

**TAPEWORM infection**

| Drug  | Adult dosage   | Pediatric dosage  |
|---|--|---|
| – <b>Adult</b> (intestinal stage)   |  |   |
| <b>Diphyllobothrium latum</b> (fish), <b>Taenia saginata</b> (beef), <b>Taenia solium</b> (pork), <b>Dipylidium caninum</b> (dog) |  |   |
| Drug of choice: Praziquantel <sup>1,2</sup>   | 5-10 mg/kg PO once   | 5-10 mg/kg PO once  |
| Alternative: Niclosamide <sup>3*</sup>  | 2 g PO once  | 50 mg/kg PO once  |
| <b>Hymenolepis nana</b> (dwarf tapeworm)  |  |   |
| Drug of choice: Praziquantel <sup>1,2</sup>   | 25 mg/kg PO once   | 25 mg/kg PO once  |
| Alternative: Nitazoxanide <sup>1,4</sup>  | 500 mg PO once/d or bid x 3d <sup>5</sup>                              | 1-3yrs: 100 mg PO bid x 3d <sup>5</sup><br>4-11yrs: 200 mg PO bid x 3d <sup>5</sup> |
| – <b>Larval</b> (tissue stage)  |  |   |
| <b>Echinococcus granulosus</b> (hydatid cyst)   |  |   |
| Drug of choice: <sup>6</sup> Albendazole <sup>7</sup>   | 400 mg PO bid x 1-6mos   | 15 mg/kg/d (max. 800 mg) x 1-6mos   |
| <b>Echinococcus multilocularis</b>  |  |   |
| Treatment of choice: See footnote 8   |  |   |
| <b>Taenia solium</b> ( <i>Cysticercosis</i> )   |  |   |
| Treatment of choice: See footnote 9   |  |   |
| Alternative: Albendazole <sup>7</sup>   | 400 mg PO bid x 8-30d; can be repeated as necessary                    | 15 mg/kg/d (max. 800 mg) PO in 2 doses x 8-30d; can be repeated as necessary        |
| OR Praziquantel <sup>1,2</sup>  | 100 mg/kg/d PO in 3 doses x 1 day then 50 mg/kg/d in 3 doses x 29 days | 100 mg/kg/d PO in 3 doses x 1 day then 50 mg/kg/d in 3 doses x 29 days              |

\* Availability problems. See table below.

- Not FDA-approved for this indication.
- Praziquantel should be taken with liquids during a meal.
- Niclosamide must be chewed thoroughly before swallowing and washed down with water.
- Nitazoxanide may be effective against a variety of protozoan and helminth infections (DA Bobak, *Curr Infect Dis Rep* 2006; 8:91; E Diaz et al, *Am J Trop Med Hyg* 2003; 68:384). It was effective against mild to moderate amebiasis, 500 mg bid x 3d, in a recent study (JF Rossignol et al, *Trans R Soc Trop Med Hyg* 2007 Oct; 101:1025 E pub 2007 July 20). It is FDA-approved only for treatment of diarrhea caused by *Giardia* or *Cryptosporidium* (*Med Lett Drugs Ther* 2003; 45:29). Nitazoxanide is available in 500-mg tablets and an oral suspension; it should be taken with food.
- JO Juan et al, *Trans R Soc Trop Med Hyg* 2002; 96:193; JC Chero et al, *Trans R Soc Trop Med Hyg* 2007; 101:203; E Diaz et al, *Am J Trop Med Hyg* 2003; 68:384.
- Patients may benefit from surgical resection or percutaneous drainage of cysts. Praziquantel is useful preoperatively or in case of spillage of cyst contents during surgery. Percutaneous aspiration-injection-reaspiration (PAIR) with ultrasound guidance plus albendazole therapy has been effective for management of hepatic hydatid cyst disease (RA Smego, Jr. et al, *Clin Infect Dis* 2003; 37:1073; S Nepalia et al, *J Assoc Physicians India* 2006; 54:458; E Zerem and R Jusufovic *Surg Endosc* 2006; 20:1543).
- Albendazole must be taken with food; a fatty meal increases oral bioavailability.
- Surgical excision is the only reliable means of cure. Reports have suggested that in nonresectable cases use of albendazole (400 mg bid) can stabilize and sometimes cure infection (P Craig, *Curr Opin Infect Dis* 2003; 16:437; O Lidove et al, *Am J Med* 2005; 118:195).
- Initial therapy for patients with inflamed parenchymal cysticercosis should focus on symptomatic treatment with anti-seizure medication (LS Yancey et al, *Curr Infect Dis Rep* 2005; 7:39; AH del Brutto et al, *Ann Intern Med* 2006; 145:43). Patients with live parenchymal cysts who have seizures should be treated with albendazole together with steroids (dexamethasone 6 mg/d or prednisone 40-60 mg/d) and an anti-seizure medication (HH Garcia et al, *N Engl J Med* 2004; 350:249). Patients with subarachnoid cysts or giant cysts in the fissures should be treated for at least 30d (JV Proaño et al, *N Engl J Med* 2001; 345:879). Surgical intervention (especially neuroendoscopic removal) or CSF diversion followed by albendazole and steroids is indicated for obstructive hydrocephalus. Arachnoiditis, vasculitis or cerebral edema is treated with prednisone 60 mg/d or dexamethasone 4-6 mg/d together with albendazole or praziquantel (AC White, Jr., *Annu Rev Med* 2000; 51:187). Any cysticercocidal drug may cause irreparable damage when used to treat ocular or spinal cysts, even when corticosteroids are used. An ophthalmic exam should always precede treatment to rule out intraocular cysts.

