Precautions

The use of emetics is now rarely favoured; in particular, ipecacuanha should not be used as an emetic in patients who are unconscious or whose condition otherwise increases the risk of aspiration, nor in patients who have taken substances, such as corrosive compounds or petroleum products, that might be especially dangerous if aspirated. Ipecacuanha should not be given to patients in shock or to those at risk from seizures either as a result of their condition or from compounds, such as strychnine, that have been ingested. Patients with cardiovascular disorders are at risk if ipecacuanha is absorbed.

Abuse. Ipecac syrup has been abused by patients with eating disorders to induce vomiting.[1] Adverse effects of repeated vomiting, such as metabolic complications, aspiration pneumonitis, parotid enlargement, dental abnormalities, and oesophagitis or haematemesis due to mucosal lacerations (the Mallory-Weiss syndrome) may be observed. Cardiotoxicity may occur and fatalities have been reported including one patient who had ingested 90 to 120 mL of ipecac syrup daily for 3 months.[2] It has been suggested that cardiac effects and myopathy following the prolonged abuse of ipecac syrup may be due to the long-term accumulation of emetine[3,4] but some have expressed doubts.[5]

Cardiomyopathy has also been reported in children given ipecacuanha to produce factitious illness (Munchausen's syndrome by proxy);[6-8] fatalities have occurred.

1. Harris RT. Bulimarexia and related serious eating disorders with medical complications. *Ann Intern Med* 1983; **99:** 800–7.
2. Adler AG, *et al.* Death resulting from ipecac syrup poisoning. *JAMA* 1980; **243:** 1927–8.
3. Palmer EP, Guay AT. Reversible myopathy secondary to abuse of ipecac in patients with major eating disorders. *N Engl J Med* 1985; **313:** 1457–9.
4. Pope HG, *et al.* The epidemiology of ipecac abuse. *N Engl J Med* 1986; **314:** 245–6.
5. Isner JM. Effects of ipecac on the heart. *N Engl J Med* 1986; **314:** 1253.
6. Goebel J, *et al.* Cardiomyopathy from ipecac administration in Munchausen syndrome by proxy. *Pediatrics* 1993; **92:** 601–3.
7. Schneider DJ, *et al.* Clinical and pathologic aspects of cardiomyopathy from ipecac administration in Munchausen's syndrome by proxy. *Pediatrics* 1996; **97:** 902–6.
8. Carter KE, *et al.* Munchausen syndrome by proxy caused by ipecac poisoning. *Pediatr Emerg Care* 2006; **22:** 655–6.

Interactions

The action of ipecacuanha may be delayed or diminished if it is given with or after charcoal; antiemetics may also reduce its effect.

Food. Milk had been believed to impair the emetic efficacy of ipecacuanha but there was no significant difference in the time to onset of vomiting, the duration of vomiting, or the number of episodes in 250 children who were given ipecac syrup with milk compared with 250 given ipecac syrup with clear fluids.[1]

1. Klein-Schwartz W, *et al.* The effect of milk on ipecac-induced emesis. *J Toxicol Clin Toxicol* 1991; **29:** 505–11.

Uses and Administration

Ipecacuanha has been used as an **expectorant** in productive cough (p.1547) in doses of up to about 1.4 mg of total alkaloids.

Ipecacuanha may also be used in larger doses as an **emetic** but is of very limited value (see Emesis Induction in Acute Poisoning, below). Vomiting usually occurs within 30 minutes of an oral emetic dose, due to an irritant effect on the gastrointestinal tract and a central action on the chemoreceptor trigger zone. Doses are usually followed by a copious drink of water or fruit juice. Adults have been given doses of about 21 to 42 mg of total alkaloids; each 5 mL of Ipecac Syrup (USP 31) supplies about 7 mg of total alkaloids. Doses may be repeated once only after 20 to 30 minutes if emesis has not occurred. For children's doses, see Administration in Children, below.

Homoeopathy. Ipecacuanha has been used in homoeopathic medicines under the following names: Ipeca; Cephaelis ipecacuanha; Ipecac.

Administration in children. Over-the-counter cough and cold preparations containing expectorants (including ipecacuanha) should be used with caution in children and generally avoided in those under 2 years of age (see p.1547).

