The worm pill: antiparasitical treatment

basic gestalt v. 0.1

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On the sidelines, re-reading the novel "Crime and Punishment" by Dostoevsky, I came across this passage in the last pages - very curious because, even if imagined 155 years ago, it seems to adapt quite well to today's everyday

Was that what you were aiming for?

Fyodor Dostoevsky Crime and Punishment, 1866 - (Pevear & Volokhonsky Translation)

He had dreamed that the whole world was doomed to fall victim to some terrible, as yet unknown and unseen pestilence spreading to Europe from the depths of Asia.

Everyone was to perish, except for certain, very few, chosen ones. Some new trichinae had appeared, microscopic creatures that lodged themselves in men's bodies. But these creatures were spirits, endowed with reason and will. Those who received them into themselves immediately became possessed and mad.

But never, never had people considered themselves so intelligent and unshakeable in the truth as did these infected ones. Never had they thought their judgments, their scientific conclusions, their moral convictions and beliefs more unshakeable. Entire settlements, entire cities and nations would be infected and go mad.

Everyone became anxious, and no one understood anyone else; each thought the truth was contained in himself alone, and suffered looking at others, beat his breast, wept, and wrung his hands. They did not know whom or how to judge, could not agree on what to regard as evil, what as good. They did not know whom to accuse, whom to vindicate.

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Intestinal parasitic infections in homosexual men: prevalence, symptoms and factors in transmission

Can Med Assoc J. 1980 Sep 20;123(6):512-4.
J S Keystone, D L Keystone, E M Proctor PMID: 7437971 PMCID: PMC1704818

Table I—Prevalence of intestinal parasitic infection in homosexual and heterosexual men as determined by stool examination

Parasite	No. (and %) of men infected: Homosexual (n = 200)	Heterosexual (n = 100)
Entamoeba histolytica or *Giardia lamblia* or both*	73 (36.5)	4 (4)
Nonpathogenic protozoa†	61 (30.5)	12 (12)
Ascaris lumbricoides	1 (0.5)	-
Total	135 (67.5)‡	16 (16)

*Of the homosexual and heterosexual men 54 (27%) and 1 (1%) respectively were infected with *E. histolytica* and 26 (13%) and 3 (3%) were infected with *G. lamblia*.
†In order of decreasing frequency, *Endolimax nana, Entamoeba hartmanni, Entamoeba coli, Iodamoeba buetschlii* and *Dientamoeba fragilis*.
‡Difference significant at $P < 0.001$ by chi-square analysis.

Table II—Relation of symptoms to parasitic infection in the two groups*

Symptoms	No. (and %) of men: Homosexual Infected	Homosexual Uninfected	Heterosexual Infected	Heterosexual Uninfected
Present	79 (59)	34 (52)	1 (6)	9 (11)
Absent	56 (41)	31 (48)	15 (94)	75 (96)
Total	135 (100)	65 (100)	16 (100)	84 (100)

*By chi-square analysis there was no statistically significant correlation of symptoms with infection, but among the uninfected men there was a highly significant association ($P < 0.001$) of symptoms with homosexuality.

Table III—Relation of various factors to parasitic infection in the two groups

Sexual orientation and factor*	No. (and %) of men: Infected	Uninfected	Total
Heterosexual			
Foreign travel			
History	3 (12)	22 (88)	25 (100)
No history	13 (17)	62 (83)	75 (100)
Homosexual			
Foreign travel			
History	46 (70)	20 (30)	66 (100)
No history	89 (66)	45 (34)	134 (100)
Type of household			
Homosexual	68 (67)	33 (33)	101 (100)
Heterosexual	67 (68)	32 (32)	99 (100)
No. of sexual partners in previous 6 months			
0–1	11 (50)	11 (50)	22 (100)
> 10	44 (71)	18 (29)	62 (100)
Cleansing before anal sex			
Done	65 (61)	41 (39)	106 (100)
Not done	70 (74)	24 (26)	94 (100)

*The only factor significantly correlated ($P = 0.05$) with infection was a lack of cleansing before anal sex.

Herbal remedies

There are several plant-based remedies that are proposed for the treatment of parasites. One often proposed is a combination of black walnut hulls, wormwood and cloves. While I don't doubt the efficacy of this treatment it is important to note in which form the product is delivered.

