Los Angeles County Department of Health Services Clinical Laboratory Scientist Training Program

Parasitology Rotation

Introduction:

Welcome to Parasitology rotation.

Parasitology is a specialized branch of the clinical laboratory that focuses on the study of parasites and their effects on human health. Parasites are organisms that live on or inside a host and derive nutrients at the host's expense. In Medical Parasitology, the emphasis is on understanding how these parasites cause diseases, how they are transmitted, and how they can be diagnosed and treated. In Parasitology laboratory, emphasis is placed on recognizing key features of the parasite such as size, shape (Egg or Larvae), structures, and specimen site to aid in the identification and diagnosis.

The field covers a wide range of parasitic organisms, including protozoa, helminths (worms: Cestodes and Trematodes), and ectoparasites (such as tick, scabies, lice and fleas). It also involves studying the life cycles of these parasites, their interactions with hosts, and the public health strategies needed to control and prevent parasitic infections. By integrating knowledge from microbiology, immunology, and epidemiology, Medical Parasitology aims to improve diagnosis, treatment, and prevention of parasitic diseases globally.

Although parasites are now less frequently observed in clinical settings in the United States, factors such as travel, immigration, and global warming contribute to a significant number of cases. Most of the videos in the library are from developing countries, where parasites are a major public health issue that impacts the daily lives and well-being of people. I hope by the end of your rotation, you will gain new insights and appreciations in the field of parasitology.

Rotation plan and schedule

In the next three weeks, we will take a deeper look into the science of parasitology. Refer below for the breakdown of your rotation.

**Week 1: Processing, Preview, self-study, dry lab and videos**

**Day 1-2**

* Watch videos on concentration procedures on stool specimens as required for the detection of Ova and Parasites.
* Watch videos on perform O&P Wet Mounts
* Understand the preservative used in stool samples for O&P Exams following the lab procedure, Rejection criteria. O&P Exam other than stools
* Watch videos on Modified Acid Fast or Fluorescent stain for Cryptosporidium
* Watch videos on trichrome stain preparation or other permanent stain for parasites
* Watch video on Pinworm preparation
* Watch videos on Malaria Smear, thick vs thin
* Complete Parasitology Assignment, use video library as a resource.

**Day 3-4 @ Olive View**

* Perform and discuss various rapid EIA tests and correctly interpret results (Cryoto/Giardia; E. histolytica)
* Examines wet and permanent smears to find and identify parasites
* Observe Preparation of Saline/Iodine prep.
* Reading Trichrome (and Iodine prep) slides/ Wet preps to identify Ova, Amebic cysts or Trophozoites.

**Week 2: O&P, Stools, GI Parasites @ Olive View**

**Day 1-3**

* Compare and Contrast the following procedures for their importance, advantages and disadvantages
  + Direct Saline/Iodine
  + Concentration
  + Trichrome
* Reading Trichrome (and Iodine prep) slides/ Wet preps to identify Ova, Amebic cysts or Trophozoites.
* Refer to reference material, size charts and study slides for aid in identifying Ova or Parasites.
* Identify the organism below from a picture of the free living cysts, egg or other diagnostic stage.
* Describe the proper specimen to collect for each Parasite
* Describe the symptoms associated with each parasite
* Describe the treatment used for each parasite
* Perform and Interpret Wet Mount for Trichomonas vaginalis

**Day 4**

* Review in the morning
* Practicum Exam in the afternoon

**Week 3: Blood Parasites, Arthropods, Pinworms, and Trichomonas**

**Day 1-3**

* Examine thin blood smears to find and identify blood parasite
* Examine Trichomonas wet mount
* Verbalize pinworm collection and processing methods.
* Identify arthropods/ectoparasites images.

**Day 4**

* Practicum exam in the morning
* Final exam in the Afternoon (To be determined, may be given on Media Lab)
* Group project due, Email to CLS Instructor QJI@DHS.LACOUNTY.GOV

**Learning Outcome**

1. **Define** key parasitological terms, such as protozoa, helminths, and arthropods, and **list** examples of each.
2. **Describe** the appropriate collection and transport procedures for parasitic examination including the significance of the preservative.
3. **Summarize** the procedures involved in preparation of stool samples such as Direct Saline/Iodine Prep, Concentration, and Trichrome.
4. **Compare and contrast** the advantage and disadvantages of the above procedures.
5. **Identify** common parasites (Ova, Amebic cysts or trophozoites) found in stool and blood samples based on their scientific names. See Parasite List
6. **Explain** the life cycles of major intestinal parasites, including Giardia lamblia, Entamoeba histolytica, and Ascaris lumbricoides.
7. **Describe** the major differences between protozoan and helminth parasites in terms of morphology and mode of transmission.
8. **Use** microscopy to **identify** parasites in prepared slides of stool and blood samples, based on their size, shape, and structures.
9. **Compare and contrast** the morphology of Plasmodium species in blood smears, focusing on size, shape, distinct features and developmental stages.
10. **Distinguish** between different stages of intestinal nematodes (e.g., eggs, larvae, and adults) based on physical features observed under a microscope.
11. **Assess** the clinical symptoms and diagnostic features associated with infection and **determine** the most likely parasitic infection based on patient history, geographical region and laboratory findings.
12. **Develop** a table to guide clinicians in the identification and management of parasitic infections based on common clinical presentations and laboratory results. (Project)

**Parasite List**

**Amoeba, Ciliates and Flagellates:**

Amebae

*Dientamoeba fragilis*

*E. coli*

*E. histolytica*

*E. hartmanni*

*E. nana*

*Iodamoeba buetschlii*

*Naegleria sp.*

*Acanthamoeba spp.*

Ciliates

*B. coli*

Flagellates

*G. lamblia*

*T. vaginalis*

Coccidia

*Cryptosporidium*

*Isospora belli*

Microsporidium

**Apicomplexa Parasites**:

*Babesia spp.*

*Plasmodium falciparum*

*Plasmodium malariae*

*Plasmodium ovale*

*Plasmodium vivax*

*Toxoplasma gondii*

**Microfilaria**

*Brugia malayi*

*Dirofilaria immitis*

*Loa Loa*

*Mansonella sp*

*Onchocerca volvulus*

*Wuchereria bancrofti*

**Nematodes**

*Ancylostoma duodenale*

*Ancylostoma braziliense*

*Ascaris*

*Enterobius vermicularis*

*Hookworm*

*Necator Americanus*

*Strongyloides stercoralis*

*Toxocara canis*

*Trichinella spiralis*

*Trichuris trichiura*

**Trematodes**

*Clonorchis sinensis*

*Fasciola hepatica*

*Fasciolopsis buski*

*Paragonimus westermani*

*Schistosoma haematobium*

*Schistosoma mansoni*

**Trypanosoma**

*Trypanosoma cruzi*

*Trypanosoma brucei complex*

**Leishmania spp.**

**Cestodes**

*D. latum*

*E. granulosus*

*T. Saginata*

*T. solium*

*H. diminuta*

*H. nana*