Sodium Iodamide *(BANM, rINNM)*

Iodamida sódica; Iodamide Sodique; Iodamide Sodium; Natrii Iodamidum.

Натрий Йодамид

$C_{12}H_{10}I_3N_2NaO_4$ = 649.9.

CAS — 10098-82-5.

ATC — V08AA03.

ATC Vet — QV08AA03.

Description. Sodium iodamide contains about 58.6% of I.

Profile

Iodamide is an ionic monomeric iodinated radiographic contrast medium (see p.1474). It is used in many procedures and may be given intravenously or by other routes, for example by instillation into the bladder or uterus; it has also been used for computed tomography.

It is usually given as a 24 to 65% solution of the meglumine salt, or as a mixture of the sodium and meglumine salts; solutions of the sodium salt have also been used. The dose varies according to the procedure and route.

Preparations

Proprietary Preparations (details are given in Part 3)
Austria: Uromiro; ***Ital.:*** Isteropac ER; Opacist ER; Uromiro 24%, 36%, and 300†; Uromiro 300 Sodico†; Uromiro 340 and 420†; ***Switz.:*** Isteropac†; Opacist ER†; Uromiro†; ***Venez.:*** Angiomiron†; Uromiron.

Iodised Oil

Aceite yodado; Ethiodized Oil.

CAS — 8001-40-9 (iodised oil); 8008-53-5 (ethiodized oil injection).

ATC — V08AD01.

ATC Vet — QV08AD01.

Description. Iodised oil is an iodine addition product of the ethyl esters of the fatty acids obtained from poppy-seed oil. It contains about 35 to 39% of combined iodine.

Incompatibility. Because of its solvent action on polystyrene, iodised oil injection should not be given in syringes made with polystyrene.

Adverse Effects and Precautions

The risk of hypersensitivity reactions or iodism is greater after the use of iodised oil than after water-soluble iodinated contrast media such as the amidotrizoates. Pulmonary oil embolism is reported to be relatively frequent after lymphography but is not usually severe; however, hypotension, tachycardia, and pulmonary oedema and infarction may occur rarely and deaths have been reported in patients with pulmonary disease. Chemical pneumonitis, oedema, granuloma formation, and goitre have occurred.

Great care must be taken to avoid vascular structures, because of the danger of oil embolism; it should therefore not be used in areas affected by haemorrhage or local trauma. Iodised oil should be used with care in patients with thyroid dysfunction or a history of allergic reactions. Use may interfere with thyroid-function tests for several months.

Hysterosalpingography. The use of oily contrast media such as iodised oil for hysterosalpingography has been associated with serious adverse effects, including tubal occlusion,[1] and cerebral and pulmonary oil embolism,[2,3] and water-soluble contrast media are usually preferred. However, diagnostic hysterosalpingography using iodised oil has been associated with an increase in fertility[4] and randomised trials[5,6] using iodised oil for treatment in patients with unexplained infertility have found a similar effect.

1. Wright FW, Stallworthy J. Female sterility produced by investigation. *BMJ* 1973; **3:** 632.
2. Dan U, *et al.* Cerebral embolization and coma after hysterosalpingography with oil-soluble contrast medium. *Fertil Steril* 1990; **53:** 939–40.
3. Uzun O, *et al.* Pulmonary and cerebral oil embolism after hysterosalpingography with oil soluble contrast medium. *Respirology* 2004; **9:** 134–6.
4. Johnson NP. A review of the use of lipiodol flushing for unexplained infertility. *Treat Endocrinol* 2005; **4:** 233–43.
5. Nugent D, *et al.* A randomized controlled trial of tubal flushing with lipiodol for unexplained infertility. *Fertil Steril* 2002; **77:** 173–5.
6. Johnson NP, *et al.* The FLUSH trial—flushing with lipiodol for unexplained (and endometriosis-related) subfertility by hysterosalpingography: a randomized trial. *Hum Reprod* 2004; **19:** 2043–51.

Pharmacokinetics

Iodised oil may persist in the body for several weeks or months. It is only slowly absorbed from most body sites, although absorption from the peritoneal cavity is stated to be relatively rapid. It is reported to be slowly metabolised to fatty acids and iodine.