The least effective are ground plants. Because here the active components are still retaining in a cell matrix that is hard to break. This is the same reason why we cook food. Without prior softening or breaking of the cell matrix, the active substances leach from the plant powders only slowly and absorption is often incomplete. The exception to this is when the plant powders are milled and sieved to a very fine dust.

Better are **standardised extracts**. These usually come in two forms. Either tinctures (plant extracted in aqueous alcohol) or dry extracts (where the solvent of the tincture has been evaporated until dry matter remains). Extracts are more potent and more reliable. Especially standardised extracts, which after lab analysis guarantee x amount of an active ingredient per fixed amount of extract.

In European folk medicine, three plants were especially used for their antiparasitical properties, and all three contain the same active substance (thujone). They are: wormwood (*Artemisia absinthium*), tansy (*Tanacetum vulgare*) and costmary (*Tanacetum balsamita*).


WORMWOOD Artemisia absinthium


TANSY Tanacetum vulgare


COSTMARY Tanacetum balsamita

WORMWOOD (*Artemisia absinthium*)

Wormwood contains bitter substances, tannins and essential oil. It is a component of the volatile essential oil, **thujone**, that is thought to be the main anti-parasitical agent. However, caution is advised as high doses of thujone are toxic, and reckless consumption of the pure essential oil has caused seizures and kidney failure (10 grams of oil was ingested, a huge overdose). Careful dosing should always be done, and especially if using the pure essential oil.

Wormwood contains a non-volatile bittering agent called absinthine, which is non-toxic but **extremely bitter**. Because of this, a tea made of wormwood is very hard to drink, near impossible, because of its extreme bitterness, and the use of a tincture or extract is preferred.

When using the powdered herb, 1 gram of plant powder in capsules, 3 times a day, is advised.

To prepare a tea, use 5 - 10 grams of the dried plant per liter of water. Drink 3 - 4 cups a day before meals (again, it is very bitter and hard to drink).

Using tincture of wormwood, the pharmacopeia states a dose of 1 gram (about 50 drops) 2 - 3 times a day, before meals. For the stronger liquid extract of wormwood, use 0.2 grams instead. If the essential oil is used, limit the dosage to 0.1 gram (about 5 drops) on a sugar cube.

A wine of absinthe can be prepared by macerating 30 grams of ground wormwood in 1 liter of wine, let it steep for 2 - 3 days. Drink up to 3 small glasses a day, always before the meals.

Strong alcoholic herbal liquors made from wormwood and related plants (absinthe, vermouth, chartreuse, genepi) share the antiparasitical action and can be used medicinally if used in moderation.

As a side-note, wormwood has been used as bittering spice in the brewing of beer in Germanic countries, and provides an excellent **non-estrogenic substitute** for hops.

Pregnant women should NOT use wormwood or any of its preparations.

TANSY (*Tanacetum vulgare*)

Tansy contains a volatile oil that is mainly composed of **thujone** (up to 70%) and **camphor**. Just like with the essential oil of wormwood, this oil is toxic in high dosage and care must be taken when using the pure essential oil internally.

When using the powdered flowertops, 2 - 4 grams of plant powder a day either in capsule, or mixed with honey or jam.

Better is to prepare an infusion by boiling 10 grams of dried flowertops per liter of water, and drink 2 - 3 cups of this per day.

In the case of rectal worms it is recommended next to drinking above tea, to also prepare an enema. This can be done by boiling 30 grams of flowertops in 1 liter of mildly salted water. Apply the enema every day for the duration of a week.

Instead of an enema, the dried extract of tansy can also be applied rectally (as a suppository) : 300 milligram extract every day for a week.

Pregnant women should NOT use tansy or any of its preparations.

Therapeutical dosage levels as described above are not harmful, but exaggerated dosages

can cause nausea, vomiting and diarrhea.

COSTMARY (*Tanacetum balsamita*)

Its use was very popular in Europe during the early to high middle ages, the plant contains an essential oil composed of **camphor** and **thujone** next to high levels of **menthone**. Making it the most pleasant tasting (minty flavored) compared to tansy and especially the bitter wormwood. The levels of thujone are usually somewhat lower than the former two, making it safer in use too.

An an infusion (tea), 2 - 8 grams of the dried plant can be taken per day, spread over the day.

