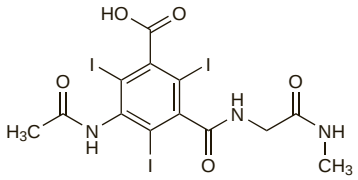
Ioglicic Acid *(BAN, USAN, rINN)*

Acide Ioglicique; Ácido ioglícico; Acidum Ioglicicum; Joglicinsyra; Joglisiinihappo; SH-H-200-AB. 5-Acetamido-2,4,6-tri-iodo-*N*-(methylcarbamoylmethyl)isophthalamic acid.

Йоглициевая Кислота

$C_{13}H_{12}I_3N_3O_5$ = 671.0.
CAS — 49755-67-1.
ATC — V08AA06.
ATC Vet — QV08AA06.



Description. Ioglicic acid contains about 56.7% of I.

Meglumine Ioglicate *(BANM, rINNM)*

Ioglicate de Méglumine; Ioglicate Meglumine; Ioglicato de meglumina; Meglumini Ioglicas. The *N*-methylglucamine salt of ioglicic acid.

Меглумина Йоглициат

$C_{13}H_{12}I_3N_3O_5$,$C_7H_{17}NO_5$ = 866.2.
ATC — V08AA06.
ATC Vet — QV08AA06.

Description. Meglumine ioglicate contains about 44.0% of I.

Sodium Ioglicate *(BANM, rINNM)*

Ioglicate de Sodium; Ioglicate Sodium; Ioglicato sódico; Natrii Ioglicas.

Натрий Йоглициат

$C_{13}H_{11}I_3N_3NaO_5$ = 692.9.
ATC — V08AA06.
ATC Vet — QV08AA06.

Description. Sodium ioglicate contains about 54.9% of I.

Profile

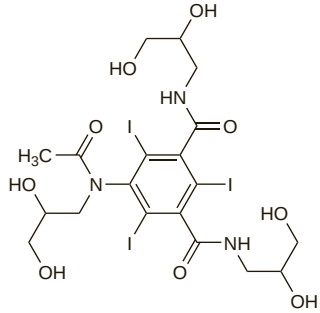
Ioglicic acid is an ionic monomeric iodinated radiographic contrast medium (p.1474) that has been used, as the meglumine and sodium salts, for diagnostic procedures.

Iohexol *(BAN, USAN, rINN)*

Iohexolum; Joheksoli; Joheksolis; Johexol; Win-39424. *N,N′*-Bis(2,3-dihydroxypropyl)-5-[*N*-(2,3-dihydroxypropyl)acetamido]-2,4,6-tri-iodoisophthalamide.

Йогексол

$C_{19}H_{26}I_3N_3O_9$ = 821.1.
CAS — 66108-95-0.
ATC — V08AB02.
ATC Vet — QV08AB02.



Description. Iohexol contains about 46.4% of I.

Pharmacopoeias. In *Eur.* (see p.vii), *Int.*, and *US.*
Ph. Eur. 6.2 (Iohexol). A white or greyish-white, hygroscopic powder. Very soluble in water; practically insoluble in dichloromethane; freely soluble in methyl alcohol. Store in airtight containers. Protect from light.
USP 31 (Iohexol). A white to off-white, hygroscopic, odourless powder. Very soluble in water and in methyl alcohol; practically insoluble or insoluble in chloroform and in ether. Store at a temperature of 25°, excursions permitted between 15° and 30°. Protect from light.

Adverse Effects, Treatment, and Precautions

Iohexol and other nonionic iodinated contrast media have similar adverse effects and precautions to ionic media but the effects tend to be less severe and the incidence is generally lower; see under the amidotrizoates, p.1475 for details.

Additional neurological adverse effects may occur when nonionic media such as iohexol are used for myelography. These include severe headache, backache, neck stiffness, dizziness, and leg or sciatic-type pain. Convulsions, aseptic meningitis, and mild and transitory perceptual aberrations, such as visual and speech disturbances, and confusion, may occur occasionally; rarely, more severe mental disturbances have occurred. Urinary retention has also been reported.