In the UK, induction of emesis with ipecacuanha is not recommended because there is no evidence that it affects absorption and it may increase the risk of aspiration (see also Emesis Induction in Acute Poisoning, below).

In the USA, children aged 6 months to 1 year have been given about 7 to 14 mg of total alkaloids and older children about 21 mg. Each 5 mL of Ipecac Syrup (USP 31) supplies about 7 mg of total alkaloids. Doses are usually followed by a copious drink of water or fruit juice; in young children this may be given before the dose. Doses may be repeated once only after 20 to 30 minutes if emesis has not occurred.

Emesis induction in acute poisoning. Standard practice in the management of acute poisoning (p.1435) has varied widely, with different procedures favoured at different times and in different countries. However, measures to reduce absorption of the toxic substance, such as stomach emptying, have often been advocated.

Two techniques of stomach emptying have been very widely used: gastric lavage; and emesis induction, with ipecacuanha as the emetic of choice. Neither technique is without hazard and the dangers of attempting to empty the stomach have to be balanced against the toxicity of the ingested poison. If the patient presents late or the risk of toxicity is small, then gastric emptying is unnecessary.

- **Gastric lavage** is not recommended in the routine management of poisoned patients[1] because there is little evidence from experimental studies that it improves the clinical outcome and it may cause significant morbidity. *It should only be considered if a potentially life-threatening amount of toxic substance has been ingested within the preceding hour.* There is significant danger of aspiration of stomach contents associated with the procedure and it should only be attempted in fully conscious patients with good airway protective reflexes, unless other means are undertaken to protect the airway. Gastric lavage is also contra-indicated if corrosive or petroleum products have been ingested. Another risk that has been suggested with gastric lavage is that the procedure may propel stomach contents beyond the pylorus and thus enhance absorption,[2] but this conclusion has been challenged[3] and the evidence appears to be limited.
- Induction of **emesis** with ipecacuanha has often been advocated for use in children, in whom gastric lavage may be particularly traumatic; it has also been used in adults. However, like gastric lavage, its routine use is not recommended in the management of poisoned patients[4] because there is no clear evidence from clinical studies that it improves the outcome; clinically significant absorption may not be prevented even if it is given within 1 hour of the ingested poison. It may also delay the use or reduce the effectiveness of activated charcoal or oral antidotes. Ipecacuanha should not be given to patients with compromised airway reflexes, nor following ingestion of corrosive or petroleum products. In addition it should be avoided in debilitated or elderly patients, or those with medical conditions that may be compromised by induction of emesis. *It may be considered in alert, conscious patients, if a potentially life-threatening amount of toxic substance has been ingested within the preceding hour, and if gastric lavage or activated charcoal are deemed inappropriate.*

Because of the limitations of both methods of gastric emptying, a number of studies have addressed the question of whether either is appropriate. Such studies have indicated that the use of activated charcoal alone to prevent absorption, without gastric emptying, is as effective as a combination of both methods.[5-7]

1. American Academy of Clinical Toxicology, European Association of Poisons Centres and Clinical Toxicologists. Position paper: gastric lavage. *J Toxicol Clin Toxicol* 2004; **42:** 933–43. Also available at: http://www.clintox.org/Pos_Statements/GastricLavage.pdf (accessed 5/12/06)
2. Saetta JP, *et al.* Gastric emptying procedures in the self-poisoned patient: are we forcing gastric content beyond the pylorus? *J R Soc Med* 1991; **84:** 274–6.
3. Eddleston M, *et al.* Does gastric lavage really push poisons beyond the pylorus? A systematic review of the evidence. *Ann Emerg Med* 2003; **42:** 359–64.
4. American Academy of Clinical Toxicology, European Association of Poisons Centres and Clinical Toxicologists. Position statement: ipecac syrup. *J Toxicol Clin Toxicol* 2004; **42:** 133–43. Also available at: http://www.clintox.org/Pos_Statements/IpecacSyrup.pdf (accessed 5/12/06)
5. Albertson TE, *et al.* Superiority of activated charcoal alone compared with ipecac and activated charcoal in the treatment of acute toxic ingestions. *Ann Emerg Med* 1989; **18:** 56–9.
6. Merigian KS, *et al.* Prospective evaluation of gastric emptying in the self-poisoned patient. *Am J Emerg Med* 1990; **8:** 479–83.
7. Pond SM, *et al.* Gastric emptying in acute overdose: a prospective randomised controlled trial. *Med J Aust* 1995; **163:** 345–9.

