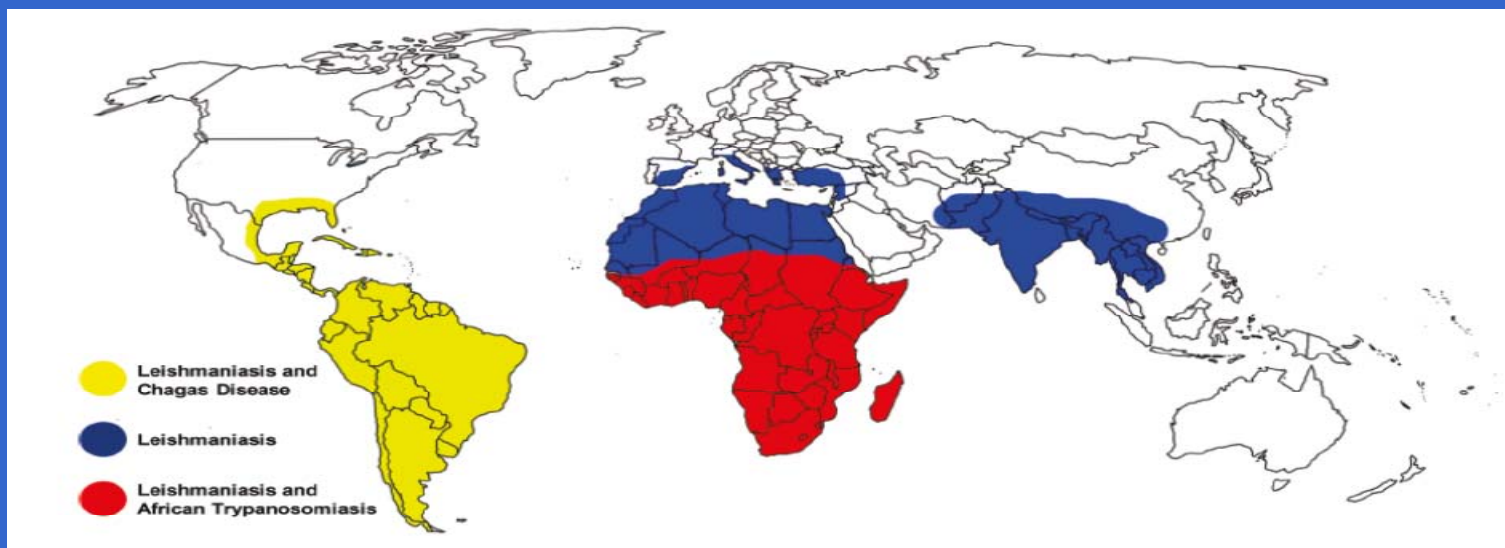




# The neglected protozoan infections of tropical region: an update

Kallesh Danappa Jayappa, Ph.D student  
Infectious minds presentation  
13<sup>th</sup> Oct 2011

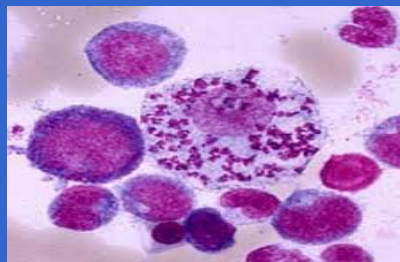
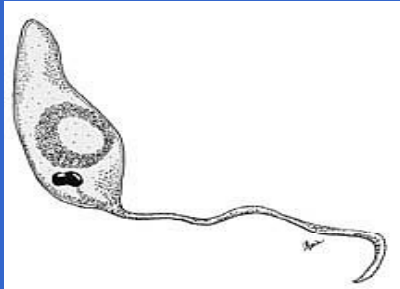
# The neglected protozoan infections



disease	global prevalence	population at risk	regions of highest prevalence	deaths	clinical manifestations and associated disabilities	primary drugs	weakness of current drugs
Chagas disease	8–9 million	25 million	Latin America and Caribbean	14 000	cardiomyopathy, megacolon, megaesophagus	Nifurtimox (4), benznidazole (5)	poor efficacy and toxicity
human African trypanosomiasis	300 000	60 million	sub-Saharan Africa	48 000	sleeping sickness	Suramin (32), pentamidine (33), melarsoprol (34), eflornithine (35)	drug toxicity and drug resistance
leishmaniasis	12 million	350 million	India, South Asia, sub-Saharan Africa, Latin America, Caribbean, and Mediterranean area	51 000	cutaneous and mucocutaneous disease, kala-azar	Antimonials (39, 40), amphotericin B (41), pentamidine (33), miltefosine (42), paromomycin (43)	drug toxicity and drug resistance