Breast feeding. Iohexol is distributed into breast milk in very small quantities[1] but no adverse effects have been seen in breast-feeding infants whose mothers were receiving iohexol and the American Academy of Pediatrics considers[2] that it is therefore usually compatible with breast feeding.

1. Nielsen ST, *et al.* Excretion of iohexol and metrizoate in human breast milk. *Acta Radiol* 1987; **28:** 523–6.
2. 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 27/03/06)

Effects on the nervous system. Encephalopathy developed in a 48-year-old man with sciatica within 9 hours of iohexol for lumbar myelography but had largely resolved 48 hours after the myelogram; complete resolution took 4 days.[1] However, recovery was slow in a patient who developed paraplegia and areflexia in the legs after a similar procedure. Five months later the patient still complained of paraesthesia in her legs and could not stand without support.[2]

1. Donaghy M, *et al.* Encephalopathy after iohexol myelography. *Lancet* 1985; **ii:** 887.
2. Noda K, *et al.* Prolonged paraplegia after iohexol myelography. *Lancet* 1991; **337**: 681.

Pharmacokinetics

After intravascular use, 90% or more of a dose of iohexol is eliminated unchanged in the urine within 24 hours. An elimination half-life of about 2 hours in patients with normal renal function has been reported. Protein binding in blood is reported to be very low.

Pregnancy. Contrast material was detected[1] in the intestines of twin neonates who were born 17 hours after iohexol was given to their mother for angiography, suggesting that transplacental transfer had taken place.

1. Moon AJ, *et al.* Transplacental passage of iohexol. *J Pediatr* 2000; **136:** 548–9.

Uses and Administration

Iohexol is a nonionic monomeric iodinated radiographic contrast medium (see p.1474). It may be given intravenously, intra-arterially, intrathecally, orally, rectally, or by instillation into body cavities and is used in diagnostic procedures including myelography, angiography, urography, arthrography, and visualisation of the gastrointestinal tract and body cavities. Iohexol is also used to produce contrast enhancement during computed tomography.

Iohexol is usually available as solutions containing 30.2 to 75.5% of iohexol (equivalent to 140 to 350 mg/mL of iodine) and the dose and strength used vary according to the procedure and the route.

Preparations

USP 31: Iohexol Injection.

Proprietary Preparations (details are given in Part 3)

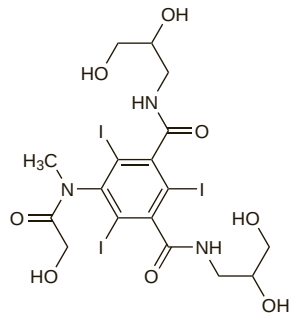
Arg.: Omnipaque†; ***Austral.:*** Omnipaque; ***Austria:*** Accupaque; Omnipaque; ***Belg.:*** Omnipaque; ***Braz.:*** Omnipaque†; ***Canad.:*** Omnipaque; ***Chile:*** Omnipaque; ***Cz.:*** Omnipaque; ***Denm.:*** Omnipaque; ***Fin.:*** Omnipaque; ***Fr.:*** Omnipaque; ***Ger.:*** Accupaque; Omnipaque; ***Gr.:*** Omnipaque; ***Hung.:*** Omnipaque; ***India:*** Radiopaque; ***Israel:*** Omnipaque; ***Ital.:*** Omnipaque; ***Neth.:*** Omnipaque; ***Norw.:*** Omnipaque; ***NZ:*** Omnipaque; ***Port.:*** Omnipaque; ***Rus.:*** Omnipaque (Омнипак); ***Spain:*** Omnigraf; Omnipaque; Omnitrast; ***Swed.:*** Omnipaque; ***Switz.:*** Accupaque; Omnipaque; ***UK:*** Omnipaque; ***USA:*** Omnipaque; ***Venez.:*** Omnipaque†.

Iomeprol *(BAN, USAN, rINN)*

Iométrol; Iomeprolum; Jomeprol; Jomeproli. *N,N′*-Bis(2,3-dihydroxypropyl)-2,4,6-triiodo-5-(*N*-methylglycolamido)-isophthalamide.

Йомепрол

$C_{17}H_{22}I_3N_3O_8$ = 777.1.
CAS — 78649-41-9.
ATC — V08AB10.
ATC Vet — QV08AB10.



