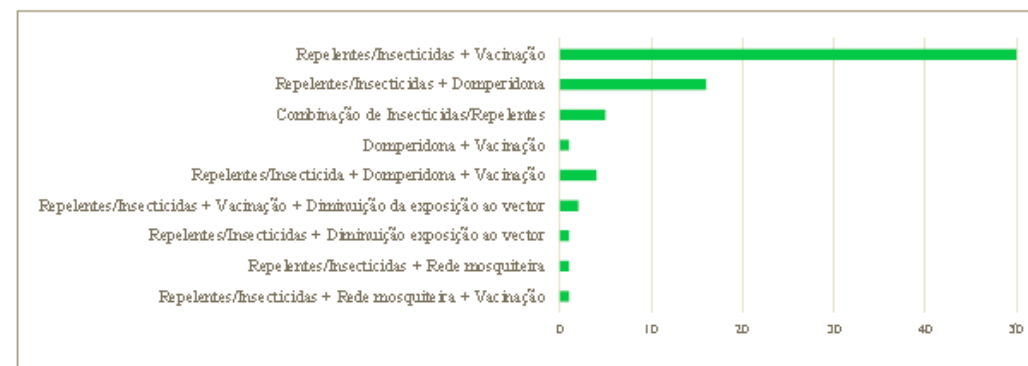


10. Medidas profiláticas utilizadas na prevenção da leishmaniose canina (n=80)

- Aplicação inseticidas /repelentes
- Vacinação (CaniLeish®)
- Administração de domperidona

Combinação de medidas profiláticas

- ✓ Immunoprofilaxia
- ✓ Inseticidas (+ de 1)
- ✓ Immunomoduladores
- ✓ Redes mosquiteiras
- ✓ Diminuição exposição aos vetores



14. Combinação de medidas profiláticas (n=70)

RESEARCH

Open Access

Use of preventive measures and serological screening tools for *Leishmania infantum* infection in dogs from Europe

Marta Baxarias¹, Josep Homedes², Cristina Mateu², Charalampos Attipa³ and Laia Solano-Gallego^{1*}

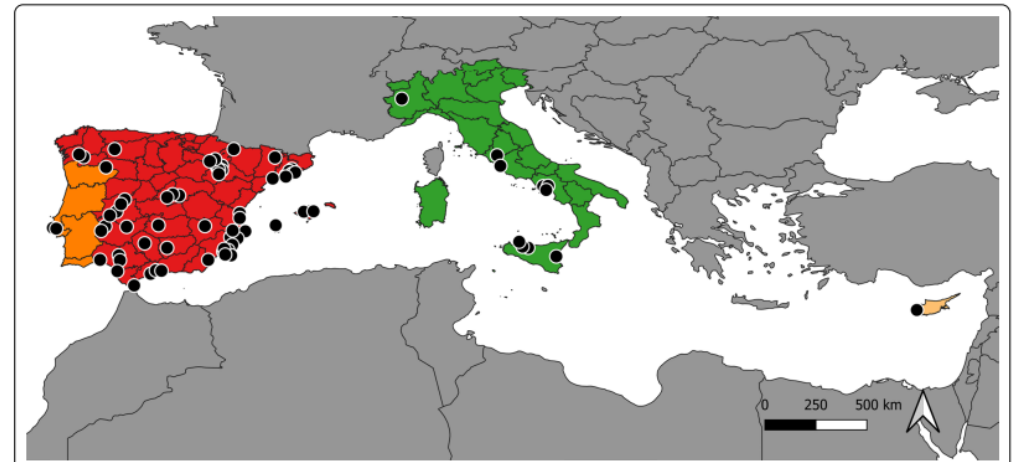


Fig. 1 Geographical distribution of all participating veterinary clinics from Europe. Spain is marked in red, Portugal in orange, Italy in green and Cyprus in yellow. Black dots represent each enrolled clinic in each country location

Entre 2012 e 2018

- Aplicação inseticidas /repelentes
- Vacinação (CaniLeish®, Letifend®)
- Administração de domperidona
- Combinação de medidas profiláticas

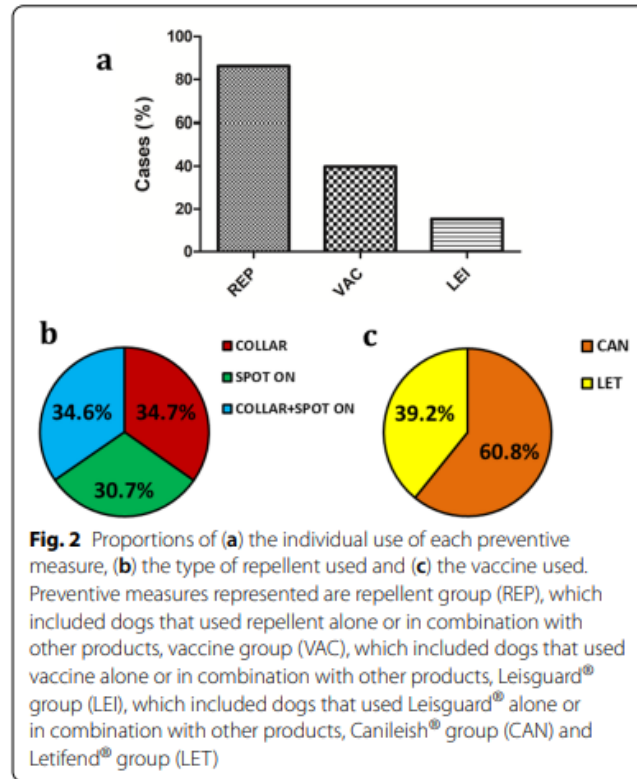


Fig. 2 Proportions of (a) the individual use of each preventive measure, (b) the type of repellent used and (c) the vaccine used. Preventive measures represented are repellent group (REP), which included dogs that used repellent alone or in combination with other products, vaccine group (VAC), which included dogs that used vaccine alone or in combination with other products, Leisguard® group (LEI), which included dogs that used Leisguard® alone or in combination with other products, Canileish® group (CAN) and Letifend® group (LET)

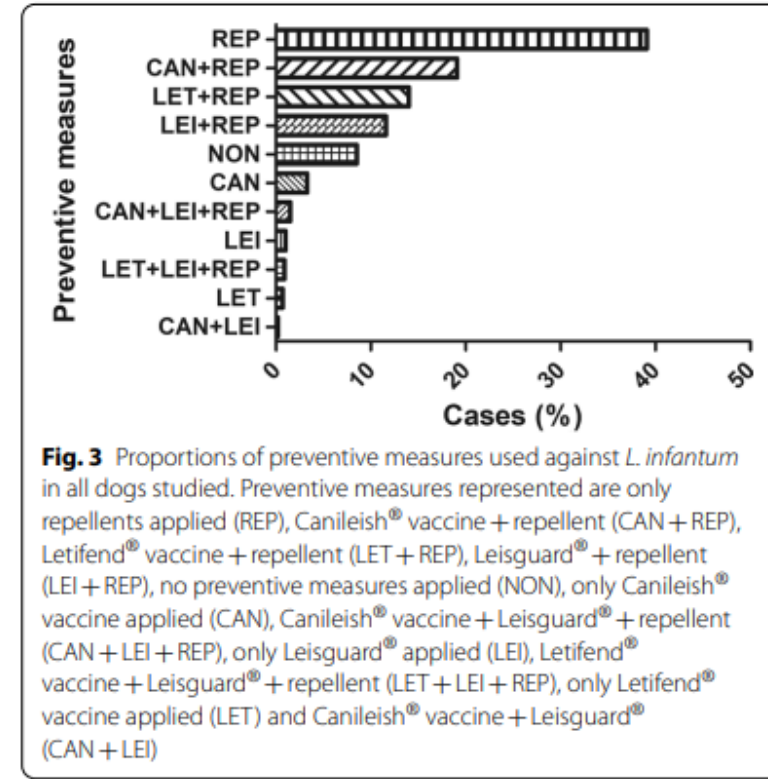


Fig. 3 Proportions of preventive measures used against *L. infantum* in all dogs studied. Preventive measures represented are only repellents applied (REP), Canileish® vaccine + repellent (CAN + REP), Letifend® vaccine + repellent (LET + REP), Leisguard® + repellent (LEI + REP), no preventive measures applied (NON), only Canileish® vaccine applied (CAN), Canileish® vaccine + Leisguard® + repellent (CAN + LEI + REP), only Leisguard® applied (LEI), Letifend® vaccine + Leisguard® + repellent (LET + LEI + REP), only Letifend® vaccine applied (LET) and Canileish® vaccine + Leisguard® (CAN + LEI)



