NEW YORK STATE
Parasitology Proficiency Testing Program

Parasitology (General)
05 October 2010

The purpose of the New York State Proficiency Testing Program in the category of Parasitology (General) is to monitor the performance of applicant laboratories in detecting and identifying parasites in fecal emulsions, fecal smears, and blood films. This document reports the results for the October 2010 proficiency test in Parasitology (General).

Sample Preparation and Quality Control

All emulsions and slides used in this test were prepared by a commercial source. The emulsions were dispensed into the vials from pools which were continuously mixed during the loading process. Numerous samples of each test specimen were selected at random by the Parasitology Laboratory of the New York State Department of Health, and were assayed for quality and confirmation of organisms. Extensive quality control tests were also conducted by the supplying vendor and a detailed quality control report was submitted to the Parasitology Laboratory for inspection and verification. Samples were authenticated by 80% of participating laboratories and/or referee laboratories.

10-K (Helminths Only)

Correct diagnosis: *Hymenolepis nana*.

Results of Participating Laboratories

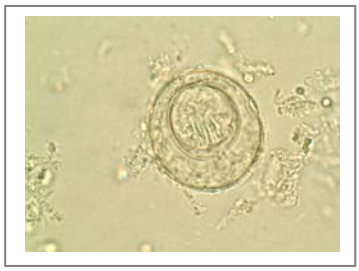
Organism reported	# of labs reporting	% of labs reporting	Referee results	Status
Hymenolepis nana	114/115	99	10/10	**Correct**
Ascaris lumbricoides	1	1	0	**Incorrect**

Quality Control and Referee Information

Participating and referee laboratories agreed that ***Hymenolepis nana*** was the correct response (99 and 100%)**.** Quality control examination of 4% of this sample showed an average of 7 ova per coverslip. Other tests performed include a Direct Immunofluorescent Assay and ELISA for *Giardia lamblia* and *Cryptosporidium* sp. which were negative for both organisms. A modified acid-fast stained smear was also negative.

Diagnostic Characteristics

Hymenolepis nana, also known as the dwarf tapeworm, is an intestinal cestode acquired by ingesting eggs or (rarely) infected beetles. *H. nana* is the only human tapeworm that doesn't have an intermediate host: transmission occurs from person to person. It has a worldwide distribution and is more commonly seen in children. The diagnostic stage is the egg recovered in stool. These eggs are spherical, thin shelled, and measure 30-47µm in diameter. They have a six hooked oncosphere with two polar thickenings. Filaments arise from these and are visible in the space between the embryo and the outer shell. Eggs of *H. nana* strongly resemble those of *Hymenolepis diminuta* in morphology, but are much smaller (*H. diminuta* eggs measure 70-85µm). Careful measurement with a calibrated ocular micrometer is essential for distinguishing these species.



10-L (Helminths Only)

Correct diagnosis: *Strongyloides stercoralis*.

Results of Participating Laboratories

Organism reported	# of labs reporting	% of labs reporting	Referee results	Status
Strongyloides stercoralis	114/115	99	10/10	**Correct**
Necator americanus	2	2	0	**Incorrect**

Quality Control and Referee Information

Participating and referee laboratories agreed that ***Strongyloides stercoralis*** was the correct response (99 and 100%). Quality control examination of 4% of this sample showed an average of 10 larvae per coverslip. Other tests performed include a Direct Immunofluorescent Assay and ELISA for *Giardia lamblia* and *Cryptosporidium* sp. which were negative for both organisms. A modified acid-fast stained smear was also negative.

Diagnostic Characteristics

Rhabditiform larva of *S. stercoralis*. Click for larger image.

Strongyloides stercoralis is an intestinal nematode with a very complex life cycle. Infection is acquired when filariform larvae in the soil penetrate the skin and are carried in the blood to the lungs. From the lungs they travel up the trachea and are swallowed. Once in the intestine they develop into mature female worms and begin to produce eggs by parthenogenesis. These eggs, which are rarely seen, hatch in the intestine into rhabditiform larvae. The larvae pass in the feces and develop into male and female worms in the soil where they complete their life cycle. The diagnostic stage is the rhabditiform larvae passed in the stool. They measure 180-380µm, have a short buccal cavity and a visible genital primordium indicated by the arrow.

10-M (All Parasites)

Correct diagnosis: *Fasciola hepatica*.