Preparations

BP 2008: Paediatric Ipecacuanha Emetic Mixture;
Ph. Eur.: Ipecacuanha Liquid Extract, Standardised; Ipecacuanha Tincture, Standardised;
USP 31: Ipecac Syrup.

Proprietary Preparations (details are given in Part 3)
Fin.: Ipeca†; ***Gr.:*** Ipecavom; ***UK:*** Fennings Little Healers.

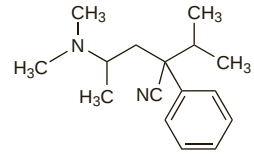
Multi-ingredient: ***Arg.:*** Cobenzil Compuesto†; No-Tos Infantil; ***Braz.:*** Agrimel†; Expec; Expectomel; Fenergan Expectorante; Iodesin; Iodopulmin†; Ipecol†; KI-Expectorante; Melagriao; Pílulas Ross; Tussol†; Tussucalman†; ***Fr.:*** Humex†; ***Hong Kong:*** Pectoral†; ***Hung.:*** Artin†; ***Indon.:*** Andonex; Koffex for Children; Prome; Promedex; Promethazine Ikapharmindo; ***Irl.:*** Venos Honey & Lemon; ***Israel:*** Doveri; Laxative Comp; Promethazine Expectorants; Prothiazine Expectorant; ***Neth.:*** Buckleys Kinderhoestsiroop; ***Rus.:*** Prothiazine Expectorant (Протиазин Экспекторант); ***S.Afr.:*** Chamberlains Cough Remedy Regular; Cough Elixir; Linctus Tussi Infans; SB Cirogin Cough Mixture; ***Singapore:*** Beacons Cough; ***Spain:*** Alofedina; Buco Regis; Encalina†; Fenergan Expectorante; ***Switz.:*** Bromocod N; Demo Elixir pectoral N; Gouttes contre la toux "S"; Neo-Codion N; Pastilles pectorales Demo N; ***UK:*** Allens Dry Tickly Cough; Allens Pine & Honey; Asthma & Catarrh Relief; Beehive Balsam; Buttercup Infant Cough Syrup; Buttercup Syrup (Blackcurrant flavour); Buttercup Syrup (Honey and Lemon flavour); Cough-eeze; Galloway's Cough Syrup; Hill's Balsam Chesty Cough for Children; Hill's Balsam Chesty Cough Pastilles; Hill's Balsam Extra Strong; Honey & Molasses; Jackson's Troublesome Coughs; Kilkof; Lockets Medicated Linctus; Modern Herbals Cough Mixture; Potters Children's Cough Pastilles; Vegetable Cough Remover; ***USA:*** Poison Antidote Kit; Quelidrine; ***Venez.:*** Tabonuco; Tessamag con Codeina.

Isoaminile *(BAN, rINN)*

Isoaminiili; Isoaminil; Isoaminilo; Isoaminilum. 4-Dimethylamino-2-isopropyl-2-phenylpentanonitrile.

Изоаминил

$C_{16}H_{24}N_2$ = 244.4.
CAS — 77-51-0.
ATC — R05DB04.
ATC Vet — QR05DB04.



Isoaminile Citrate *(BANM, rINNM)*

Citrato de isoaminilo; Isoaminile, Citrate d'; Isoaminili Citras. 4-Dimethylamino-2-isopropyl-2-phenylvaleronitrile dihydrogen citrate.

Изоаминила Цитрат

$C_{16}H_{24}N_2.C_6H_8O_7$ = 436.5.
CAS — 126-10-3; 2841 6-66-2.
ATC — R05DB04.
ATC Vet — QR05DB04.

Isoaminile Cyclamate *(rINNM)*

Ciclamato de isoaminilo; Isoaminile, Cyclamate d'; Isoaminili Cyclamas. 4-Dimethylamino-2-isopropyl-2-phenylvaleronitrile cyclohexanesulfamate.

Изоаминила Цикламат

$C_{16}H_{24}N_2.C_6H_{13}NO_3S$ = 423.6.
CAS — 10075-36-2.
ATC — R05DB04.
ATC Vet — QR05DB04.

