



# QUESTION BANK

• SEMESTER 3 •

MSK MODULE

— PARASITOLOGY —



# Lecture 1 - Parasites Affecting Skin and Muscles

## Part 1: MCQs (Choose the correct answer):

**1. A 25-year-old man returned from a holiday in a rural endemic area and presented with a painless ulcer with a raised border on his cheek. The lesion appeared several weeks after he had been bitten at night by small flying insects. Which of the following is the vector responsible for transmitting this infection?**

- A. Female Anopheles mosquito
- B. Female Chrysops
- C. Black fly (Simulium)
- D. Tsetse fly
- E. Female sandfly

**2. Leishmania species are haemoflagellate protozoa that inhabit the reticuloendothelial system. Inside which of the following cells are these parasites found?**

- A. Red blood cells
- B. Neutrophils
- C. Hepatocytes
- D. Endothelial cells
- E. Macrophages

**3. A 40-year-old farmer living in a rural desert area develops a chronic skin ulcer. Which of the following Old World species is responsible for the rural type of cutaneous leishmaniasis?**

- A. Leishmania tropica
- B. Leishmania donovani
- C. Leishmania braziliense
- D. Leishmania major
- E. Leishmania mexicana

**4. A 66-year-old man who lived for several years in South America presented with a nodular ulcerative lesion destroying the nasal septum. Histology of the biopsy revealed necrosis, chronic inflammation and intracellular amastigotes. Which of the following could be the causative organism?**

- A. Leishmania tropica complex
- B. Leishmania ethiopica
- C. Leishmania braziliense complex
- D. Leishmania major
- E. Leishmania donovani

**5. A 25-year-old traveller recently returned from an endemic area and presents with a painless ulcer on his forearm. A Giemsa-stained smear from the ulcer edge reveals amastigotes inside macrophages. Which of the following is the infective stage of this parasite in its life cycle?**

- A. Amastigote
- B. Trypomastigote
- C. Promastigote
- D. Epimastigote
- E. Microfilaria

**6. A skin scraping is taken from the edge of a chronic non-healing ulcer in a patient suspected of having cutaneous leishmaniasis. Which of the following stages is expected to be seen in the stained smear?**

- A. Promastigote form
- B. Amastigote form
- C. Filariform larva
- D. Microfilaria
- E. Trichina capsule

**7. Which of the following animals acts as the reservoir host of cutaneous leishmaniasis?**

- A. Pigs and rats
- B. Cattle and sheep
- C. Cats and birds
- D. Canines and rodents
- E. Horses and donkeys

**8. A 30-year-old woman returning from an endemic area has a skin lesion that began as a small papule and progressed to a nodular plaque and then to an ulcer. Which of the following best describes the lesion of cutaneous leishmaniasis?**

- A. A painful ulcer with an undermined edge from the onset
- B. A painless vesicular lesion that heals within a few days
- C. A painless ulcer with a raised border that may be covered with scales or crust
- D. A deep punched-out ulcer on the sole of the foot
- E. A rapidly spreading gangrenous ulcer with purple bullae

**9. A specimen taken from the edge of a suspected leishmanial ulcer is inoculated into culture. On which of the following media does the amastigote develop into an elongated flagellated promastigote?**

- A. Blood agar
- B. NNN media
- C. Sabouraud media
- D. Lowenstein-Jensen media
- E. MacConkey agar

**10. Which of the following is included in the prevention and control of cutaneous leishmaniasis?**

- A. Eradication of the reservoir host and control of the sandfly
- B. Proper cooking of pork meat
- C. Inspection of slaughter houses
- D. Chlorination of drinking water
- E. Regular deworming of cattle

**11. A 43-year-old man from Cameroon was referred to the Emergency Ophthalmology Department complaining of the presence of a worm moving across his eye. The complete blood cell count showed eosinophilia. If a blood film was done, which of the following could be detected?**

- A. Microfilaria
- B. Adult stage
- C. Trypomastigote
- D. Trophozoite
- E. Amastigote

