Lymphatic Filariasis

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Learning objectives

• Describe the etiology, pathogenesis, and some epidemiology of lymphatic filariasis
• Describe the clinical symptoms, differential diagnosis, and diagnostic tools for LF
• Treatment of LF, including individual treatment and Mass Drug Administration
• Meet Henry
Meet Henry
What is lymphatic filariasis?

- Infection caused by 3 different nematodes
  - Wuchereria bancrofti (90%) – Africa, SE Asia, India, Pacific Islands, some places in Latin America
  - Brugia malayi (9.9%) – China, India, Indonesia, SE Asia, Pacific Islands
  - Brugia timori (0.1%) – Timor island of Indonesia
Male and female adult *W. bancrofti* 2-10 cm
Vector-borne (multiple species mosquito)
**Mosquito Stages**

1. Mosquito takes a blood meal (L3 larvae enter skin)
2. L3 larvae
3. Migrate to head and mosquito's proboscis
4. L1 larvae
5. Microfilariae shed sheaths, penetrate mosquito's midgut, and migrate to thoracic muscles

**Human Stages**

1. Mosquito takes a blood meal (ingests microfilariae)
2. Adults in lymphatics
3. Adults produce sheathed microfilariae that migrate into lymph and blood channels
4. Mosquito takes a blood meal (L3 larvae enter skin)

**Infective Stage**

**Diagnostic Stage**

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*CDC*  
Safer, Healthier People  
http://www.fda.gov/cdrh
Epidemiology

- Estimated 120 million people infected
- 70-90% in SE Asia, 40% in India
- Low mortality but high MORBIDITY
- Most symptoms seen in early adulthood
- Gradual accumulation of worm burden
  - Repeatedly bitten by mosquitoes
- Most people affected live in endemic areas
Key
- *W. bancrofti*
- *B. malayi*
- *B. timori*
Pathogenesis

- Symptoms due to dead or dying worms
- Mostly immune response and resultant lymphatic inflammation (acute) and eventual obstruction (chronic)
- Some direct damage by adult worm itself
- Contain rickettsia-like Wolbachia bacteria that induce inflammation
Clinical symptoms

- Estimated 2/3 people “asymptommatic”
- Acute adenolymphangitis
  - Fever
  - Painful lymphadenopathy that spreads distally
  - Immune response to dying worms
  - Duration 4 – 7 days
  - Supportive treatment
  - Recurrent acute attacks → chronic symptoms
Acute lymphangitis
Tropical Pulmonary Eosinophilia

• Asthma like disease, hyperactive immune response to microfilariae in lungs
• More common on Indian subcontinent
• Cough, wheeze, dyspnea (worse at night)
• Marked eosinophilia and abnormal CXR
• Treated with DEC
Chronic Symptoms

- Lymphedema
  - Affects upper and lower extremities, breast, genitalia
  - Initially pitting edema $\rightarrow$ brawny edema $\rightarrow$ hyperpigmentation/hyperkeratosis (elephantiasis)
- Renal lymphatic obstruction - chyluria
- Secondary bacterial and fungal infections
Hydrocele
Chyuria
Differential Diagnosis

- Podoconiosis
- Bacterial lymphadenitis
- Tuberculous lymphadenitis
- Malignant obstruction of lymphatics
Diagnosis

- Eosinophilia
- Blood smears – nocturnal bloods (10p – 2a)
  - Whole blood thick stain to see microfilariae
  - Concentration technique through filter
- Serologic tests
  - Antibodies to filaria – not useful
  - Antigen test – Cards could be useful in field
- Ultrasound – “filarial dance sign”
Immunochromographic card
W. bancrofti
B. malayi
B. malayi
Treatment

- **DEC (diethylcarbamazine citrate)**
  - Kills microfilariae and “damages” adults
- **Ivermectin**
  - Kills microfilariae but not adult worms
- **Albendazole**
  - Affects adults but NOT microfilariae
- **Doxycycline** – remember Wolbachia?
Treatment (cont.)

- Combination drug therapy
  - DEC + Albendazole or Ivermectin
  - Doxycycline then DEC
  - Doxycycline then Ivermectin

- Surgery for hydrocoele and lymphedema

- Supportive treatment for extremity edema
  - Keep clean and moist, compression / massage
  - Treat secondary infections
Mass drug administration

- 1997 World Health Assembly calls for elimination of LF
- 2000 - Global Programme to Eliminate LF
- 83 Endemic countries
- Donations from drug companies for albendazole and ivermectin
- [www.filariasis.org](http://www.filariasis.org)
**Wuchereria bancrofti**

**Mosquito Stages**
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7. Adults in lymphatics
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**Human Stages**
- Infective Stage
- Diagnostic Stage

[CDC](http://www.dpd.cdc.gov/dpdx)
Mass drug administration

In regions endemic with onchocerciasis: Ivermectin and albendazole once yearly x 5 years

Rest of the world: DEC and albendazole once yearly x 5 years

Goal to eliminate by 2020