Information provided by The Medical Letter. For a copy of the entire **Drugs for Parasitic Infections** article, go to: [www.medicalletter.org/parasitic\\_cdc](http://www.medicalletter.org/parasitic_cdc)

**MANUFACTURERS OF DRUGS USED TO TREAT PARASITIC INFECTIONS**

- albendazole – *Albenza* (GlaxoSmithKline)
- Albenza* (GlaxoSmithKline) – albendazole
- Alinia* (Romark) – nitazoxanide
- Ambisome* (Gilead) – amphotericin B, liposomal
- amphotericin B – *Fungizone* (Apothecon), others
- amphotericin B, liposomal – *Ambisome* (Gilead)
- Ancobon* (Valeant) – flucytosine
- § *Antiminth* (Pfizer) – pyrantel pamoate
- *Aralen* (Sanofi) – chloroquine HCl and chloroquine phosphate
- § artemether – *Artenam* (Arenco, Belgium)
- § artemether/lumefantrine – *Coartem*, *Riamet* (Novartis)
- § *Artenam* (Arenco, Belgium) – artemether
- § artesunate – (Guilin No. 1 Factory, People's Republic of China)
- atovaquone – *Mepron* (GlaxoSmithKline)
- atovaquone/proguanil – *Malarone* (GlaxoSmithKline)
- azithromycin – *Zithromax* (Pfizer), others
- *Bactrim* (Roche) – TMP/Sulfa
- § benznidazole – *Rochagan* (Brazil)
- *Biaxin* (Abbott) – clarithromycin
- § *Biltricide* (Bayer) – praziquantel
- † bithionol – *Bitin* (Tanabe, Japan)
- † *Bitin* (Tanabe, Japan) – bithionol
- § *Brolene* (Aventis, Canada) – propamidine isethionate
- chloroquine HCl and chloroquine phosphate – *Aralen* (Sanofi), others
- clarithromycin – *Biaxin* (Abbott), others
- *Cleocin* (Pfizer) – clindamycin
- clindamycin – *Cleocin* (Pfizer), others
- Coartem* (Novartis) – artemether/lumefantrine
- crotamiton – *Eurax* (Westwood-Squibb)
- dapsone – (Jacobus)
- § *Daraprim* (GlaxoSmithKline) – pyrimethamine USP
- † diethylcarbamazine citrate (DEC) – *Hetrazan*
- *Diflucan* (Pfizer) – fluconazole
- § diloxanide furoate – *Furamide* (Boots, United Kingdom)
- doxycycline – *Vibramycin* (Pfizer), others
- eflornithine (Difluoromethylornithine, DFMO) – *Ornidyl* (Aventis)
- § *Egaten* (Novartis) – triclabendazole
- Elimite* (Allergan) – permethrin
- Ergamisol* (Janssen) – levamisole
- Eurax* (Westwood-Squibb) – crotamiton
- *Flagyl* (Pfizer) – metronidazole
- § *Flisint* (Sanofi-Aventis, France) – fumagillin
- fluconazole – *Diflucan* (Pfizer), others
- flucytosine – *Ancobon* (Valeant)
- § fumagillin – *Flisint* (Sanofi-Aventis, France)
- *Fungizone* (Apothecon) – amphotericin
- § *Furamide* (Boots, United Kingdom) – diloxanide furoate
- § furazolidone – *Furozone* (Roberts)
- § *Furozone* (Roberts) – furazolidone
- † *Germanin* (Bayer, Germany) – suramin sodium
- § *Glucantime* (Aventis, France) – meglumine antimonate
- † *Hetrazan* – diethylcarbamazine citrate (DEC)
- Humatin* (Monarch) – paromomycin
- § *Impavido* (Zentaris, Germany) – miltefosine

(continued)

