4. Archibald LK, *et al.* Albendazole is effective treatment for chronic strongyloidiasis. *Q J Med* 1993; **86:** 191–5.
5. Pornsuriyasak P, *et al.* Disseminated strongyloidiasis successfully treated with extended duration ivermectin combined with albendazole: a case report of intractable strongyloidiasis. *Southeast Asian J Trop Med Public Health* 2004; **35:** 531–4.
6. Singthong S, *et al.* Randomized comparative trial of two high-dose albendazole regimens for uncomplicated human strongyloidiasis. *Southeast Asian J Trop Med Public Health* 2006; **37** (suppl 3): 32–4.

Toxocariasis. Albendazole is one of the drugs that might be used for the treatment of toxocariasis (p.139) and in a small study[1] it produced improvement similar to that achieved with tiabendazole but with fewer problems.

1. Stürchler D, *et al.* Thiabendazole vs albendazole in treatment of toxocariasis: a clinical trial. *Ann Trop Med Parasitol* 1989; **83:** 473–8.

Trichinosis. Albendazole may be effective in the treatment of trichinosis (p.139). A retrospective study in 44 patients with trichinosis comparing albendazole treatment with tiabendazole found that, while the two drugs were of comparable efficacy, albendazole was the better tolerated.[1] Albendazole has been used to treat a patient infected with *Trichinella pseudospiralis*, an organism related to *T. spiralis*, the usual cause of trichinosis.[2]

1. Cabié A, *et al.* Albendazole versus thiabendazole as therapy for trichinosis: a retrospective study. *Clin Infect Dis* 1996; **22:** 1033–5.
2. Andrews JRH, *et al.* Trichinella pseudospiralis in humans: description of a case and its treatment. *Trans R Soc Trop Med Hyg* 1994; **88:** 200–3.

Trichostrongyliasis. Albendazole in a single dose of 400 mg has been suggested[1] as an alternative to pyrantel embonate or mebendazole in the treatment of trichostrongyliasis (p.139).

1. Abramowicz M, ed. *Drugs for parasitic infections*. 1st ed. New Rochelle NY: The Medical Letter, 2007.

Trichuriasis. Albendazole is used in the treatment of trichuriasis (p.139). It is normally given in a single dose and is often used in mixed intestinal nematode infections.[1] However, it has been reported[1-3] that in children with mixed intestinal worm infections single doses of albendazole are ineffective in eliminating *Trichuris trichiura* and multiple doses are required to produce worthwhile reductions in egg production. Treatment for 3 days has been used[4] (but for a suggestion that such regimens may be associated with impaired growth in less heavily infected children, see Effects on Growth under Adverse Effects, above). Combined use of albendazole with ivermectin may prove useful.[5]

1. Hall A, Anwar KS. Albendazole and infections with Trichuris trichiura and Giardia intestinalis. *Southeast Asian J Trop Med Public Health* 1991; **22:** 84–7.
2. Hall A, Nahar Q. Albendazole and infections with Ascaris lumbricoides and Trichuris trichiura in children in Bangladesh. *Trans R Soc Trop Med Hyg* 1994; **88:** 110–12.
3. Albonico M, *et al.* A randomized controlled trial comparing mebendazole and albendazole against Ascaris, Trichuris and hookworm infections. *Trans R Soc Trop Med Hyg* 1994; **88:** 585–9.
4. Abramowicz M, ed. *Drugs for parasitic infections*. 1st ed. New Rochelle NY: The Medical Letter, 2007.
5. Ismail MM, Jayakody RL. Efficacy of albendazole and its combinations with ivermectin or diethylcarbamazine (DEC) in the treatment of Trichuris trichiura infections in Sri Lanka. *Ann Trop Med Parasitol* 1999; **93:** 501–4.

Preparations

USP 31: Albendazole Tablets.

Proprietary Preparations (details are given in Part 3)