(Cavalli *et al.*, 2009)

# Leishmaniasis



(Leishmania sp)



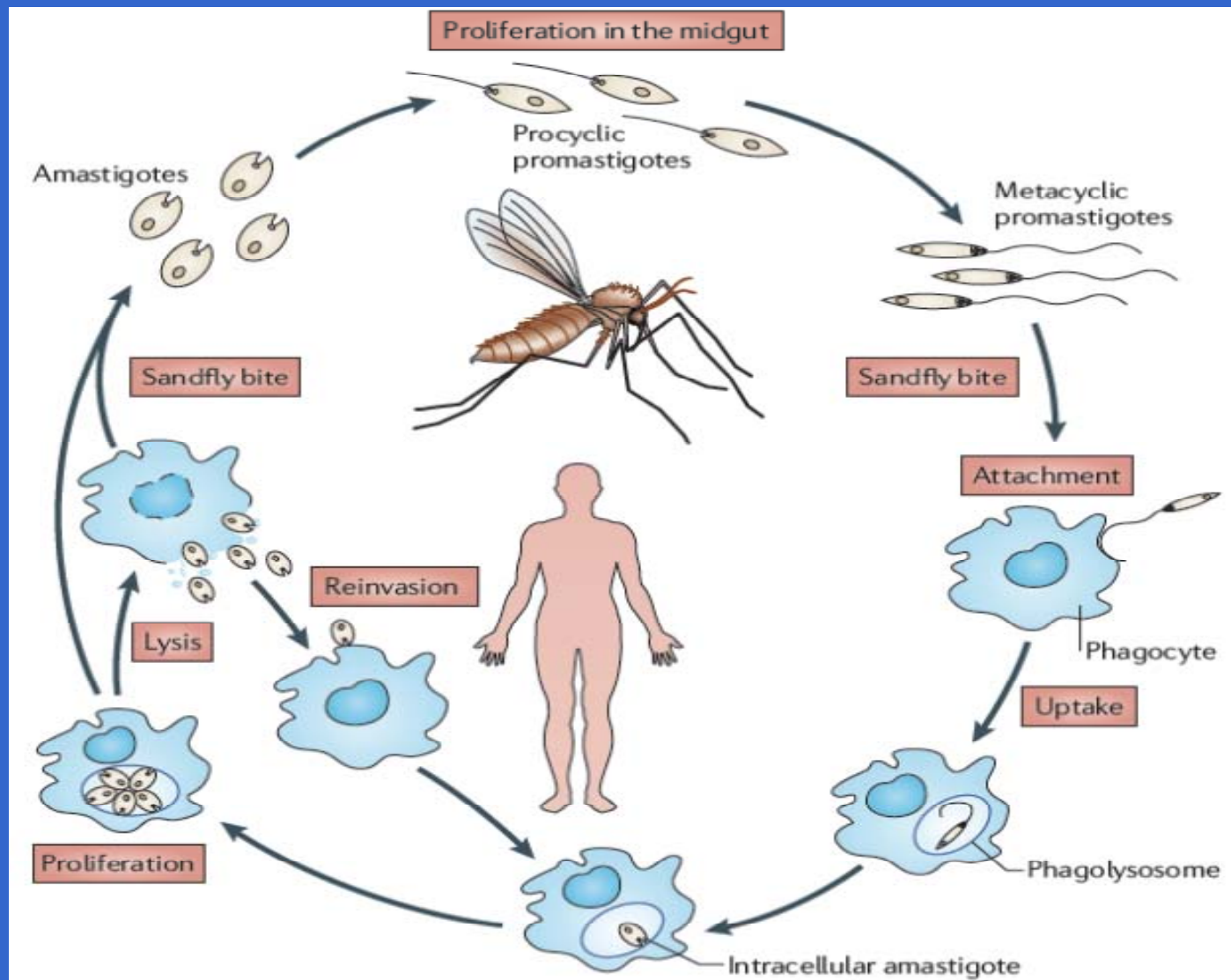
(Plebotomus flies)

