Alfuzosin Hydrochloride

(BANM, USAN, rINNM)

Alfutsosiinihydrokloridi; Alfuzosin Hidroklorür; Alfuzosine, chlorhydrate d'; Alfuzosin-hydrochlorid; Alfuzosinhydroklorid; Alfuzosini hydrochloridum; Alfuzozin-hidroklorid; Alfuzozino hidrochloridas; Hidrocloruro de alfuzosina; SL-77499-10; SL-77499 (alfuzosin). *N*-{3-[4-Amino-6,7-dimethoxyquinazolin-2-yl(methyl)amino]propyl}tetrahydro-2-furamide hydrochloride.

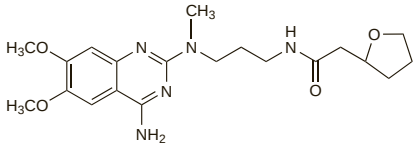
Альфузозина Гидрохлорид

$C_{19}H_{27}N_5O_4,HCl$ = 425.9.

CAS — 81403-80-7 (alfuzosin); 81403-68-1 (alfuzosin hydrochloride).

ATC — G04CA01.

ATC Vet — QG04CA01.



(alfuzosin)

Pharmacopoeias. In *Eur.* (see p.vii).

Ph. Eur. 6.2 (Alfuzosin Hydrochloride). A white or almost white, slightly hygroscopic, crystalline powder. Freely soluble in water; sparingly soluble in alcohol; practically insoluble in dichloromethane. A 2% solution in water has a pH of 4.0 to 5.5. Store in airtight containers. Protect from light.

Adverse Effects, Treatment, and Precautions

As for Prazosin Hydrochloride, p.1375. Alfuzosin may be more selective for the urinary tract and vasodilator effects may be less frequent. It should be avoided in severe hepatic impairment, and doses may need to be reduced in mild to moderate hepatic impairment and in renal impairment (see below).

Incidence of adverse effects. In postmarketing surveillance involving 13 389 patients given alfuzosin 2.5 mg three times daily by mouth for benign prostatic hyperplasia, about 3.7% of patients failed to complete treatment because of adverse effects. These were mostly vasodilatory in nature (vertigo or dizziness, syncope or malaise, hypotension, and headache), and were more common in patients over 75 years of age and during the first week of treatment.[1]

1. Lukacs B, *et al.* Safety profile of 3 months' therapy with alfuzosin in 13,389 patients suffering from benign prostatic hypertrophy. *Eur Urol* 1996; **29:** 29–35.

Surgical procedures. Alpha blockers, including alfuzosin, have been associated with intraoperative floppy iris syndrome in cataract surgery patients. For further details, see under Tamsulosin, p.2197.

Interactions

As for Prazosin Hydrochloride, p.1376. Potent inhibitors of the cytochrome P450 isoenzyme CYP3A4, such as ketoconazole, itraconazole, and ritonavir, may increase blood concentrations of alfuzosin.

Pharmacokinetics

Alfuzosin is readily absorbed after oral doses and peak plasma concentrations generally occur 0.5 to 3 hours after a dose; bioavailability is about 64%. Absorption from modified-release preparations is improved if given with food. It is extensively metabolised in the liver, mainly by the cytochrome P450 isoenzyme CYP3A4, to inactive metabolites that are excreted primarily in faeces via the bile. Only about 11% of a dose is excreted unchanged in the urine. Alfuzosin has a plasma elimination half-life of 3 to 5 hours. It is 90% bound to plasma proteins.

Uses and Administration

Alfuzosin is an alpha$_1$-adrenoceptor blocker (p.1153) with actions similar to those of prazosin (p.1376). It acts preferentially on receptors in the lower urinary tract and is therefore used in benign prostatic hyperplasia (p.2178) to relieve symptoms of urinary obstruction, including acute urinary retention.

Alfuzosin is given orally as the hydrochloride. Like other alpha$_1$-adrenoceptor blockers, it may cause collapse in some patients after the first dose, which should therefore be given just before bedtime to reduce the risk. Doses may need to be reduced in patients with hepatic or renal impairment (see below); the initial dose should also be reduced in the elderly.