Arg.: Vastus; ***Austral.:*** Eskazole; Zentel; ***Austria:*** Eskazole; ***Braz.:*** Alba-3; Albel; Alben†; Albendrox†; Albendy†; Albenix†; Albentel; Albenzonil; Albezin†; Alib†; Alin; Alzoben†; Bentiamin†; Benzol; Imavermil; Mebenix; Monozol; Neo Bendazol; Parasin; Parazol; Totelmin†; Verdazol†; Vermiclase; Vermital; Zentel; Zolben; Zoldan†; ***Chile:*** Ceprazol; Vermoil; Zentel; ***Cz.:*** Zentel; ***Fr.:*** Zentel; ***Ger.:*** Eskazole; ***Gr.:*** Eskazole; Zentel; ***India:*** Albezole; Bendex; Combantrin-A; Emanthal; Nemozole; Olworm; Zentel; ***Israel:*** Eskazole; ***Ital.:*** Zentel; ***Malaysia:*** Albendol; Champs D-Worms; Thelban†; Vemizol; Zentel; Zoben; ***Mex.:*** Albensil; Aldamin; Alfazol; Bendapar; Bradelmin; Dazocan; Dazolin; Dezabil; Digezanol; Entoplus; Eskazole; Euralben; Flatezol†; Gascop; Helmisons; Kolexan; Loveral; Lurdex; Olbendital; Rivazol; Serbendazol; Synparyn; Tenibex; Veranzol; Vermilan†; Vermin Plus; Vermisen; Zelfin; Zenaxin; Zentel; ***Neth.:*** Eskazole; ***Philipp.:*** Zentel; ***Pol.:*** Zentel; ***Port.:*** Zentel; ***Rus.:*** Nemozole (Немозол); ***S.Afr.:*** Bendex; Zentel; ***Singapore:*** Alzental; Zentel; ***Spain:*** Eskazole; ***Switz.:*** Zentel; ***Thai.:*** Abentel; Albatel; Alben; Albenda; Alda†; Alfuca; Alzol; Anthel†; Gendazel; Labenda; Leo-400; Manoverm; Masaworm†; Mesin; Mycotel; Vermixide; Zeben; Zela; Zentel; Zenzera; ***Turk.:*** Andazol; ***UAE:*** Albenda; ***USA:*** Albenza; ***Venez.:*** Albezol; Albicar; Bevindazol; Helal; Sostril; Taron; Vendazol; Zentel.

Multi-ingredient: ***Mex.:*** Oxal.

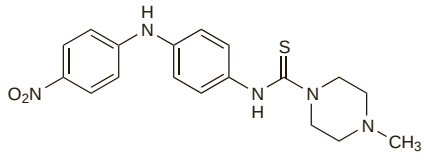
Amocarzine *(rINN)*

Amocarzina; Amocarzinum; CGP-6140. 4-Methyl-4′-(*p*-nitroanilino)thio-1-piperazinecarboxanilide.

Амокарзин

$C_{18}H_{21}N_5O_2S$ = 371.5.

CAS — 36590-19-9.



NOTE. Amocarzine has sometimes been referred to as thiocarbamazine.

Profile

Amocarzine is an antifilarial anthelmintic that is active against the adult worms of *Onchocerca volvulus.* It has been studied for the oral treatment of onchocerciasis (p.137).

◊ References.

1. Poltera AA, *et al.* Onchocercacidal effects of amocarzine (CGP 6140) in Latin America. *Lancet* 1991; **337:** 583–4.
2. Cooper PJ, *et al.* Onchocerciasis in Ecuador: evolution of chorioretinopathy after amocarzine treatment. *Br J Ophthalmol* 1996; **80:** 337–42.
3. Awadzi K, *et al.* The safety and efficacy of amocarzine in African onchocerciasis and the influence of ivermectin on the clinical and parasitological response to treatment. *Ann Trop Med Parasitol* 1997; **91:** 281–96.

Trivalent Antimony Compounds

Compuestos de antimonio trivalente.

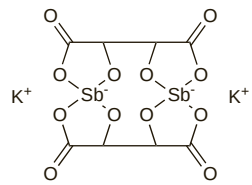
Antimony Potassium Tartrate

Antim. Pot. Tart.; Antimónico potásico, tartrato; Antymonu potasu winian; Brechweinstein; Kalii Stibyli Tartras; Potassium Antimonyltartrate; Stibii et Kalii Tartras; Tartar Emetic; Tartarus Stibiatus. Dipotassium bis{μ-[2,3-dihydroxybutanedioato(4-)-O^1,O^2:O^3,O^4]}-diantimonate(2-) trihydrate; Dipotassium bis[μ-tartrato(4-)]diantimonate(2-) trihydrate.

Антимонил-тартрат Калия

$C_8H_4K_2O_{12}Sb_2,3H_2O$ = 667.9.

CAS — 11071-15-1 (anhydrous antimony potassium tartrate); 28300-74-5 (antimony potassium tartrate trihydrate).



Pharmacopoeias. In *US*.

USP 31 (Antimony Potassium Tartrate). Odourless, colourless, transparent crystals or white powder. The crystals effloresce on exposure to air and do not readily rehydrate even on exposure to high humidity. Soluble 1 in 12 of water, 1 in 3 of boiling water, and 1 in 15 of glycerol; insoluble in alcohol. Its solutions are acid to litmus.

Antimony Sodium Tartrate

Antim. Sod. Tart.; Antimónico sódico, tartrato; Sodium Antimonyltartrate; Stibium Natrium Tartaricum. Disodium bis{μ-[2,3-dihydroxybutanedioato(4-)-O^1,O^2:O^3,O^4]}diantimonate(2-); Disodium bis{μ-[L-(+)-tartrato(4-)]}diantimonate(2-).

Антимонил-тартрат Натрия

$C_8H_4Na_2O_{12}Sb_2$ = 581.6.

CAS — 34521-09-0.

Pharmacopoeias. In *Int.* (as $C_4H_4NaO_7Sb$ = 308.8) and *US*.