**12. Which of the following is the vector of Loa loa?**

- A. Female sandfly
- B. Black fly (Simulium)
- C. Female Anopheles
- D. Female Chrysops
- E. Cyclops

**13. A 35-year-old man from West Africa complains of recurrent swellings up to 3 cm in size on his forearm. The swellings disappear after a few days and then reappear at another site. Which of the following is the name of these swellings?**

- A. Onchocercoma
- B. Calabar swellings
- C. Sowdah
- D. Trichina capsule
- E. Periorbital oedema

**14. A patient is suspected of having loiasis. At which of the following times should the blood specimen be collected in order to detect the diagnostic stage?**

- A. At midnight
- B. Immediately after a meal
- C. During the day
- D. Early before sunrise
- E. At any time after treatment

**15. Which of the following correctly matches the infective stage of Loa loa with its mode of infection?**

- A. Microfilaria - ingestion of contaminated food
- B. Promastigote - bite of an infected female sandfly
- C. Trichina capsule - ingestion of raw meat
- D. Adult worm - penetration of the intact skin
- E. Infective filariform larva - bite of an infected female Chrysops

**16. Which of the following is included in the control and prevention of Loa loa infection?**

- A. Destruction of rats
- B. Control of the Chrysops vector and treatment of patients
- C. Proper breeding of pigs
- D. Eradication of the canine reservoir host
- E. Control of the sandfly

**17. A 45-year-old man from a village beside a fast-flowing river in tropical Africa complains of intense itching and progressive loss of vision. Which of the following is the vector of the causative parasite?**

- A. Female sandfly
- B. Female Chrysops
- C. Reduviid bug
- D. Black fly (Simulium)
- E. Female Anopheles

**18. Examination of a patient with onchocerciasis reveals firm painless nodules over the iliac crest and the scapulae. Which of the following is the name given to these nodules?**

- A. Onchocercoma
- B. Calabar swelling
- C. Sowdah
- D. Involucrum
- E. Sequestrum

**19. A patient from Yemen presents with an immunologically hyperactive form of onchodermatitis in which the affected skin darkens as a result of intense inflammation. Which of the following is the name of this condition?**

- A. Sowdah
- B. Calabar swelling
- C. Onchocercoma
- D. Mucosal leishmaniasis
- E. Splinter haemorrhage

**20. Which of the following statements is correct regarding onchocerciasis?**

- A. It is the commonest cause of blindness in the world
- B. It is limited to Central and South America
- C. Its adult worms inhabit the small intestine
- D. It is the second major cause of blindness in the world
- E. It is a protozoan infection transmitted by the female sandfly

**21. Which of the following specimens is used for the parasitological diagnosis of Onchocerca volvulus?**

- A. Skin snips and aspirate from the subcutaneous nodules
- B. Stool sample
- C. Muscle biopsy
- D. Blood film collected at midnight
- E. Sputum sample

**22. Which of the following is the infective stage of Onchocerca volvulus?**

- A. Microfilaria
- B. Infective third stage filariform larva
- C. Promastigote
- D. Encysted L1 larva
- E. Adult female worm

**23. A 49-year-old woman developed abdominal discomfort, nausea and vomiting a few days after eating lightly cooked pork, followed by fatigue and muscle aches. Which of the following is the mode of infection of the causative parasite?**

- A. Bite of an infected female sandfly
- B. Penetration of the skin by filariform larvae
- C. Bite of an infected black fly
- D. Ingestion of raw or insufficiently cooked pork containing L1 larvae
- E. Ingestion of water containing cysts

**24. Which of the following is the infective stage of *Trichinella spiralis*?**

- A. The adult worm in the small intestine
- B. The first stage (L1) larva in the trichina capsule
- C. Microfilaria in the blood
- D. Promastigote in culture
- E. The encysted amastigote

