Ferristene *(BAN, USAN)*

Ferristeno.

$C_8H_{11}NO_3S,(Fe_2O_3)_{0.725}$.

CAS — 155773-56-1.

ATC — V08CB02.

ATC Vet — QV08CB02.

Description. Ferristene contains about 23.4% of Fe.

Profile
Ferristene consists of iron ferrite crystals carried on monosized spheres of cross-linked poly(ammonium styrenesulfonate). It has superparamagnetic properties and has been used orally as a magnetic resonance contrast medium (p.1474) for imaging of the abdomen.

Preparations
Proprietary Preparations (details are given in Part 3)
UK: Abdoscan†.

Ferucarbotran *(BAN, USAN)*

Ferrixan; Ferucarbotrano; SHU-555A; ZK-132281.

Profile
Ferucarbotran is a colloidal aqueous suspension of iron oxide (magnetite and maghemite) particles coated with carboxydextran. It has superparamagnetic properties and is used similarly to ferumoxides (below) as a magnetic resonance contrast medium (p.1474) for imaging of the liver; the particles are taken up by the reticuloendothelial system of the liver and spleen and provide contrast enhancement. It is given intravenously as a solution containing 28 mg/mL of iron. The usual dose is 0.9 mL for patients weighing less than 60 kg and 1.4 mL for patients weighing 60 kg and over.

◊ References.

1. Reimer P, Balzer T. Ferucarbotran (Resovist): a new clinically approved RES-specific contrast agent for contrast-enhanced MRI of the liver: properties, clinical development, and applications. *Eur Radiol* 2003; **13:** 1266–76.

Preparations
Proprietary Preparations (details are given in Part 3)
Austral.: Resovist†; ***Austria:*** Resovist; ***Belg.:*** Resovist; ***Cz.:*** Resovist; ***Denm.:*** Resovist; ***Fin.:*** Resovist†; ***Ger.:*** Resovist; ***Gr.:*** Resovist; ***Israel:*** Resovist†; ***Ital.:*** Resovist; ***Neth.:*** Resovist; ***Norw.:*** Resovist; ***Port.:*** Resovist; ***Spain:*** Resograf; Resovist; ***Swed.:*** Resovist; ***Switz.:*** Resovist.

Ferumoxides *(BAN, USAN)*

AMI-25; Ferumóxidos.

$(Fe_2O_3)_m(FeO)_n$.

CAS — 119683-68-0.

Adverse Effects and Precautions
The most common adverse effects with ferumoxides are pain, vasodilatation, and hypotension; paraesthesia may also occur. Hypersensitivity reactions have developed. Extravasation may lead to discoloration of the skin around the injection site. Ferumoxides should not be used in patients with known hypersensitivity to iron and should be used with caution in patients with iron overload disorders.

Uses and Administration
Ferumoxides consists of colloidal particles of magnetite (iron oxide). It has superparamagnetic properties and is used as a magnetic resonance contrast medium (p.1474) for imaging of the liver; the particles are taken up by the reticuloendothelial system of the liver and spleen and provide contrast enhancement. It is available as a suspension containing 11.2 mg/mL of iron, which should be diluted in 100 mL of glucose 5% before use and given intravenously over at least 30 minutes. The dose is expressed in terms of iron. In Europe, the usual dose is 0.84 mg/kg; in the USA, a dose of 0.56 mg/kg is used.

◊ Reference to the use of ferumoxides followed by a gadolinium-based contrast medium.[1]

1. Qayyum A, *et al.* Detection of hepatocellular carcinoma by ferumoxides-enhanced MR imaging in cirrhosis: incremental value of dynamic gadolinium-enhancement. *J Magn Reson Imaging* 2006; **23:** 17–22.

Preparations
USP 31: Ferumoxides Injection.

Proprietary Preparations (details are given in Part 3)
Arg.: Feridex†; ***Austria:*** Endorem; ***Belg.:*** Endorem; ***Denm.:*** Endorem; ***Fin.:*** Endorem; ***Fr.:*** Endorem; ***Ger.:*** Endorem; ***Gr.:*** Endorem; ***Israel:*** Feridex†; ***Ital.:*** Endorem; ***Jpn:*** Feridex; ***Neth.:*** Endorem; ***Norw.:*** Endorem; ***Port.:*** Endorem; ***Spain:*** Endorem; ***Swed.:*** Endorem; ***Switz.:*** Endorem; ***USA:*** Feridex.

Ferumoxsil *(BAN, USAN)*

AMI-121; Ferumoksiili; Ferumoxil; Férumoxsil; Ferumoxsilum.