OTHER HERBS TRADITIONALLY USED AGAINST PARASITES


EPAZOTE ; JESUIT'S TEA
(Chenopodium ambrosioides)


DALMATIAN PYRETHRUM
(Tanacetum cinerariifolium)


OLD WOMAN ; SEA-WORMWOOD
(Artemisia maritima)


COMMON MUGWORT
(Artemisia vulgaris)

EPAZOTE, JESUIT'S TEA (*Chenopodium ambrosioides*)

Originally a plant from Central and South-America, it has been introduced to the warmer regions of Europe. Epazote contains an essential oil with a turpentine-like odor, the main constituent of this oil (up to 70%) is an organic peroxide called **ascaridole**. Pure ascaridole, isolated from volatile oil has weak explosive qualities, and can detonate when heated and confined. Hence legal restrictions may apply on the commerce in this oil.

Chenopodium oil is toxic in high doses, and deaths have occured from overdoses. A maximum dosage of 0.5 - 1 gram a day, divided along three meals, should never be exceeded. When used with care the essential oil makes for a potent antiparasitical agent.

One pharmacopeia states to combat intestinal parasites, take 25 drops of essential oil (about 0.5 gram) twice a day, with 2 hours in between. Then 2 - 3 hours after the second dose, ingest 20 - 30 grams of castor oil or a similar laxative.

Another method calls for 5 - 10 drops of essential oil (usually on a sugar cube), 3 times a day, and this for 2 days. At the end of the second day, a laxative such as castor oil is taken.

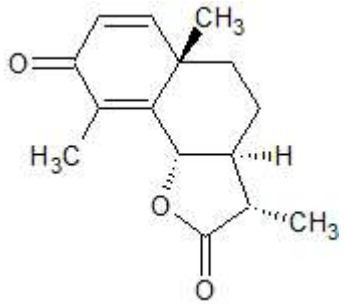
The treatment may only be repeated after 15 days, as there is a real danger for **accumulation**.

DALMATIAN PYRETHRUM (*Tanacetum cinerariifolium*)

Also called **Dalmatian chrysanthemum**, a plant native to Croatia. The flowers of this plant look like daisies. The powdered flowerheads and seedpots, and the oleoresin extract of these, were used as flea-powder and is an excellent insecticide, otherwise harmless for both warm- and cold-blooded animals (it is very toxic to bees though). Used internally, pyrethrum is pretty effective against tapeworms and most intestinal worms.

OLD WOMAN (*Artemisia maritima*)

Also called **sea-wormwood**, grows in salty soils, near the coastlines of the Old World. It possessed the same qualities as wormwood but less powerful. It is a bitter tonic and aromatic. The plant contains a unique sesquiterpenoid called **santonin**, that has strong antiparasitical action and was commonly used in medicine for this purpose up to the 1950s. It is not without side-effects however, a common one is disturbances of vision (yellow vision).



santonin

Also, importantly**, it must always be administred together with a laxative,** usually senna leaves**, so that the dead worms can be passed out**. Equally important is that the medicine is administred on an empty stomach, and fasting during its use (1 - 2 days) is highly

recommended.

Using the flowerheads is recommended over using pure santonin, as the plants contains next to this unique substance the same anthelminthic volatile oil as found in wormwood and tansy.

The powdered flowerheads are given to adults on an empty stomach: 10 - 20 grams a day as capsules or mixed into honey, jam or milk. One hour afterwards a laxative is taken (preferably senna tea, castor oil is not recommended in this case) to expel the dead worms.

An infusion (tea) of the flowerheads can also be prepared : 10 grams per liter water, add sugar, and drink multiple cups per day.

An enema can also be prepared from 10 - 50 grams of flowerheads per liter water, it is particularly effective to kill and remove pinworms.

A complete treatment lasts 2 - 3 days. The use of pure santonin in medicine is now considered surpassed by substances with less side-effects such as mebendazole and ivermectin. **Levant wormseed** (*Artemisia cina*) also contains santonin and can be substituted for sea-wormwood.

COMMON MUGWORT (*Artemisia vulgaris*)

Very common plant in Europe and Asia, and naturalized in America. Bitter and aromatic, its essential oil contains **cineole** and **thujone**. Traditionally used as a tonic, against fever, and against intestinal worms. Mugwort is comparable to wormwood in its properties, but somewhat less potent.