- iodoquinol – *Yodoxin* (Glenwood), others  
itraconazole – *Sporanox* (Janssen-Ortho), others  
ivermectin – *Stromectol* (Merck)  
ketoconazole – *Nizoral* (Janssen), others  
† *Lampit* (Bayer, Germany) – nifurtimox  
*Lariam* (Roche) – mefloquine  
§ *Leshcutan* (Teva, Israel) – topical paromomycin  
levamisole – *Ergamisol* (Janssen)  
lumefantrine/artemether – *Coartem, Riamet* (Novartis)  
*Malarone* (GlaxoSmithKline) – atovaquone/proguanil  
malathion – *Ovide* (Medicis)  
mebendazole – *Vermox* (McNeil), others  
mefloquine – *Lariam* (Roche)  
§ meglumine antimonate – *Glucontime* (Aventis, France)  
† melarsoprol – *Mel-B*  
† *Mel-B* – melarsoprol  
*Mepron* (GlaxoSmithKline) – atovaquone  
metronidazole – *Flagyl* (Pfizer), others  
§ miconazole – *Monistat i.v.*  
§ miltefosine – *Impavido* (Zentaris, Germany)  
§ *Monistat i.v.* – miconazole  
*NebuPent* (Fujisawa) – pentamidine isethionate  
§ niclosamide – *Yomesan* (Bayer, Germany)  
† nifurtimox – *Lampit* (Bayer, Germany)  
nitazoxanide – *Alinia* (Romark)  
*Nix* (GlaxoSmithKline) – permethrin  
• *Nizoral* (Janssen) – ketoconazole  
§ ornidazole – *Tiberal* (Roche, France)  
*Ornidyl* (Aventis) – eflornithine (Difluoromethylornithine, DFMO)  
*Ovide* (Medicis) – malathion  
§ oxamniquine – *Vansil* (Pfizer)  
§ *Paludrine* (AstraZeneca, United Kingdom) – proguanil  
paromomycin – *Humatin* (Monarch); *Leshcutan* (Teva, Israel; topical formulation not available in US)  
*Pentam 300* (Fujisawa) – pentamidine isethionate  
pentamidine isethionate – *Pentam 300* (Fujisawa), *NebuPent* (Fujisawa)  
† *Pentostam* (GlaxoSmithKline, United Kingdom) – sodium stibogluconate  
permethrin – *Nix* (GlaxoSmithKline), *Elimite* (Allergan)  
§ praziquantel – *Biltricide* (Bayer)  
primaquine phosphate USP  
§ proguanil – *Paludrine* (AstraZeneca, United Kingdom)  
proguanil/atovaquone – *Malarone* (GlaxoSmithKline)  
§ propamidine isethionate – *Brolene* (Aventis, Canada)  
§ pyrantel pamoate – *Antiminth* (Pfizer)  
pyrethrins and piperonyl butoxide – *RID* (Pfizer), others  
§ pyrimethamine USP – *Daraprim* (GlaxoSmithKline)  
*Qualaquin* – quinine sulfate (Mutual Pharmaceutical Co/AR Scientific)  
quinacrine  
\* quinidine gluconate (Eli Lilly)  
§ quinine dihydrochloride  
quinine sulfate – *Qualaquin* (Mutual Pharmaceutical Co/AR Scientific)  
*Riamet* (Novartis) – artemether/lumefantrine  
• *RID* (Pfizer) – pyrethrins and piperonyl butoxide  
• *Rifadin* (Aventis) – rifampin  
rifampin – *Rifadin* (Aventis), others  
§ *Rochagan* (Brazil) – benznidazole  
\* *Rovamycin* (Aventis) – spiramycin  
† sodium stibogluconate – *Pentostam* (GlaxoSmithKline, United Kingdom)  
\* spiramycin – *Rovamycin* (Aventis)  
• *Sporanox* (Janssen-Ortho) – itraconazole  
*Stromectol* (Merck) – ivermectin  
sulfadiazine – (Eon)  
† suramin sodium – *Germanin* (Bayer, Germany)  
§ *Tiberal* (Roche, France) – ornidazole  
*Tindamax* (Mission) – tinidazole  
tinidazole – *Tindamax* (Mission)  
TMP/Sulfa – *Bactrim* (Roche), others  
§ triclabendazole – *Egaten* (Novartis)  
§ *Vansil* (Pfizer) – oxamniquine  
• *Vermox* (McNeil) – mebendazole  
• *Vibramycin* (Pfizer) – doxycycline  
• *Yodoxin* (Glenwood) – iodoquinol  
• *Yomesan* (Bayer, Germany) – niclosamide  
• *Zithromax* (Pfizer) – azithromycin

\* Available in the US only from the manufacturer.

§ Not available commercially. It may be obtained through compounding pharmacies such as Panorama Compounding Pharmacy, 6744 Balboa Blvd, Van Nuys, CA 91406 (800-247-9767) or Medical Center Pharmacy, New Haven, CT (203-688-6816). Other compounding pharmacies may be found through the National Association of Compounding Pharmacies (800-687-7850) or the Professional Compounding Centers of America (800-331-2498, [www.pccarx.com](http://www.pccarx.com)).

† Available from the CDC Drug Service, Centers for Disease Control and Prevention, Atlanta, Georgia 30333; 404-639-3670 (evenings, weekends, or holidays: 770-488-7100).

• Also available generically.