Description. Iomeprol contains about 49% of I.

Adverse Effects, Treatment, and Precautions

As for the amidotrizoates (p.1475). For adverse effects relating to the use of nonionic contrast media such as iomeprol for myelography, see under Iohexol (p.1483).

Pharmacokinetics

After intravascular use, iomeprol is rapidly eliminated unchanged in the urine, with a terminal elimination half-life of 1.9 hours. It is not significantly bound to plasma proteins.

Uses and Administration

Iomeprol is a nonionic monomeric iodinated radiographic contrast medium (see p.1474). It may be given intravenously, intra-arterially, intrathecally, or by instillation into body cavities, and is used in radiographic procedures including myelography, angiography, urography, and arthrography. It is also used to produce contrast enhancement during computed tomography.

Iomeprol is usually available as solutions containing 30.62 to 81.65% of iomeprol (equivalent to 150 to 400 mg/mL of iodine) and the dose and strength used vary according to the procedure and the route.

◊ Reviews.

1. Dooley M, Jarvis B. Iomeprol: a review of its use as a contrast medium. *Drugs* 2000; **59:** 1169–86.

Preparations

Proprietary Preparations (details are given in Part 3)

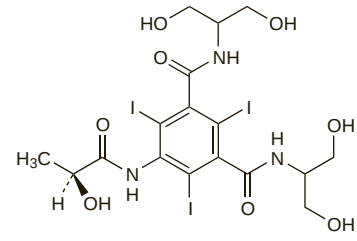
Austral.: Iomeron; ***Austria:*** Iomeron; ***Belg.:*** Iomeron; ***Cz.:*** Iomeron; ***Denm.:*** Iomeron; ***Fin.:*** Iomeron; ***Fr.:*** Iomeron; ***Ger.:*** Imeron; ***Gr.:*** Iomeron; ***Hung.:*** Iomeron; ***Irl.:*** Iomeron†; ***Israel:*** Iomeron; ***Ital.:*** Iomeron; ***Jpn:*** Iomeron; ***Neth.:*** Iomeron; ***Norw.:*** Iomeron; ***NZ:*** Iomeron; ***Port.:*** Iomeron; ***Spain:*** Iomeron; ***Swed.:*** Iomeron; ***Switz.:*** Iomeron; ***UK:*** Iomeron.

Iopamidol *(BAN, USAN, rINN)*

B-15000; Iopamidolum; Jopamidol; Jopamidoli; Jopamidolis; SQ-13396. (*S*)-*N,N′*-Bis[2-hydroxy-1-(hydroxymethyl)ethyl]-2,4,6-tri-iodo-5-lactamidoisophthalamide.

Йопамидол

$C_{17}H_{22}I_3N_3O_8$ = 777.1.
CAS — 60166-93-0; 62883-00-5.
ATC — V08AB04.
ATC Vet — QV08AB04.



Description. Iopamidol contains about 49% of I.

Pharmacopoeias. In *Eur.* (see p.vii), *Jpn*, and *US.*
Ph. Eur. 6.2 (Iopamidol). A white or almost white powder. Freely soluble in water; practically insoluble in alcohol and in dichloromethane; very slightly soluble in methyl alcohol. Protect from light.
USP 31 (Iopamidol). A white to off-white, practically odourless, powder. Very soluble in water; practically insoluble in alcohol and in chloroform; sparingly soluble in methyl alcohol. Store at a temperature of 25°, excursions permitted between 15° and 30°. Protect from light.

Adverse Effects, Treatment, and Precautions

As for the amidotrizoates, p.1475. For the adverse effects relating to the use of nonionic contrast media such as iopamidol for

myelography, see under Iohexol, p.1483; for specific references, see below.

Effects on the nervous system. Reports of serious neurological sequelae to lumbar myelography with iopamidol.