Profile

Isoaminile is a centrally acting cough suppressant. Isoaminile cyclamate has been given orally in doses of 40 to 80 mg up to 5 times daily. For children's doses, see Administration in Children, below. The citrate has also been used.

Administration in children. Isoaminile cyclamate has been given orally in the following doses:

- 1 to 6 years: 20 mg 2 or 3 times daily
- over 6 years: 40 mg 2 or 3 times daily

Preparations

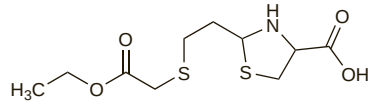
Proprietary Preparations (details are given in Part 3)
Gr.: Peracon†; ***Indon.:*** Peracon; ***S.Afr.:*** Peracon†.
Multi-ingredient: ***S.Afr.:*** Peracon Expectorant†.

Letosteine *(pINN)*

Letosteína; Létostéine; Letosteinum. 2-[2-(Ethoxycarbonylmethylthio)ethyl]thiazolidine-4-carboxylic acid.

Летостеин

$C_{10}H_{17}NO_4S_2$ = 279.4.
CAS — 53943-88-7.
ATC — R05CB09.
ATC Vet — QR05CB09.



Profile

Letosteine is a mucolytic that has been used in the treatment of respiratory disorders associated with productive cough (p.1547).

Preparations

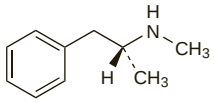
Proprietary Preparations (details are given in Part 3)
Fr.: Viscotiol†; ***Spain:*** Broluidan†.

Levmetamfetamine *(USAN, rINN)* ⊗

l-Deoxyephedrine; L-Desoxiefedrina; L-Desoxyephedrine; Lesoxyephedrine; Levmétamfétamine; Levmetamfetaminum; Levmetanfetamina; Levometanfetamina; *l*-Methamphetamine; *l*-Methylamphetamine. (*R*)-*N*,α-Dimethylbenzeneethanamine; (–)-(*R*)-*N*,α-Dimethylphenethylamine.

Левметамфетамин

$C_{10}H_{15}N$ = 149.2.
CAS — 33817-09-3.



Pharmacopoeias. In *US.*
USP 31 (Levmetamfetamine). A clear, practically colourless, liquid. Store in airtight containers. Protect from light.

Profile
Levmetamfetamine is the *laevo* isomer of metamfetamine (p.2158) and is used topically in the treatment of nasal congestion (p.1548).

Abuse. Levmetamfetamine is a less potent central stimulant than metamfetamine, but it has been subject to occasional abuse.[1,2] In addition, as a stimulant its use is prohibited in sport during competition. However, it is classed by the World Anti-Doping Agency as one of the specified substances particularly susceptible to unintentional anti-doping rule violations because of general availability in medicinal products or which are less likely to be successfully abused as doping agents.[3]

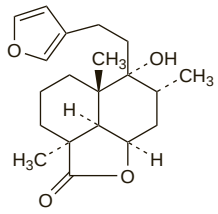
1. Halle AB, *et al.* Drug abuse with Vicks nasal inhaler. *South Med J* 1985; **78:** 761–2.
2. Ferrando RL, *et al.* Bizarre behavior following the ingestion of levo-desoxyephedrine. *Drug Intell Clin Pharm* 1988; **22:** 214–17.
3. World Anti-Doping Agency. The World Anti-Doping Code: 2007 Prohibited List International Standard (issued 16 September, 2006). Available at: http://www.wada-ama.org/rtecontent/document/2007_List_En.pdf (accessed 04/04/07)

Preparations
Proprietary Preparations (details are given in Part 3)
USA: Vicks Vapor Inhaler.

Marrubium

Andornkraut; Herba Marrubii; Hurtanminttu; Jablečníková nať; Juanrubio; Kransborre; Malva de sapo; Malvarrubia; Marrube blanc, parties aériennes fleuries de; Marrubii herba; Marrubio; Šantrų žolė; White Horehound.

Шандра Обыкновенная



(marrubiin)

Pharmacopoeias. In *Eur.* (see p.vii).
Ph. Eur. 6.2 (White Horehound). The whole or fragmented dried flowering aerial parts of *Marrubium vulgare*. It contains a minimum 0.7% of marrubiin ($C_{20}H_{28}O_4$ = 332.4), calculated as the dried drug.