In **benign prostatic hyperplasia,** the usual dose of alfuzosin hydrochloride is 2.5 mg three times daily, increased to 10 mg daily if necessary. In elderly patients, and those receiving treatment for hypertension, a lower initial dose of 2.5 mg twice daily should be considered. A modified-release preparation may also be used in a dose of 10 mg once daily after a meal.

In patients aged over 65 years catheterised for **acute urinary retention** associated with benign prostatic hyperplasia, a modified-release preparation may be given in a dose of 10 mg once daily after a meal for 3 to 4 days.

◊ Reviews.

1. Wilde MI, *et al.* Alfuzosin: a review of its pharmacodynamic and pharmacokinetic properties, and therapeutic potential in benign prostatic hyperplasia. *Drugs* 1993; **45:** 410–29.
2. McKeage K, Plosker GL. Alfuzosin: a review of the therapeutic use of the prolonged-release formulation given once daily in the management of benign prostatic hyperplasia. *Drugs* 2002; **62:** 633–53.
3. Lee M. Alfuzosin hydrochloride for the treatment of benign prostatic hyperplasia. *Am J Health-Syst Pharm* 2003; **60:** 1426–39. Correction. *ibid.* 2004; **61:** 437.
4. Weiner DM, Lowe FC. Alfuzosin for the management of benign prostate hyperplasia. *Expert Opin Pharmacother* 2003; **4:** 2057–63.
5. Guay DR. Extended-release alfuzosin hydrochloride: a new alpha-adrenergic receptor antagonist for symptomatic benign prostatic hyperplasia. *Am J Geriatr Pharmacother* 2004; **2:** 14–23.
6. MacDonald R, Wilt TJ. Alfuzosin for treatment of lower urinary tract symptoms compatible with benign prostatic hyperplasia: a systematic review of efficacy and adverse effects. *Urology* 2005; **66:** 780–8.
7. McVary KT. Alfuzosin for symptomatic benign prostatic hyperplasia: long-term experience. *J Urol (Baltimore)* 2006; **175:** 35–42.

Administration in hepatic or renal impairment. In patients with mild to moderate hepatic impairment the initial dose of alfuzosin hydrochloride should be 2.5 mg daily, increased to 2.5 mg twice daily according to response; modified-release preparations are not recommended.

In patients with renal impairment, 2.5 mg twice daily should be given initially, adjusted according to response. Although UK and US licensed product information advises caution with the use of modified-release preparations in severe renal impairment (creatinine clearance below 30 mL/minute), a study[1] in patients with varying degrees of renal impairment (including severe) suggested that no dose reduction was necessary.

1. Marbury TC, *et al.* Pharmacokinetics and safety of a single oral dose of once-daily alfuzosin, 10 mg, in male subjects with mild to severe renal impairment. *J Clin Pharmacol* 2002; **42:** 1311–17.

Preparations

Proprietary Preparations (details are given in Part 3)

Arg.: Dalfaz; UroXatral; ***Austria:*** Urion†; Xatral; ***Belg.:*** Xatral; ***Braz.:*** Xatral; ***Canad.:*** Xatral; ***Chile:*** UroXatral; ***Cz.:*** Alfuzostad; Xatral; ***Denm.:*** Xatral; ***Fin.:*** Xatral; ***Fr.:*** Urion; Xatral; ***Ger.:*** Urion; UroXatral; ***Gr.:*** Alfuprost; Alfural; Alfuzin; Innosensitive; Spedamyl; Xatral; ***Hong Kong:*** Xatral; ***Hung.:*** Alfetim; Alfuzostad; ***India:*** Flotral; ***Indon.:*** Xatral; ***Irl.:*** Xatral; ***Israel:*** Xatral; ***Ital.:*** Mittoval; Xatral; ***Malaysia:*** Xatral; ***Mex.:*** Xatral; ***Neth.:*** Mittoval; Urion; UroXatral; Xatral; ***Norw.:*** Xatral; ***Philipp.:*** Xatral; ***Pol.:*** Alfuzostad; Dalfaz; ***Port.:*** Benestan; ***Rus.:*** Dalfaz (Дальфаз); ***S.Afr.:*** Xatral; ***Singapore:*** Xatral; ***Spain:*** Alfetim†; Benestan; Unibenestan; ***Swed.:*** Xatral; ***Switz.:*** Xatral; ***Thai.:*** Xatral; ***Turk.:*** Xatral; ***UK:*** Besavar; Xatral; ***USA:*** UroXatral; ***Venez.:*** Xatral.

