



TEAM443
MICROBIOLOGY

Schistosomiasis

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Objectives

NO objectives were found

Any future corrections will be in the editing file, so
please check it frequently

Color Index:
Main text
Important
Doctor Notes
Males slide
Females slide
Extra



Schistosoma

Classification of Parasites

Protozoa	Helminths
<ul style="list-style-type: none"> ▶ Unicellular ▶ Single cell for all functions 	<ul style="list-style-type: none"> ▶ Multicellular ▶ Specialized cell
<ul style="list-style-type: none"> ▶ Amoebae: move by pseudopodia ▶ Flagellates: move by flagella ▶ Ciliates: move by cilia ▶ Apicomplexa (Sporozoa) tissue parasites 	<ul style="list-style-type: none"> ▶ Roundworms (Nematodes): <ul style="list-style-type: none"> → Elongated, cylindrical, unsegmented ▶ Flatworms: <ul style="list-style-type: none"> → Trematodes: leaf-like, unsegmented e.g : Schistosoma , Fasciola hepatica → Cestodes: tape-like, segmented

Schistosoma species (Blood Flukes)

Female Slides

A genus of trematodes, commonly known as blood-flukes, تجي المياه الراكده و مستحيل تجي في المياه المتحركة

Are parasitic flatworms responsible for a highly significant group of infections in humans termed schistosomiasis also called bilharziasis and snail fever

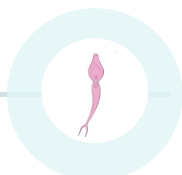
Schistosomiasis is considered by the WHO as the second most socioeconomically devastating parasitic disease (after malaria) with hundreds of millions infected worldwide

Depending on the infecting species, Adult flatworms (sexual stage-human definitive host) parasitize blood capillaries of either the:

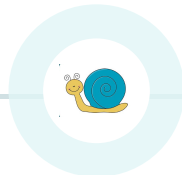
- 1- **Mesenteries (Schistosoma Mansoni)** → GIT (LIVER)
- 2- **Plexus of the bladder (Schistosoma Haematobium)** → urinary bladder

Life cycle “briefly”

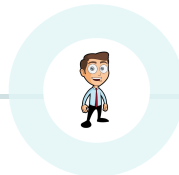
Very Important



Infective stage: Cercaria
(it will penetrate skin)



★ **Intermediate host :**
Snails (have a role in propagation of cercaria)



Definitive Host:
Human



Diagnostic stage: Eggs
pass in stool or urine



Life cycle of schistosoma

Infective stage

1. Infected person with Schistosoma will pass eggs either when he is passing stool in **S.mansoni** or when he is passing urine in **S.haematobium**
2. These eggs contain miracidium which hatch from the eggs in the water and go directly to specific snail, to become cercariae "**infective stage**"
3. Cercaria emerge from snail (where propagation of the parasite takes place) in the water and **penetrate the skin to infect human**, and cause dermatitis.

Cercaria to Schistosomula

4. Cercaria is transformed into a **schistosomula** inside the host tissues, which then enters the systemic circulation

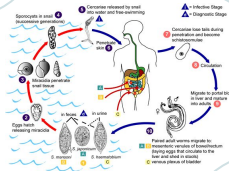
Schistosomula to adult flatworm

5. schistosomula finds its way into either
 - to the portal circulation worms mature and become an adult in the mesenteric veins of the portal circulation to the liver (S.mansoni & Sjaponicum)
 - remain in the systemic circulation and mature in the **blood vessels of the vesical (bladder) and venous plexus.** (S. haematobium)
6. they will discharge eggs

Diagnostic stage

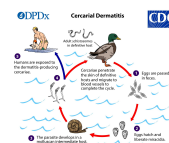
7. Eggs of **S.mansoni** and **S.japonicum** are passed mainly in **stool**, Eggs of **S.haematobium** passed mainly in the urine.

The **egg** is the **diagnostic stage**



Schistosome Dermatitis

- ▶ **Schistosome dermatitis, or "swimmers itch"** occurs when skin is penetrated by a free-swimming, fork-tailed infective cercaria.
- ▶ The dermatitis often develops 24 hours after exposure and lasts for 2 to 3 days and then spontaneously disappears





Pathology

after mature and become an adult in the mesenteric veins or in blood vessels of the **bladder** and venous plexus ,the eggs travel in 2 directions

Developing Schistosoma in liver

S. mansoni & *S. japonicum* parasites adult male and female located mainly in mesenteric vein **and its branches**, the worm discharges Eggs ,the eggs travel in 2 directions:

The bowl

Some eggs find their way into the lumen of the bowel and appear in the feces.