Imunoprofilaxia LCan: desafios

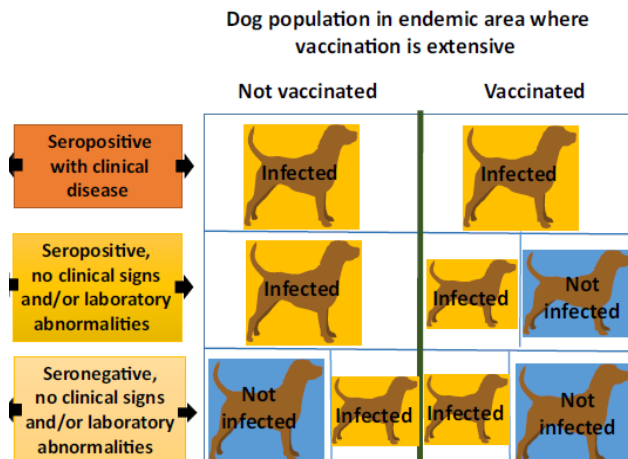
- **Eficácia na prevenção CanL (doença clínica)**
 - Letifend®: 64%
- **Potencial infecciosidade de animais vacinados e infetados**
 - Letifend®: não testada
- **Interferência de anticorpos induzidos pela vacina no diagnóstico serológico de *L. infantum* (DIVA: diferenciar animais infetados dos vacinados)**
 - Letifend®: sem deteção de Acs vacinais com IFI, ELISA e testes rápidos

Review

Diagnostic Challenges in the Era of Canine *Leishmania infantum* Vaccines

Laia Solano-Gallego,^{1,†,*} Luís Cardoso,^{2,†}
Maria Grazia Pennisi,^{3,†} Christine Petersen,^{4,†}
Patrick Bourdeau,^{5,†} Gaetano Oliva,^{6,†} Guadalupe Miró,^{7,†}
Lluís Ferrer,^{8,†} and Gad Baneth^{9,†}

<http://dx.doi.org/10.1016/j.pt.2017.06.004>



Solano-Gallego et al. 2017

The Use of Specific Serological Biomarkers to Detect CaniLeish Vaccination in Dogs

Carla Lima^{1,2,3}, Nuno Santarém^{1,2*}, Javier Nieto⁴, Javier Moreno⁴, Eugenia Carrillo⁴, Daniella Castanheira Bartholomeu⁵, Lillian Lacerda Bueno⁵, Ricardo Fujwara⁵, Célia Amorim^{1,2†} and Anabela Cordelro-da-Silva^{1,2,3*}

doi: 10.3389/fvets.2019.00373

LCan na Europa: países não endêmicos

Aumento nº casos importados

- **Movimentação dos cães com os seus tutores para zonas endêmicas durante a época de atividade flebotomínica (+++ verão)**

Veterinary Parasitology 213 (2015) 2–11



ELSEVIER

Contents lists available at ScienceDirect

Veterinary Parasitology

journal homepage: www.elsevier.com/locate/vetpar

Spread of *Leishmania infantum* in Europe with dog travelling

Carla Maia^a, Luís Cardoso^{b,*}

<http://www.pawstransport.com/european-europe-pet-transport-animal-courier-uk-to-spain.html>



Fig. 1. Map depicting the distribution of canine leishmaniosis (CanL) and its main spreading trends between endemic and non-endemic European countries. Dark grey colouring: countries or regions where *Leishmania infantum* is endemic; light grey: potentially endemic regions or countries; stars: autochthonous CanL cases in countries or regions where the disease is not endemic; squares: CanL cases in dogs imported to non-endemic countries; arrows: movement of infected dogs (importation or return travelling) from endemic to non-endemic countries.

LCan na Europa: países não endémicos

Aumento nº casos importados

➤ Adoção de cães abandonados/viver em abrigos de áreas endémicas

Schäfer et al. *Parasites & Vectors* (2019) 12:30
<https://doi.org/10.1186/s13071-018-3284-8>

Parasites & Vectors

RESEARCH

Open Access

Retrospective evaluation of vector-borne infections in dogs imported from the Mediterranean region and southeastern Europe (2007–2015)



Ingo Schäfer^{1*}, Maria Volkmann², Pamela Beelitz³, Roswitha Merle², Elisabeth Müller⁴ and Barbara Kohn¹

Results: Overall, 35% (122/345 dogs) were positive for at least one pathogen. Concurrent infections with two to four pathogens were detected in 8% of the dogs (27/345). The positive results were: *L. infantum* 21% (66/314 dogs; methods: PCR 20/79, IFAT or ELISA 63/308 dogs), *E. canis* 16% (45/278 dogs; methods: PCR 8/68, IFAT 43/257 dogs),

H. canis 11% (3/28 dogs; method: PCR), *Babesia* spp. 10% (25/251 dogs; methods: *Babesia* spp. PCR 3/98, *B. canis/vogeli* IFAT or ELISA 22/214 and *B. gibsoni* IFAT 0/13 dogs), *Dirofilaria* spp. 7% (13/178 dogs; methods: *D. immitis* Ag-ELISA 8/156, Knott's test 7/95, microfilariae PCR 5/23 dogs) and *A. platys* 5% (1/21 dogs; method: PCR). None of 8 tested dogs were positive in a combined *Babesia* spp./*Hepatozoon* spp. PCR test.

Importante fazer despiste antes da adoção



OPEN ACCESS

Veterinary Record (2020)

doi:10.1136/vetrec-2019-105380

PAPER

Importing rescue dogs into the UK: reasons, methods and welfare considerations



Charlotte Norman,¹ Jenny Stavisky ², Carri Westgarth ^{1,3}

Abstract

Background Rescuing dogs from overseas is increasing in popularity but has associated risks. This study is the first to investigate the reasons why people bring rescue dogs into the UK from overseas, the importation process, and potential welfare problems associated with this practice.

Methods An online questionnaire was advertised on social media in 2017 and received 3080 responses.

Results Participants primarily chose to adopt from abroad based on a desire for a particular dog they had seen advertised and on concern for its situation. However, some were motivated by previously having been refused dogs from UK rescues. Adopters reported that the EU Pet Travel Scheme was used to import 89 per cent of dogs,

with only 1.2 per cent reportedly under the more stringent (and correct) Balal Directive. 14.8 per cent (79/533) of dogs reportedly tested for *Leishmania infantum* had positive results. Although sometimes severe, the prevalence of behavioural problems appeared comparable to that of other rescue dogs.

LCan na Europa: países não endêmicos

Casos autóctones

- **Transmissão vertical:** transplacentária, venérea (?)
- **Transmissão horizontal** por mordedura

Karkamo et al. *Acta Veterinaria Scandinavica* (2014) 56:84
DOI 10.1186/s13028-014-0084-9

AVS ACTA VETERINARIA
SCANDINAVICA

CASE REPORT

Open Access

The first report of autochthonous non-vector-borne transmission of canine leishmaniosis in the Nordic countries

Veera Karkamo^{1*}, Anu Kaistinen², Anu Näreaho³, Kati Dillard¹, Katri Vainio-Siukola¹, Gabriele Vidgrén¹, Niina Tuoresmäki⁴ and Marjukka Anttila¹

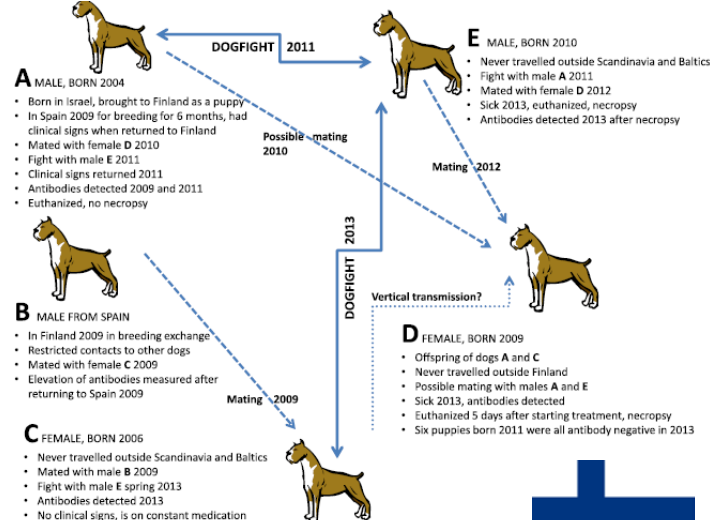


Figure 1 Schematic presentation of the events related to the case study. (Dogs A to E).