ATC — V08CB01.

ATC Vet — QV08CB01.

Adverse Effects and Precautions
The most common adverse effects with ferumoxsil are diarrhoea, nausea, vomiting, and abdominal pain; oral paraesthesia has also been reported. Ferumoxsil should be used with caution in patients with iron overload disorders.

Uses and Administration
Ferumoxsil consists of a silicone polymer bonded to colloidal particles of magnetite (iron oxide). It has superparamagnetic properties and is used as a magnetic resonance contrast medium (p.1474) for imaging of the gastrointestinal tract; the particles remain in the stomach and intestine when given orally or rectally and provide contrast enhancement. It is given as a suspension containing 175 micrograms/mL of iron. The usual dose is 600 to 900 mL by mouth, or 300 to 600 mL rectally.

Preparations
USP 31: Ferumoxsil Oral Suspension.

Proprietary Preparations (details are given in Part 3)
Austria: Lumirem; ***Braz.:*** Lumirem†; ***Denm.:*** Lumirem; ***Fin.:*** Lumirem; ***Fr.:*** Lumirem; ***Ger.:*** Lumirem; ***Ital.:*** Lumirem; ***Neth.:*** Lumirem; ***Port.:*** Lumirem; ***Swed.:*** Lumirem; ***USA:*** Gastromark.

Ferumoxtran-10 *(USAN)*

AMI-227; BMS-180549; Code 7227.

CAS — 189047-99-2.

Profile
Ferumoxtran-10 consists of colloidal particles of magnetite (iron oxide) coated with a low-molecular-weight dextran. It has superparamagnetic properties and is under investigation as a magnetic resonance contrast medium for imaging of the lymphatic system.

Gadobenic Acid *(BAN, rINN)*

Acide Gadobénique; Ácido gadobénico; Acidum Gadobenicum; B-19036; Gd-BOPTA. Dihydrogen [(±)-4-carboxy-5,8,11-tris(carboxymethyl)-1-phenyl-2-oxa-5,8,11-triazatridecan-13-oato(5–)]gadolinate(2–).

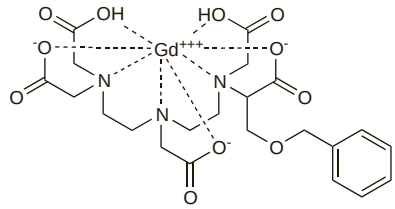
Гадобеновая Кислота

$C_{22}H_{28}GdN_3O_{11}$ = 667.7.

CAS — 113662-23-0.

ATC — V08CA08.

ATC Vet — QV08CA08.



Meglumine Gadobenate *(BANM, rINNM)*

B-19036/7; Gadobenaattidimeglumiini; Gadobenatdimeglumin; Gadobénate de Méglumine; Gadobenate Dimeglumine *(USAN)*; Gadobenato de meglumina; Gadobenatum Dimegluminum; Meglumini Gadobenas.

Меглумина Гадобенат

$C_{22}H_{28}GdN_3O_{11},2C_7H_{17}NO_5$ = 1058.1.

CAS — 127000-20-8.

ATC — V08CA08.

ATC Vet — QV08CA08.

Adverse Effects and Precautions
As for Gadopentetic Acid, p.1479.

◊ References.

1. Kirchin MA, *et al.* Safety assessment of gadobenate dimeglumine (MultiHance): extended clinical experience from phase I studies to post-marketing surveillance. *J Magn Reson Imaging* 2001; **14:** 281–94.
2. Shellock FG, *et al.* Safety of gadobenate dimeglumine (MultiHance): summary of findings from clinical studies and postmarketing surveillance. *Invest Radiol* 2006; **41:** 500–9.

Pharmacokinetics
Gadobenate is rapidly distributed into the extracellular space after intravenous injection. An elimination half-life of about 1.2 to 1.7 hours has been reported. It is not metabolised and about 78 to 94% of a dose is excreted in the urine within 24 hours; about 2 to 4% is excreted in the faeces.

Uses and Administration
Gadobenic acid is an ionic gadolinium chelate with actions and uses similar to those of gadopentetic acid (p.1480). It has paramagnetic properties and is used as a magnetic resonance contrast medium (p.1474). It distributes mainly into extracellular fluid, but does not cross the blood-brain barrier, and is used in imaging of the liver and CNS.