Bloodstream

Other eggs flow with bloodstream in the portal circulation and enter the **LIVER (MAINLY)**. Most of these eggs are trapped in the liver and give rise to pathology as:

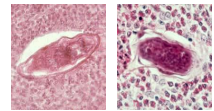
- Some of these eggs find their way through the liver tissue and enter the systemic circulation to another Bloodstream organ as **brain**.

- **Fibrosis** of the liver caused from eggs settled in the liver and may produce **Portal hypertension(important)** which may lead to:

- Hepatomegaly and splenomegaly

- Esophageal varices(lead to death)**

- Hematemesis**, hemorrhoids, ascites.



Eggs of *Schistosoma mansoni* in the liver and **cellular reaction granuloma**.

Developing Schistosoma in urinary bladder

The worm/the adult parasites male and female is located in the vesical venous plexus surrounding the urinary bladder.

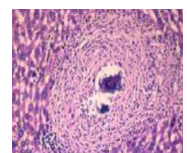
Urine

– Some other eggs will pass to the urethra and pass into urine.

Urinary bladder

– Many eggs are trapped in the wall of the bladder where they may give rise to calcification and granuloma formation.

–Constriction of the orifice of the ureter may produce kidney damage, hydronephrosis and **cancer** of the bladder, Also **cause peripheral fibrosis**



Granuloma in the bladder



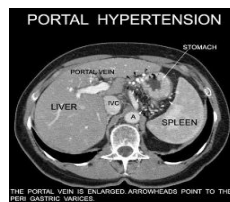
Pathogenicity of schistosomiasis

Pathogenicity of Schistosomiasis	
Female Slides Cercarial dermatitis	<ul style="list-style-type: none"> ○ At the site of entry of cercaria.
Female Slides Toxic metabolites	<ul style="list-style-type: none"> ○ Liberated during the growth of schistosomula in the circulation veins, May cause: anaphylactic reaction, fever, urticarial rashes and eosinophilia (when there's eosinophilia think about parasites).
eggs	<ul style="list-style-type: none"> ○ The EGGS is the main cause of pathology in schistosomiasis. ○ Many eggs become stranded in the tissues or are carried by the bloodstream to other organs mainly the LIVER. ○ Eggs may erode blood vessels and cause hemorrhages. ○ Schistosome eggs, deposited in the tissues, act as foreign protein, cause irritation leading to cell infiltration and connective tissue hyperplasia, egg granuloma around each egg (cell mediated immunity). ○ The host reaction to the eggs may vary from small granulomas to extensive fibrosis ○ The extent of damage is generally related to the number of eggs present in the tissues. ○ Each mature female lays 300 eggs.

Chronic schistosomiasis



Could cause:

- Portal hypertension
- Hepatomegaly & splenomegaly with ascites







Schistosomiasis

Organism		Schistosoma mansoni, japonicum, intercalatum, mekongi	Schistosoma haematobium
Pathology	Causes	Intestinal and liver Schistosomiasis	Urinary Schistosomiasis
	Location	Mesenteric portal circulation veins	Vesical Venous plexus surrounding the urinary bladder.
	Prepatent period	5-7 weeks	10-12 weeks
	Egg deposition and extrusion	<ul style="list-style-type: none"> ◦ Dysentery (blood and mucus in stools). ◦ Hepatosplenomegaly, Splenomegaly. ◦ CNS involvement (rare). 	<ul style="list-style-type: none"> ◦ Painless hematuria. ◦ Inflammation of bladder and burning micturition. ◦ lung and CNS involvement (rare). ◦ Eggs are trapped in the wall of the bladder where they may give rise to calcification and granuloma formation.
	Tissue proliferation & repair	<ul style="list-style-type: none"> ◦ Periportal fibrosis (mainly) ◦ portal hypertension, hematemesis ◦ Papillomata in the intestine. ◦ Lung and CNS involvement. ◦ Esophageal varices 	<ul style="list-style-type: none"> ★ Periportal fibrosis (sometimes). they asked about it in previous exams ◦ Papillomata in the bladder and lower ureter (leading to obstructive uropathy). ◦ Lung and CNS involvement.
Diagnosis	Parasitological Microscopy (main)	Examination of stool → Eggs with lateral spine in stool 	Examination of urine → Eggs with terminal spine in urine 
	Immunology	Serology tests CFT, ELISA	
	Indirect	<ul style="list-style-type: none"> ◦ Endoscopy ◦ Radiology 	<ul style="list-style-type: none"> ◦ Cystoscopy ◦ Radiology
	Intradermal test	With cercarial antigen cause allergic reaction.	
Control & Treatment		<ul style="list-style-type: none"> ◦ Prescription drugs- Availability of Praziquantel (PZQ). A known drug treatment for schistosomiasis. ◦ Providing education on sanitation and personal hygiene ◦ The control of snail reproduction ◦ Government commitment to provide funds to support research work and focus more on the primary health care. 	