CANINE DISEASE 

Leishmaniosis in a dog with no history of travel outside the UK

VET RECORD | 23 March 2019

doi: 10.1136/vr.l1268

Naucke et al. *Parasites & Vectors* (2016) 9:256
DOI 10.1186/s13071-016-1551-0



Parasites & Vectors

SHORT REPORT

Open Access



First report of transmission of canine leishmaniosis through bite wounds from a naturally infected dog in Germany

Torsten J Naucke^{1,2,3*}, Silke Amelung⁴ and Susanne Lorentz¹

Veterinary Parasitology 237 (2017) 122–124



Contents lists available at ScienceDirect

Veterinary Parasitology

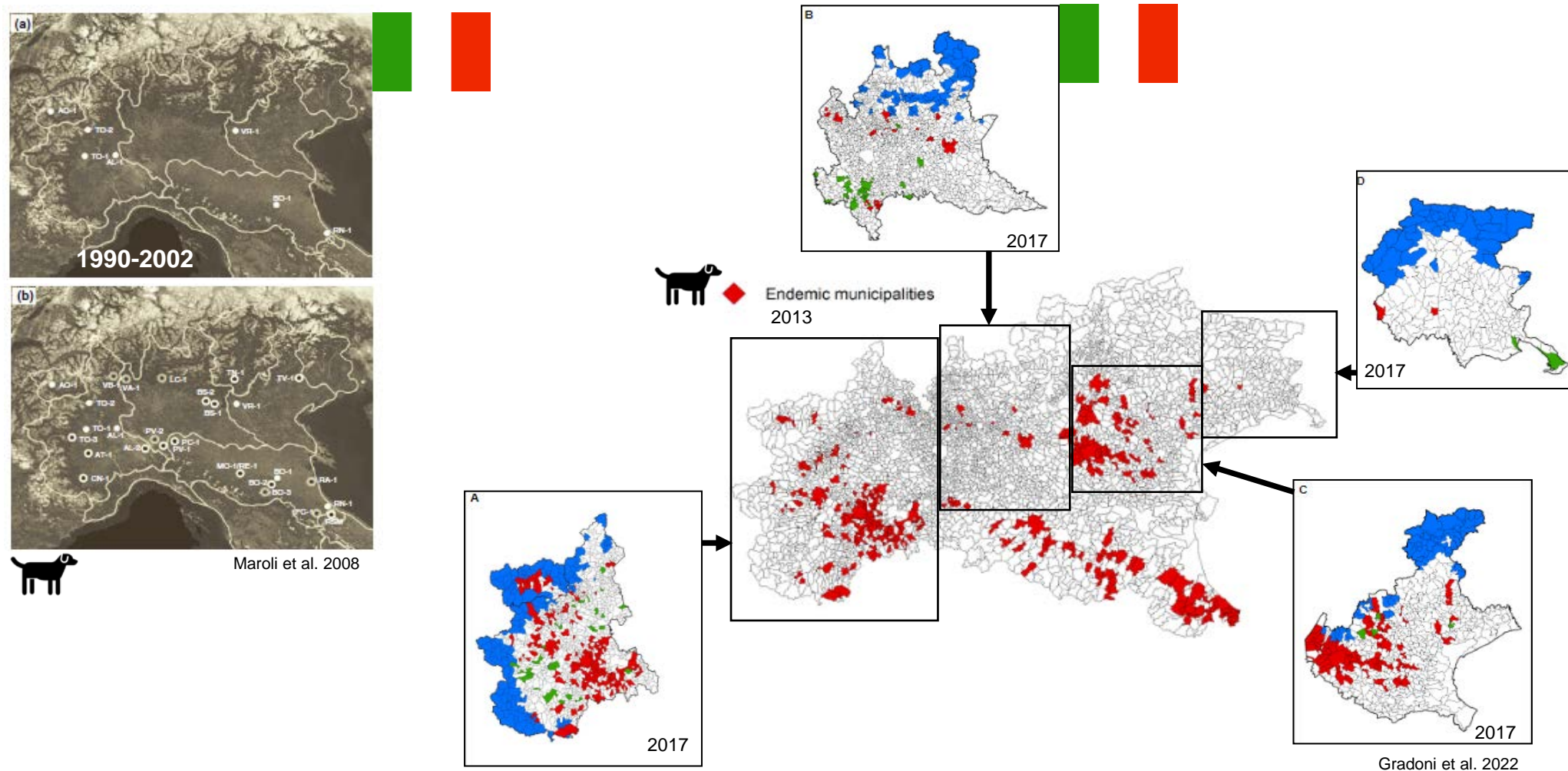
journal homepage: www.elsevier.com/locate/vetpar

Canine leishmaniosis in three consecutive generations of dogs in Czech Republic

Vlasta Svobodova^a, Miroslav Svoboda^a, Lucia Friedlaenderova^b, Petr Drahotsky^c, Eva Bohacova^c, Gad Baneth^d

LCan na Europa: países/regiões não endêmicas

- Efeito das **mudanças climáticas** de longo prazo (+++ temperatura) → favorecimento **expansão geográfica** de flebótomos **vetores** ⇒ aparecimento de **novos focos de leishmaniose**



Proposta de algoritmo de abordagem e gestão da infecção por *Leishmania* e leishmaniose canina em países não endêmicos

Acta Tropica 237 (2023) 106710

Contents lists available at ScienceDirect

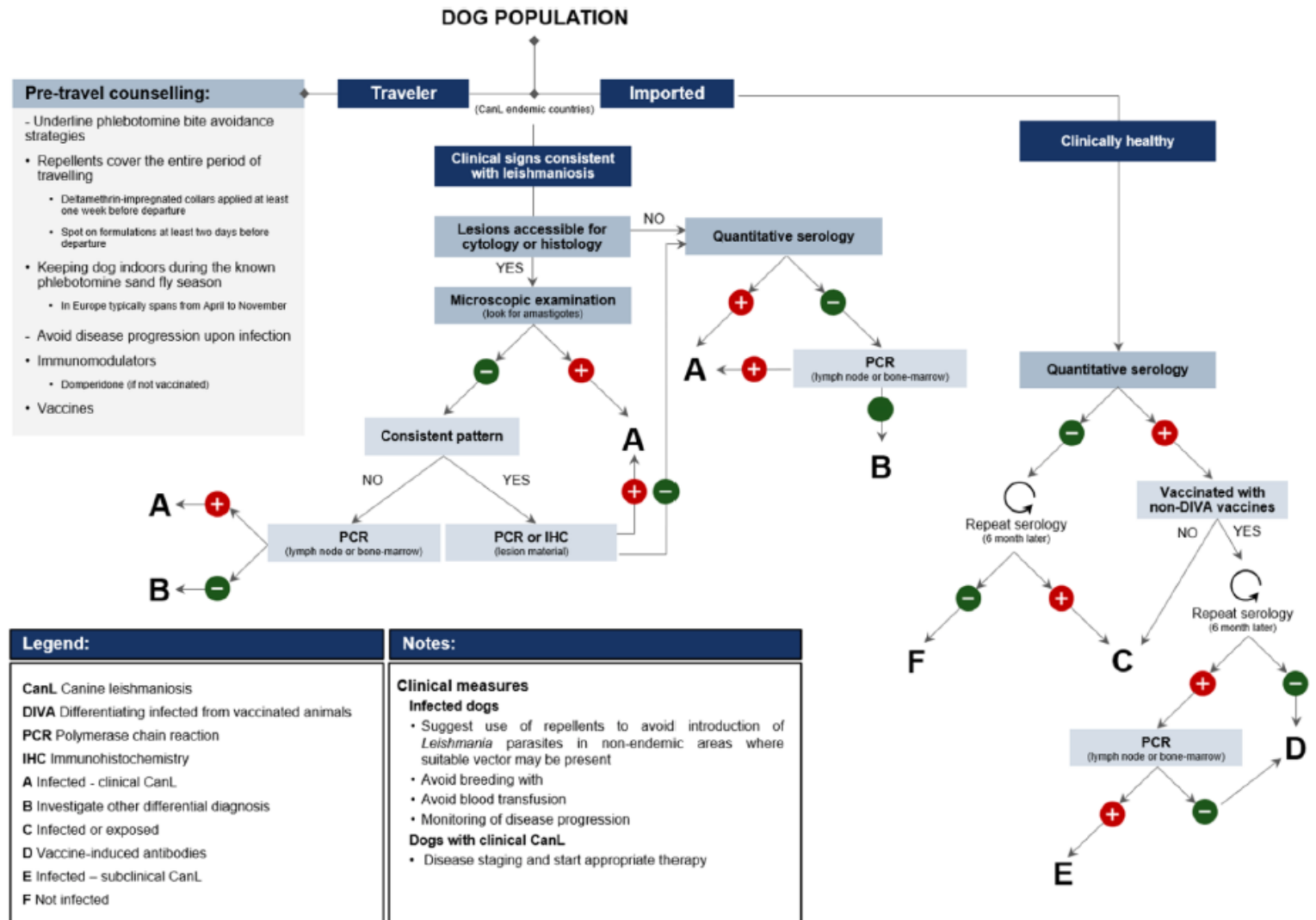
Acta Tropica

journal homepage: www.elsevier.com/locate/actatropica



A global perspective on non-autochthonous canine and feline *Leishmania* infection and leishmaniosis in the 21st century

Rafael Rocha^a, André Pereira^{b,c}, Carla Maia^{a,*}



Profilaxia LCan: países/regiões não endêmicas



Table 6. Preventative Recommendations Based on Risk of *L. infantum* Infection.