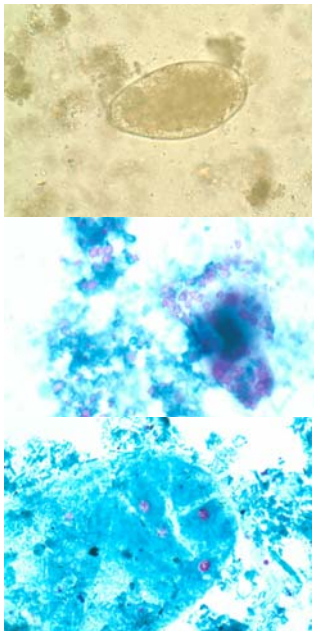
Results of Participating Laboratories

Organism reported	# of labs reporting	% of labs reporting	Referee results	Status
Fasciola hepatica	108/115	94	9/10	**Correct**
Chilomastix mesnili	33	29	3	**No Penalty**
Entamoeba coli	26	23	3	**No Penalty**
Cryptosporidium sp.	9	8	0	**Incorrect**
Paragonimus westermani	2	2	0	**Incorrect**
Diphyllobothrium latum	1	1	0	**Incorrect**
No Parasites Seen	1	1	0	**Incorrect**

Quality Control and Referee Information

Participating and referee laboratories agreed that ***Fasciola hepatica*** was the correct response (94 and 90%). Quality control examination of 4% of this sample revealed an average of 2 ova per coverslip. *Chilomastix mesnili* and rare *Entamoeba coli* were also identified during QC examination and were excluded from grading. Other tests performed include Direct Immunofluorescent Assay and ELISA for *Giardia lamblia* and *Cryptosporidium* sp. which were negative for both organisms. A modified acid-fast stained smear was also negative.

Diagnostic Characteristics



Fasciola hepatica (top) and pink-staining bodies confused with *Cryptosporidium* (center)

Fasciola hepatica is a liver trematode with a worldwide distribution. It is extremely rare in the United States. Humans become infected by eating uncooked aquatic plants containing metacercariae from the intermediate snail host. These metacercariae excyst in the duodenanum and migrate to the liver. Once the larvae enter the bile ducts they mature and begin to lay eggs which are the diagnostic stage. The eggs are very large, measuring 130-150µm by 60-90µm. They are thin shelled and have an operculum. Although these eggs are similar in appearance to *Paragonimus westermani,* they are easily distinguished by size: *Paragonimus* eggs are 80-120µm long.

Although a number of labs reported seeing *Cryptosporidium* sp. this was not confirmed on quality control examination nor was it reported by any referee laboratories. Modified acid fast stained slides did show numerous pink staining objects as shown in the middle photo, but these bodies were not C*ryptosporidium*. Many normal stool components can also stain pink in this assay. One useful difference in this particular case is that the bodies do not have the internal structure found in oocysts (for an example of *Cryptosporidium* oocysts stained in this assay, see lower image).

10-N (Protozoa Only)

Correct diagnosis: No Parasites Seen.

Results of Participating Laboratories

Organism reported	# of labs reporting	% of labs reporting	Referee results	Status
No Parasites Seen	113/115	98	10/10	**Correct**
Endolimax nana	1	1	0	**Incorrect**
Iodamoeba butschlii	1	1	0	**Incorrect**

Quality Control and Referee Information

Participating and referee laboratories agreed that **No Parasites Seen** was the correct response (98 and 100%). Quality control examination of 4% of this sample showed no organisms present.

10-O (All Parasites)

Correct diagnosis: *Plasmodium falciparum.*

Results of Participating Laboratories

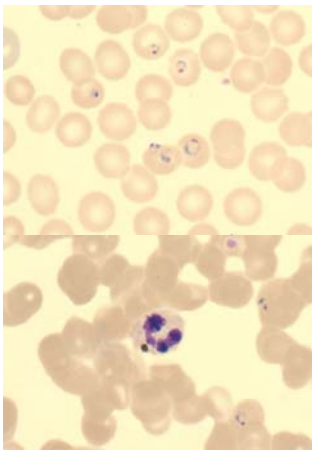
Organism reported	# of labs reporting	% of labs reporting	Referee results	Status
Plasmodium falciparum	102/109	94	10/10	**Correct**
Babesia sp.	5	5	0	**Incorrect**
Plasmodium sp.	2	2	0	**Incorrect**

Quality Control and Referee Information

Participating and referee laboratories agreed that ***Plasmodium falciparum*** was the correct response (94 and 100%). Quality control examination of 4% of this sample showed parasites in every 100X oil immersion field. The infected cells are not enlarged and no stippling is present. The only stage seen was the ring stage trophozoite.