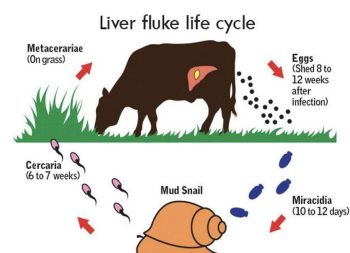
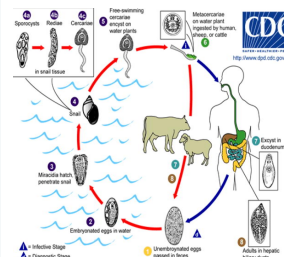


Fasciola Hepatica (Liver fluke)

<h2>Transmission & Pathogenesis</h2>		<ul style="list-style-type: none"> ◦ Cercariae leave snail, encyst on vegetation, and form metacercaria. ★ Ingestion of raw, fresh-water vegetation contaminated with metacercaria. ◦ Metacercaria excyst in the duodenum → migrate through intestinal wall to the liver and settle in the biliary tract → grow into adult worm and liberate eggs in bile → throw bile eggs reach the intestine and then passed in stool. 	
<h2>Life Cycle</h2>	<p>Infective stage:</p>	<p>Metacercaria ingested with contaminated grasses.</p>	 <p>Watercress, means of transmission of fascioliasis containing Metacercaria</p>
	<p>Intermediate host:</p>	<p>Snails</p>	
	<p>Definitive host:</p>	<p>Sheep, cattle, goat and MAN.</p>	
	<p>Diagnostic Stage:</p>	<p>Eggs pass in stool or duodenal aspirate</p>	
<h2>Clinical picture</h2>  <p>Egg of Fasciola hepatica can be seen in true patient's stool or in false infection.</p>	<p>False infection (Spurious infection)</p>	<p>1-Occurs when eggs are eaten in infected animal (cattle) liver and passed in stool. 2-will not lead to liver infection only we can detect eggs in stool after eating raw cattle liver infected with Fasciola Hepatica so we can find the eggs in stool but patient is not infected. So when we do duodenal aspirate it will be negative</p>	
	<p>True Infection</p>	<p>Occurs when man ingests water plant (watercress) contaminated with Metacercaria, the adult worm can causes mainly:</p> <ul style="list-style-type: none"> ◦ Biliary colic with biliary obstruction, jaundice. ◦ Generalised abdominal pain. ◦ Cholecystitis and cholithiasis. 	
<h2>Diagnosis</h2>	<ul style="list-style-type: none"> ◦ Eggs in stools or duodenal aspirate. ◦ Serological test: CFT and skin test are also used. 		
<h2>Treatment</h2>	<p>Triclabendazole is the drug of choice to treat fascioliasis and is on the WHO list of essential medicines. The correct dosage is calculated based on the person's weight (10 mg/kg) and the tablets are given at one time.</p>		

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- First, someone infected with Fasciola Hepatica passes unembryonated eggs in stool. Later on, eggs will become embryonated in the water (Miracidium), and it will hatch out looking for a snail. In the snail and while still swimming in the water, it will develop into cercaria first. Then, when this cercaria finds a water plant, it will finally **تتحوصل** and develop into metacercaria and infect other person by ingestion of this contaminated water plant (fecal-oral route).
- Accordingly, we can say that the snail is the first intermediate host of Fasciola Hepatica, and the water plant is the second intermediate host.