Clinical presentation	Pathogen	Region
Visceral leishmaniasis (kala-azar or dumdum fever)	<i>L.d. donovani</i>	China, India, Iran, Sudan, Kenya, Ethiopia
	<i>L.d. infantum</i>	Mediterranean countries
	<i>L.d. chagasi</i>	Brazil, Columbia, Venezuela, Argentina
Cutaneous leishmaniasis (oriental sore or tropical sore, uta ulcer or chiclero ulcer or Aleppo boil)	<i>L. tropica</i>	Mediterranean countries, Afghanistan
	<i>L. major</i>	Middle East, Western and Northern Africa, Kenya
	<i>L. aethiopica</i>	Ethiopia
	<i>L. mexicana</i>	Central America, Amazon regions
Mucocutaneous leishmaniasis (espundia)	<i>L.-braziliensis complex</i>	Brazil, Peru, Ecuador, Columbia, Venezuela



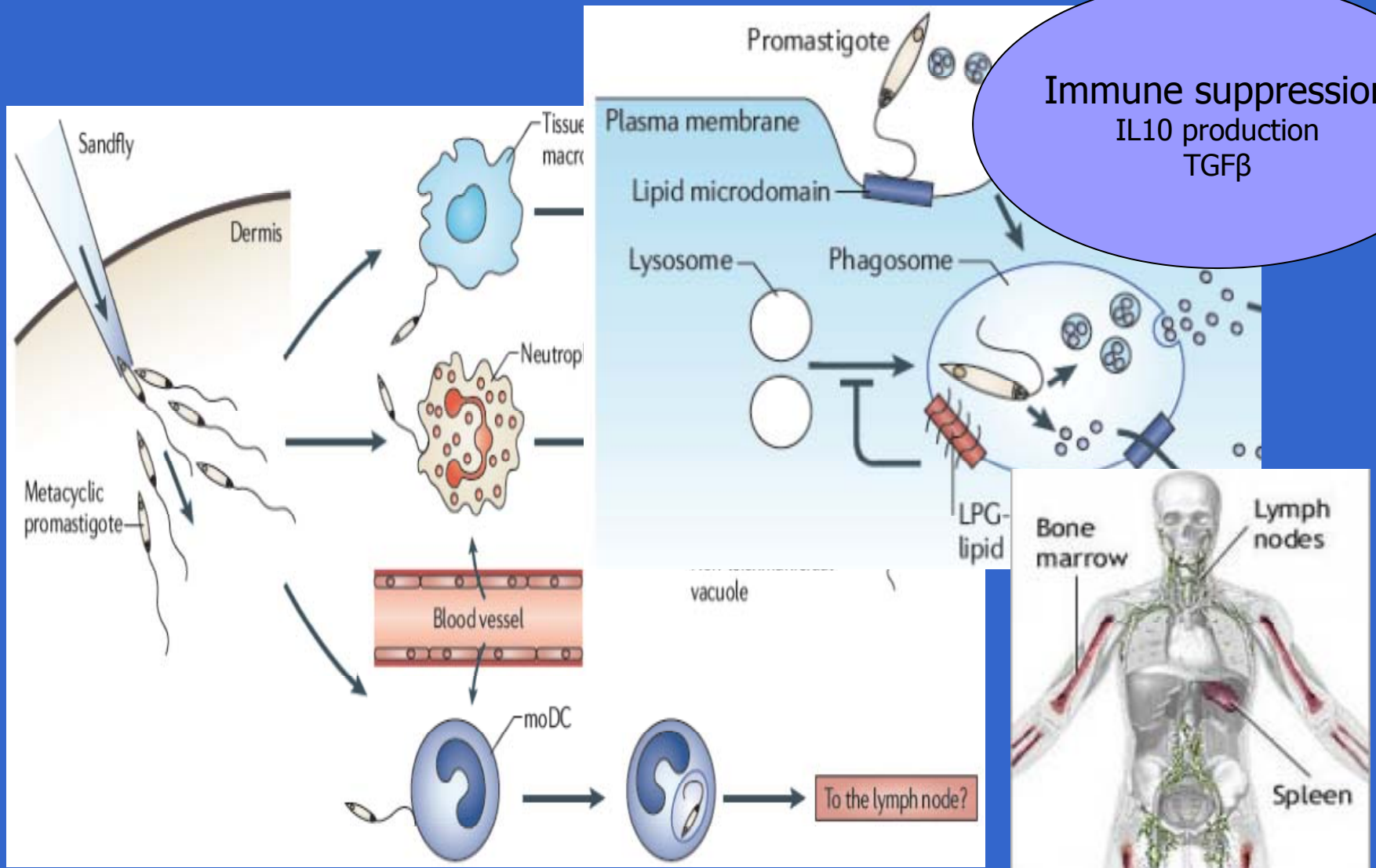
(Google images/Neuber,2008)