Uses and Administration

Iodised oil is an iodinated radiographic contrast medium (p.1474) that is used mainly for lymphography. It has been used for hysterosalpingography but water-soluble agents are preferred. Although some preparations have been used in bronchography, the fluid injection of iodised oil is unsuitable for such use. Doses are dependent upon the procedure.

Because it is slowly metabolised to release iodine, iodised oil is used in the management of iodine deficiency (p.2170).

Infertility. For reference to the use of iodised oil in the management of infertility, see Hysterosalpingography under Adverse Effects and Precautions, above.

Malignant neoplasms. Intra-arterial injection of iodised oil has been used in both the diagnosis and management of malignant neoplasms of the liver (p.667). After injection into the hepatic artery, iodised oil is selectively retained by hepatic carcinomas and may have a role as an adjunct to computed tomography for both diagnosis and monitoring.[1-3] It has also been used in the management of hepatic carcinoma,[2,4] either to increase the retention of antineoplastics (chemoembolisation),[5] or to provide targeted delivery of radioactive iodine.[6]

1. Dalla Palma L. Diagnostic imaging and interventional therapy of hepatocellular carcinoma. *Br J Radiol* 1998; **71:** 808–18.
2. Ryder SD. Guidelines for the diagnosis and treatment of hepatocellular carcinoma (HCC) in adults. *Gut* 2003; **52** (suppl): iii1–iii8. Also available at: http://www.bsg.org.uk/pdf_word_docs/hcc.pdf (accessed 27/03/06)
3. Zheng X-H, *et al.* Detection of hypervascular hepatocellular carcinoma: comparison of multi-detector CT with digital subtraction angiography and Lipiodol CT. *World J Gastroenterol* 2005; **11:** 200–203.
4. Trinchet JC, *et al.* Review article: intra-arterial treatments in patients with hepatocellular carcinoma *Aliment Pharmacol Ther* 2003; **17** (suppl 2): 111–118.
5. Group d'Etude et de Traitement du Carcinome Hépatocellulaire. A comparison of Lipiodol chemoembolization and conservative treatment for unresectable hepatocellular carcinoma. *N Engl J Med* 1995; **332:** 1256–61.
6. Lau WY, *et al.* Adjuvant intra-arterial iodine-131-labelled lipiodol for resectable hepatocellular carcinoma: a prospective randomised trial. *Lancet* 1999; **353:** 797–801.

Preparations

BP 2008: Iodised Oil Fluid Injection;
USP 31: Ethiodized Oil Injection.

Proprietary Preparations (details are given in Part 3)
Arg.: Lipiodol; ***Austral.:*** Lipiodol; ***Austria:*** Lipiodol; ***Belg.:*** Lipiodol; ***Braz.:*** Lipiodol†; ***Chile:*** Lipiodol; ***Cz.:*** Lipiodol; ***Denm.:*** Lipiodol; ***Fr.:*** Lipiodol; ***Ger.:*** Lipiodol; ***Gr.:*** Lipiodol; ***Hung.:*** Lipiodol; ***Israel:*** Lipiodol; ***Ital.:*** Lipiodol; ***Neth.:*** Lipiodol; ***Norw.:*** Lipiodol†; ***NZ:*** Lipiodol; ***Port.:*** Lipiodol; ***Switz.:*** Lipiodol; ***UK:*** Lipiodol; ***USA:*** Ethiodol; ***Venez.:*** Lipiodol.

Iodixanol *(BAN, USAN, rINN)*

2-5410-3A; Iodixanolum; Jodiksanoli; Jodixanol. 5,5′-[(2-Hydroxytrimethylene)bis(acetylimino)]bis[*N*,*N*′-bis(2,3-dihydroxypropyl)-2,4,6-triiodoisophthalamide].

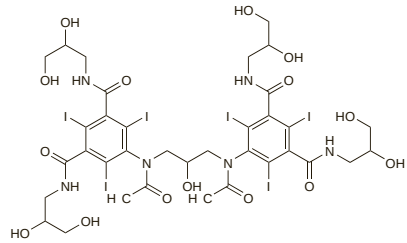
Йодиксанол

$C_{35}H_{44}I_6N_6O_{15}$ = 1550.2.

