Anti-helminthics Summary

Drug	MOA	Uses	Side Effects	Notes
luminal amebicides (Diloxanide furoate, Iodoquinol, Paromomycin)		-Treatment of Asymptomatic Ameba Intestinal Infection (asymptomatic carries) -Therapy with a luminal amebicide is also required in the treatment of all other forms of amebiasis		
Metronidazole	The nitro group of metronidazole is reduced in anaerobic bacteria and sensitive protozoans. It inhibits nucleic acid synthesis by disrupting the DNA of microbial cells *This only occurs when metronidazole is partially reduced,	-Drug of choice in the treatment of: Extraluminal amebiasis Giardiasis Trichomoniasis - The drug of choice in the treatment of all tissue infections with E histolytica (hepatic abscess; intestinal wall/ extraintestinal infections) -Treatment of choice for Amebic Colitis (combined with a luminal amebicide)	-**Common**: Nausea, headache, dry mouth, metallic taste. -**Infrequent**: vomiting, diarrhea, insomnia, weakness, dizziness, thrush, rash, dysuria, dark urine, vertigo, paresthesias, and neutropenia. -**Rare:** Pancreatitis and severe central nervous system toxicity (ataxia, encephalopathy, seizures)	-Oral metronidazole is readily absorbed. -Half-life 7.5 hours -Because this reduction usually happens only in anaerobic cells, it has relatively little effect upon human cells or aerobic bacteria -Not effective against luminal parasites and so must be used with a luminal amebicide to ensure eradication of the infection. -Kills trophozoites but not cysts -Metronidazole has a disulfiram -like effect. -Avoided in pregnant or nursing women, although congenital abnormalities have not clearly been associated with use in humans.
Tinidazole	Same MOA as metronidazole	-Similar activity as metronidazole - The drug of choice in the treatment of all tissue infections with E histolytica (hepatic abscess; intestinal wall/ extraintestinal infections)	-Same as metronidazole but is better tolerated and has better toxicity profile	-Oral tinidazole is readily absorbed. -Half-life 12–14 hours. -Not effective against luminal parasites and so must be used with a luminal amebicide to ensure eradication of the infection. -Kills trophozoites but not cysts
Tetracyclines & erythromycin		-Alternative drugs for moderate colitis but are not effective against extra-intestinal disease		

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Dehydro-emetine or emetine		-For treatment of amebic colitis - Effective against tissue trophozoites ofE histolytica -Their use is limited to severe amebiasis when metronidazole cannot be used.	- Pain, tenderness, and sterile abscesses at the injection site; diarrhea, nausea, and vomiting; muscle weakness and discomfort. -Serious toxicities include cardiac arrhythmias, heart failure, and hypotension.	- Emetine, an alkaloid derived from ipecac. -Dehydroemetine, a synthetic analog. - Used for the minimum period needed to relieve severe symptoms (3–5 days) and should be administered S. C. (preferred) or I.M -These drugs are best avoided because of toxicity.
Iodoquinol		-Luminal amebicide, but not against intestinal wall or extraintestinal trophozoites	-**Infrequent:** Diarrhea , anorexia, nausea, vomiting, abdominal pain, headache, rash, and pruritus. -Should be discontinued if it produces persistent diarrhea or signs of iodine toxicity (dermatitis, urticaria, pruritus, fever)	-90% is excreted in the feces. -Taken with meals to limit gastrointestinal toxicity. -Used with caution in patients with optic neuropathy, renal or thyroid disease, or nonamebic hepatic disease.
Diloxanide Furoate	-Unknown	-Drug of choice for asymptomatic luminal infections. - Not active against tissue trophozoites. -Used with a tissue amebicide, usually metronidazole, to treat serious intestinal & extraintestinal infections.	-Flatulence is common, nausea & abdominal cramps are infrequent & rashes are rare	-In the gut, it splits into diloxanide and furoic acid; about 90% of the diloxanide is rapidly absorbed (the unabsorbed diloxanide is the active antiamebic)
Paromomycin Sulfate		-It is used only as a luminal amebicide and has no effect against extraintestinal amebic infections. - Parenteral paromomycin is now used to treat visceral leishmaniasis	- Occasional abdominal distress & diarrhea.	-Aminoglycoside antibiotic that is not absorbed from the gastrointestinal tract.