Profile
Marrubium is the flower or leaf of *Marrubium vulgare* (Labiatae). It has been used for its supposed expectorant properties in herbal preparations for the treatment of cough. It has also been used as a flavouring.

Preparations
Proprietary Preparations (details are given in Part 3)
Ger.: Angocin Bronchialtropfen.

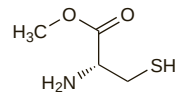
Multi-ingredient: ***Austral.:*** Broncafect; Verbascum Complex†; ***Austria:*** Asthmatee EF-EM-ES; Gallen- und Lebertee St Severin; ***Canad.:*** Herbal Throat†; Original Herb Cough Drops; Swiss Herb Cough Drops; ***Chile:*** Fucus Compuesto†; ***Cz.:*** Original Schwedenbitter; Species Cholagogae Planta; The Salvat; Zlucnikova Cajova Smes; ***Ital.:*** Altuss; Broncosedina; ***Pol.:*** Amarosal; ***S.Afr.:*** Cough Elixir; ***Spain:*** Natusor Asmaten†; Natusor Broncopul†; ***Switz.:*** Hederix; ***UK:*** Allens Chesty Cough; Asthma & Catarrh Relief; Catarrh-eeze; Chest Mixture; Cough-eeze; Herb and Honey Cough Elixir; Honey & Molasses; Horehound and Aniseed Cough Mixture; Modern Herbals Cough Mixture; Vegetable Cough Remover.

Mecysteine Hydrochloride *(BANM, rINNM)*

Hidrocloruro de mecisteína; Mécystéine, Chlorhydrate de; Mecysteini Hydrochloridum; Methyl Cysteine Hydrochloride; Methylcysteine Hydrochloride. Methyl L-2-amino-3-mercaptopropionate hydrochloride.

Мецистеина Гидрохлорид

$C_4H_9NO_2S$,HCl = 171.6.
CAS — 2485-62-3 (mecysteine); 18598-63-5 (mecysteine hydrochloride); 5714-80-7 (mecysteine hydrochloride).



(mecysteine)

Adverse Effects and Precautions
Nausea and heartburn have occasionally been reported. Since mucolytics may disrupt the gastric mucosal barrier mecysteine hydrochloride should be used with caution in patients with a history of peptic ulcer disease.

Uses and Administration
Mecysteine hydrochloride is used as a mucolytic in respiratory disorders associated with productive cough (p.1547). It is given orally in a usual dose of 200 mg three times daily before meals reduced to 200 mg twice daily after 6 weeks. A rapid clinical effect can be achieved by giving 200 mg four times daily for the first 2 days. For children's doses, see Administration in Children, below. Mecysteine has also been given by inhalation.

Administration in children. The recommended oral dose of mecysteine hydrochloride in children aged 5 to 12 years is 100 mg 3 times daily.

Respiratory disorders. Mecysteine hydrochloride given orally has reduced symptoms of cough in patients with chronic bronchitis or other respiratory disorders, but its effect on sputum production and pulmonary function has been variable.[1,2] The use of mucolytics in chronic obstructive pulmonary disease (p.1112) is controversial.

1. Aylward M, *et al.* Clinical therapeutic evaluation of methylcysteine hydrochloride in patients with chronic obstructive bronchitis: a balanced double-blind trial with placebo control. *Curr Med Res Opin* 1978; **5:** 461–71.
2. Sahay JN, *et al.* The effect of methyl cysteine (Visclair) in respiratory diseases: a pilot study. *Clin Trials J* 1982; **19:** 137–43.

Preparations
Proprietary Preparations (details are given in Part 3)
Irl.: Visclair; ***UK:*** Visclair.

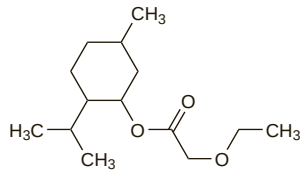
Multi-ingredient: ***Ital.:*** Donatiol.

Menglytate *(rINN)*

Menglitato; Menglytatum; Menthol Ethylglycolate. *p*-Menth-3-yl ethoxyacetate.

Менглитат

$C_{14}H_{26}O_3$ = 242.4.
CAS — 579-94-2.