Geographic area	Clinical status	Different scenarios	Travel history	Lifestyle	Preventative applications	Additional recommendations
Nonendemic areas	Any	0	Local (negligible)	Any	None	Avoid breeding with, or blood transfusion from dogs belonging to scenarios 3–5 (and 1–2, if possible)
		1	Occasional travel to endemic fringe or endemic areas	Any	Repellents: Cover the entire period of travelling/exposure including the delay for activity	See scenario 0 If travel once and less than 3 weeks, topical insecticide spot-on formulations applied at least 2 days before travelling/exposure. For longer periods of travel, repeated spot on or collars. Test for <i>L. infantum</i> infection (6 months post-travel, via quantitative serology)
		2	Frequent (or long) travel to endemic fringe/endemic areas	Breeding, frequently outdoors	Repellents: cover the period of travelling including the delay for activity Vaccination ^c (optional)	See scenario 0 If long or frequent trips preventative measures should be the same as for Scenario 4 Test for <i>L. infantum</i> infection (6 months post last travel, via quantitative serology)
		3	Re-homing from an endemic area	Any	None	Test for <i>L. infantum</i> infection via quantitative serology If positive, do not breed, consider treatment (staging); ectoparasite control Testing of other household dogs

Miro et al. 2017

Infeção por *Leishmania* spp. em gatos

- ✓ 1º caso de **Leishmaniose Felina** causada por *L. infantum* em 1912 (Argélia)
- ✓ **Ampla distribuição geográfica** da **prevalência** da **infeção** nos gatos domésticos e peridomésticos

A. Pereira, C. Maia

Current Research in Parasitology & Vector-Borne Diseases 1 (2021) 100035

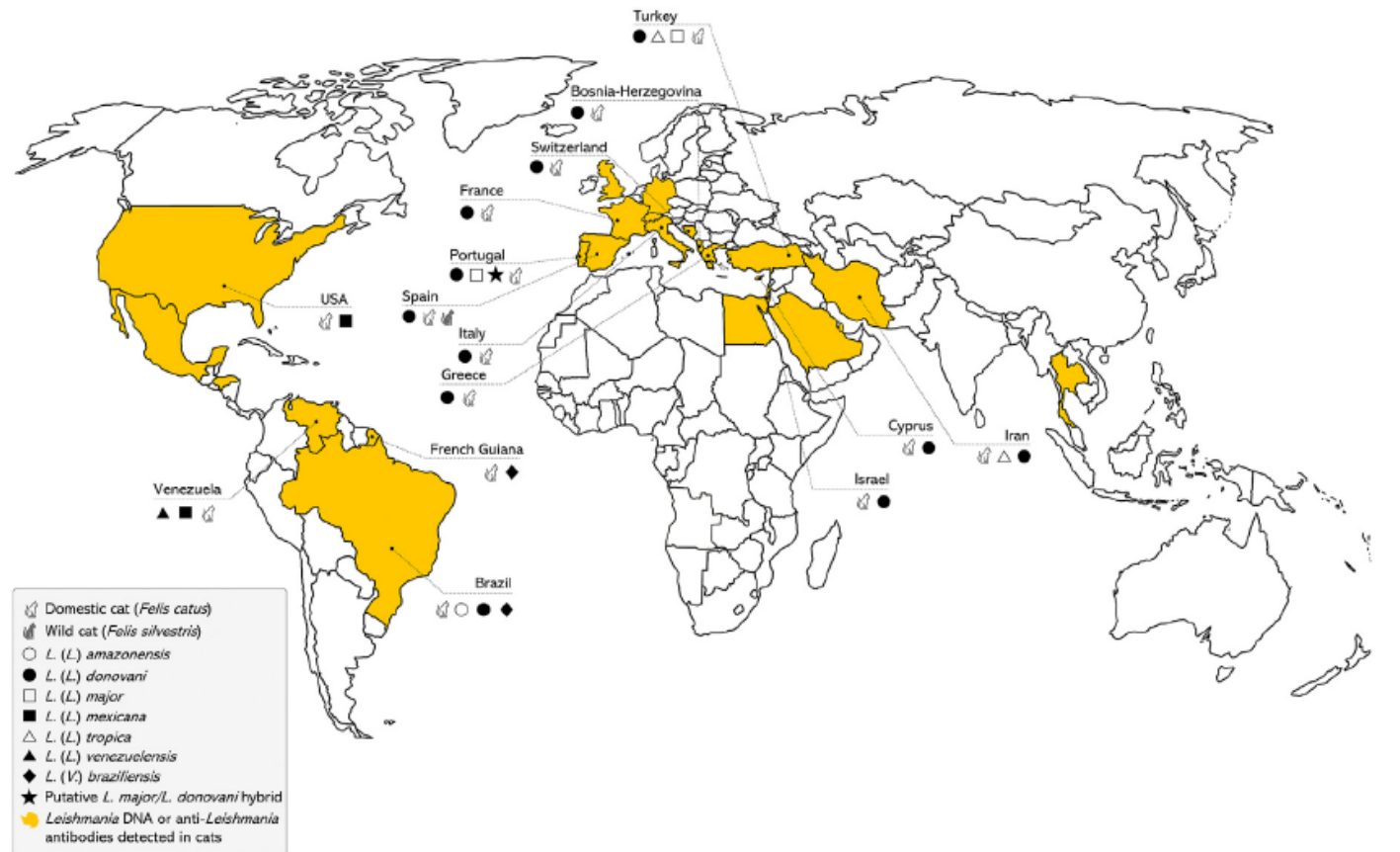


Fig. 2 Worldwide distribution of *Leishmania* infection in cats (*Felis* spp.)

O papel do gato na epidemiologia da infecção por *L. infantum*

Opinion

Can domestic cats be considered reservoir hosts of zoonotic leishmaniasis?

Carla Maia^{1,2} and Lenea Campino¹

Gato = **Reservatório** ou Hospedeiro acidental:

- ✓ Carácter **assintomático** ou oligossintomático da infeção com tendência para a **cronicidade**
- ✓ **Parasitas** molecular e bioquimicamente **idênticos** ao isolados no ser **humano**
- ✓ **Animal de estimação** frequentemente presente no ciclo doméstico e peridoméstico de transmissão do parasita



O papel do gato na epidemiologia da infecção por *L. infantum*

- ✓ **Fonte alimentar** dos **flebotomíneos** vetores
- ✓ Presença de **parasitas** no **sangue periférico**
- ✓ Animais **cronicamente infetados** por *L. infantum* ⇒ xenodiagnóstico ⇒ **infetantes** para ***Phlebotomus perniciosus*** e ***Lutzomyia longipalpis***



Short communication

First report of infection of *Lutzomyia longipalpis* by *Leishmania* (*Leishmania*) *infantum* from a naturally infected cat of Brazil

Sydnei Magno da Silva^{a,*}, Priscila Fonte Boa Rabelo^{b,1}, Nelder de Figueiredo Gontijo^a, Raul Rio Ribeiro^c, Maria Norma Melo^a, Vitor Marcio Ribeiro^b, Marilene Suzan Marques Michalick^{a,d}



Veterinary Parasitology 145 (2007) 357–360

www.elsevier.com/locate/vetpar

Short communication

Infection of sandflies by a cat naturally infected with *Leishmania infantum*

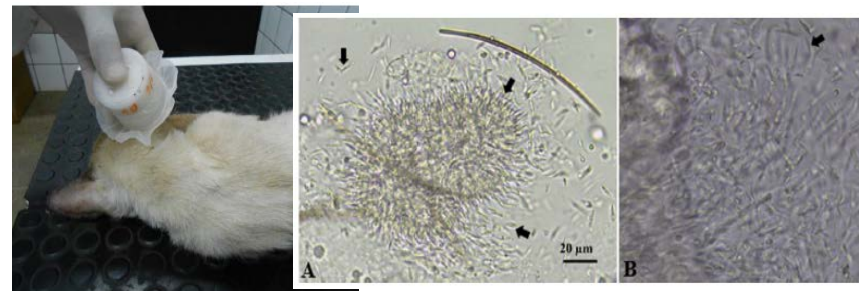
Michele Maroli^{a,*}, Maria Grazia Pennisi^b, Trentina Di Muccio^a, Cristina Khoury^a, Luigi Gradoni^a, Marina Gramiccia^a



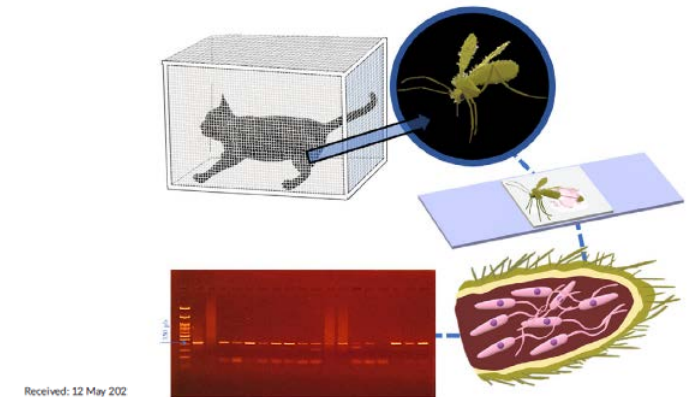
Research paper

Infection of *Lutzomyia longipalpis* in cats infected with *Leishmania infantum*

Ivete Lopes de Mendonça^{b,*}, Joilson Ferreira Batista^b, Kayo Sandro Pimentel do Prado Lopes^c, Francisco das Chagas Ribeiro Magalhães Neto^b, Diana Sousa Alcântara^b, Yslla Fernanda Fitz Balo Merigueti^d, Carlos Henrique Nery Costa^e



Mendonça et al. 2020



Received: 12 May 2021

DOI: 10.1111/tbed.14216

ORIGINAL ARTICLE

Transboundary and Emerging Diseases WILEY

Xenodiagnosis in four domestic cats naturally infected by *Leishmania infantum*

Geovanna Vioti¹ | Mariana Dantas da Silva² | Fredy Galvis-Ovallos² | Maria Luana Alves¹ | Diogo Tiago da Silva¹ | João Augusto Franco Leonel¹ | Nuno Wolfgang Balbini Pereira¹ | Julia Cristina Benassi³ | Júlio Cesar Pereira Spada¹ | Carla Maia⁴ | Eunice Aparecida Bianchi Galati² | Wilma Aparecida Starke-Buzetti⁵ | Trícia Maria Ferreira de Sousa Oliveira^{1,3}