Alprostadil *(BAN, USAN, rINN)*

Alprostadiili; Alprostadilis; Alprostadilum; Alprosztadil; PGE$_1$; Prostaglandin E$_1$; U-10136. (*E*)-(8*R*,11*R*,12*R*,15*S*)-11,15-Dihydroxy-9-oxoprost-13-enoic acid; 7-{(1*R*,2*R*,3*R*)-3-Hydroxy-2-[(*E*)-(3*S*)-3-hydroxyoct-1-enyl]-5-oxocyclopentyl}heptanoic acid.

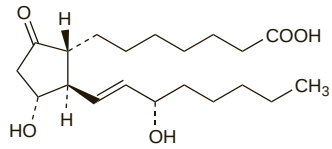
Алпростадил

$C_{20}H_{34}O_5$ = 354.5.

CAS — 745-65-3.

ATC — C01EA01; G04BE01.

ATC Vet — QC01EA01; QG04BE01.



NOTE. In *Martindale* the term alprostadil is used for the exogenous substance and prostaglandin E$_1$ for the endogenous substance.

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

Ph. Eur. 6.2 (Alprostadil). A white or slightly yellowish crystalline powder. Practically insoluble in water; freely soluble in alcohol; soluble in acetone; slightly soluble in ethyl acetate.

USP 31 (Alprostadil). A white to off-white crystalline powder. M.p. about 110°. Soluble in water; freely soluble in alcohol; soluble in acetone; very slightly soluble in chloroform and in ether; slightly soluble in ethyl acetate. Store between 2° and 8° in airtight containers.

Alprostadil Alfadex *(BAN, rINNM)*

Alprostadilum Alfadexum; α-Cyclodextrin Alprostadil; PGE$_1$ α-CD; Prostaglandin E$_1$ α-Cyclodextrin Clathrate Compound.

Алпростадил Альфадекс

$C_{20}H_{34}O_5,x[C_{36}H_{60}O_{30}]$.

ATC — C01EA01; G04BE01.

ATC Vet — QC01EA01; QG04BE01.

Pharmacopoeias. In *Jpn.*

Adverse Effects, Treatment, and Precautions

The adverse effects reported most commonly in **infants** with congenital heart disease treated with alprostadil are apnoea, fever, flushing, hypotension, bradycardia, tachycardia, diarrhoea, and convulsions. Other adverse effects reported include oedema, cardiac arrest, hypokalaemia, disseminated intravascular coagulation, and cortical proliferation of the long bones. Weakening of the wall of the ductus arteriosus and pulmonary artery may occur on prolonged infusion. Alprostadil should be avoided in neonates with respiratory distress syndrome and should be used with caution in those with bleeding tendencies; blood pressure and respiratory status should be monitored during infusion.

Adverse effects reported in **adults** given alprostadil have included headache, flushing, hypotension, diarrhoea, and pain and inflammation at the infusion site.

After intracavernosal or intra-urethral alprostadil for the treatment of erectile dysfunction, the most frequently reported adverse effect is pain during erection. Local reactions including penile fibrosis, fibrotic nodules, and Peyronie's disease have been reported. Priapism may occur (see below). Systemic effects are less common but hypotension and other adverse effects have been reported. Intracavernosal or intra-urethral use should be avoided in patients with complicating penile deformities or with sickle-cell disease, myeloma, leukaemias, or other conditions predisposing to prolonged erection.

In children. Reviews[1,2] of adverse effects associated with alprostadil in infants with congenital heart disease.