Profile
Menglytate is an ingredient of a number of preparations promoted for the treatment of cough.

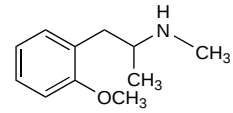
Preparations
Proprietary Preparations (details are given in Part 3)
Multi-ingredient: ***Ital.:*** Coryfin C; Neo Borocillina Balsamica.

Methoxyphenamine Hydrochloride *(BANM, rINNM)* ⊗

Hidrocloruro de metoxifenamina; Methoxiphenadrin Hydrochloride; Méthoxyphénamine, Chlorhydrate de; Methoxyphenamini Hydrochloridum; Mexyphamine Hydrochloride. 2-Methoxy-*N*α-dimethylphenethylamine hydrochloride.

Метоксифенамина Гидрохлорид

$C_{11}H_{17}NO$,HCl = 215.7.
CAS — 93-30-1 (methoxyphenamine); 5588-10-3 (methoxyphenamine hydrochloride).
ATC — R03CB02.
ATC Vet — QR03CB02.



(methoxyphenamine)

Profile
Methoxyphenamine is a sympathomimetic with effects similar to those of ephedrine (p.1558), given orally as the hydrochloride. It has been used as a bronchodilator mainly in combination preparations for the relief of cough and nasal congestion.

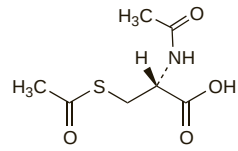
Preparations
Proprietary Preparations (details are given in Part 3)
Multi-ingredient: ***Chile:*** Cheracol; ***Hong Kong:*** Asmeton; ***Irl.:*** Casacol; ***Thai.:*** Asmeton†; ***Venez.:*** Metoxifilin.

Methyl Dacisteine *(rINNM)*

Dacisteína de metilo; Dacistéine Méthyle; Dacisteinum Methylis; EL-1035 (dacisteine); Methyl Diacetylcysteinate. Methyl *N*,*S*-diacetyl-L-cysteinate.

Дацистеин Метил

$C_8H_{13}NO_4S$ = 219.3.
CAS — 18725-37-6 (dacisteine); 19547-88-7 (methyl dacisteine).



(dacisteine)

Profile
Like acetylcysteine (p.1548), methyl dacisteine has been used as a mucolytic in respiratory disorders associated with productive cough (p.1547). It has been given orally in a usual dose of 600 mg daily, divided into 3 or 4 doses.

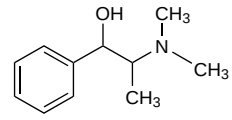
Preparations
Proprietary Preparations (details are given in Part 3)
Fr.: Mucothiol; ***Hung.:*** Mucothiol†; ***Ital.:*** Mucothiol.

Methylephedrine Hydrochloride *(BANM)* ⊗

dl-Methylephedrine Hydrochloride; *dl*-*N*-Methylephedrine Hydrochloride; Metilefedrina, hidrocloruro de. (1*RS*,2*RS*)-2-Dimethylamino-1-phenylpropan-1-ol hydrochloride.

Метилэфедрина Гидрохлорид

$C_{11}H_{17}NO$,HCl = 215.7.
CAS — 552-79-4 ((–)-methylephedrine); 1201-56-5 ((±)-methylephedrine); 38455-90-2 ((–)-methylephedrine hydrochloride); 942-46-1 ((±)-methylephedrine hydrochloride); 18760-80-0 ((±)-methylephedrine hydrochloride).



(methylephedrine)

Pharmacopoeias. In *Jpn.*

Profile
Methylephedrine hydrochloride is a sympathomimetic with effects similar to those of ephedrine (p.1558). It has been used as a bronchodilator and is given orally in combination preparations for the relief of cough and nasal congestion.

Preparations
Proprietary Preparations (details are given in Part 3)
Multi-ingredient: ***Austria:*** Tussoretardin; ***Hong Kong:*** Codaewon; ***Jpn:*** Colgen Kowa IB Toumei; Sin Colgen Kowa Kaze; ***S.Afr.:*** Ilvico; ***Switz.:*** Tossamine plus; ***Thai.:*** Coughmin†; Hustazol-C†; Methorcon; ***Venez.:*** Ilvico.