A tea is made using 1 teaspoon of dried herb per cup of water, several cups can be drank during the day.

As powder, 2 - 4 grams a day. As tincture or liquid extract, 1 - 2 grams a day.

When these therapeutic dosages are respected, there are no side-effects from common mugwort.

TURPENTINE

Turpentine is the volatile oil obtained by distillation of pine tar oleoresin, chiefly the lower boiling fraction. It consists mainly of **α-pinene** and **β-pinene**. Turpentine has several uses in industry, as paint thinner and wax solvent. Industrial-grade turpentine, the kind found in the

hardware store, should not be used for medicinal reasons. Also, an unrelated petroleum distillate called "white spirit" is sometimes sold as turpentine substitute under the name *te**r**pentine*, another reason to stay away from the hardware store product.

Turpentine suitable for medicinal purposes can be found as **100% pure gum spirits**. Where this is hard to obtain, a suitable substitute with similar chemical profile is the product sold as "essential oil of pine needles" (*Pinus sylvestris*) from aromatherapy supply houses.

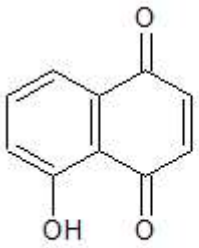
Turpentine has a long historical use as anti-parasitical agent, even back in pre-Norman Anglo-Saxon days (the days of king Alfred the Great) ingesting "ship tar" was recommended for use against intestinal worms. Ship tar being pine tar, the source of turpentine. When used medicinally, careful dosing is required, and the maximum dose of 1 TEAspoon must be respected. Lethal dose of turpentine had been known as low as 1 TABLEspoon in some people.

Start with a few drops to half a TEAspoon of turpentine dripped on a sugarcube. Do this once a day for 3-5 days. After this it can be repeated twice a week for up to a month. Wait at least 2 weeks before repeating the process. The turpentine dose can also be diluted in a bit of castor oil, the latter added as laxative.

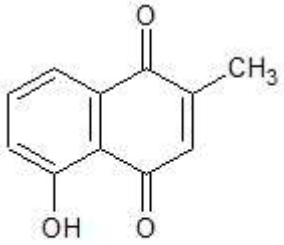
Adjuvant vermifuge plants

BLACK WALNUT (*Juglans nigra*)

Black walnut has been touted as a vermifuge (worm and parasite eliminator) for many years. Black walnut is considered to be an antiseptic, a germicide, a parasitic, and a laxative. The hull can be ground down into a fine powder and taken internally, or even better, taken as a tincture.



juglone
(black pigment)



plumbagin
(yellow pigment)

The active constituents are thought to be **tannins** and the quinone dyes **juglone** (black) and **plumbagin** (yellow). So if you use a tincture, the darker it is colored the better, the more active substances are in there.

If black walnut is not available the English walnut (*Juglans regia*) can be substituted, although it is less potent. if the English walnut is used, the blackened ripe fruits are the best source of juglone.

It is thought that juglone is especially active **against the parasites in the larvae stage**.

Excessive dosages of these quinone dyes are nowadays thought to be genotoxic and mutagenic, at least in mice. This should not be an issue when taking extracts of black walnut hulls in reasonable doses.

CLOVE (*Syzygium aromaticum* ; old name *Eugenia caryophyllata*)

Cloves are mainly used as spice, its characteristic odor being derived from **eugenol**, the main constituent of its volatile oil. Long used in traditional medicine, clove oil is effective especially against toothache. The oil of cloves is also believed **to be effective at killing parasite eggs** in the intestines, by weakening the protective coating around the worm's eggs.

Eugenol was found to promote apoptosis-like death in the parasite that causes Indian black fever (kala-azar). As a stand alone treatment, studies have shown the effectiveness of eugenol, often in clove essential oil form, against gastro-intestinal protozoan parasites and the parasitic flatworms that cause snail fever.

The essential oil of cloves can be used pure, or diluted in some olive oil (if the taste is too strong). When used undiluted clove oil might cause skin and mucous membrane irritation. Use up to 5 drops of clove oil diluted in a spoonful of olive oil, 3 - 4 times a day. Castor oil can also be used as diluent, taken into account its potent laxative action.

Cloves can also be smoked mixed with tobacco, clove cigarettes (**kretek**) are popular in

Indonesia.