1. Lewis AB, *et al.* Side effects of therapy with prostaglandin E in infants with critical congenital heart disease. *Circulation* 1981; **64:** 893–8.
2. Lucron H, *et al.* Complications du traitement par prostaglandines E1 des cardiopathies congénitales en réanimation médicale pédiatrique. *Arch Mal Coeur Vaiss* 2005; **98:** 524–30.

Effects on the bones. Periosteal or cortical hyperostosis has been reported in infants given alprostadil for cyanotic congenital heart disease.[1-4] A retrospective review of 30 infants[2] treated with alprostadil revealed radiographic signs of periosteal reactions in 5. Changes could be detected after even short courses of therapy; 3 developed relatively mild periosteal changes in the ribs after infusions ranging from 9 to 205 hours and one had involvement of the left femur after infusion for 71 hours. Resolution of lesions had occurred in most bones 6 to 12 months later. In a further study,[5] radiological evidence of cortical hyperostosis was found in 53 of 86 infant heart transplant recipients who had received alprostadil infusion pre-operatively. Of 53 of the infants who had received alprostadil for less than 30 days, 21 were affected (2 severely). Correspondingly, of those treated for 30 to 60 days, 18 of 22 were affected (13 severely). All 14 infants treated

for more than 60 days were affected (7 severely). Since the associated bone changes may persist for months after stopping alprostadil, caution should be exercised to avoid misdiagnosis.

1. Ueda K, *et al.* Cortical hyperostosis following long-term administration of prostaglandin E in infants with cyanotic congenital heart disease. *J Pediatr* 1980; **97:** 834–6.
2. Ringel RE, *et al.* Periosteal changes secondary to prostaglandin administration. *J Pediatr* 1983; **103:** 251–3.
3. Williams JL. Periosteal hyperostosis resulting from prostaglandin therapy. *Eur J Radiol* 1986; **6:** 231–2.
4. Kalloghlian AK, *et al.* Cortical hyperostosis simulating osteomyelitis after short-term prostaglandin E infusion. *Eur J Pediatr* 1996; **155:** 173–4.
5. Woo K, *et al.* Cortical hyperostosis: a complication of prolonged prostaglandin infusion in infants awaiting cardiac transplantation. *Pediatrics* 1994; **93:** 417–20.

Effects on the gastrointestinal tract. Hyperplasia of the gastric mucosa, resulting in gastric outlet obstruction, has been reported in several neonates receiving alprostadil infusion.[1-3] It was suggested that this effect was dose-dependent.[1] Regression of the obstruction usually occurred after cessation of therapy.

For a report of necrotising enterocolitis in infants receiving alprostadil for congenital heart disease, see Dinoprostone, p.2007.

1. Peled N, *et al.* Gastric-outlet obstruction induced by prostaglandin therapy in neonates. *N Engl J Med* 1992; **327:** 505–10.
2. Merkus PJFM, *et al.* Prostaglandin E1 and gastric outlet obstruction in infants. *Lancet* 1993; **342:** 747.
3. Kobayashi N, *et al.* Acute gastric outlet obstruction following the administration of prostaglandin: an additional case. *Pediatr Radiol* 1997; **27:** 57–9.

Effects on the metabolism. Severe hyperglycaemia with apparent ketoacidosis occurred during postoperative infusion of alprostadil in the infant of a diabetic mother.[1] The manufacturers had received reports of hyperglycaemia associated with alprostadil in 5 infants, one of whom had a diabetic mother. Hypoglycaemia has also been reported in a few infants.[2]

1. Cohen MH, Nihill MR. Postoperative ketotic hyperglycaemia during prostaglandin E infusion in infancy. *Pediatrics* 1983; **71:** 842–4.
2. Lewis AB, *et al.* Side effects of therapy with prostaglandin E in infants with critical congenital heart disease. *Circulation* 1981; **64:** 893–8.

Effects on the skin. A 63-year-old man with Peyronie's disease[1] developed toxic pustuloderma (acute generalised exanthematous pustulosis) 6 days after receiving a single intracavernosal injection of alprostadil to define the penile morphology. He was treated with antihistamines and topical corticosteroids and the condition resolved completely within a week.

