

INTERNATIONAL SCHOOL OF MEDICINE

#### **Department of Infectious Diseases**

# Leishmaniasis

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## Leishmaniasis

#### Leishmaniasis is a zoonosis.

Transmitted among mammalian hosts by female **sand flies**.

## Leishmaniasis

**Species Pathogenic in Humans** 

Leishmania donovani (complex) (VL) Leishmania tropica (CL) Leishmania major (CL) Leishmania aethiopica (CL) Leishmania mexicana (Complex) (CL) Leishmania brazilliensis (complex) (MCL)

### **Three important Species**

#### Leishmania donovani (VL)

VISCERAL LEISHMANIASIS : involving endothelial tissue liver, spleen, and bone marrow.

#### Leishmania tropica (CL)

**OLD WORLD CUTANEOUS LEISHMANIASIS :** involving epithelial cells the skin at the site of a sand fly bite.

#### Leishmania brazilliensis (MCL)

NEW WORLD MUCO CUTANEOUS LEISHMANIASIS: involving mucous membranes of the mouth and nose after spread from a nearby cutaneous lesion.

#### **Geographical distribution of leishmaniasis**



- Currently, leishmaniasis occurs in 4 continents and is considered to be endemic in 88 countries, 72 of which are developing countries:
  - 90% of all VL: Bangladesh, Brazil, India, Nepal and Sudan
  - 90% of all MCL: Bolivia, Brazil and Peru
  - 90% of all CL : Afghanistan, Brazil, Iran, Peru, Saudi Arabia and Syria
- Annual incidence: 1-1.5 million cases of CL
  - : 500,000 cases of VL
- Prevalence: 12 million people
- Population at risk: 350 million

(WHO, 2010)

## SITUATION IN INDIA



- 40-50% of global burden (Bora 1999, Natl Med J India) 48 districts affected
- Surveillance being done by NVBDCP
- INDIA: 13869 cases and 20 deaths by VL (2013)
- Endemic states in Eastern India: Bihar, Jharkhand, West Bengal, Uttar Pradesh
- Estimated 165.4 million population at risk in 4 states

#### Life Cycle of leishmaniasis Promastigote Amasitgote Transformation





## **Promastigote stage**

Promastigote stage inside the Sandfly

## Sand fly : Vectors Intermediateflagellahost, transmitted disease

Promastigotes in rosettes in a culture of an orient sore on N.N.N. medium (Giemsa stain).

## Leishmania sp.

## amastigote stage

**Ovoid small intracellular parasites in a bone marrow** aspirate. The typical rod shaped kinetoplast is seen besides the nucleus.(Giemsa stain).

20 µm

# Life cycle





**Digenetic** Life Cycle



**Promastiogte stage** \_inside the Insect \_Motile form \_infectious stage





#### **Transmission of Leishmaniasis**

\_ by sand flies.

\_ artificial transmission of leishmania via the sharing of **contaminated syringes** and needles, from one intravenous drug user to another.

- Rarely, Leishmaniasis is spread from a pregnant woman to her baby (Materno-fetal transplacental transmission).
- Blood transfusion or contaminated needles also can spread Leishmaniasis.





#### **Cutaneous Leishmaniasis**

**Cutaneous** forms of the disease normally produce skin ulcers on the exposed parts of the body such as the face, arms and legs. The disease can produce a large number of lesions





## A cutaneous leishmaniasis lesion on



Some people have swollen lymph glands near the sores. For example, the glands under the arm can swell if the sores are on the arm or hand.



The skin sores will heal by themselves, but this can take months or years. The sores can leave ugly scars.