A popular strategy by modern herbalists is **to combine the extracts of black walnut hulls, wormwood herb and cloves in one preparation, in order to attack all stages of the parasites: eggs, larvae and adult worms.**

Laxatives

ALEXANDRIAN SENNA (*Senna alexandrina* ; apothecary name *Cassia Officinalis*)

Native to North-Africa and India, and historically used in the form of senna pods, or as herbal tea made from the leaves, as a stimulant laxative. Standardized senna extract is still used for this reason in modern medicine, the active principles are called senna glycosides: **sennoside A and B**, they constitute about 3% of the leaves and pods.

Kayam churna is a **traditional Indian laxative** that contains senna leaves.

Kayam churna "gets shit done".

Senna leaves should be ingested as powder or an infusion (tea) can be prepared from them. The normal dosage is 1 - 2 grams, the laxative effects take place about 6 - 8 hours after

consumption, usually with only little cramps and belly-ache. Higher doses (up to 4 - 5 grams) are liable to cause diarrhea combined with painful abdominal cramps.

A liquid extract of senna can also be used, 2 - 6 grams given before sleep (so the laxative effects occur in the morning).

It is not recommended for long-term use, as it may result in poor bowel function or electrolyte problems.

Senna loses much of its potency on longterm storage.

CASTOR OIL (*Ricinus communis* bean oil)

Castor oil is a vegetable oil pressed from castor beans. Use of castor oil as a laxative was already attested in ancient Egypt. Castor oil as a laxative is safe if it used in moderate amount and for limited period of time.

Recommended dose is 1 - 2 teaspoons. Ingesting this thick oil is not very pleasant, it is often recommended to drink a hot sweetened beverage (coffee, tea, hot chocolate) along with it. As with senna, it takes some time (6 - 8 hours) for the effects to emerge, so it can be taken in the evening before going to sleep, its laxative effects will then be evident in the morning.

When used daily, a maximum period of two weeks is recommended. Discontinue the use of castor oil in case of diarrhea.

Synthetics

IVERMECTIN

Ivermectin is one of the most important drugs in veterinary and human medicine for the control of parasitic infection. It is a chemically modified derivative of naturally produced antibiotics called avermectins. Although best described for its activity on glutamate-gated chloride channels in parasitic nematodes, understanding of its mode of action remains incomplete. Ivermectin has potent activity against a broad spectrum of parasitic nematodes after both oral and parenteral administration, although it does not appear to affect flukes or tapeworms. It also has activity against various arthropods, including lice, mites, and some

ticks. **Ivermectin has a wide safety margin in most mammals**.

Because of widespread abuse, unfortunately, anthelmintic resistance is now a major global problem in the control of gastrointestinal roundworms of sheep, cattle and horses, and there are now reports of ivermectin resistance in the canine heartworm.

Ivermectin still can be used as part of a general anti-parasitical treatment, combined with a second broad-spectrum anti-parasitical drug, such as mebendazole or similar. Average treatment dosage is 200 micrograms per kilogram of bodyweight, twice a day. So for a 80 kg adult man, that would amount to 12 mg in the morning, and 12 mg in the evening.

This could be combined with 2x 100 mg mebendazole per day (again for a 80 kg adult man). This could be repeated for 3 - 4 days. The last day a laxative could be taken.

Ivermectin is considered relatively free of toxicity in standard doses (up to 300 µg/kg, so up to 24 mg for a 80 kg adult man). Ivermectin is contraindicated in children under the age of five or those who weigh less than 15 kilograms (33 pounds), and individuals with liver or kidney disease. Ivermectin is secreted in very low concentration in breast milk, it remains unclear if it is safe to use during pregnancy.

MEBENDAZOLE

Mebendazole is **a broad-spectrum antihelminthic agent** of the benzimidazole type. It is used to treat a number of parasitic worm infestations including ascariasis, pinworm infection, hookworm infections, guinea worm infections, hydatid disease, and giardia, among others. Mebendazole is usually well tolerated. Common side effects include headache, vomiting, and ringing in the ears. If used at large doses it may cause bone marrow suppression. It is unclear if it is safe in pregnancy.

Mebendazole is prescription only in Canada, Australia, the UK, and the USA. It is available over the counter in many other countries. A typical 6 pill package containing 100 mg pills usually costs somewhere between the equivalent of 5 to 30 euros, except in the USA where since 2016 the price has increased to an insane 440 US dollars per single dose pill.