1. Gallego I, *et al.* Toxic pustuloderma induced by intracavernous prostaglandin E . *Br J Dermatol* 1997; **136:** 975–6.

Priapism. If priapism (p.1333) occurs after the use of alprostadil for erectile dysfunction, its treatment should not be delayed more than 6 hours. Initial therapy is by penile aspiration. If aspiration is unsuccessful a sympathomimetic with action on alpha-adrenergic receptors is given by cautious intracavernosal injection, with continuous monitoring of blood pressure and pulse. Extreme caution is necessary in patients with coronary heart disease, hypertension, cerebral ischaemia, or if taking an antidepressant. Low doses and dilute solutions are recommended as follows:

- intracavernosal injection of phenylephrine 100 to 200 micrograms (0.5 to 1 mL of a 200 micrograms/mL solution) every 5 to 10 minutes; maximum total dose 1 mg

alternatively

- intracavernosal injection of adrenaline 10 to 20 micrograms (0.5 to 1 mL of a 20 micrograms/mL solution) every 5 to 10 minutes; maximum total dose 100 micrograms

alternatively

- intracavernosal injection of metaraminol may be used, but it should be noted that fatal hypertensive crises have been reported; metaraminol 100 micrograms (5 mL of a 20 micrograms/mL solution) may be given by careful slow injection every 15 minutes; a maximum total dose of up to 1 mg has been suggested

If necessary the sympathomimetic injections can be followed by further penile aspiration. If sympathomimetics are unsuccessful, urgent surgical referral is required.

Pharmacokinetics

On infusion alprostadil is rapidly metabolised by oxidation during passage through the pulmonary circulation. It is excreted in the urine as metabolites within about 24 hours. Systemic absorption of alprostadil occurs after intracavernosal injection.

◊ References.

1. Cox JW, *et al.* Pulmonary extraction and pharmacokinetics of prostaglandin E during continuous intravenous infusion in patients with adult respiratory distress syndrome. *Am Rev Respir Dis* 1988; **137:** 5–12.
2. Cawello W, *et al.* Dose proportional pharmacokinetics of alprostadil (prostaglandin E) in healthy volunteers following intravenous infusion. *Br J Clin Pharmacol* 1995; **40:** 273–6.
3. Lea AP, *et al.* Intracavernous alprostadil: a review of its pharmacodynamic and pharmacokinetic properties and therapeutic potential in erectile dysfunction. *Drugs Aging* 1996; **8:** 56–74.

Uses and Administration

Alprostadil is a prostaglandin (p.2374) that causes vasodilatation and prevents platelet aggregation. The endogenous substance is termed prostaglandin E_1. Alprostadil is used mainly in congenital heart disease and in erectile dysfunction (p.2179).

In the management of **erectile dysfunction**, alprostadil is given by intracavernosal injection; preparations may contain alprostadil or alprostadil alfadex, but the dose is expressed in terms of the base. Alprostadil may also be given as an intra-urethral application.

By *intracavernosal injection*, the initial dose should be low, for example 2.5 micrograms, and is increased incrementally until a suitable dose is established. Normally, the second dose should be 5 micrograms if some response to the first dose is observed, or 7.5 micrograms if there is no response; increments should then be of 5 to 10 micrograms until an effective dose is reached. The usual dose range is 5 to 20 micrograms and the maximum recommended dose is 60 micrograms. In cases of erectile dysfunction of neurogenic origin secondary to spinal cord injury an initial dose of 1.25 micrograms has been given, with a second dose of 2.5 micrograms, a third dose of 5 micrograms, and subsequent increments of 5 micrograms. While finding a suitable dose, the interval between doses should be at least 1 day if there has been a partial response. If there is no response however, the next, higher dose may be given within 1 hour. Once established, the optimal dose should be given not more than once daily and not more than three times per week.

Alprostadil may also be injected intracavernosally in the diagnosis of erectile dysfunction in doses ranging from 5 to 20 micrograms.

By *intra-urethral (transurethral) application*, the initial dose is 250 micrograms. The dose may be increased incrementally to 500 or 1000 micrograms or decreased to 125 micrograms according to response. The optimal dose should be given not more than twice daily or seven times per week. A dose of 500 micrograms may be used diagnostically.