1. Wallers K, *et al.* Severe meningeal irritation after intrathecal injection of iopamidol. *BMJ* 1985; **291:** 1688.
2. Robinson C, Fon G. Adverse reaction to iopamidol. *Med J Aust* 1986; **144:** 553.
3. Bell JA, McIlwaine GG. Postmyelographic lateral rectus palsy associated with iopamidol. *BMJ* 1990; **300**: 1343–4.
4. Mallat Z, *et al.* Aseptic meningoencephalitis after iopamidol myelography. *Lancet* 1991; **338**: 252.
5. Bain PG, *et al.* Paraplegia after iopamidol myelography. *Lancet* 1991; **338**: 252–3.
6. Klein KM, *et al.* Status epilepticus and seizures induced by iopamidol myelography. *Seizure* 2004; **13:** 196–9.

Pharmacokinetics

On intravascular use, iopamidol is rapidly eliminated, with up to 50% of the dose recovered unchanged in the urine within 2 hours; the elimination half-life is about 2 hours. It is not significantly bound to plasma proteins.

Uses and Administration

Iopamidol is a nonionic monomeric iodinated radiographic contrast medium (see p.1474). It may be given intravenously, intra-arterially, intrathecally, intra-articularly, orally, or rectally and is used in radiographic procedures including angiography, arthrography, myelography, urography, and imaging of the gastrointestinal tract. Iopamidol is also used for contrast enhancement during computed tomography.

Iopamidol is usually available as solutions containing 30.62 to 75.5% of iopamidol (equivalent to 150 to 370 mg/mL of iodine) and the dose and strength used vary according to the procedure and route.

Preparations

USP 31: Iopamidol Injection.

Proprietary Preparations (details are given in Part 3)
Arg.: Hemoray; Iopamiron; Opacrile; ***Austral.:*** Isovue; ***Austria:*** Gastromiro; Iopamiro; Scanlux; ***Braz.:*** Iopamiron; ***Chile:*** Radiomiron; ***Cz.:*** Gastromiro†; Iopamiro†; Scanlux; ***Denm.:*** Iopamiro; ***Fr.:*** Iopamiron; ***Ger.:*** Solutrast; Unilux; ***Gr.:*** Iopamiro; Scanlux; ***Hung.:*** Gastromiro†; Iopamiro; Scanlux; ***Irl.:*** Gastromiro†; Niopam†; ***Israel:*** Gastromiro†; Iopamiro; ***Ital.:*** Gastromiro; Iopamiro; Iopasen; ***Mex.:*** Pamiray; ***Neth.:*** Gastromiro; Iopamiro; Scanlux; ***Norw.:*** Iopamiro; ***NZ:*** Iopamiro; Isovue; ***Port.:*** Gastromiro; Iopamiro; Scanlux; ***Spain:*** Iopamiro; ***Swed.:*** Iopamiro; ***Switz.:*** Iopamiro; Scanlux; ***UK:*** Gastromiro; Niopam; Scanlux; ***USA:*** Isovue; ***Venez.:*** Iopamiron.

Iopanoic Acid *(BAN, rINN)*

Acide iopanoïque; Ácido iopanoico; Acidum iopanoicum; Iodopanoic Acid; Jopaanihappo; Jopano rūgštis; Jopánsav; Jopansyra; Kyselina jopanoová. 2-(3-Amino-2,4,6-tri-iodobenzyl)butyric acid.

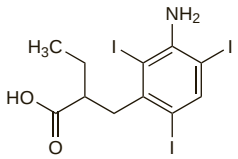
Йопаноевая Кислота

$C_{11}H_{12}I_3NO_2$ = 570.9.

CAS — 96-83-3.

ATC — V08AC06.

ATC Vet — QV08AC06.



Description. Iopanoic acid contains about 66.7% of I.

Pharmacopoeias. In *Chin.*, *Eur.* (see p.vii), *Int.*, and *US.*

Ph. Eur. 6.2 (Iopanoic Acid). A white or yellowish-white powder. Practically insoluble in water; soluble in dehydrated alcohol and in methyl alcohol; dissolves in dilute solutions of alkali hydroxides. Protect from light.

USP 31 (Iopanoic Acid). A cream-coloured powder, with a faint characteristic odour. Insoluble in water; soluble in alcohol, in chloroform, in ether, and in solutions of alkali hydroxides and carbonates. Store in airtight containers. Protect from light.