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Albendazole	inhibits microtubule synthesis in nematodes that irreversibly impairs glucose uptake, intestinal parasites are immobilized and die slowly	-Broad spectrum. -Drug of choice for hydatid disease & cystecercosis. - also used for (intestinal nematodes) pinworm, hookworm. -Drug of choice for Hydated diseases - Neurocysticercosis: used along with cotricosteroid to decrease the inflammation caused by dying organism	-Short term use: no significant adverse effects. -long term use: abdominal distress, headache ,fever , fatigue, alopecia , increased liver enzymes , pancytopenia. (low level of all blood cells produced by the bone marrow). -Not given during pregnancy & in hypersensitive people.	-Taken orally -Absorbed erratically, increased with fatty meal -Metabolized in the liver to active metabolite albendazole sulphoxide -Half life of 8-12 hours -Used on empty stomach for intraluminal parasites but with fatty meal when against tissue parasites
Mebendazole	inhibits microtubule synthesis, irreversibly impairs glucose uptake. Intestinal parasites are immobilized & die slowly.	- Has wider spectrum than albendazole -Kills hook worm, pin worm , ascariasis and trichuriasis.	-Short term therapy: mild GI disturbance. -High dose: Hypersensitivity reactions, agranulocytosis (rare) , alopecia ,elevation of liver enzymes . *Caution under 2ys of age may cause convulsion.	-More safe than albendazole - Less than 10% of drug is absorbed Absorption increases with fatty meal. -Converted to inactive metabolites rapidly in liver. -Half life of 2-6 hours -Given orally before or after meals, tablets should be chewed before swallowing
Pyrantel Pamoate	A neuromuscular blocker, causes paralysis of worms, which is followed by expulsion.	- Broad-spectrum antihelminthic, highly effective for pinworm, ascaris & Trichostrongylus orientalis infections and moderately effective against hookworm. - Effective in intestinal tract, not in the tissues or the ova		- Given orally once with or without food. -For pinworm, the dose is repeated in 2 weeks. -For ascariasis, a single dose be repeated if eggs are found 2 weeks after treatment. -For hookworm, a single dose is effective against light infections. -In heavy infections, a 3-day course. -A course of treatment can be repeated in 2 weeks.

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Piperazine	- Causes paralysis of ascaris by blocking ACh at the myoneural junction.	- Only recommended for the treatment of ascariasis.	-Generally mild (5–30%) nausea, vomiting, diarrhea, abdominal pain, dizziness, & headache. -Neurotoxicity & allergic reactions are rare.	-Readily absorbed orally and excreted unchanged in urine. -Given orally once daily for 2 days. -For heavy infections treatment is repeated after 1 wk.
Niclosamide	- Adult worms (but not ova) are rapidly killed, due to inhibition of oxidative phosphorylation or stimulation of ATPase activity.	- Used for the treatment of most tapeworm infections.	Mild, infrequent and transitory GI disturbance	- Niclosamide is a salicylamide derivative. -Minimally absorbed from the GIT -2g once, given in the morning on an empty stomach. The tablets must be chewed thoroughly and then swallowed with water. -Purgative needed
Diethylcarbamazine Citrate	immobilizes microfilariae and alters its surface structure, making them susceptible to destruction by host defense mechanism.	- Drug of choice for filariasis, Loa loa & tropical eosinophillia. -Microfiliariae are rapidly killed. Adult worms are killed slowly requiring several courses of treatment.	-Generally mild and transient, include headache, malaise, anorexia, weakness, nausea, vomiting, and dizziness. -As a result of the release of proteins from dying microfilariae or adult worms: fever, malaise, papular rash, headache, gastrointestinal symptoms, cough, chest pain, and muscle or joint pain. -**Leukocytosis** is common (white blood cell count above the normal range in the blood). -**Eosinophilia** (abnormally high amounts of eosinophils). -**Proteinuria** may also occur.	- Rapidly absorbed from gut, half-life of 2-3 hours , excreted in urine unchanged. -The mode of action against adult worms is unknown. *Caution when using diethylcarbamazine in patients with hypertension or renal disease.