# Leishmania life cycle



(Kaye *et al.*, 2011)

# Leishmaniasis pathogenesis



(Kaye *et al.*, 2011)

# Post kala azar dermal leishmaniasis (PKADL)



(Ganguly *et al.*, 2010)



(Zijlstra *et al.*, 2003)

- Post visceral leishmaniasis complication
- Mostly seen in India and Sudan
- India- generally seen after 2-3 years of VL
- Sudan- onset is much quicker (avr 6 months)
- Serve as a potential source for infection
- No standard markers for PKDL prediction

# Leishmania diagnosis



Skin smear



Bone marrow aspiration

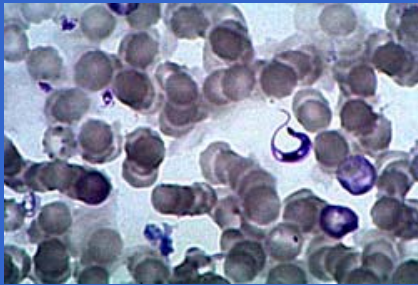
- CL: Skin smear and tissue explant biopsy examination
- VL: Bone marrow punch biopsy examination and serological tests (ELISA, IFT)

## Treatment and prevention

- VL: Pentavalent antimonials, Miltefosine and Paramomycin
- CL: Paramomycin ointment
- Sand fly control, mosquito nets, insecticide treatment of dogs
- No effective vaccine available

(Google images)

# American trypanosomiasis (chagas disease)



(*Trypanosoma cruzi*)



(*Triatoma spp*)



(*Rhodnius prolixus*)

## Acute phase



(Chagoma)

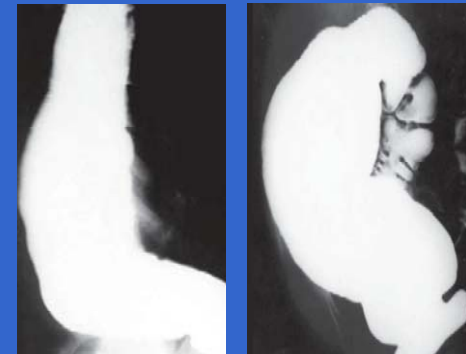


(Romana)

## Chronic phase



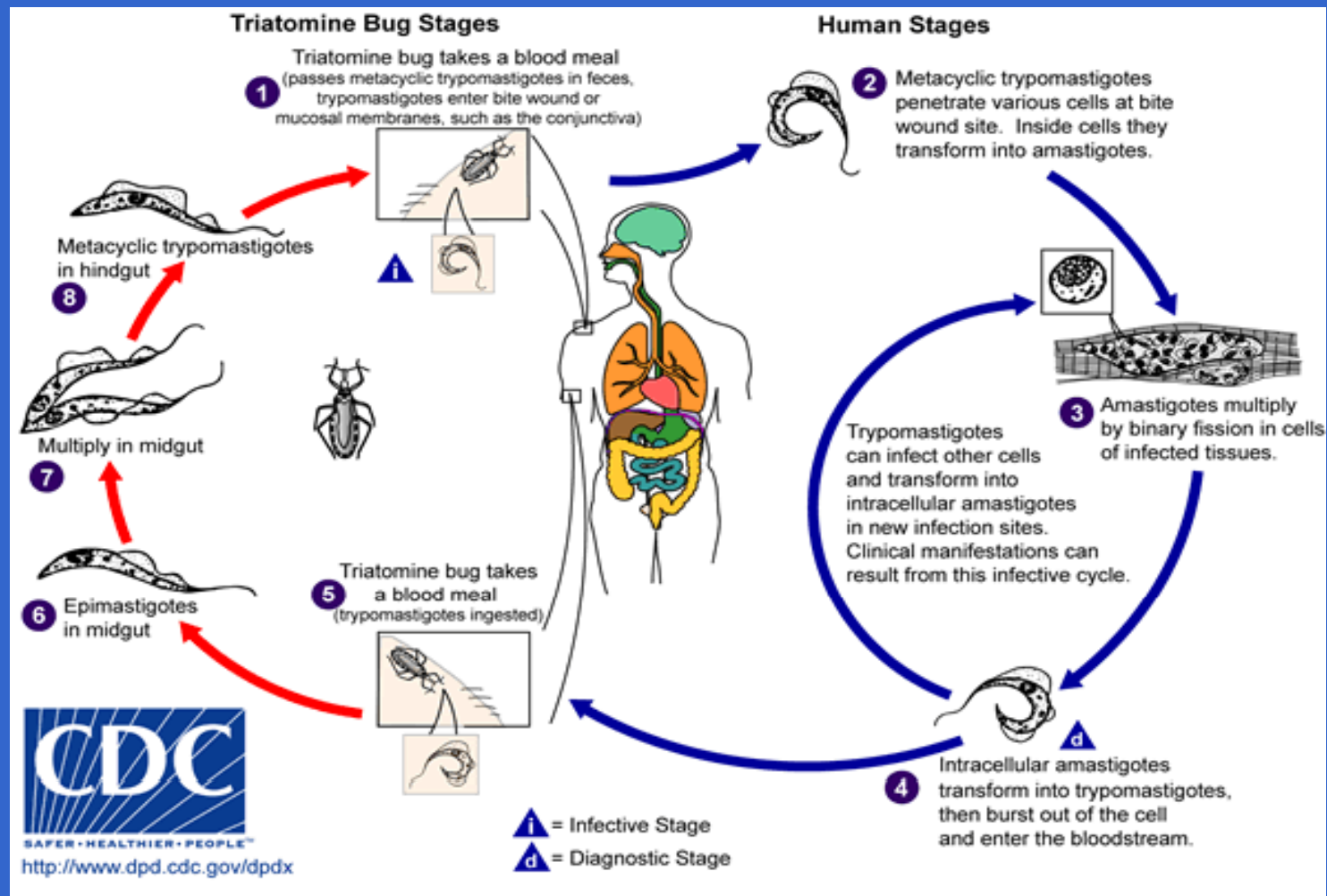
(Cardiomegaly)