Adverse Effects

Gastrointestinal disturbances such as nausea, vomiting, abdominal cramp, and diarrhoea are reported to occur in up to 40% of patients but are usually mild and transient. Mild stinging or burning on micturition, and skin rashes and flushing have occurred occasionally. Acute renal failure, thrombocytopenia, and hypersensitivity reactions have been reported.

Iopanoic acid has potent uricosuric and anticholinesterase effects.

Precautions

Iopanoic acid is contra-indicated in severe hepatic or renal disease; doses higher than 3 g should not be given to patients with renal impairment. It should not be used in the presence of acute gastrointestinal disorders that may impair absorption. It should be used with caution in patients with a history of hypersensitivity to iodine or to other contrast media, severe hyperthyroidism, hyperuricaemia, or cholangitis. Because of its cholinergic action, premedication with atropine has been suggested in some countries for patients with coronary heart disease. Iodine-containing contrast media may interfere with thyroid-function tests and with some blood and urine tests.

Breast feeding. No adverse effects have been observed in breast-feeding infants whose mothers were receiving iopanoic acid and the American Academy of Pediatrics considers[1] that it is therefore 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 27/03/06)

Pharmacokinetics

Iopanoic acid is variably absorbed from the gastrointestinal tract and is strongly and extensively bound to plasma proteins. It is conjugated in the liver to the glucuronide and excreted largely in the bile and the remainder (about one-third of the dose) in the urine. It appears in the gallbladder about 4 hours after a dose is taken and maximum concentrations occur after about 17 hours. About 50% of a dose is excreted in 24 hours, but elevated protein-bound iodine concentrations may persist for several months.

Uses and Administration

Iopanoic acid is an ionic monomeric iodinated radiographic contrast medium (p.1474). It has been given orally for cholecystography and cholangiography in usual doses of 3 g, given with plenty of water, about 10 to 14 hours before X-ray examination.

Iopanoic acid has also been used in the management of hyperthyroidism (see below).

Hyperthyroidism. Iopanoic acid and other iodinated oral cholecystographic agents reduce conversion of thyroxine to triiodothyronine, as well as inhibiting release of thyroid hormones from the thyroid gland,[1] and they have been used in the management of hyperthyroidism (p.2165). Iopanoic acid has been used successfully for pre-operative preparation in severe hyperthyroidism,[2-4] and for control of hyperthyroidism before radioiodine treatment.[5] It has a rapid effect but rebound hyperthyroidism may occur and it is not generally suitable for long-term use.[1]

1. Braga M, Cooper DS. Oral cholecystographic agents and the thyroid. *J Clin Endocrinol Metab* 2001; **86:** 1853–60.
2. Pandey CK, *et al.* Rapid preparation of severe uncontrolled thyrotoxicosis due to Graves' disease with iopanoic acid—a case report. *Can J Anesth* 2004; **51:** 38–40.
3. Dhillon KS, *et al.* Treatment of hyperthyroidism associated with thyrotropin-secreting pituitary adenomas with iopanoic acid. *J Clin Endocrinol Metab* 2004; **89:** 708–11.
4. Panzer C, *et al.* Rapid preoperative preparation for severe hyperthyroid Graves' disease. *J Clin Endocrinol Metab* 2004; **89:** 2142–4.
5. Bal CS, *et al.* Effect of iopanoic acid on radioiodine therapy of hyperthyroidism: long-term outcome of a randomized controlled trial. *J Clin Endocrinol Metab* 2005; **90:** 6536–40.

Preparations

BP 2008: Iopanoic Acid Tablets;
USP 31: Iopanoic Acid Tablets.

Proprietary Preparations (details are given in Part 3)
Arg.: Colesom†; ***Ital.:*** Cistobil†; ***Spain:*** Colegraf; ***Venez.:*** Colepak†.

Iopentol *(BAN, USAN, rINN)*

Compound 5411; Iopentolum; Jopentol; Jopentoli. *N,N'*-Bis(2,3-dihydroxypropyl)-5-[*N*-(2-hydroxy-3-methoxypropyl)acetamido]-2,4,6-tri-iodoisophthalamide.