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Doxycycline	-Doxycycline acts indirectly, by killing **Wolbachia**, an intracellular bacterial symbiont of filarial parasites.	-Has macrofilaricidal activity against Wuchereria bancrofti (lymphatic filariasis), and better activity than any other available drug against adult worms. -Active also against onchocerciasis (river blindness)		-It may be used for filariasis, both for treatment of active disease and in mass chemotherapy campaigns
Ivermectin	-**Strongyloidiasis**: A GABA agonists. Paralyzes nematodes, causing a flaccid paralysis in the worm. - **Onchocerciasis:** Microfilaricidal. It does not kill adult worms but blocks the release of microfilariae.	-Drug of choice for the treatment of onchocerciasis (river blindness) and for strongyloidiasis	**In strongyloidiasis**: -fatigue, dizziness, nausea, vomiting, abdominal pain, and rashes. **In onchocerciasi :** -Occurs in 5–30% ,generally mild due to the killing of microfilariae. -A more intense reaction in 1–3% A severe reaction in 0.1%, including high fever, hypotension, and bronchospasm. -Swellings and abscesses occasionally occur at 1–3 weeks at sites of adult worms. -Corneal opacities & eye lesions may develop several days after treatment.	- Microfilariae in the anterior chamber of the eye decrease slowly over months. Repeated doses have a low macrofilaricidal action and permanently reduce microfilaria production. - Does not cross the blood brain barrier in humans (therefore little CNS effects).
Bithionol	Unknown, bithionol may work by uncoupling oxidative phosphorylation, thus reducing the production of ATP in the helminthes.	-The drug of choice in the treatment of sheep liver fluke (Fasciolahepatica) and the second drug of choice in lung flukeP (aragonimus westermani).	-Generally mild (40% of patients) and include: diarrhea, abdominal cramps, anorexia, nausea, vomiting, dizziness, and headache. - Skin rashes may occur, a reaction to antigens released from dying worms.	
Praziquantel	It increases the permeability of cell membranes to calcium, resulting in paralysis, dislodgement, and death.	-Effective in schistosoma infections of all species & most other trematode & cestode infections, including cysticercosis. - Useful in mass treatment of several infections.	- Mild and transient adverse effects, except for Neurocysticercosis due to inflammatory reactions around dying parasites.	-Safe and effective as a single oral dose. - Plasma concentrations of it increase when it is taken with a high-carbohydrate meal

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Metrifonate	**Organophosphate cholinesterase inhibitor** temporarily paralyzes the adult worms, resulting in their shift from the bladder venous plexus to small arterioles of the lungs, where they are trapped, encased by the immune system, and die.	- Safe, low-cost alternative drug for Schistosoma haematobium infections - A prophylactic agent when given monthly to children -Used in mass treatment programs		- Not active against S. mansoni or S. japonicum - Given three times orally at 14-day intervals
Oxamniquine	Unknown MOA: Contraction and paralysis of the worms results in detachment from terminal venules in the mesentery and transit to the liver, where many die. Surviving females return to the mesenteric vessels but cease to lay eggs	- Alternative to praziquantel for the treatment of S mansoni infections. - Used extensively for mass treatment -In mixed schistosome infections, it has been used in combination with metrifonate.		-Active against both mature and immature stages. -Not effective against S haematobium or S japonicum

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