**25. Regarding the life cycle of *Trichinella spiralis*, which of the following best describes the role of man?**

- A. Man is an accidental host and acts as a dead end
- B. Man is the natural definitive host
- C. Man is the principal reservoir host
- D. Man is the intermediate host only
- E. Man acts as a biological vector

**26. During the first week of trichinellosis, which of the following is the most common clinical feature?**

- A. Periorbital oedema
- B. Splinter haemorrhages
- C. Myalgia of the extraocular muscles
- D. Total blindness
- E. Watery diarrhoea

**27. A patient in the second week of trichinellosis develops fever and marked hypereosinophilia. Which of the following is most characteristic at this stage?**

- A. Calabar swelling with pruritus
- B. A painless ulcer with a raised border
- C. Firm painless subcutaneous nodules
- D. Skin depigmentation and atrophy
- E. Periorbital and facial oedema with splinter haemorrhages

**28. Two to three weeks after infection with *Trichinella spiralis*, myositis with myalgia and muscle weakness first involves which of the following muscles?**

- A. The diaphragm
- B. The muscles of the lower back
- C. The extraocular muscles
- D. The biceps
- E. The muscles of the jaw

**29. Which of the following investigations confirms the diagnosis of trichinellosis?**

- A. Detection of microfilaria in a blood film
- B. Examination of skin snips
- C. Demonstration of the larvae in a muscle biopsy
- D. A Giemsa-stained smear from the edge of an ulcer
- E. Culture of the specimen on NNN media

**30. Which of the following is included in the control and prevention of *Trichinella spiralis* infection?**

- A. Control of the Simulium vector
- B. Use of insect repellent at night
- C. Eradication of the canine reservoir host
- D. Collection of blood specimens during the day
- E. Inspection of slaughter houses and destruction of rats

## Part 2: Essay / Short-Answer Questions:

**1. A 26-year-old man returned from a rural endemic area with a painless ulcer with a raised border on his left cheek. The lesion appeared two months after he had been repeatedly bitten by small insects at night.**

A. What is your provisional diagnosis, and mention the causative parasite?

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B. Mention the vector and the mode of infection.

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C. Mention the infective stage and the diagnostic stage of this parasite.

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D. Mention two laboratory methods used to confirm the diagnosis.

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**2. Compare between Old World and New World cutaneous leishmaniasis.**

|                           | Old World leishmaniasis | New World leishmaniasis |
|---------------------------|-------------------------|-------------------------|
| Geographical distribution |                         |                         |
| Species included          |                         |                         |
| Disease caused            |                         |                         |

**3. Complete the following:**

A. The habitat of *Leishmania* spp. is .....

B. The diagnostic stage of *Leishmania* in culture is .....

C. The diagnostic stage of *Loa loa* in blood is .....

D. The vector of *Onchocerca volvulus* is .....

E. The infective stage of *Trichinella spiralis* is .....

#### 4. Cutaneous and mucocutaneous leishmaniasis.

A. Mention three measures for the prevention and control of cutaneous leishmaniasis.

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B. Mention two features of the clinical picture of mucocutaneous leishmaniasis.

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**5. A 43-year-old man from Cameroon was referred to the Emergency Ophthalmology Department complaining of a worm moving under the conjunctiva of his right eye. The complete blood cell count showed marked eosinophilia.**

A. What is your provisional diagnosis, and mention the vector of this parasite?

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B. What are Calabar swellings, and why are they also called fugitive swellings?

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C. Mention two laboratory findings that confirm the diagnosis, and state the time at which the blood specimen should be collected.

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**6. A 45-year-old man from a village beside a fast-flowing river in West Africa complains of intense itching, firm painless nodules over the iliac crest and the scapulae, and gradual blurring of vision.**

A. What is your provisional diagnosis, and mention the vector and the habitat of the parasite?

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B. What is an onchocercoma, and mention two sites at which these nodules occur?

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C. Mention two skin lesions caused by the microfilariae, and define Sowdah.

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D. Mention the parasitological method used for diagnosis.