CAS — 92339-11-2.

ATC — V08AB09.

ATC Vet — QV08AB09.



Description. Iodixanol contains about 49.1% of I.

Pharmacopoeias. In *US.*

USP 31 (Iodixanol). A white to off-white, amorphous, odourless, hygroscopic powder. Freely soluble in water. Store at a temperature of 25°, excursions permitted between 15° and 30°. Protect from light.

Adverse Effects, Treatment, and Precautions

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

Pharmacokinetics

Iodixanol is rapidly distributed into extracellular fluid after intravenous injection. It is not bound to plasma proteins. It is not metabolised and about 97% of a dose is excreted in the urine within 24 hours. A terminal elimination half-life of about 2 hours has been reported. Iodixanol is removed by dialysis.

Uses and Administration

Iodixanol is a nonionic dimeric iodinated radiographic contrast medium (see p.1474); it is iso-osmolar with blood. It may be given intravenously, intra-arterially, intrathecally, orally, or by instillation into body cavities, and is used in procedures including angiography, arthrography, cholangiopancreatography, hysterosalpingography, myelography, and urography, as well as for imaging of the upper gastrointestinal tract and for contrast enhancement during computed tomography.

Iodixanol is usually available as a solution containing between 30.5 and 65.2% of iodixanol (equivalent to between 150 and 320 mg/mL of iodine). The dose and strength used vary according to the procedure and route.

◊ References.

1. Spencer CM, Goa KL. Iodixanol: a review of its pharmacodynamic and pharmacokinetic properties and diagnostic use as an x-ray contrast medium. *Drugs* 1996; **52:** 899–927.

Preparations

USP 31: Iodixanol Injection.

Proprietary Preparations (details are given in Part 3)
Austral.: Visipaque; ***Austria:*** Visipaque; ***Belg.:*** Visipaque; ***Braz.:*** Visipaque†; ***Canad.:*** Visipaque; ***Chile:*** Visipaque; ***Cz.:*** Visipaque; ***Denm.:*** Visipaque; ***Fin.:*** Visipaque; ***Fr.:*** Visipaque; ***Ger.:*** Visipaque; ***Gr.:*** Visipaque; ***Hung.:*** Visipaque; ***Israel:*** Visipaque; ***Ital.:*** Visipaque; ***Neth.:*** Visipaque; ***Norw.:*** Visipaque; ***NZ:*** Visipaque; ***Port.:*** Visipaque; ***Rus.:*** Visipaque (Визипак)†; ***Spain:*** Visipaque; ***Swed.:*** Visipaque; ***Switz.:*** Visipaque; ***UK:*** Visipaque; ***USA:*** Visipaque.

Iodoxamic Acid *(BAN, USAN, rINN)*

Acide Iodoxamique; Ácido iodoxámico; Acidum Iodoxamicum; B-10610; Jodoksaamihappo; Jodoxamsyra; SQ-21982. 3,3′-(4,7,10,13-Tetraoxahexadecanedioyldiamino)bis(2,4,6-tri-iodobenzoic acid).

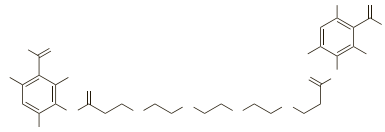
Йодоксамовая Кислота

$C_{26}H_{26}I_6N_2O_{10}$ = 1287.9.

CAS — 31127-82-9.

ATC — V08AC01.

ATC Vet — QV08AC01.



Description. Iodoxamic acid contains about 59.1% of I.

Meglumine Iodoxamate *(BANM, rINNM)*

Dimeglumine Iodoxamate; Iodoxamate de Méglumine; Iodoxamate Meglumine *(USAN)*; Iodoxamato de meglumina; Meglumini Iodoxamas. The di(*N*-methylglucamine) salt of iodoxamic acid.

Меглумина Йодоксамат

$C_{26}H_{26}I_6N_2O_{10}.(C_7H_{17}NO_5)_2$ = 1678.3.

CAS — 51764-33-1.

ATC — V08AC01.

ATC Vet — QV08AC01.