Alprostadil is also available in some countries as a *topical* formulation for the treatment of erectile dysfunction. There is also ongoing investigation of the use of topical formulations for female sexual dysfunction.

Alprostadil is used to maintain the patency of the ductus arteriosus in neonates with **congenital heart disease** until surgery is possible. It is given by continuous intravenous infusion beginning with doses of 50 to 100 nanograms/kg per minute; doses should be reduced as soon as possible to the minimum necessary to maintain response. Lower starting doses may be effective in some patients. The dose can be increased to 400 nanograms/kg per minute but, in general, higher infusion rates do not improve effect. Alprostadil may also be given by continuous infusion through an umbilical artery catheter placed at the ductal opening.

Ergotamine poisoning. Alprostadil[1,2] is one of many drugs that have been used to treat the circulatory disturbances in ergotamine poisoning (p.620).

1. Levy JM, *et al.* Prostaglandin E for alleviating symptoms of ergot intoxication: a case report. *Cardiovasc Intervent Radiol* 1984; **7:** 28–30.
2. Horstmann R, *et al.* Kritische Extremitätenischämie durch Ergotismus. *Dtsch Med Wochenschr* 1993; **118:** 1067–71.

Haemorrhagic cystitis. Bladder irrigation with alprostadil produced resolution of severe haemorrhagic cystitis in 5 of 6 children who had undergone bone marrow transplantation.[1] Alprostadil was given via a catheter and retained for 1 hour each day for at least 7 consecutive days.

1. Trigg ME, *et al.* Prostaglandin E bladder instillations to control severe hemorrhagic cystitis. *J Urol (Baltimore)* 1990; **143:** 92–4.

Hepatic disorders. Benefit has been reported in patients with *viral hepatitis* (p.851) given intravenous alprostadil alone or followed by oral dinoprostone or misoprostol.[1,2] Prostaglandins were studied because they had previously been shown to have a cytoprotective effect in experimentally induced hepatitis or in isolated hepatocytes, but the mechanism by which they exerted a beneficial effect was uncertain.

Combined intravenous therapy with glucagon, insulin, and alprostadil formulated in lipid microspheres has also been found effective in preventing *acute fulminant hepatic failure* after hepatic arterial infusion of antineoplastic chemotherapy.[3]

1. Sinclair SB, *et al.* Biochemical and clinical response of fulminant viral hepatitis to administration of prostaglandin E: a preliminary report. *J Clin Invest* 1989; **84:** 1063–9.
2. Flowers M, *et al.* Prostaglandin E in the treatment of recurrent hepatitis B infection after orthotopic liver transplantation. *Transplantation* 1994; **58:** 183–92.
3. Ikegami T, *et al.* Randomized control trial of lipo-prostaglandin E in patients with acute liver injury induced by Lipiodol-targeted chemotherapy. *Clin Pharmacol Ther* 1995; **57:** 582–9.

Organ and tissue transplantation. Alprostadil and other prostaglandin analogues have been investigated in regimens for the management of solid organ transplantation, with variable results. For reference to the use of alprostadil in intestinal grafts see p.1813.

References.

1. Merion RM. Prostaglandins in liver transplantation. *Adv Exp Med Biol* 1997; **433:** 13–18.
2. Iberer F, *et al.* Prostaglandins in heart transplantation. *Adv Exp Med Biol* 1997; **433:** 19–22.
3. Ray JG. Prostaglandin E1 analogs do not improve renal function among either transplant or nontransplant patients: no further trials required. *Transplantation* 1998; **66:** 476–83.

Peripheral vascular disease. Various prostaglandins, including alprostadil,[1-7] have been used in the treatment of peripheral vascular disease (p.1178), particularly in severe Raynaud's syndrome, but do not constitute mainline therapy.