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**7. A 49-year-old female reported having abdominal discomfort, nausea and vomiting after she had eaten lightly cooked pork. She also complained of fatigue, anorexia and muscle aches for several weeks. Trichinosis was confirmed.**

A. Mention the causative parasite, its infective stage and the mode of infection.

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B. Mention two clinical features of the intestinal phase and two of the muscle phase.

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C. What investigations were done to confirm the diagnosis? (mention two)

**8. Give reason for each of the following:**

A. Man is considered an accidental host and a dead end in *Trichinella spiralis* infection.

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B. The blood specimen used for the diagnosis of *Loa loa* is collected during the day.

C. The ulcer of cutaneous leishmaniasis is usually painless but may become painful.

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9. Compare between *Loa loa* and *Onchocerca volvulus*.

| Point of comparison         | <i>Loa loa</i> | <i>Onchocerca volvulus</i> |
|-----------------------------|----------------|----------------------------|
| Vector                      |                |                            |
| Habitat                     |                |                            |
| Diagnostic stage            |                |                            |
| Specimen used for diagnosis |                |                            |

10. List the measures of control and prevention of *Trichinella spiralis* infection.

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11. List the parasites affecting the skin and the parasite affecting the muscles that were discussed in this lecture, mentioning the habitat of each.

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## Part 1: MCQ Answer Key

- 1 E – Female sandfly Slides 4 & 7 (Leishmania spp. are transmitted by the bite of the female sandfly)
- 2 E – Macrophages Slide 4 (Leishmania inhabits the reticuloendothelial system inside the macrophages)
- 3 D – Leishmania major Slide 5 (Old World complex: *L. tropica* (urban) and *L. major* (rural); *L. ethiopica* also included)
- 4 C – Leishmania braziliense complex Slides 5 & 10 (New World species (*L. braziliense* and *L. mexicana* complexes) cause mucocutaneous leishmaniasis with ulcerative destruction of the nose, mouth, pharynx and larynx)
- 5 C – Promastigote Slides 6 & 7 (Infective stage: promastigote form, inoculated during the bite of the sandfly)
- 6 B – Amastigote form Slides 7, 11 & 12 (Diagnostic stage: amastigote form in a Giemsa-stained smear, or promastigote form in culture)
- 7 D – Canines and rodents Slide 7 (Reservoir host: canines and rodents; the definitive host is man)
- 8 C – A painless ulcer with a raised border that may be covered with scales or crust Slide 8 (Lesions progress from small papules to nodular plaques to open ulcers with a raised border; they are painless unless secondarily infected with bacteria)
- 9 B – NNN media Slide 11 (Culture on NNN media: the amastigote develops into an elongated flagellated promastigote)
- 10 A – Eradication of the reservoir host and control of the sandfly Slide 13 (Prevention and control: treatment of cases, eradication of the reservoir host, control of the sandfly)
- 11 A – Microfilaria Slides 14 & 17 (Diagnostic stage of *Loa loa* is the microfilaria in blood; a high eosinophil count is common)
- 12 D – Female Chrysops Slide 14 (The vector of *Loa loa* is the female Chrysops)
- 13 B – Calabar swellings Slide 16 (Swellings of up to 3 cm on the extremities, also called fugitive swellings because they disappear in a few days and reappear elsewhere)
- 14 C – During the day Slide 17 (Microfilariae are detected in a blood specimen collected at day time (diurnal periodicity))
- 15 E – Infective filariform larva - bite of an infected female Chrysops Slide 14 (Infective stage: infective filariform larva; mode of infection: bite of an infected female Chrysops)
- 16 B – Control of the Chrysops vector and treatment of patients Slide 18 (The two control measures given for *Loa loa*)
- 17 D – Black fly (*Simulium*) Slide 19 (The vector of *Onchocerca volvulus* is the black fly (*Simulium*), which breeds beside fast-flowing rivers)
- 18 A – Onchocercoma Slide 22 (Adult worms grow in subcutaneous tissue forming a firm painless nodule (onchocercoma) over superficial bones - scalp, scapulae, ribs, elbows, iliac crest, sacrum and knees)
- 19 A – Sowdah Slide 22 (Sowdah is the immunologically hyperactive form of onchodermatitis in which the affected skin darkens)
- 20 D – It is the second major cause of blindness in the world Slide 19 (Onchocerciasis affects about 40 million people in tropical Africa, Central and South America and Yemen)
- 21 A – Skin snips and aspirate from the subcutaneous nodules Slide 24 (Parasitological diagnosis: demonstration of microfilaria from skin snips and material aspirated from subcutaneous nodules)
- 22 B – Infective third stage filariform larva Slide 19 (Infective stage: infective 3rd stage filariform larva; diagnostic stage: microfilaria)
- 23 D – Ingestion of raw or insufficiently cooked pork containing L1 larvae Slides 26 & 27 (Mode of infection: ingestion of raw or uncooked pork or other animal meat containing L1 larvae)
- 24 B – The first stage (L1) larva in the trichina capsule Slide 27 (Infective stage: first stage (L1) larva within the trichina capsule)
- 25 A – Man is an accidental host and acts as a dead end Slides 26 & 27 (The pig is the principal reservoir; man is an accidental definitive host and acts as a dead end)
- 26 E – Watery diarrhoea Slide 28 (Intestinal phase (first week): watery diarrhoea is the most common feature, with abdominal pain, nausea and vomiting)
- 27 E – Periorbital and facial oedema with splinter haemorrhages Slide 28 (Muscle phase (second week): hypersensitivity reaction with fever and hypereosinophilia, periorbital and facial oedema, and sub-conjunctival and nail bed (splinter) haemorrhages)
- 28 C – The extraocular muscles Slide 30 (Stage of muscle encystment (2-3 weeks): myositis with myalgia, muscle oedema and weakness in the extraocular muscles, followed by the biceps and the muscles of the jaw, neck, lower back and diaphragm)
- 29 C – Demonstration of the larvae in a muscle biopsy Slide 30 (Laboratory diagnosis: larvae in muscle biopsies, serology (IFAT, ELISA), blood eosinophilia, elevated WBC count and elevated muscle enzymes)
- 30 E – Inspection of slaughter houses and destruction of rats Slide 31 (Control and prevention: avoid eating pork, proper breeding of pigs, avoid feeding pigs from garbage, inspection of slaughter houses, destruction of rats)

