

# **Leishmaniasis**

Otherwise healthy 64 year-old male presents to Pittsburgh physicians with a skin lesion...

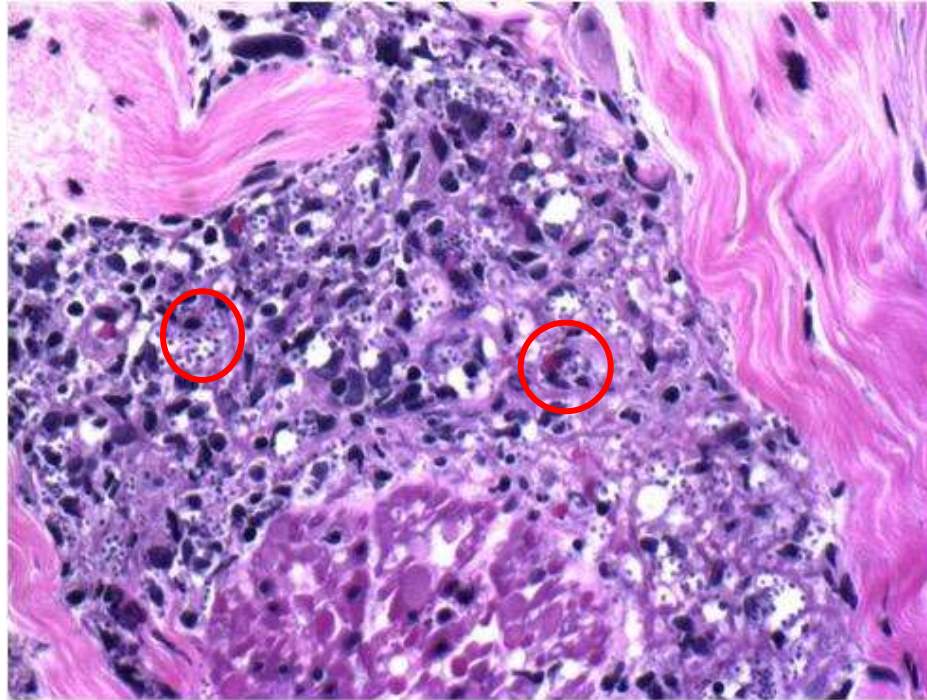


- PMH/PSH: negative
- No allergies
- No medications at home
- ROS: otherwise negative
- Exam:
  - Afebrile; vitals stable
  - Unremarkable and appropriate for his age
- Laboratories unremarkable

**Further Questions?**

- Retired audiometrist...owns 4 centers
- Has a sailboat in Florida
- Regularly sails to Central America and the Caribbean with his wife
- The last trip (within 2 months) included Belize and Guatemala
  - Usually sails inland in Guatemala, where he docks
- Does follow traveler immunization and precautions
- Does remember insect bites