(Megaesophagus/colon)

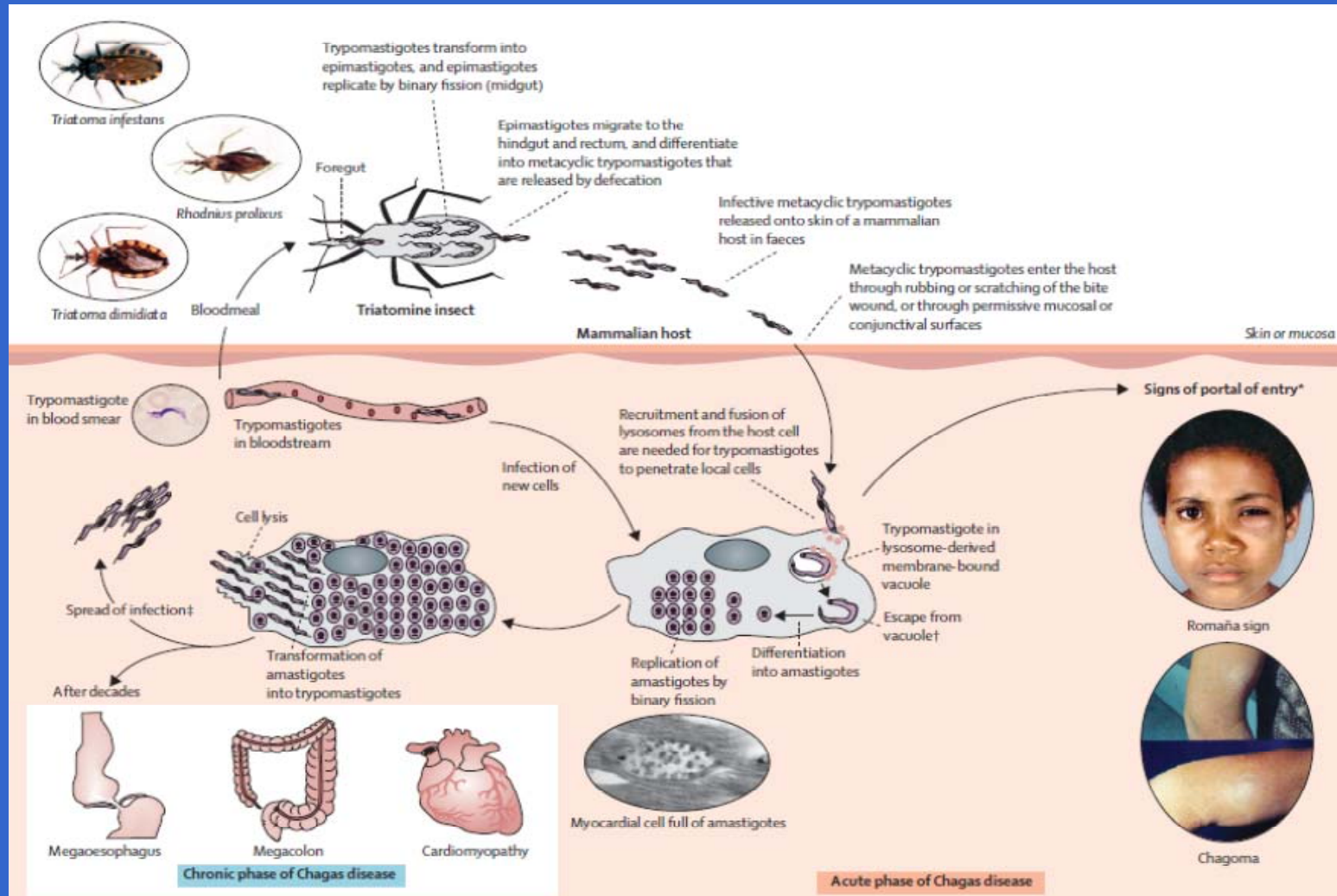


# Life cycle of *Trypanosoma cruzi*



(Google images)

# Chagas disease pathogenesis



(Rassi *et al.*, 2010)

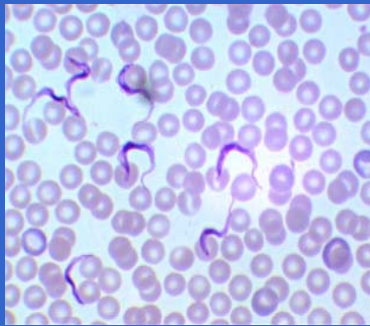
## Diagnosis

- **Acute phase:** blood smear, buffy coat and serum precipitate examination
- **Congenital infections:** Cord blood examination, IgG serodiagnosis