## Part 2: Essay Answer Key (with slide references)

### 1. Cutaneous leishmaniasis - Slides 4, 6, 7, 8 & 11

- A. Cutaneous leishmaniasis (Old World type); causative parasite: Leishmania tropica complex - L. tropica (urban), L. major (rural), L. ethiopica
- B. Vector: the female sandfly. Mode of infection: inoculation of the infective stage during the bite of the female sandfly
- C. Infective stage: promastigote form. Diagnostic stage: amastigote form in a smear, or promastigote form in culture
- D. (1) Direct method: skin scrapings from the edge of the ulcer, stained by Giemsa, showing amastigotes; culture on NNN media. (2) Indirect method: serological tests such as IFAT

### 2. Old World versus New World cutaneous leishmaniasis - Slide 5

- Geographical distribution: Old World - Africa, Europe and Asia; New World - Central and South America
- Species: Old World - Leishmania tropica complex (L. ethiopica, L. tropica urban, L. major rural); New World - L. braziliense complex and L. mexicana complex
- Disease caused: Old World - cutaneous leishmaniasis; New World - mucocutaneous leishmaniasis

### 3. Complete the following - Slides 4, 7, 11, 17, 19 & 27

- A. The reticuloendothelial system (inside the macrophages)
- B. The promastigote form (on NNN media)
- C. The microfilaria
- D. The black fly (Simulium)
- E. The first stage (L1) larva in the trichina capsule