Leishmaniose felina (FeL) em países europeus endémicos



Original Article



Feline leishmaniosis: diagnosis, treatment and outcome in 16 cats

Ana Fernandez-Gallego¹, Luis Feo Bernabe¹, Anabel Dalmau², Diego Esteban-Saltiveri³, Artur Font¹, Marta Leiva^{4,5}, Amparo Ortuñez-Navarro⁶, Maria-Teresa Peña^{4,5}, Maria-Dolores Tabar⁷, Llibertat Real-Sampietro⁸, Ferran Saló⁹, Albert Lloret¹⁰ and Mar Bardagi^{1,4}

Journal of Feline Medicine and Surgery
1–15
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DOI: 10.1177/1098612X20902865
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LEISHMANIOSIS DUE TO *LEISHMANIA INFANTUM* IN A FIV AND FELV POSITIVE CAT WITH A SQUAMOUS CELL CARCINOMA DIAGNOSED WITH HISTOLOGICAL, SEROLOGICAL AND ISOENZYMATIC METHODS

GREVOT A.*, JAUSSAUD HUGUES P.***, MARTY P.***, PRATLONG F.****, OZON C.*****, HAAS P.*****
BRETON C.***** & BOURDOISEAU G.*

<http://dx.doi.org/10.1051/parasite/2005123271>

Veterinary Dermatology

Vet Dermatol 2014

DOI: 10.1111/vde.12180

Letter to the Editor

Antonella Migliazzo*, Fabrizio Vitale*, Simona Calderone*, Roberto Puleio*, Diana Binanti† and Francesca Abramo‡

Feline leishmaniosis: a case with a high parasitic burden



Veterinary Parasitology: Regional Studies and Reports 1–2 (2015) 65–69

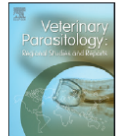


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Veterinary Parasitology: Regional Studies and Reports

journal homepage: www.elsevier.com/locate/vprsr



Case Report

Feline leishmaniosis in Portugal: 3 cases (year 2014)



Paulo Pimenta^{a,*}, Sofia Alves-Pimenta^a, João Barros^a, Pedro Barbosa^a, Ana Rodrigues^a, Maria João Pereira^a, Luís Maltez^b, Adelina Gama^{b,c}, José Manuel Cristóvão^d, Lenea Campino^{d,e}, Carla Maia^{d,f}, Luís Cardoso^{b,c}



Leishmaniose felina



Feline leishmaniosis in Portugal: 3 cases (year 2014)

Paulo Pimenta ^{a,*}, Sofia Alves-Pimenta ^a, João Barros ^a, Pedro Barbosa ^a, Ana Rodrigues ^a, Maria João Pereira ^a, Luís Maltez ^b, Adelina Gama ^{b,c}, José Manuel Cristóvão ^d, Lenea Campino ^{d,e}, Carla Maia ^{d,f}, Luís Cardoso ^{b,c}



Fig. 4. Case 1. At presentation, an upper eyelid conjunctival nodular lesion, the peripaque and the nodular OD were observed.

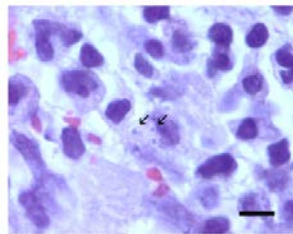


Fig. 5. Case 1. Histologic preparation of bone marrow showing a few *Leishmania* spp. amastigotes within the cytoplasm of macrophages (arrows). H&E, scale bar = 10 µm.

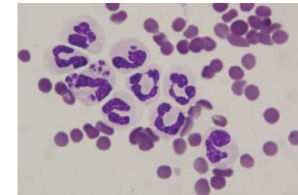


Fig. 9. Case 3. At presentation, a nodular lesion of the lower eyelid OS was observed.

CASE REPORT

Pancytopenia in a cat with visceral leishmaniasis

Ricardo Marcos ^{*1}, Marta Santos ^{*1}, Fernanda Malhão ¹, Rui Pereira ², Ana Cristina Fernandes ³, Luís Montenegro ², Paola Roccabianca ⁴



Successful treatment of feline leishmaniosis using a combination of allopurinol and N-methylglucamine antimoniate



Maria Alexandra Basso ¹, Cátia Marques ¹, Marcos Santos ¹, Ana Duarte ¹, Hugo Pissarra ¹, L Miguel Carreira ¹, Lidia Gomes ¹, Ana Valério-Bolas ², Luís Tavares ¹, Gabriela Santos-Gomes ² and Isabel Pereira da Fonseca ¹

First case of feline leishmaniosis caused by *Leishmania infantum* genotype E in a cat with a concurrent nasal squamous cell carcinoma

Carla Maia ^{1,2,3}, Cristina Sousa ⁴, Cláudia Ramos ¹, José Manuel Cristóvão ¹, Pedro Faisca ³ and Lenea Campino ^{1,2,5}



Um caso de leishmaniose felina

Dra. Ana Sanches; Dra. Ana Gomes Pereira; Dr. João Pedro Carvalho

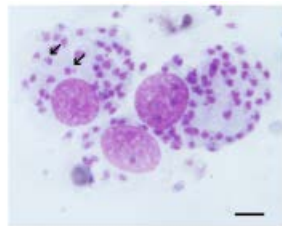
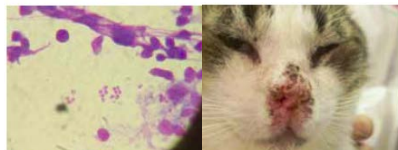


Fig. 3. Case 1. Cytologic preparation from afferent eye aqueous effluvia (axial view). CC: Macrophages and multiple intracellular cleft-like eggs (arrows) are present. CD (Giemsa), scale bar = 10 µm.

Case Report

Granulomatous rhinitis secondary to feline leishmaniosis: report of an unusual presentation and therapeutic complications

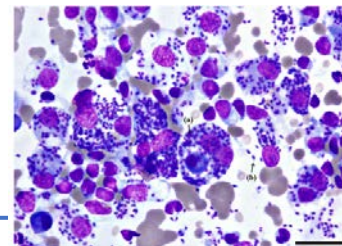
Rodolfo Oliveira Leal ^{1,2}, Hugo Pereira ^{1,2}, Clara Cartaxeiro ¹, Esmeralda Delgado ^{1,2}, Maria da Conceição Peleteiro ¹ and Isabel Pereira da Fonseca ¹



Journal of Feline Medicine and Surgery Open Reports
1:2
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SAGE



Figure 5 Erythema and alopecia on outer surface of the pinnae manifested some days after starting allopurinol treatment. Focal alopecia is also evident on the head



An Unusual Case of Feline Leishmaniosis With Involvement of the Mammary Glands

André Pereira, DVM ^{a,b}, Joana Valente, DVM ^c, Ricardo Parreira, PhD ^{d,d}, José Manuel Cristóvão, MSc ^{a,b}, Susana Azinheira, DVM ^c, Lenea Campino, MD, PhD ^b, Carla Maia, DVM, PhD, Dip. EVPC ^{a,b,*}

Topics in Companion An Med 000 (2019) 1–4



Deteção de anticorpos anti-*Leishmania* e/ou DNA de *Leishmania* em gatos



Veterinary Parasitology 174 (2010) 37–42



Low seroprevalence of *Leishmania infantum* infection in cats from northern Portugal based on DAT and ELISA

Luís Cardoso^{a,b,1}, Ana Patrícia Lopes^{a,1}, Kate Sherry^c, Henk Schallig^d, Laia Solano-Gallego^{c,*}



Short communication
Feline *Leishmania* infection in a canine leishmaniasis endemic region, Portugal

C. Maia^{a,b,*}, J. Gomes^c, J. Cristóvão^a, M. Nunes^a, A. Martins^d, E. Rebêlo^c, L. Campino^a

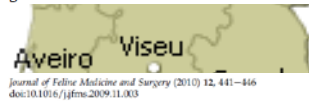
Vilhena et al. Parasites & Vectors 2013, 6:99
<http://www.parasitesandvectors.com/content/6/1/99>



RESEARCH Open Access

Feline vector-borne pathogens in the north and centre of Portugal

Hugo Vilhena^{1,2†}, Verónica L. Martínez-Díaz^{3†}, Luís Cardoso^{4,5†}, Liseite Vieira⁴, Laura Altet⁶, Olga Frandino⁶, Josep Pastor⁷ and Ana C. Silvestre-Ferreira⁴



Journal of Feline Medicine and Surgery (2010) 12, 441–446
doi:10.1016/j.jfms.2009.11.003



Survey of infectious and parasitic diseases in stray cats at the Lisbon Metropolitan Area, Portugal