- **Chronic phase:** Serodiagnosis, PCR and clinical examination

## Treatment and prevention

- Anti-trypanosomal treatment is recommended for all forms of infection
- Benznidazole and nifurtimox are every effective against T cruzi
- Prevention: vector control and elimination of non-vector mediated spread

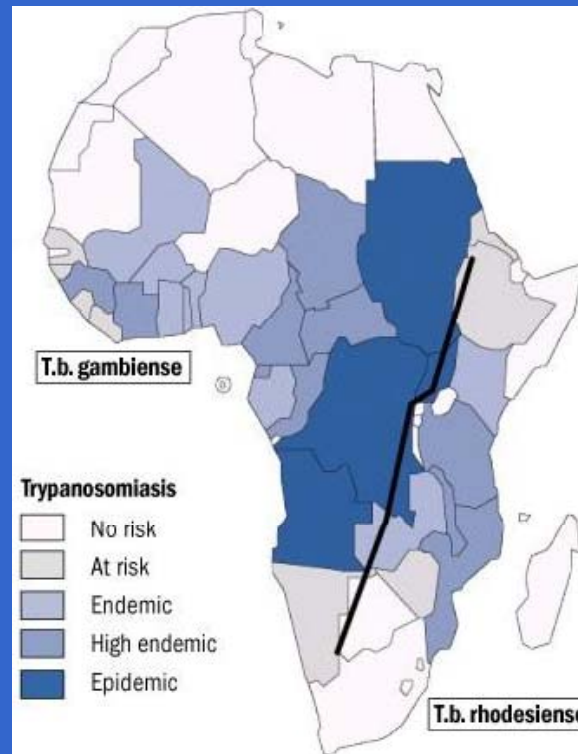
# African trypanosomiasis (sleeping sickness)