**What to do next?**



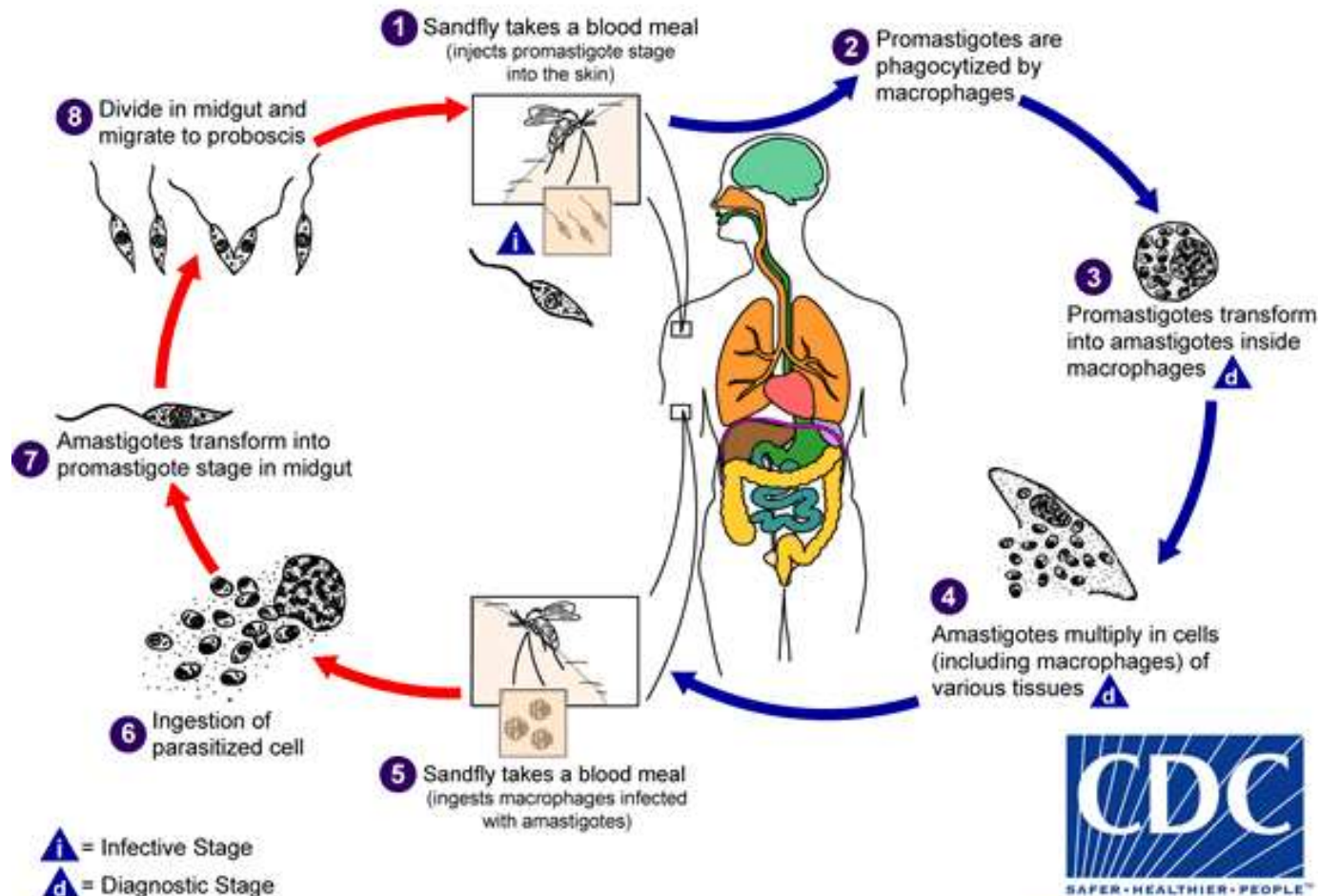
3-4 micrometer organisms inside and outside of macrophages  
Cultures grew *Leishmania mexicana*

# Leishmaniasis Background

- Disease caused by the protozoan parasite of the **genus Leishmania**
- Spread by the bite of **sandflies**
- Can present in three main ways: **cutaneous, mucocutaneous, or visceral**
  - *Cutaneous* - skin ulcers
  - *Mucocutaneous* - ulcers of skin, mouth, and nose
  - *Visceral* - skin ulcers that progress to fever, hepatosplenomegaly, and anemia

## Sandfly Stages

## Human Stages



# Cutaneous Leishmaniasis

- Most common form of leishmaniasis
- **L. major and L. tropica**
- **Geographical distribution:** Afghanistan, Algeria, Brazil, Colombia, Iran, Pakistan, Peru, Saudi Arabia, and Syria
- Begins as erythematous papule at site of sandfly bite
- Papule increases in size and becomes a nodule which eventually ulcerates and crusts over
- Can become disseminated in immunocompromised patients
- Other severe types include **leishmaniasis recidivans** and **post-kalazar dermal leishmaniasis**





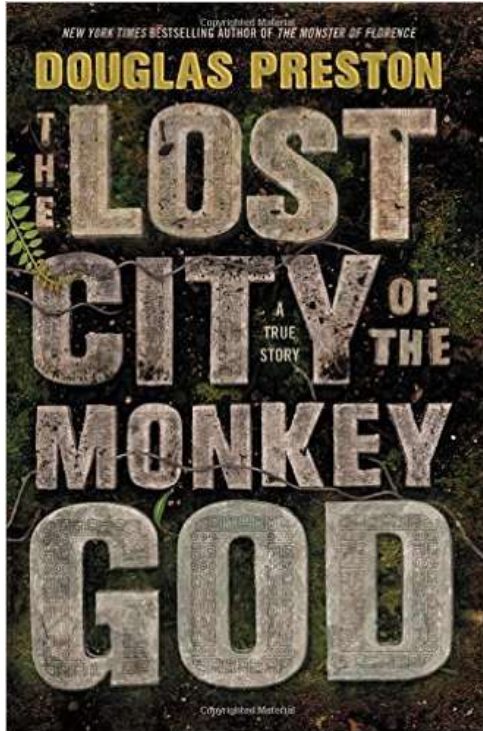
# Mucocutaneous Leishmaniasis

## *Viannia* subgenus

- South America, ninety percent of the cases occur in Brazil, Bolivia, and Peru.
- Initial symptoms are similar to that of cutaneous leishmaniasis
- Single or multiple lesions and ulcers develop at the mucosal regions (nose, mouth, throat cavities) and in the adjacent tissue
- Extensive disfiguring of the nasal septum, lips, and palate (does not include the bones)

“The parasite migrates to the mucous membranes of your mouth and your nose and basically eats them away. Your nose falls off, your lips fall off, and eventually your face becomes a gigantic, open sore.”