Ana Duarte DVM, PhD^a, Isabel Castro DVM, MSc^a, Isabel M. Pereira da Fonseca DVM, PhD^a, Virgílio Almeida DVM, MSc, PhD^a, Luís M. Madeira de Carvalho DVM, PhD^a, José Meireles DVM, PhD^a, Maria I. Fazendeiro DVM, PhD^a, Luís Tavares DVM, MSc, PhD^a, Yolanda Vaz DVM, MSc, PhD^a

Maia et al. Parasites & Vectors 2014, 7:115
<http://www.parasitesandvectors.com/content/7/1/115>



RESEARCH Open Access

Bacterial and protozoal agents of feline vector-borne diseases in domestic and stray cats from southern Portugal

Carla Maia^{1,2,3†}, Cláudia Ramos⁴, Mónica Coimbra⁴, Filipa Bastos³, Ângela Martins⁵, Pedro Pinto³, Mónica Nunes^{6,7}, Maria Luísa Vieira^{6,7}, Luís Cardoso^{8,9} and Lenea Campino^{1,10}



Short communication
Feline *Leishmania* infection in a canine leishmaniasis endemic region, Portugal

C. Maia^{a,b,*}, J. Gomes^c, J. Cristóvão^a, M. Nunes^a, A. Martins^d, E. Rebêlo^c, L. Campino^a

Pereira et al. Parasites Vectors (2019) 12:128
<https://doi.org/10.1186/s13071-019-3376-0>

Parasites & Vectors

RESEARCH Open Access

Antibody response to *Phlebotomus perniciosus* saliva in cats naturally exposed to phlebotomine sand flies is positively associated with *Leishmania* infection

André Pereira¹, José Manuel Cristóvão¹, Hugo Vilhena^{2,3,4}, Ângela Martins⁵, Patrícia Cachola⁶, Joaquim Henriques⁷, Mónica Coimbra⁸, Ana Catarino⁹, Tereza Lestina¹⁰, Tatiana Spitzova¹⁰, Petr Volf¹⁰, Lenea Campino¹ and Carla Maia¹



Short communication
Prevalence of *Dirofilaria immitis* antigen and antibodies to *Leishmania infantum* in cats from southern Portugal

Carla Maia^{a,b,*}, Cláudia Ramos^a, Mónica Coimbra^c, Luís Cardoso^{d,e}, Lenea Campino^{a,f}

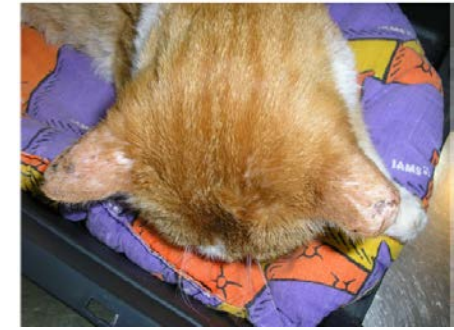
Anticorpos anti-*Leishmania*: 0,6%- 3,7%

DNA de *Leishmania* sangue periférico: 0,7%-30,4%



LFel: Sinais clínicos

- ✓ **Alterações cutâneas:** úlceras, alopecia, dermatite pustular, nodular e papular
- ✓ **Linfoadenopatia** local ou generalizada
- ✓ **Sinais oculares:** uveíte, edema da córnea, conjuntivite
- ✓ Quadro clínico inespecífico: Febre, anorexia, perda de peso, estomatite, desidratação, vômitos, icterícia e diarreia



Pennisi et al. 2015



Pennisi et al. 2015



Pennisi et al. 2015



Leishmania infection in cats and feline leishmaniosis: An updated review with a proposal of a diagnosis algorithm and prevention guidelines

André Pereira, Carla Maia*

Global Health and Tropical Medicine (GHMT), Instituto de Higiene e Medicina Tropical (IHMT), Universidade NOVA de Lisboa, 1349-008 Lisboa, Portugal



LFel: alterações laboratoriais mais comuns

- ✓ Anemia normocrômica, normocítica não-regenerativa
- ✓ Neutrofilia
- ✓ Trombocitopenia
- ✓ Hiperproteinemia
- ✓ Hipergamaglobulinemia
- ✓ Aumento creatinina sérica
- ✓ Proteinúria

LFel: Diagnóstico etiológico

Parasitológico

- Exame direto (citologia, histopatologia)
- Exame cultural
- PCR, qPCR

Serológico (produção de Acs anti-*Leishmania* nem sempre presente, mesmo em casos clínicos)

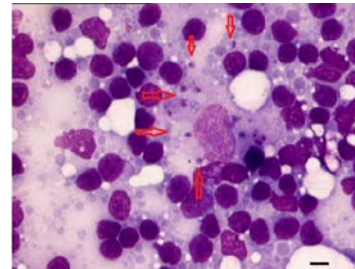
- IFI
- ELISA
- Outras (DAT, WB ...)



Leishmania infection in cats and feline leishmaniosis: An updated review with a proposal of a diagnosis algorithm and prevention guidelines

André Pereira, Carla Maia*

Global Health and Tropical Medicine (GHMT), Instituto de Higiene e Medicina Tropical (IHMT), Universidade NOVA de Lisboa, 1349-008 Lisboa, Portugal



Pennisi et al. 2015

Pennisi et al. *Parasites & Vectors* (2015) 8:302
DOI 10.1186/s13071-015-0909-z



REVIEW

Open Access

LeishVet update and recommendations on feline leishmaniosis

Maria-Grazia Pennisi^{1*}, Luis Cardoso², Gad Baneth³, Patrick Bourdeau⁴, Alek Koutinas⁵, Guadalupe Miró⁶, Gaetano Oliva⁷ and Laia Solano-Gallego⁸

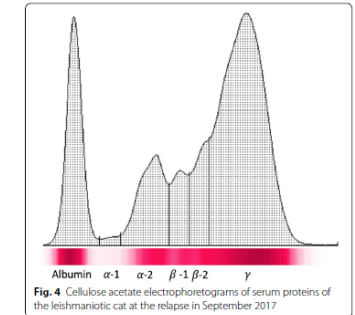


Fig. 4 Cellulose acetate electrophoretograms of serum proteins of the leishmaniotic cat at the relapse in September 2017

Brianti et al. 2019

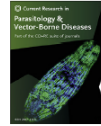
Proposta de algoritmo de diagnóstico para gatos clinicamente saudáveis utilizados como doadores de sangue ou para reprodução, e gatos com suspeita de leishmaniose

Current Research in Parasitology & Vector-Borne Diseases 1 (2021) 100035

Contents lists available at ScienceDirect

Current Research in Parasitology & Vector-Borne Diseases

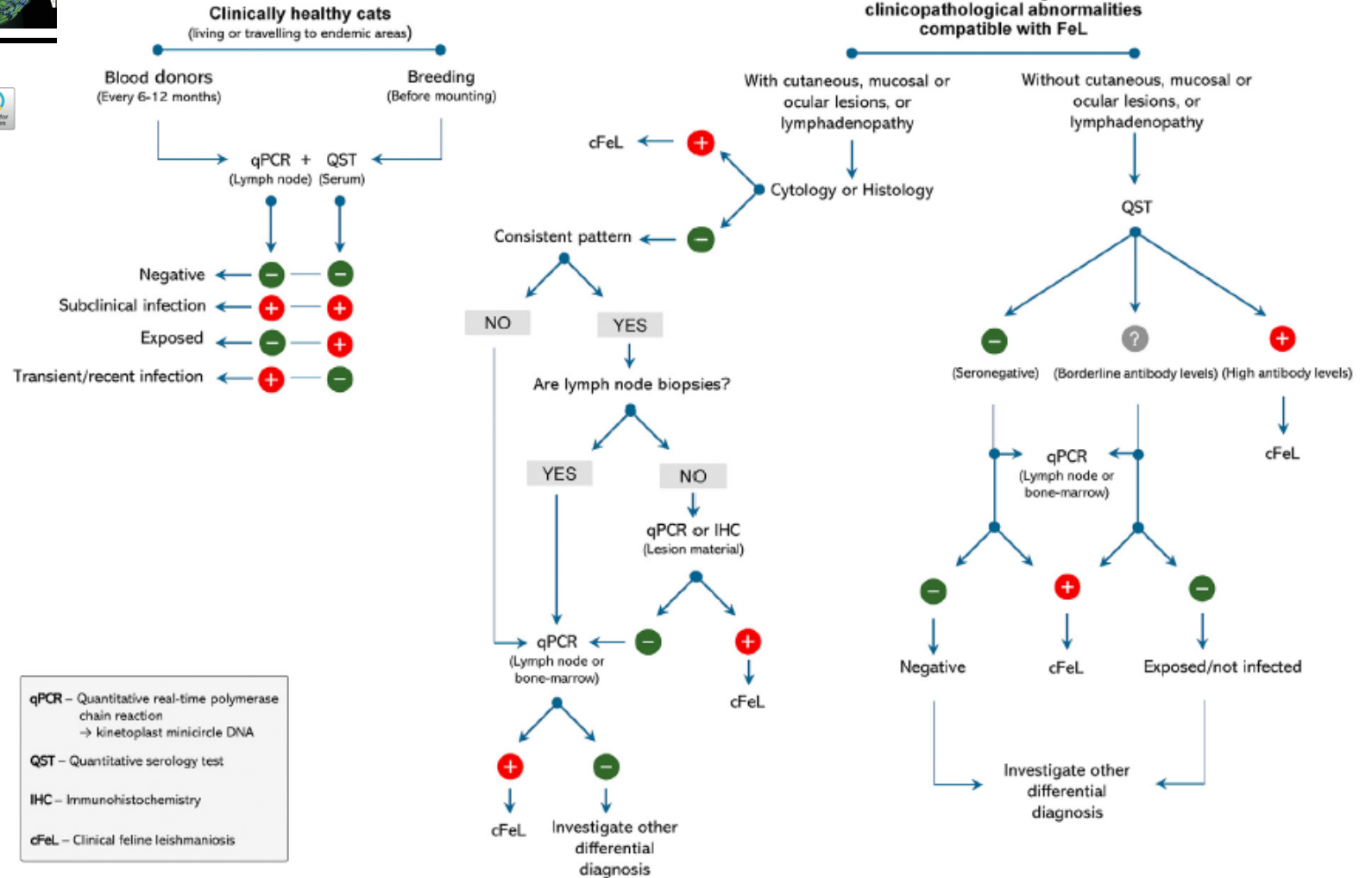
journal homepage: www.editorialmanager.com/crpvbd/default.aspx