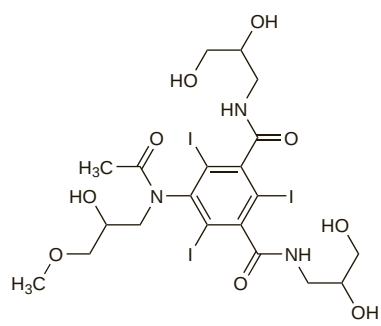
Йопентол

$C_{20}H_{28}I_3N_3O_9$ = 835.2.

CAS — 89797-00-2.

ATC — V08AB08.

ATC Vet — QV08AB08.



Description. Iopentol contains about 45.6% of I.

Profile

Iopentol is a nonionic monomeric iodinated radiographic contrast medium (see p.1474). It may be given intravenously, intra-arterially, orally, or by instillation into body cavities, and is used in procedures including angiography, arthrography, endoscopic retrograde cholangiopancreatography, hysterosalpingography, urography, and visualisation of the gastrointestinal tract. It is also used for contrast enhancement in computed tomography.

Iopentol is usually available as solutions containing 32.9 to 76.8% of iopentol (equivalent to 150 to 350 mg/mL of iodine) and the dose and strength used vary according to the procedure and route.

Preparations

Proprietary Preparations (details are given in Part 3)
Austria: Imagopaque; ***Fr.:*** Ivepaque; ***Ger.:*** Imagopaque; ***Gr.:*** Imagopaque; ***Ital.:*** Imagopaque; ***Spain:*** Imagopaque†; ***Switz.:*** Imagopaque†.

Iopodic Acid *(BANM, rINNM)*

Acide Iopodique; Ácido iopodico; Acidum Iopodicum; Ipodic Acid. 3-(3-Dimethylaminomethyleneamino-2,4,6-tri-iodophenyl)propionic acid.

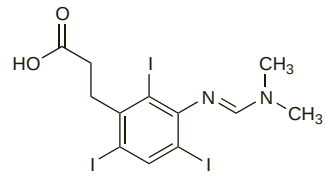
Йоподовая Кислота

$C_{12}H_{13}I_3N_2O_2$ = 598.0.

CAS — 5587-89-3.

ATC — V08AC08; V08AC10.

ATC Vet — QV08AC08; QV08AC10.



Calcium Iopodate *(BANM, rINNM)*

Calcii Iopodas; Calcium Ipodate; Iopodate Calcique; Iopodato cálcico; Ipodate Calcium; Kalciumjopodat; Kalsiumjopodaatti.

Кальций Йоподат

$(C_{12}H_{12}I_3N_2O_2)_2Ca$ = 1234.0.

CAS — 1151-11-7.

ATC — V08AC10.

ATC Vet — QV08AC10.

Description. Calcium iopodate contains about 61.7% of I.

Sodium Iopodate *(BAN, rINN)*

Iopodate de Sodium; Iopodato de sodio; Ipodate Sodium *(USAN)*; Natrii Iopodas; Natriumjopodaatti; Natriumjopodat; NSC-106962; Sodium Ipodate.

Натрий Йоподат

$C_{12}H_{12}I_3N_2NaO_2$ = 619.9.

CAS — 1221-56-3.

ATC — V08AC08.

ATC Vet — QV08AC08.

Description. Sodium iopodate contains about 61.4% of I.

Pharmacopoeias. In *US.*

USP 31 (Ipodate Sodium). A fine, white or off-white, odourless, crystalline powder. Soluble 1 in less than 1 of water, 1 in 2 of alcohol, 1 in 2 of dimethylacetamide, and 1 in 3.5 of dimethylformamide and of dimethyl sulfoxide; very slightly soluble in chloroform; freely soluble in methyl alcohol. Store in airtight containers.

Profile

Iopodic acid is an ionic monomeric iodinated radiographic contrast medium (see p.1474). It has similar properties to iopanoic acid (p.1484) and has been used orally as the sodium or calcium salt for cholecystography and cholangiography. It has also been tried in the management of hyperthyroidism.

Preparations

USP 31: Ipodate Sodium Capsules.

Proprietary Preparations (details are given in Part 3)
Gr.: Biloptin†; ***UK:*** Biloptin†; Solu-Biloptin†.