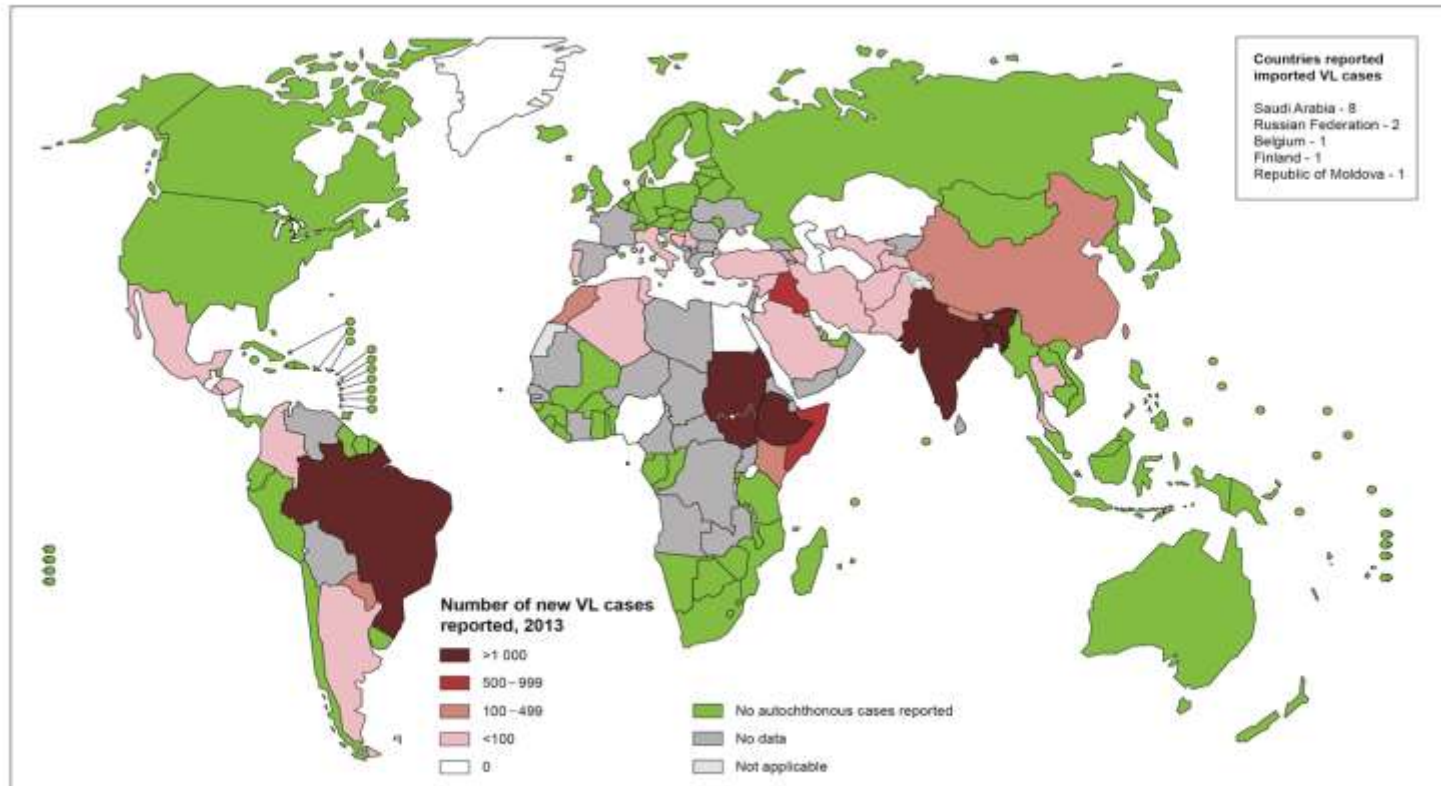
-- Doug Preston, an author who documented the trip



# Visceral Leishmaniasis

- Most lethal form of leishmaniasis - second largest parasitic killer in the world
- Also known as kala-azar
- **L. donovani and L. infantum**
- **Geographical distribution:** Brazil, Ethiopia, India, Somalia, South Sudan, and Sudan
- Presentation includes **hepatosplenomegaly, irregular fevers, anemia, pancytopenia**, weight loss, and weakness that occurs progressively over a period of weeks or months.
- Almost all clinically symptomatic patients **die within months if untreated.**

## Status of endemicity of visceral leishmaniasis, worldwide, 2013



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Data Source: World Health Organization  
Map Production: Control of Neglected  
Tropical Diseases (NTD)  
World Health Organization





# Why is visceral leishmaniasis a public health problem?

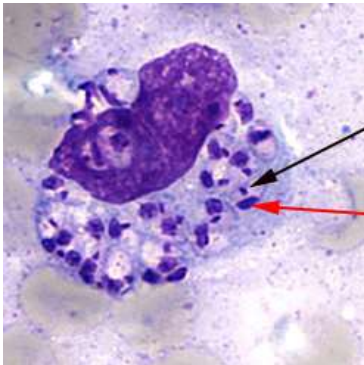
Neglected tropical disease

- 98 countries throughout the world
- Estimated 200,000 to 400,000 new cases of VL are diagnosed each year
- Yearly mortality rate of 20,000 to 30,000 individuals
- In Latin America, 90% of cases occur in Brazil and without timely treatment, fatality occurs in over 95% of cases.
  - Children are at a greater risk than adults in endemic areas
- Caused by rapid urbanization, poor sanitation and housing facilities.