Leishmania infection in cats and feline leishmaniosis: An updated review with a proposal of a diagnosis algorithm and prevention guidelines

André Pereira, Carla Maia

Global Health and Tropical Medicine (GHTM), Instituto de Higiene e Medicina Tropical (IHMT), Universidade NOVA de Lisboa, 1349-008 Lisboa, Portugal




LFel: Tratamento

- ✓ “Off-label” monoterapia/terapia combinada: **alopurinol (++)**, **antimoniato de meglumina**, **miltefosine**
- ✓ **Remissão** dos **sinais clínicos**
- Normalização dos parâmetros bioquímicos



Case Report



Journal of Feline Medicine and Surgery Open Reports
1-7
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DOI: 10.1177/2055116916630002
jfmsopenreports.com
SAGE

Successful treatment of feline leishmaniosis using a combination of allopurinol and N-methylglucamine antimoniate

Maria Alexandra Basso¹, Cátia Marques¹, Marcos Santos¹, Ana Duarte¹, Hugo Pissarra¹, L Miguel Carreira¹, Lídia Gomes¹, Ana Valério-Bolas², Luís Tavares¹, Gabriela Santos-Gomes² and Isabel Pereira da Fonseca¹

Received: 12 January 2018 | Revised: 18 March 2018 | Accepted: 22 April 2018
DOI: 10.1111/vms.12666


IMAGING DIAGNOSIS

WILEY

Computed tomographic features of destructive granulomatous rhinitis with intracranial extension secondary to leishmaniasis in a cat

Raul Altuzarra¹ | Rebeca Movilla¹ | Xavier Roura¹ | Yvonne Espada^{1,2} | Natalia Majo³ | Rosa Novellas^{1,2}

Case Report



Granulomatous rhinitis secondary to feline leishmaniosis: report of an unusual presentation and therapeutic complications

Rodolfo Oliveira Leal^{1,2}, Hugo Pereira^{1,2}, Clara Cartaxeiro¹, Esmeralda Delgado^{1,2}, Maria da Conceição Peleteiro¹ and Isabel Pereira da Fonseca¹

Journal of Feline Medicine and Surgery Open Reports
1-7
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Brianti et al. Parasites Vectors (2019) 12:121
https://doi.org/10.1186/s13071-019-3388-9

Parasites & Vectors

SHORT REPORT Open Access

Treatment and long-term follow-up of a cat with leishmaniosis

Emanuele Brianti¹, Nunziata Celi², Ettore Napoli¹, Jessica M. Abbate¹, Francesca Arfuso¹, Gabriella Gaglio¹, Roberta Iatta³, Salvatore Giannetto¹, Marina Gramiccia⁴ and Domenico Otranto³

Check for updates

Veterinary Ophthalmology (2005) 8, 1, 71–75

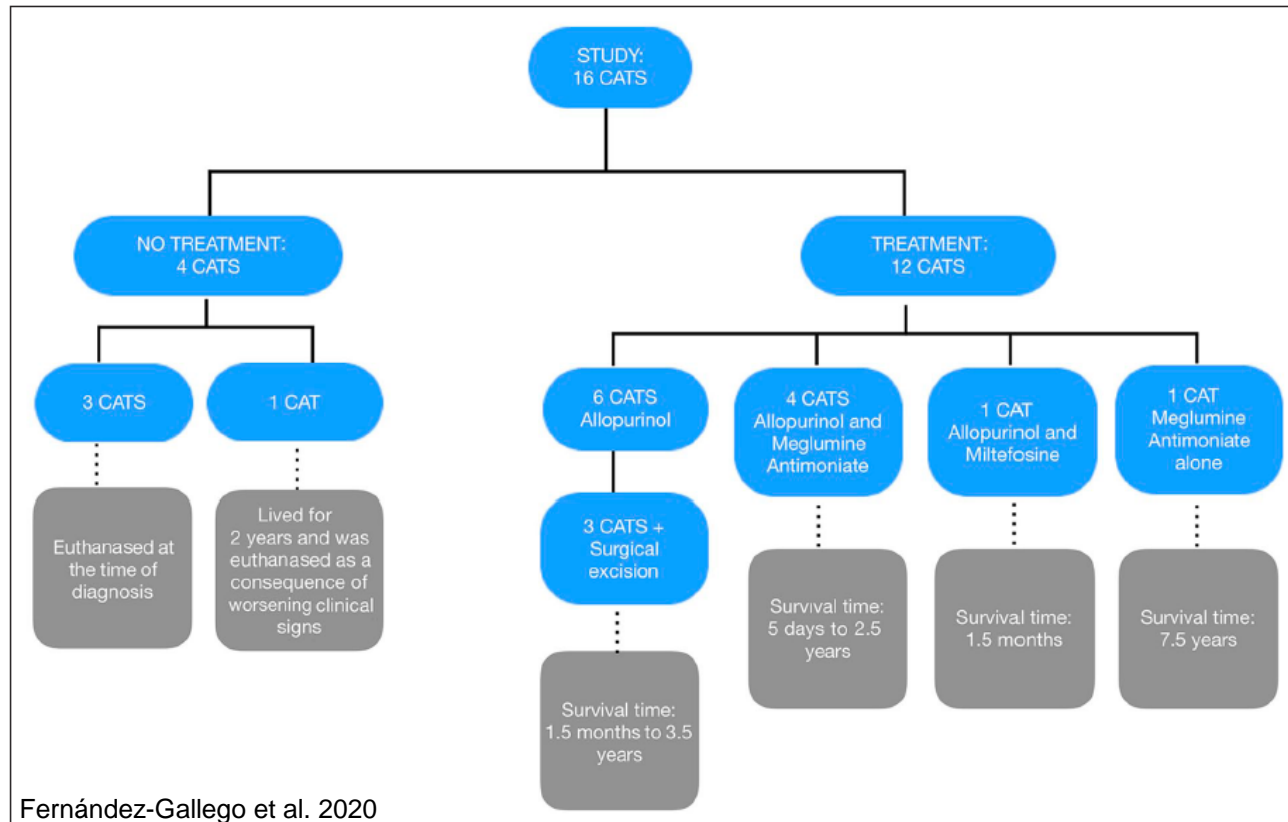
CASE REPORT

Therapy of ocular and visceral leishmaniasis in a cat

Marta Leiva,* Albert Lloret,* Teresa Peña† and Xavier Roura*

LFel: Prognóstico

- ✓ De bom a reservado
- ✓ Co-morbilidades (ex: Insuficiência renal aguda, panleucopenia, vírus imunossupressores)



LFel: Profilaxia

- ✓ Testar presença de Acs e de DNA parasitário em **dadores de sangue** (evitar transmissão não vetorial)
- ✓ Maioria dos piretróides tóxicos para os gatos. Exceção: **flumetrina**

Brianti et al. *Parasites & Vectors* (2017) 10:334
DOI 10.1186/s13071-017-2258-6

Parasites & Vectors

RESEARCH

Open Access

Prevention of feline leishmaniosis with an imidacloprid 10%/flumethrin 4.5% polymer matrix collar



Emanuele Brianti^{1*}, Luigi Falsone^{1†}, Ettore Napoli^{1†}, Gabriella Gaglio¹, Salvatore Giannetto¹, Maria Grazia Pennisi¹, Vito Priolo¹, Maria Stefania Latrofa², Viviana Domenica Tarallo², Fabrizio Solari Basano³, Roberto Nazzari³, Katrin Deuster⁴, Matthias Pollmeier⁴, Laura Gulotta⁵, Vito Colella², Filipe Dantas-Torres^{2,6}, Gioia Capelli⁷ and Domenico Otranto²



Table 2 Results of serology (IFAT) and qPCR on blood and conjunctival swab for *Leishmania infantum* in cats treated with the Seresto® collar (G1) or in untreated controls (G2) after being exposed to one transmission season in highly endemic area

Group	n	IFAT titre		qPCR		Total (%) ^a
		1:80	1:160	Blood	C.S.	
G1	79	2	1	2	1	5 (6.3) ^A
G2	80	9	3	10	5	20 (25.0) ^B