USP 31 (Antimony Sodium Tartrate). Odourless, colourless, transparent crystals or white powder. The crystals effloresce on exposure to air. Freely soluble in water; insoluble in alcohol.

Sodium Stibocaptate *(BAN, rINN)*

Antimony Sodium Dimercaptosuccinate; Estibocaptato de sodio; Natrii Stibocaptas; Ro-4-1544/6; Sb-58; Stibocaptate; Stibocaptate de Sodium; TWSb/6. Antimony sodium *meso*-2,3-dimercaptosuccinate. The formula varies from $C_{12}H_{11}NaO_{12}S_6Sb_2$ = 806.1 to $C_{12}H_6Na_6O_{12}S_6Sb_2$ = 916.0.

Натрия Стибокаптат

CAS — 3064-61-7 ($C_{12}H_6Na_6O_{12}S_6Sb_2$).

Stibophen

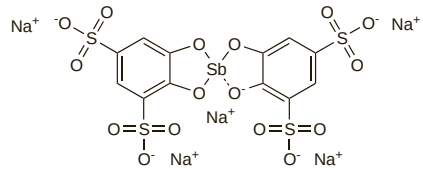
Estibofeno; Fouadin; Stibophenum. Bis[4,5-dihydroxybenzene-1,3-disulphonato(4–)-O^4,O^5]antimonate(5–) pentasodium heptahydrate.

Стибофен

$C_{12}H_4Na_5O_{16}S_4Sb,7H_2O$ = 895.2.

CAS — 15489-16-4 (stibophen heptahydrate).

ATC — P02BX03.



Adverse Effects and Treatment

Trivalent antimony compounds are more toxic than pentavalent antimonials such as sodium stibogluconate, possibly because they are excreted much more slowly. The most serious adverse effects are on the heart and liver. There are invariably ECG changes during treatment, but hypotension, bradycardia, and cardiac arrhythmias are more serious. Sudden death or cardiovascular collapse may occur at any time. Elevated liver enzyme values are common; liver damage with hepatic failure and death is more likely in patients with pre-existing hepatic disease.

Adverse effects immediately after intravenous use of trivalent antimonials, in particular the tartrates, have included coughing, chest pain, pain in the arms, vomiting, abdominal pain, fainting, and collapse, especially after rapid injection. Extravasation during injection is extremely painful because of tissue damage. An anaphylactoid reaction characterised by an urticarial rash, husky voice, and collapse has been reported after the sixth or seventh intravenous injection of a course of treatment.

Numerous less immediate adverse effects have occurred including gastrointestinal disturbances, muscular and joint pains, arthritis, pneumonia, dyspnoea, headache, dizziness, weakness, pruritus, skin rashes, facial oedema, fever, haemolytic anaemia, and kidney damage.

Large oral doses of antimony compounds have an emetic action. Continuous treatment with small doses of antimony may give rise to symptoms of subacute poisoning similar to those of chronic arsenical poisoning.

Treatment of severe poisoning with antimony compounds is similar to that for arsenic poisoning (p.2261); dimercaprol may be of benefit.

◊ References.

1. Stemmer KL. Pharmacology and toxicology of heavy metals: antimony. *Pharmacol Ther* 1976; **1:** 157–60.

Precautions

Trivalent antimony therapy has generally been superseded by less toxic treatment. It is contra-indicated in the presence of lung, heart, liver, or kidney disease. Intravenous injections should be given very slowly and stopped if coughing, vomiting, or substernal pain occurs; extravasation should be avoided.

Some antimony compounds such as the tartrates cause severe pain and tissue necrosis and should not be given by intramuscular or subcutaneous injection.

Breast feeding. The American Academy of Pediatrics[1] states that there have been no reports of any clinical effect on the infant associated with the use of antimony by breast-feeding mothers, and that therefore it may be considered to be usually compatible with breast feeding.

1. American Academy of Pediatrics. The transfer of drugs and other chemicals into human milk. *Pediatrics* 2001; **108:** 776–89. Correction. *ibid.*; 1029. Also available at: http://aappolicy.aappublications.org/cgi/content/full/pediatrics%3b108/3/776 (accessed 02/06/04)

Glucose-6-phosphate dehydrogenase deficiency. In the event of trivalent antimony compounds being used, patients with G6PD deficiency should be excluded. WHO lists stibophen[1] among the anthelmintics to be avoided in patients with this deficiency.

1. WHO. Glucose-6-phosphate dehydrogenase deficiency. *Bull WHO* 1989; **67:** 601–11.

Pharmacokinetics

Antimony compounds are poorly absorbed from the gastrointestinal tract. They are slowly excreted, mainly in the urine, after parenteral doses. Antimony accumulates in the body during treatment and persists for several months afterwards. Trivalent antimony has a greater affinity for cell proteins than for plasma proteins.

Uses and Administration

Trivalent antimony compounds were used in the treatment of the protozoal infection leishmaniasis until the advent of the less toxic pentavalent compounds. They continued to be used in the treatment of schistosomiasis, but have now been superseded by less toxic and more easily given drugs such as praziquantel.