A typical dosage regimen for mebendazole could be 2x 100mg per day, for a total of 3 consequetive days, in the case of an average 80 kg adult man. Optionally, a laxative could be taken at the end of the third day.

Both mebendazole and fenbendazole also have promising potential in anti-cancer research.

FENBENDAZOLE

A broad-spectrum antihelminthic agent, an analog of mebendazole, usually prescribed for animal use, **although it is considered safe for humans**. Fenbendazole is metabolized in the liver to oxfendazole, which is anthelmintic too; oxfendazole partially gets reduced back to fenbendazole in the liver and rumen.

Fenbendazole is sold as canine dewormer under the name Panacur or Safe-Guard. It is important to read the ingredients listed on the package and find a veterinary dewormer product that only lists fenbendazole as ingredient.

Because of the kikery that hyperinflated the cost of mebendazole in the USA, Americans are encouraged to look into this low-cost veterinary drug that can perfectly substitute for it. In fact, there is reason to assume that fenbendazole is even more potent and has longer lasting effects, **because its prime metabolites are equally active**.

Dosage and treatment regiment is the same as with mebendazole (2x 100mg a day for 3 - 4 days for a 80 kg adult male).

As regards to toxicity, based on limited human data it appears that doses up to 500 mg per person (per day for 10 consecutive days) did not result in adverse effects. Moreover, single doses up to 2,000 mg per person were reported to cause no adverse effects.

PRAZIQUANTEL

Praziquantel is a medication used to treat a number of types of parasitic worm infections in mammals, birds, amphibians, reptiles, and fish. In humans specifically, it is used to treat schistosomiasis, clonorchiasis, opisthorchiasis, tapeworm infections, cysticercosis, hydatid disease, and other fluke infections. Side effects in humans may include poor coordination, abdominal pain, vomiting, headache, and allergic reactions.

The majority of side effects develop due to the release of the contents of the parasites as they are killed and the consequent host immune reaction. The heavier the parasite burden,

the heavier and more frequent the side effects normally are.

Praziquantel as medication for humans is prescription-only in many countries, but it's available over the counter for veterinary use.

For most cases a dosage of 25 mg per kg bodyweight is recommended, three times a day. So for an adult male weighing 80 kg, the dosage taken would be 25 x 80 = 2000 mg, taken in the morning, at noon, and in the evening. Duration of the therapy is 1 - 2 days generally.

Praziquantel is marked as 600 mg tablets for human use, but often lower doses are used for canines or other animals. I have seen a particular brand for dogs that used 200 mg pills. That would make a lot of pills to swallow, but the advantage here is that the required treatment only lasts a single day, two at most.

PIPERAZINE

Marketed as piperazine hexahydrate or its hydrochloride or citrate salts. Note that piperazine has no relationship with pepper and does not occur in nature. Piperazine was marketed as vermifuge in the late 19th century, **its mode of action is generally by paralysing parasites**, which allows the host body to easily remove or expel the invading organism.

This is especially important in cases where people are heavily infested with parasites. A common broad-spectrum antihelminthic such as mebendazole is used alone in those with mild to moderate infestations. It kills parasites relatively slowly, and in those with very heavy infestations**, it can cause some parasites to migrate out of the digestive system,**

leading to appendicitis, bile duct problems, or intestinal perforation.

To avoid this, heavily infested patients may be treated with piperazine, either before or instead of mebendazole. **Piperazine paralyses the parasites, causing them to pass in the feces**.

Usually the equivalent of 50 mg/kg of piperazine hexahydrate is administered, that would be 4000 mg or 4 grams for an adult 80 kg male. This is repeated for 2 days, in severe cases treatment can be continued for 7 days. The dosage levels for other piperazine salts (hydrochloride, adipate, citrate) are similar to slightly higher.

Although piperazine is only slightly toxic for humans (the lethal dose is estimated to be between 5 - 15 grams per kg bodyweight, so 400 grams for an adult male weighing 80 kg) it is recommended to not exceed the recommended therapeutic dosage. Piperazine could also be dangerous when taken by people who have contact allergy to ethylenediamine, a substance used as stabilizer in topical creams.

Piperazine used to be widely available without prescription in many countries under numerous trade names, but it became increasingly harder to obtain.