# Diagnostic Methods

Diagnosed by detecting *Leishmania* parasites (or DNA) in tissue specimens (bone marrow, spleen, blood, lymph nodes - visceral, skin lesion - cutaneous)

- Rapid test
- Light-microscopic examination of stained slides
- Culture techniques
- Molecular methods (PCR)



Light  
microscopic  
examination



Traditional  
culture with  
parasite

# Treatments

- Sodium stibogluconate (Pentostam)
- **Amphotericin B liposomal** (AmBiosome)
- Miltefosine
- Glucantime (drug of choice in dogs)

No vaccine available



# High Risk Groups

## HIV

- Concomitant HIV infection increases the risk of developing active VL by between **100 and 2320x**
- VL/HIV coinfection are mutually reinforcing: **HIV infected people are particularly vulnerable to VL while VL accelerates HIV replication and progression to AIDS**
- Co-infected patients will die unless they are given ART treatment.
- Co-infected patients can serve as **human reservoirs**

## Pediatrics

- Brazil has seen an average of 3,600 new cases of VL, **48.9% were children** younger than 10 years
- Infants have higher levels of these inflammatory cytokines than adults, IL-6
- One of main factors associated with death from VL is young age



# Summer Research

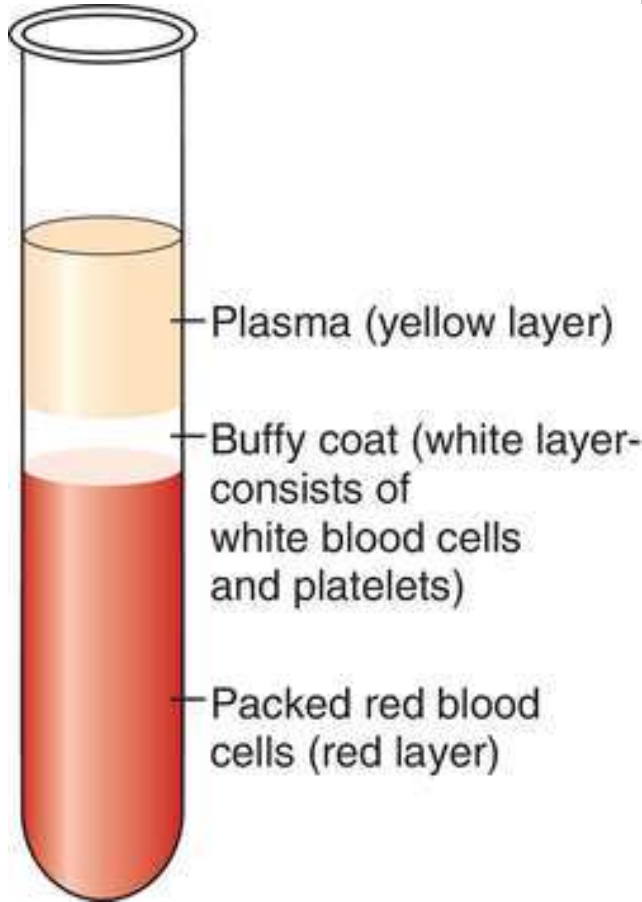








# Leukoconcentration and Xenodiagnosis







## Pediatric Case Series

- Analyzed medical records of 10 children between 4 months and 11 years who died from VL

### RESULTS:

- 80% under 2 years of age
- Average symptom duration prior to hospitalization 30.5 days
- Average fever of 20.3 days prior to hospitalization
- TX of choice: Amphotericin B liposomal (3 days average) 80%
- Causes of death: secondary infection 40%, hemorrhage 30%, sepsis and shock 30%, pancreatitis 10%
- 70% experienced lack of hospital resources

# Visceral Leishmaniasis in Canines

- Infected dogs are primary reservoir for zoonotic visceral leishmaniasis in endemic regions
- Dogs are one of the most significant risk factors for predisposing humans to infection
- Wide range of clinical presentation - asymptomatic to fatal visceralizing disease
- Endemic regions - transmission vector-borne via sand fly
- US - vertical transmission in US dogs without a travel history to an endemic region

Thank you!