

TABLE 245e-3 PROTOZOAL INFECTIONS

Parasite	Geographic Distribution	Life-Cycle Hosts		Parasite Stage	Body Fluid or Tissue	Diagnosis	
		Intermediate (Transmission)	Definitive			Serologic Tests	Other
Intestinal Protozoans							
<i>Entamoeba histolytica</i> (amebiasis)	Worldwide, especially tropics	Fecal-oral	Humans	Troph, cyst	Feces, liver	EIA, antigen detection	Ultrasound, liver CT, PCR
<i>Giardia lamblia</i> (giardiasis)	Worldwide	Fecal-oral	Humans	Troph, cyst	Feces	Antigen detection	DFA, PCR
<i>Isospora belli</i>	Worldwide	Fecal-oral	Humans	Oocyst	Feces	—	Acid-fast ^a
<i>Cryptosporidium</i>	Worldwide	Fecal-oral	Humans, other animals	Oocyst	Feces	Antigen detection	Acid-fast, ^a DFA, biopsy, PCR
<i>Cyclospora cayentanensis</i>	Worldwide?	Fecal-oral	Humans, other animals?	Oocyst	Feces	—	Acid-fast, ^a modified safranin, autofluorescence, biopsy, PCR
Microsporidia: <i>Enterocytozoon bieneusi</i> , <i>Encephalitozoon</i> spp. (microsporidiosis)	Worldwide?	?	Animals, humans	Spore	Feces	—	Modified trichrome, biopsy, PCR
Free-Living Amebas							
<i>Naegleria</i>	Worldwide	Warm water	Humans	Troph, cyst	CNS, nares	DFA	Biopsy, nasal swab, culture
<i>Acanthamoeba</i>	Worldwide	Soil, water	Humans	Troph, cyst	CNS, skin, cornea	DFA	Biopsy, scrapings, culture
<i>Balamuthia</i>	The Americas	Soil?	Humans, other animals	Troph, cyst	Brain	DFA	Biopsy, PCR
Blood and Tissue Protozoans							
<i>Plasmodium</i> spp. (malaria)	Subtropics and tropics	Mosquitoes	Humans	Asexual	Blood	RDT	PCR
<i>Babesia microti</i> (babesiosis)	U.S., especially New England	Ticks	Rodents, humans	Asexual	Blood	IIF	Risk in asplenia, PCR
<i>Trypanosoma rhodesiense</i> (African sleeping sickness)	Sub-Saharan East Africa	Tsetse flies	Humans, herbivores	Tryp	Blood, CSF	IIF ^b	Also chancre, lymph nodes
<i>T. gambiense</i> (African sleeping sickness)	Sub-Saharan West Africa	Tsetse flies	Humans, swine	Tryp	Blood, CSF	Card agglutination, ^c IIF ^b	Also chancre, lymph nodes
<i>T. cruzi</i> (Chagas' disease)	Mexico to South America	Reduviid bugs (triatomes)	Humans, dogs, wild animals	Amastigote, trypanosome	Multiple organs/blood	IIF, EIA	Reactivation in immunosuppression
<i>Leishmania tropica</i> , etc.	Widespread in tropics and subtropics	Sandflies (<i>Phlebotomus</i>)	Humans, dogs, rodents	Amastigote	Skin	IFA, EIA ^d	Biopsy, scrapings, culture
<i>L. braziliensis</i> (mucocutaneous)	Mexico to South America	Sandflies (<i>Lutzomyia</i>)	Humans, dogs, rodents	Amastigote	Skin, mucous membranes	IFA ^b , EIA	Biopsy, scrapings, culture
<i>L. donovani</i> (kala-azar)	Widespread in tropics and subtropics	Sandflies (<i>Phlebotomus</i>)	Humans, dogs, wild animals	Amastigote	RE system	IFA ^b , EIA	Biopsy, culture, PCR
<i>Toxoplasma gondii</i> (toxoplasmosis)	Worldwide	Humans, other mammals	Cats	Cyst, trophozoite	CNS, eye, muscles, other	EIA, IIF	PCR

^aAcid-fastness is best demonstrated by auramine fluorescence or modified acid-fast stain. ^bContact the CDC at 404-718-4100. ^cCard agglutination is provided to endemic countries by the World Health Organization. ^dLimited specificity; most sensitive for *L. donovani*.

Abbreviations: CNS, central nervous system; CSF, cerebrospinal fluid; DFA, direct fluorescent antibody; EIA, enzyme immunoassay; IFA, indirect fluorescent antibody; IIF, indirect immunofluorescence; PCR, polymerase chain reaction; RDT, rapid detection test; RE, reticuloendothelial; troph, trophozoite; trypan, trypanomastigote form.

for the diagnosis of schistosomiasis, and punch biopsy of skin lesions for the identification and culture of cutaneous and mucocutaneous species of *Leishmania* are simple procedures, but the diagnosis can be missed if the specimens are improperly obtained or processed.

NONSPECIFIC TESTS

Eosinophilia (>500/ μ L) commonly accompanies infections with most of the tissue helminths; absolute numbers of eosinophils may be high in trichinellosis and the migratory phases of filariasis (Table 245e-7).

Intestinal helminths provoke eosinophilia only during pulmonary migration of the larval stages. Eosinophilia is not a manifestation of protozoal infections. Parasitic causes of eosinophilia in cerebrospinal fluid include nematodes (e.g., *Angiostrongylus*, *Gnathostoma*, *Toxocara*, and *Baylisascaris* species) as well as flatworms (e.g., *T. solium* and *Schistosoma* species).

Like the hypochromic microcytic anemia of heavy hookworm infections, other nonspecific laboratory abnormalities may suggest parasitic infection in patients with appropriate geographic and/or environmental exposures. Biochemical evidence of cirrhosis or an