### 4. Prevention and mucocutaneous disease - Slides 10 & 13

- A. Treatment of cases; eradication of the reservoir host; control of the sandfly
- B. Spread of the parasite from the skin to the mucosal surfaces of the nose or mouth; in advanced cases, ulcerative destruction and disfigurement of the nose, mouth, pharynx and larynx, which causes death of the patient

### 5. Loa loa (African eye worm) - Slides 14, 16 & 17

- A. Loiasis (Loa loa, African eye worm); vector: the female Chrysops
- B. Swellings of up to 3 cm, usually on the extremities; called fugitive because they disappear within a few days only to reappear elsewhere
- C. Detection of microfilaria in blood, and a high eosinophil count (the adult worm may also be isolated from the eye); the blood specimen is collected at day time

### 6. Onchocerca volvulus (river blindness) - Slides 19, 22 & 24

- A. Onchocerciasis (river blindness); vector: the black fly (Simulium); habitat: the subcutaneous tissues
- B. Onchocercoma is a firm painless nodule formed by the adult worms in the subcutaneous tissue, a few mm to about 10 cm in size; it occurs over superficial bones - scalp, scapulae, ribs, elbows, iliac crest, sacrum and knees
- C. Dermatitis with pruritus, pigmentation, atrophy and fibrosis; Sowdah is the immunologically hyperactive form of onchodermatitis in which the affected skin darkens because of intense inflammation
- D. Demonstration of microfilaria in skin snips and in material aspirated from the subcutaneous nodules

### 7. Trichinella spiralis (trichinosis) - Slides 25, 27, 28 & 30

- A. Trichinella spiralis; infective stage: the first stage (L1) larva in the trichina capsule; mode of infection: ingestion of raw or insufficiently cooked pork containing L1 larvae
- B. Intestinal phase (first week): watery diarrhoea (the most common feature), abdominal pain, nausea or vomiting. Muscle phase (second week): fever with hypereosinophilia, periorbital and facial oedema, sub-conjunctival and nail bed (splinter) haemorrhages, myositis with myalgia
- C. Demonstration of the larvae in a muscle biopsy; serology for antibody detection (IFAT, ELISA); other methods include blood eosinophilia, an elevated WBC count and elevated muscle enzymes

### 8. Give reason - Slides 8, 17 & 27

- A. The pig is the principal reservoir and transmission occurs from one flesh-eating animal to another; the larvae encysted in human muscle are not eaten by another host, so the cycle cannot continue and man is a dead end
- B. The microfilariae of Loa loa show diurnal periodicity, so they appear in the peripheral blood during the day
- C. The lesion itself is painless, but it becomes painful if the open sore becomes secondarily infected with bacteria

### 9. Loa loa versus Onchocerca volvulus - Slides 14, 17, 19 & 24

- Vector: Loa loa - female Chrysops; Onchocerca volvulus - black fly (Simulium)
- Habitat: both inhabit the subcutaneous tissue (Onchocerca adults lie within subcutaneous nodules)
- Diagnostic stage: microfilaria for both parasites
- Specimen: Loa loa - blood collected during the day; Onchocerca volvulus - skin snips and nodule aspirate

#### 10. Control and prevention of *Trichinella spiralis* - Slide 31

- Avoid eating pork meat
- Proper breeding of pigs
- Avoid feeding pigs from garbage
- Inspection of slaughter houses
- Destruction of rats

#### 11. Parasites affecting the skin and the muscles - Slides 4, 7, 14, 19 & 25

- Skin: *Leishmania* spp. causing cutaneous and mucocutaneous leishmaniasis - habitat: the reticuloendothelial system (inside macrophages)
- Skin: *Loa loa* (African eye worm), a subcutaneous filaria - habitat: the subcutaneous tissue
- Skin: *Onchocerca volvulus* (river blindness), a subcutaneous filaria - habitat: the subcutaneous tissues
- Muscles: *Trichinella spiralis* - the adults inhabit the small intestine while the larvae encyst in the striated muscles