## **Cutaneous Leishmaniasis**









## The Baghdad boil Baghdad-boil, 2004

# Several hundred US soldiers in Iraq.

## Leishmania tropica.



- Causes ulceration of the skin called Cutaneous Leshmaniasis
  Dry or urban C.L.
- Dry sore that may persist for several months before healing, then person is immune
- Some people "vaccinate" their children against Leshmaniasis.
- Rarely can cause infections of the viscera

## Mucocutaneous Leishmaniasis Mucocutaneous leishmaniasis (Espundia)

*Leishmania braziliensis* & *L . maxicana* 



### **Mucocutaneous Leishmaniasis**

#### mucocutaneous forms of

leishmaniasis, lesions can lead to partial or total destruction of the mucosa membranes of the nose, mouth and throat cavities and surrounding tissues. Nasal stuffiness, runny nose, bleeding of nose, rectum &vagina. Ulcer & erosion of mouth, nose, rectum, lips, gums, vaginal







# **Visceral Leishmaniasis**

Visceral disease (Kala-azar)

#### Visceral disease (Kala-azar)

Most severe form of disease, the disease typically starts with irregular bouts of fever, chills, and general anemia





Since leishmaniasis is primarily a disease of the reticulo-endothelial system, replacement of infected cells produces hyperplasia and consequent enlargement of the visceral organs associated with the system (e.g., spleen and liver).

Hepatosplenomegaly

## Post Kala Azar Dermal Leishmanoid

- Normally develops <2 years after recovery
- Restricted to skin, rare but varies geographically
- Some people recover spontaneously
- Some people who were treated later develop Post-Kala- azar dermal leishmanoid

黑热病人照片



黑热病主要的临床表现为长期 不规则发热、肝脾肿大、全血贫血。 昭片中患者肝,脾肿大。

皮肤型黑热病人照片



我国常见的皮肤型黑热病为 结节型,皮肤结节多呈黄豆或 绿豆大,结节的皮肤发红,多见 于面部和颈部。





Dogs can act as reservoirs of *Leishmania* parasites.

They also exhibit symptoms of infection.

# Diagnosis

Diagnosing Leishmaniasis can be difficult Sometimes the Lab tests are negative even if a person has Leishmaniasis.





## **1. Clinical Diagnosis: signs & symptoms** Patient history (travel, vectors)

#### **2. Laboratory Diagnosis :**

## Laboratory Diagnosis of leishmaniasis :

#### **Cutaneous leishmaniasis :**

 Tissue sample (scraping, aspirate or punch biopsy) for smear and culture

#### Visceral leishmaniasis :

- Bone marrow biopsy or splenic aspirate for smear and culture.(N.N.N) V.L.(anemia , leukopenia , glubuline/albumine is high (Hypergammaglobulinia)
- Serology ( ELISA ) ( IFAT ).
- PCR
- Skin test
- Inoculate serum of infected person in lab. animals.

## Animal inoculation

#### Inoculate serum of infected person in lab. animals.

#### **Cutaneous and mucocutaneous treatment**

- Antimony components : Meglumine antimoniate (Glucantime) and Sodium stibogluconate (Pentostam) are drugs of choice.
  - 20 mg/kg/d IV or IM for 20d
- Pentamidine, Paromomycin are alternative drugs for CL
- Amphotricine B for antimony resistant MCL
- Fluconazole may decrease healing time

#### **Visceral leishmaniasis treatment**

- Pentostam or Glucantime 20 mg /kg/d IV or IM for 28d
- Amphotricin B: 0.5-1 mg/kg IV daily 15-20d
- Liposomal Amphotricin B (Ambisome): 3 mg/kg/d IV on days 1-5, day 14 and day 21
  - Low toxicity and high stability, better delivery
- Alternative: Pentamidine (4mg/kg three times weekly, between 5-25 weeks ), Parmomycine

#### Visceral leishmaniasis treatment (con.)

- Miltefosine (Impavido) (2.5 mg/kg/d p.o. for 28 d)
  - It was developed for cancer therapy at first
  - The only oral drug
  - safer and more tolerable drug (less toxicity for bone marrow and haematopoietic progenitor cells)
  - teratogenic





## Leishmaniasis control

- Vector control
  - insecticides
  - insecticide impregnated bed nets (IIB)
- Case finding treatment
- Aniaml reservoir control
  - Treatment or killing of seropositive dogs
  - Rodent killing



- Decrease of susceptibility: Childhood age, malnutrition and Immunosuppression are susceptibility factors for VL.
  - eliminating of childhood malnutrition
  - try to produce an efficient vaccine