Diagnostic Characteristics

Plasmodium falciparum is one of the four species of *Plasmodium* know to infect humans. It causes the most dangerous and severe form of malaria and is always considered to be a medical emergency. Death may occur rapidly if proper treatment is not started immediately. Its distribution is limited to the tropics, primarily Africa and Asia. *P. falciparum* invades all ages of RBC's and so the parasitemia can exceed 50%.



Plasmodium falciparum (top) and WBC with pigment (bottom)

The usual stages seen in the peripheral blood are rings and gametocytes. Schizogony occurs in the internal organs so it is rare to see other stages, although they may be present in cases of severe malaria. The infected RBCs are not enlarged nor do they contain Schüffner's dots. The rings are generally small, and may have one or two chromatin dots. Appliqué forms are also characteristic. Gametocytes are rounded to banana-shaped and contain a single well defined chromatin and coarse rice-grain like pigment. *Plasmodium falciparum* can be difficult to distinguish from *Babesia* sp., but some characteristics are especially useful for differential diagnosis. Mature *Plasmodium* trophozoites contain pigment (haemozoin), whereas *Babesia* trophozoites do not. Presence of pigment in trophozoites, or in white blood cells which have consumed trophozoites, indicates a diagnosis of *Plasmodium*.

Scoring Information

Immunoassay Results

Cryptosporidium	**10-K**		**10-L**		**10-M**	
METHOD	**-**	**+**	**-**	**+**	**-**	**+**
Meridian ImmunoCard STAT Crypto/Giardia	24	0	24	0	21	3
Meridian Merifluor Crypto/Giardia	18	0	18	0	17	1
Remel ProspecT Cryptosporidium EIA	21	0	21	0	20	1
Remel Xpect Cryptosporidium	1	0	1	0	1	0
Remel Xpect Giardia/Cryptosporidium	5	0	5	0	5	0
TechLab/Wampole Test EIA	5	0	5	0	5	0

Giardia	**10-K**		**10-L**		**10-M**	
METHOD	**-**	**+**	**-**	**+**	**-**	**+**
Meridian ImmunoCard STAT Crypto/Giardia	25	0	25	0	25	0
Meridian Merifluor Crypto/Giardia	14	0	14	0	14	0
Remel ProspecT Giardia EIA	26	0	26	0	26	0
Remel ProSpect Giardia EZ	2	0	2	0	2	0
Remel Xpect Giardia	2	0	2	0	2	0
Remel Xpect Giardia/Cryptosporidium	5	0	5	0	5	0
TechLab/Wampole Test EIA	8	0	8	0	8	0

Distribution of Scores

Score	# of labs	% of labs
100	109	86
90-99	1	1
80-89	12	9
70-79	2	2
60-69	2	2
0	1	1

Answer Key

Sample	Correct Answer	Points
10-K	*Hymenolepis nana*	20
10-L	*Stongyloides stercoralis*	20
10-M	*Fasciola hepatica*	20
10-N	No Parasites Seen	20
10-O	*Plasmodium falciparum*	20

TOTAL POSSIBLE POINTS 100

Grading

The answer key was derived from the response of all participating laboratories as per **CLIA Regulations**, Part 493, Subpart I, Section 493.917. These regulations can be viewed at wwwn.cdc.gov/clia/regs/toc.aspx These regulations state that 80% or more of participating laboratories **or** referee laboratories must identify the parasite for it to be correct. Similarly, reporting of a parasite identified by less than 10% of the participating laboratories **or** referees is an incorrect response. Organisms reported by more than 10% but less than 80% of the participating laboratories **or** referees are "Unauthenticated", and are not considered for grading.

Each sample has a maximum value of 20 points. Credit is given according to the formula:

(# of Correct Responses/ (# of Correct Responses + # of Incorrect Answers)) X 100

Important Reminders

The mailout dates for Parasitology have been changed from the first Monday of February, June, and October to the first Tuesday.

The next Parasitology Proficiency Test is scheduled for **February 1, 2011.** You are responsible for notifying us **before February 8, 2011** if you do not receive your samples. Proficiency test results must be electronically submitted through EPTRS by **February15, 2011** in order to receive a score. These requirements are stated in the NYS Proficiency Testing Handbook provided by the NYS Clinical Laboratory Evaluation Program or can be accessed via the Internet at:

http://www.wadsworth.org/labcert/clep/ProgramGuide/pg.htm

News and Notes

Beginning with the February 2009 proficiency exam, the **grading policy changed**. In order to make the score on the NYS Parasitology PT exam more accurately reflect laboratory performance, and be more consistent across categories, a new scoring system was put into effect. Under the new scoring system, grades are based only on the specimen or organism types processed by your laboratory.