T brucei



Tsetse fly



## Haemolymphatic phase



Chancre



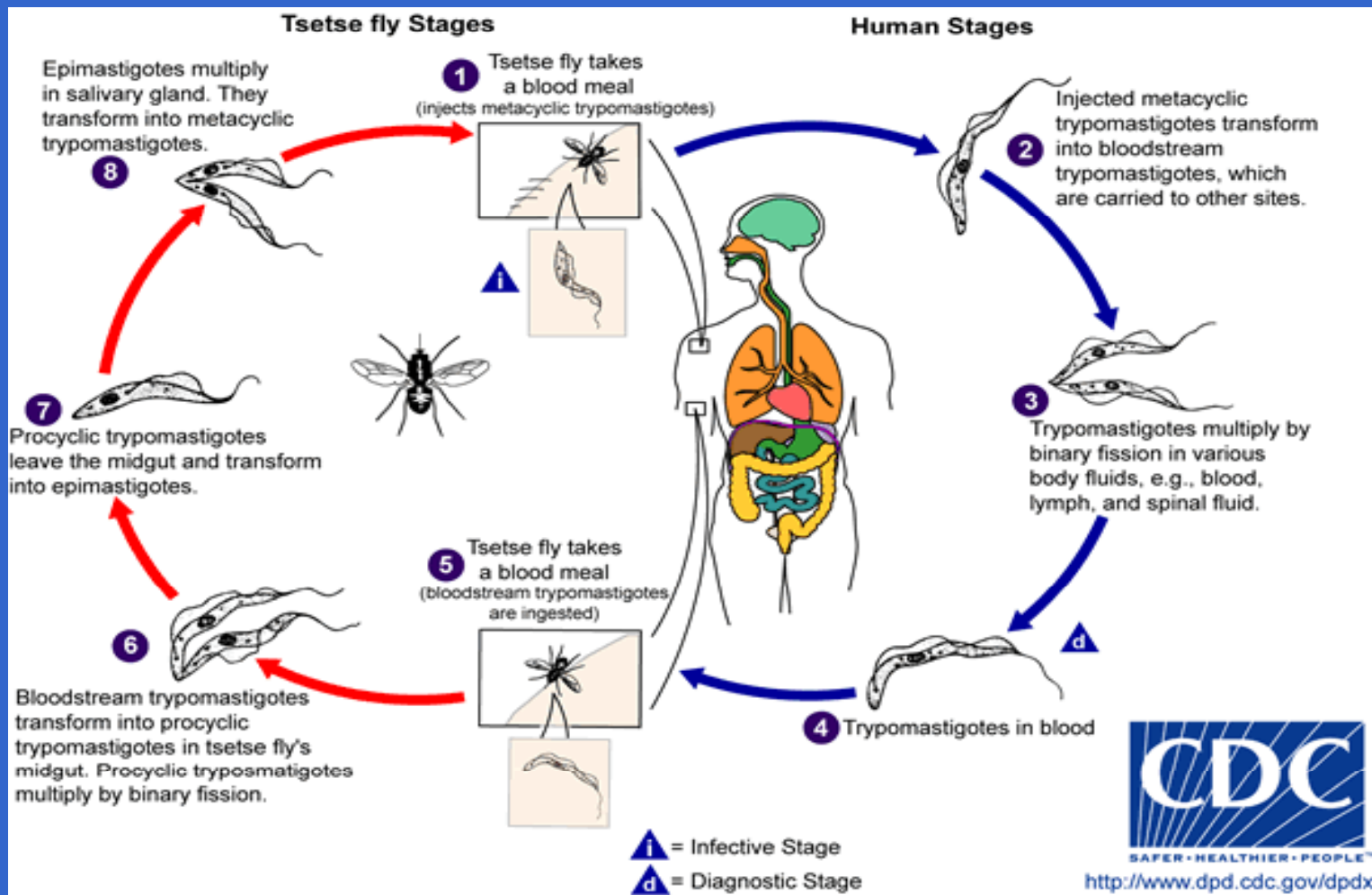
Winterbottom's sign

## Neurological phase



(Google images)