1. Clifford PC, *et al.* Treatment of vasospastic disease with prostaglandin E . *BMJ* 1980; **281:** 1031–4.
2. Telles GS, *et al.* Prostaglandin E in severe lower limb ischaemia: a double-blind controlled trial. *Br J Surg* 1984; **71:** 506–8.
3. Mohrland JS, *et al.* A multiclinic, placebo-controlled, double-blind study of prostaglandin E in Raynaud's syndrome. *Ann Rheum Dis* 1985; **44:** 754–60.
4. Sethi GK, *et al.* Intravenous infusion of prostaglandin E (PGE) in management of limb ischemia. *Am Surg* 1986; **52:** 474–8.
5. Langevitz P, *et al.* Treatment of refractory ischemic skin ulcers in patients with Raynaud's phenomenon with PGE infusions. *J Rheumatol* 1989; **16:** 1433–5.
6. The ICAI Study Group. Prostanoids for chronic critical leg ischemia: a randomized, controlled, open-label trial with prostaglandin E . *Ann Intern Med* 1999; **130:** 412–21.
7. Bartolone S, *et al.* Efficacy evaluation of prostaglandin E1 against placebo in patients with progressive systemic sclerosis and significant Raynaud's phenomenon. *Minerva Cardioangiol* 1999; **47:** 137–43.

Preparations

USP 31: Alprostadil Injection.

Proprietary Preparations (details are given in Part 3)

Arg.: Cardiobron; Caverject†; Prolisina VR; Prostavasin; ***Austral.:*** Caverject; Muse†; Prostin VR; ***Austria:*** Alprostapint; Caverject; Minprog; Muse; Prostavasin; Virilan; ***Belg.:*** Caverject; Prostin VR; ***Braz.:*** Apilcav†; Aplicav; Caverject; Muse†; Prostavasin; ***Canad.:*** Caverject; Muse; Prostin VR; ***Chile:*** Caverject; Prostin Pediatrico; ***Cz.:*** Alprostan; Alprostapint; Caverject; Edex†; Karon; Muse; Prostavasin; Prostin VR†; ***Denm.:*** Caverject; Muse; Prostivas; ***Fin.:*** Caverject; Muse; Prostivas; ***Fr.:*** Caverject; Edex; Muse; Prostine VR; ***Ger.:*** Caverject; Minprog; Muse; Prostavasin; Viridal; ***Gr.:*** Caverject; Edex†; Prostin VR; ***Hong Kong:*** Befar; Caverject; Prostavasin; Prostin VR; ***Hung.:*** Alprostapint; Caverject; Prostavasin; Prostin VR; ***India:*** Prostin VR; ***Irl.:*** Caverject; Muse; Viridal; ***Israel:*** Alprostapint; Caverject; Muse†; Prostin VR; ***Ital.:*** Alprostar; Caverject; Prostavasin; Prostin VR; Viridal; ***Jpn:*** Liple; Palux; Prostandin; ***Malaysia:*** Caverject; Prostin VR; ***Mex.:*** Caverject; Muse†; ***Neth.:*** Caverject; Muse; Prostin VR; ***Norw.:*** Bondil; Caverject; Prostivas; ***NZ:*** Caverject; Muse†; Prostin VR; ***Pol.:*** Caverject; Prostavasin; Prostin VR; ***Port.:*** Caverject; Muse; Prostin VR; Vasoprost; ***Rus.:*** Alprostan (Алпростан); Caverject (Каверджект); Vasaprostan (Вазапростан); Vazaprostan (Вазапростан); ***S.Afr.:*** Caverject; Muse; Prostin VR; ***Singapore:*** Caverject; Eglandin†; ***Spain:*** Caverject; Sugiran; ***Swed.:*** Bondil; Caverject; Prostivas; ***Switz.:*** Caverject; Muse; Prostin VR; ***Thai.:*** Caverject†; Muse†; Prostin VR; ***UK:*** Caverject; Muse; Prostin VR; Viridal; ***USA:*** Caverject; Edex; Muse; Prostin VR; ***Venez.:*** Caverject.

Multi-ingredient: ***USA:*** Tri-Mix.

Aminotadalafil

6-(1,3-Benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydro-2-aminopyrazino[1′,2′:1,6]pyrido[3,4-b]indole-1,4-dione.

Аминотадалафил

$C_{21}H_{18}N_4O_4$ = 390.4.