Gadobenic acid is given intravenously as the meglumine salt. It is available as a solution containing meglumine gadobenate 529 mg/mL (0.5 mmol/mL). Usual doses for imaging are:

- liver: 0.1 mL/kg (0.05 mmol/kg) intravenously
- brain or spine: 0.2 mL/kg (0.1 mmol/kg) intravenously.

Preparations
Proprietary Preparations (details are given in Part 3)
Austria: MultiHance; ***Belg.:*** MultiHance; ***Cz.:*** MultiHance; ***Denm.:*** MultiHance; ***Fin.:*** MultiHance; ***Fr.:*** MultiHance; ***Ger.:*** MultiHance; ***Gr.:*** MultiHance; ***Hung.:*** MultiHance; ***Irl.:*** MultiHance†; ***Israel:*** MultiHance; ***Ital.:*** MultiHance; ***Neth.:*** MultiHance; ***Norw.:*** MultiHance; ***NZ:*** MultiHance; ***Port.:*** MultiHance; ***Spain:*** MultiHance; ***Swed.:*** MultiHance; ***Switz.:*** MultiHance; ***UK:*** MultiHance; ***USA:*** MultiHance.

Gadobutrol *(rINN)*

Gadobutrolum. {10-[(1*RS*,2*SR*)-2,3-Dihydroxy-1-(hydroxymethyl)propyl]-1,4,7,10-tetraazacyclododecane-1,4,7-triacetato-(3–)}gadolinium.

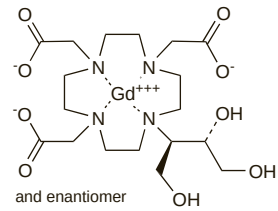
Гадобутрол

$C_{18}H_{31}GdN_4O_9$ = 604.7.

CAS — 138071-82-6.

ATC — V08CA09.

ATC Vet — QV08CA09.



Adverse Effects and Precautions
As for Gadopentetic Acid, p.1479. Gadobutrol may prolong cardiac repolarisation and should not be used in patients with uncorrected hypokalaemia. Caution is required in patients with severe cardiovascular disease, and in those with congenital long QT syndrome or a history of drug-induced arrhythmias.

Pharmacokinetics
Gadobutrol is rapidly distributed into the extracellular space following intravenous injection. It is not significantly bound to plasma proteins. An elimination half-life of about 1.8 hours has been reported. It is not metabolised and more than 90% of a dose is excreted in the urine within 12 hours; less than 0.1% is excreted in the faeces.

Uses and Administration
Gadobutrol is a nonionic gadolinium chelate with actions and uses similar to those of gadopentetic acid (p.1480). It has paramagnetic properties and is used as a magnetic resonance contrast medium (p.1474). It distributes mainly into extracellular fluid, but does not cross the blood-brain barrier, and is used in imaging of the CNS, kidneys, and liver, and in magnetic resonance angiography.

Gadobutrol is available as a solution containing 605 mg/mL (1 mmol/mL). Usual doses are:

- cranial and spinal imaging: 0.1 mL/kg (0.1 mmol/kg) intravenously. A second dose of up to 0.2 mL/kg (0.2 mmol/kg) may be given within 30 minutes if required
- kidneys and liver: 0.1 mL/kg (0.1 mmol/kg) intravenously
- angiography: 0.1 to 0.3 mL/kg (0.1 to 0.3 mmol/kg) intravenously

A solution containing 302.5 mg/mL (0.5 mmol/mL) has also been used.

◊ References.

1. Huppertz A, Rohrer M. Gadobutrol, a highly concentrated MR-imaging contrast agent: its physicochemical characteristics and the basis for its use in contrast-enhanced MR angiography and perfusion imaging. *Eur Radiol* 2004; **14** (suppl 5): M12–M18.

Preparations
Proprietary Preparations (details are given in Part 3)
Austral.: Gadovist; ***Austria:*** Gadovist; ***Belg.:*** Gadovist; ***Canad.:*** Gadovist; ***Cz.:*** Gadovist; ***Denm.:*** Gadovist; ***Fin.:*** Gadovist; ***Ger.:*** Gadovist; ***Gr.:*** Gadovist; ***Hung.:*** Gadovist; ***Ital.:*** Gadovist; ***Neth.:*** Gadovist; ***Norw.:*** Gadovist; ***NZ:*** Gadovist; ***Port.:*** Gadovist; ***Rus.:*** Gadovist (Гадовист); ***S.Afr.:*** Gadovist; ***Spain:*** Gadograf; Gadovist; ***Swed.:*** Gadovist; ***Switz.:*** Gadovist; ***UK:*** Gadovist.