^aNot the sum per group and row as individual animals tested positive on multiple tests but the total number of individuals testing positive in a group
Significant differences are marked with different upper case letters ($\chi^2 = 9.095$, $df = 1$, $P = 0.0026$)



LFel na Europa: países não endêmicos




Acta Tropica 237 (2023) 106710

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Acta Tropica

journal homepage: www.elsevier.com/locate/actatropica



25 casos importados:

- 22 na Alemanha
- 3 na Suíça

A global perspective on non-autochthonous canine and feline *Leishmania* infection and leishmaniosis in the 21st century

Rafael Rocha^a, André Pereira^{b,c}, Carla Maia^{a,*}



PAPERS & ARTICLES

Veterinary Record (2005)
156, 542-545

Two cases of feline leishmaniosis in Switzerland



S. RÜFENACHT, H. SAGER, N. MÜLLER, V. SCHAERER, A. HEIER, M. M. WELLE, P. J. ROOSJE

Ocular signs, diagnosis and long-term treatment with allopurinol in a cat with leishmaniasis



M. Richter¹, D. Schaarschmidt-Kiener², C. Krudewig³

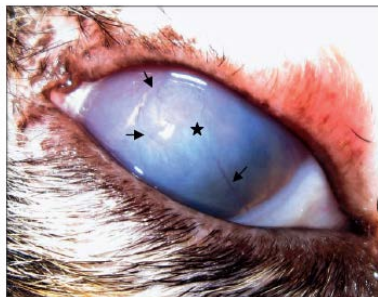


Figure 2: Stromal keratitis with vasculisation (arrows) and dense whitish infiltrates (asterisk) in the right eye.

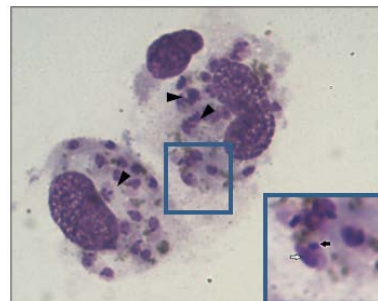
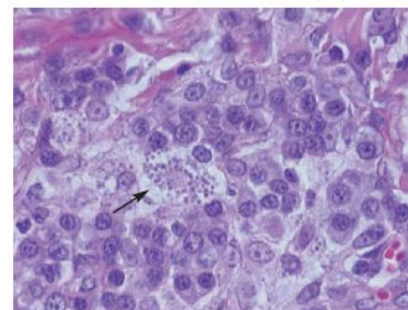


Figure 4: Smear of the cornea of the right eye (DiffQuick®, original magnification x 1000): Two macrophages with nu-



- 1- Gato de rua espanhol adotado na Suíça
- 2- Gato com deslocções frequentes entre Espanha e Suíça



Gato de rua espanhol adotado na Suíça

Proposta de algoritmo de abordagem e gestão da infecção por *Leishmania* e leishmaniose felina em países não endêmicos

Acta Tropica 237 (2023) 106710

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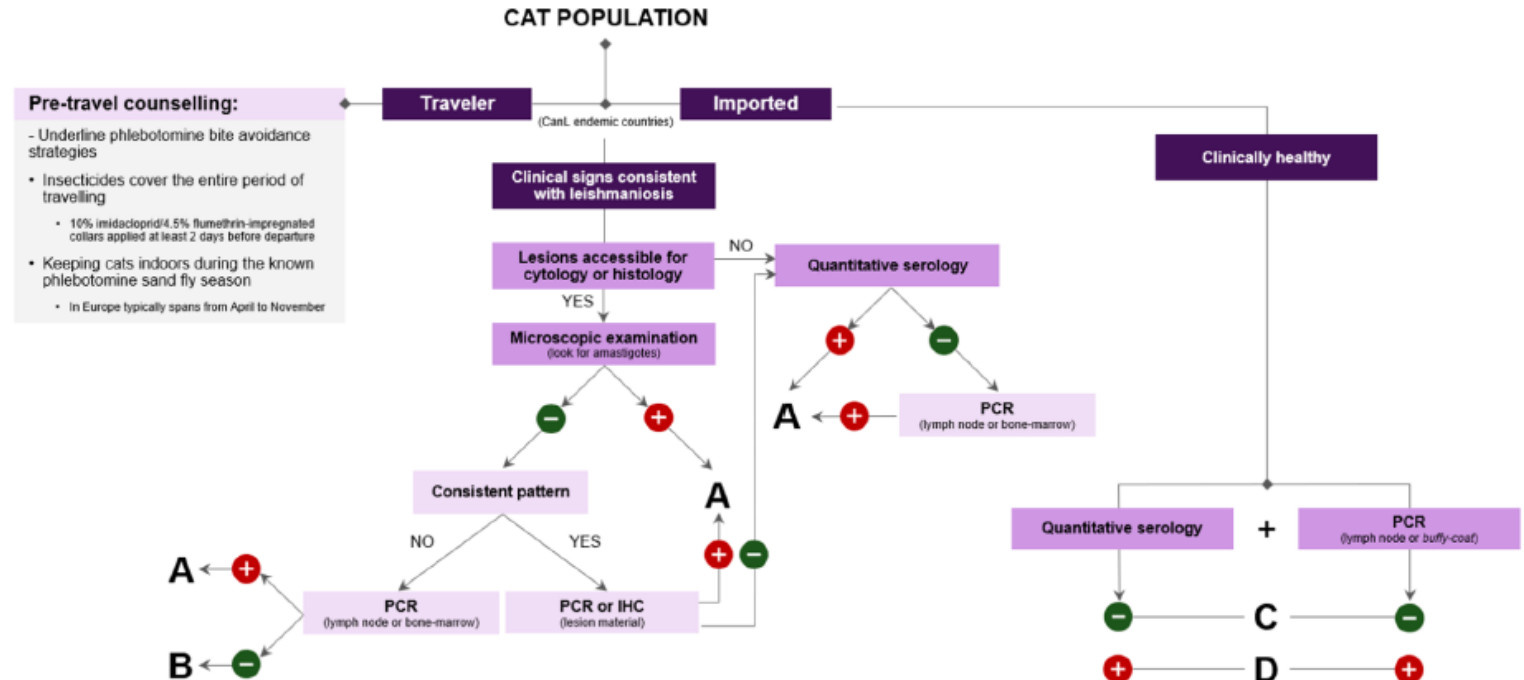
Acta Tropica

journal homepage: www.elsevier.com/locate/actatropica



A global perspective on non-autochthonous canine and feline *Leishmania* infection and leishmaniosis in the 21st century

Rafael Rocha^a, André Pereira^{b,c}, Carla Maia^{a,*}



Legend:	Notes:
CanL Canine leishmaniosis	Clinical measures
PCR Polymerase chain reaction	Infected cats
IHC Immunohistochemistry	• Suggest use of 10% imidacloprid/4.5% flumethrin-impregnated collars to avoid introduction of <i>Leishmania</i> parasites in non-endemic area where suitable vector may be present
A Infected - clinical FeL	• Avoid breeding with
B Investigate other differential diagnosis	• Avoid blood transfusion
C Not infected	• Monitoring of disease progression
D Infected - subclinical FeL	Cats with clinical FeL
E Exposed	• Start therapy (still empirically based; off label drugs)
F Transient/recent infection	

Conclusões-LCan

- ✓ Endêmica países Sul da Europa
- ✓ **Aumento** casos em **países não endêmicos** (casos importados, autóctones)
- ✓ Risco de aparecimento de novos focos associados à expansão geográfica dos vetores
- ✓ **Estadiamento clínico: terapêutica** adequada e previsão de **prognóstico**
- ✓ **Terapêutica não** conduz à **cura parasitológica**, apenas à cura clínica
- ✓ **Vacinação não previne a infecção**, apenas diminui o desenvolvimento de doença
- ✓ **Cães vacinados e infetados são infecciosos** para os **vetores**
- ✓ Necessidade de desenvolvimento de técnicas serológicas que permitam DIVA
- ✓ **Aplicação de inseticidas** à base de **piretróides essencial** em cães:
 - Não infetados, infetados, tratados, vacinados que **vivam** em **regiões endêmicas**
 - Que se **desloquem** a **regiões endêmicas**

Conclusões-LFel

- ✓ Estudos de prevalência de infecção por *L. infantum* em **gatos de países endêmicos do Sul da Europa**
 - ⇒ **frequentemente expostos** ao parasita
- ✓ **Aumento** de casos de **LFel** em países endêmicos:
 - **Maior sensibilidade dos clínicos** na inclusão da leishmaniose nos DD de patologias felinas
 - **Maior acessibilidade a técnicas de diagnóstico**
- ✓ Diagnóstico clínico e laboratorial da LFel semelhante à LCan
- ✓ Terapêutica “off-label”, mesmos fármacos utilizados no tratamento da LCan
- ✓ Inexistência de vacina
- ✓ **Aplicação de inseticidas** à base de **flumetrina** durante a **época flebotomínica**:
 - **Gatos que vivam em regiões endêmicas** (++ acesso ao exterior)
 - Gatos que se **desloquem a regiões endêmicas**

Muito obrigada pela vossa atenção