Description. Meglumine iodoxamate contains about 45.4% of I.

Profile

Iodoxamic acid is an ionic dimeric iodinated radiographic contrast medium (p.1474) that has been used intravenously as the meglumine salt for cholecystography and cholangiography.

Iofendylate *(BAN, rINN)*

Ethyl Iodophenylundecylate; Iodophendylate; Iofendilato; Iofendylatum; Iophendylate; Jofendylaatti; Jofendylat. A mixture of stereoisomers of ethyl 10-(4-iodophenyl)undecanoate.

Йофендилат

$C_{19}H_{29}IO_2$ = 416.3.

CAS — 99-79-6; 1320-11-2.

ATC — V08AD04.

ATC Vet — QV08AD04.

Description. Iofendylate contains about 30.5% of I.

Pharmacopoeias. In *Chin.* and *US.*

USP 31 (Iophendylate). A colourless to pale yellow, viscous liquid, darkening on long exposure to air. Is odourless or has a faintly ethereal odour. Very slightly soluble in water; freely soluble in alcohol, in chloroform, in ether, and in benzene. Store in airtight containers at a temperature of 25°, excursions permitted between 15° and 30°. Protect from light.

Profile

Iofendylate is an ionic monomeric iodinated radiographic contrast medium (p.1474). It was formerly used for myelography, but was associated with serious adverse effects, including allergy, arachnoiditis, and aseptic meningitis, and has now been superseded by nonionic media. Residues of iofendylate remaining years after myelography have been associated with adverse effects. Other former uses included ventriculography, and visualisation of the fetus in the amniotic sac.

Preparations

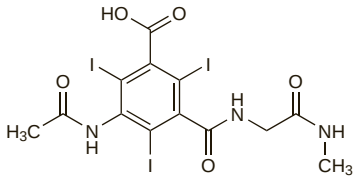
BP 2008: Iofendylate Injection;
USP 31: Iophendylate Injection.

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

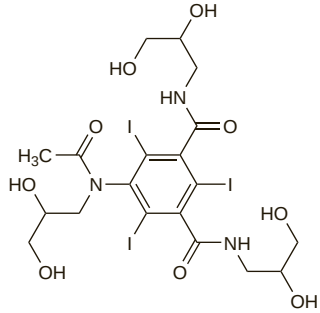
Ioglicic acid is an ionic monomeric iodinated radiographic contrast medium (p.1474) that has been used, as the meglumine and sodium salts, for diagnostic procedures.

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)

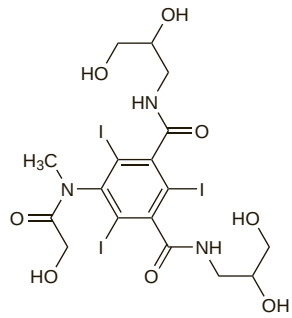
Arg.: Omnipaque†; ***Austral.:*** Omnipaque; ***Austria:*** Accupaque; Omnipaque; ***Belg.:*** Omnipaque; ***Braz.:*** Omnipaque†; ***Canad.:*** Omnipaque; ***Chile:*** Omnipaque; ***Cz.:*** Omnipaque; ***Denm.:*** Omnipaque; ***Fin.:*** Omnipaque; ***Fr.:*** Omnipaque; ***Ger.:*** Accupaque; Omnipaque; ***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)

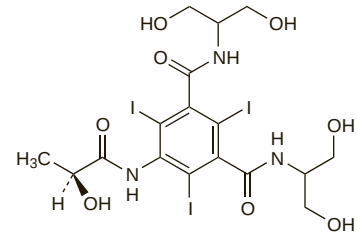
Austral.: Iomeron; ***Austria:*** Iomeron; ***Belg.:*** Iomeron; ***Cz.:*** Iomeron; ***Denm.:*** Iomeron; ***Fin.:*** Iomeron; ***Fr.:*** Iomeron; ***Ger.:*** Imeron; ***Gr.:*** Iomeron; ***Hung.:*** Iomeron; ***Irl.:*** Iomeron†; ***Israel:*** Iomeron; ***Ital.:*** Iomeron; ***Jpn:*** Iomeron; ***Neth.:*** 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