Summary

Schistosoma (Blood Flukes)	<ul style="list-style-type: none"> ○ Life cycle ★ <ul style="list-style-type: none"> → Infective stage: Cercaria (it will penetrate skin) → Intermediate host : Snails (have a role in propagation of cercaria) → Definitive Host: Human → Diagnostic stage: Eggs pass in stool or urine ○ Schistosome dermatitis, or "swimmers itch" ★ ○ The EGGS is the main cause of pathology in schistosomiasis. ○ Treatment: Praziquantel
	<p style="text-align: center;">Schistosoma manson</p> <ul style="list-style-type: none"> ○ Flow with bloodstream in the portal circulation and enter the LIVER (mainly) ○ Eggs of S.mansoni and S.japonicum are passed mainly in stool, ○ Pathology: Fibrosis of the liver may produce Portal hypertension (important) which may lead to: ★ Hepatomegaly and splenomegaly, Esophageal varices (lead to death), Hematemesis, hemorrhoids, ascites ○ Eggs with lateral spine in stool ○ Can cause Periportal fibrosis
	<p style="text-align: center;">Schistosoma haematobium</p> <ul style="list-style-type: none"> ○ remain in the systemic circulation and mature in the blood vessels of the vesical (bladder) and venous plexus. ○ Many eggs are trapped in the wall of the bladder where they may give rise to calcification and granuloma formation and cause cancer of the bladder, and peripheral fibrosis ○ Some other eggs will pass to the urethra and pass into urine. ○ Eggs with terminal spine in urine ○ can cause Periportal fibrosis ★
<p>Fasciola Hepatica Liver Flukes</p>	<ul style="list-style-type: none"> ○ Life cycle <ul style="list-style-type: none"> → Infective stage: Ingestion of fresh-water vegetation contaminated with metacercaria → Intermediate host: Snails ○ Pathogenesis: migrate through intestinal wall to the liver and settle in the biliary tract. ○ Pathology: Biliary colic with biliary obstruction, jaundice. ★



MCQs

Q1 - Periportal fibrosis is caused by which one of the following organisms?

- | | | | |
|----------------------|-----------------|------------------------|------------------|
| A. Fasciola hepatica | B. Echinococcus | C. Schistosoma mansoni | D. Strongyloides |
|----------------------|-----------------|------------------------|------------------|

Q2 - Which of the following stages of Schistosomiasis is infective to humans?

- | | | | |
|--------|---------------|-------------|--------------|
| A. Egg | B. Adult worm | C. Cercaria | D. Sporocyst |
|--------|---------------|-------------|--------------|

Q3 - What is the drug of choice for treating Schistosomiasis?

- | | | | |
|-----------------|--------------------|------------------|-----------------|
| A. Tetracycline | B. Triclabendazole | C. Acetaminophen | D. Praziquantel |
|-----------------|--------------------|------------------|-----------------|

Q4 - Which of the following is acquired by ingesting metacercariae?

- | | | | |
|----------------------|-------------------------|------------------------|-------------------|
| A. Fasciola hepatica | B. Ascaris lumbricoides | C. Schistosoma mansoni | D. E. Histolytica |
|----------------------|-------------------------|------------------------|-------------------|

Q5 - Which one of the following parasites invade gallbladder and causes biliary obstruction?

- | | | | |
|----------------------------|----------------------|-------------------------|------------------------|
| A. Schistosoma haematobium | B. Fasciola hepatica | C. American Trypanosoma | D. Schistosoma mansoni |
|----------------------------|----------------------|-------------------------|------------------------|

Q6 - Ingestion of water plant with metacercaria causes transition of which of the following?

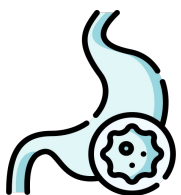
- | | | | |
|--------------------|---------------------|----------------------------|----------------------|
| A. Taenia saginata | B. Hymenolepis nana | C. Echinococcus granulosus | D. Fasciola hepatica |
|--------------------|---------------------|----------------------------|----------------------|

Q7- Cercaria is the infective stage of which parasite? ★

- | | | | |
|---------------|----------------|------------|--------------------|
| A. Leishmania | B. Schistosoma | C. malaria | D. Trypanosomiasis |
|---------------|----------------|------------|--------------------|

Answers:

A1 C A2 C A3 D A4 A A5 B A6 D A7 B



SAQ

How Fasciola Hepatica transmitted ?

Ingestion of fresh-water vegetation contaminated with metacercaria, migrate through intestinal wall to the liver and settle in the biliary tract → biliary obstruction, jaundice.



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MICROBIOLOGY

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