# Life cycle of *Trypanosoma brucei*

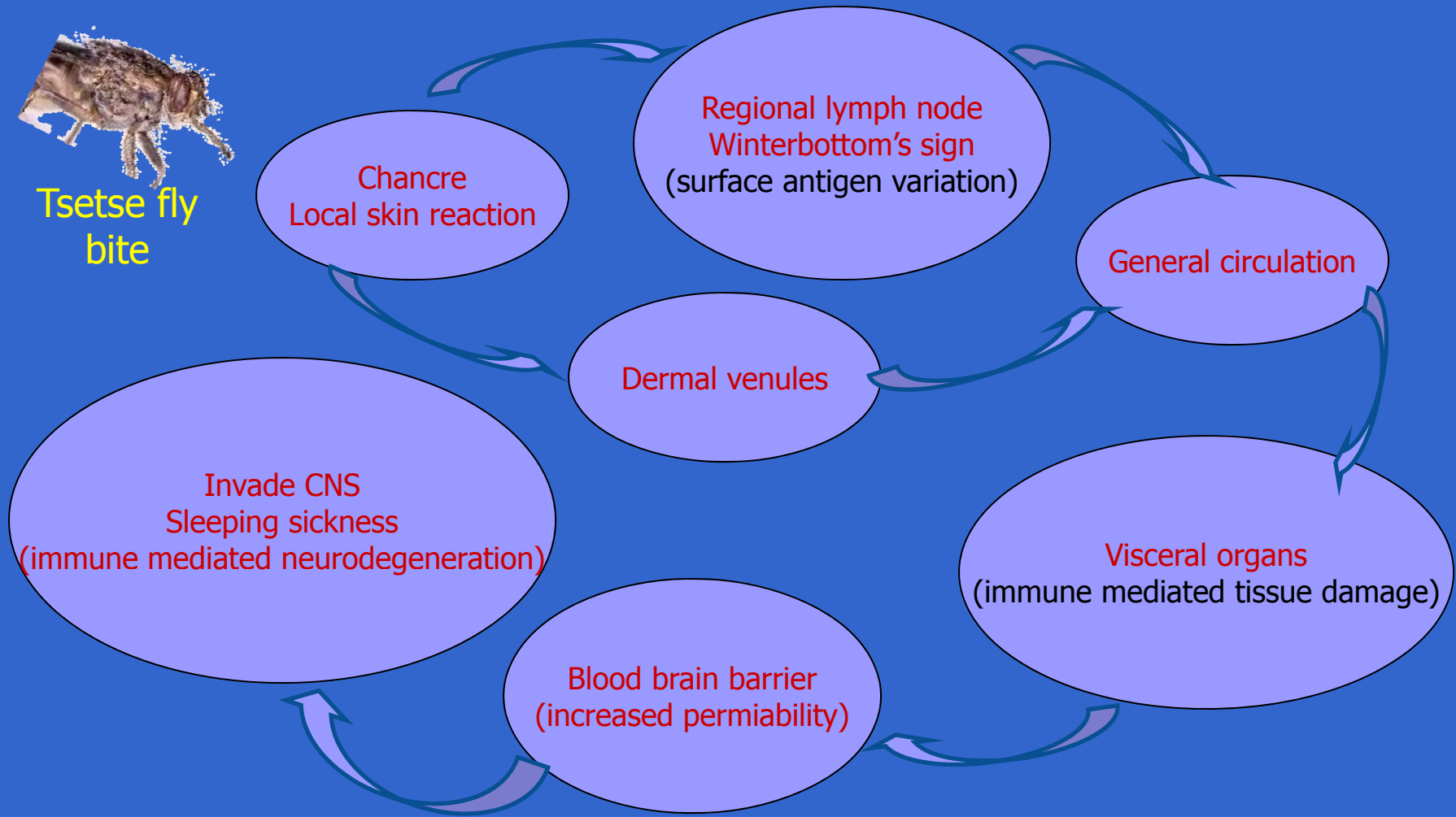


(Google images)

# Sleeping sickness pathogenesis



Tsetse fly bite



## Diagnosis

- Card Agglutination Test for Trypanosomiasis (CATT) for antibody
- Card Indirect Agglutination Test (CIATT) tests for antigens
- Microscopic examination of blood smear, lymph node aspiration
- Examination of CSF for white blood count and trypanosoma organism

## Treatment and prevention

- **Haemolymphatic phase:** treated with Pentamidine and Suramin
- **Neuronal phase:** treated by Melarsoprol, eflornithine and nifurtimox/  
eflornithine combination
- **WHO:** programme for surveillance and control of african trypanosomiasis
- **Tsetse fly control:** poisoning and draining water bodies

## HIV and protozoal parasite co-infection

- HIV co-infection: disease incidence, prevalence and pathogenesis
- HIV/leishmania co-infection: altered visceral leishmaniasis prevalence
- HIV/leishmania co-infection: influences disease transmission
- HAART: reduced new infections but fail to eliminate relapses
- The HIV and leishmania infections are mutually beneficial
- Altered disease pathogenesis: T cruzi/HIV co-infection



## Summary

- Leishmania and trypanosoma: endemic in developing and under developing countries, affecting large population size
- Leishmania infection: transmitted by phlebotomus flies, exhibits cutaneous, visceral and muco-cutaneous forms
- Post kala azar dermal leishmaniasis: not fatal but involves serious public health concern
- Chagas disease: transmitted by bug, characterized by acute self-limiting infection and a chronic infection affecting heart and digestive organs
- Sleeping sickness: transmitted by tse-tse fly, infection involves haemolymphatic and neuronal phases
- HIV-1 co-infection: seen in both endemic and non-endemic countries, leads to altered disease pattern, proves fatal if not managed well

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Thank You!

