minoxidil might occur in these patients during multiple-dose therapy. It was advised that minoxidil be started with smaller doses or at longer dosage intervals in patients with renal impairment.

1. Halstenson CE, *et al.* Disposition of minoxidil in patients with various degrees of renal function. *J Clin Pharmacol* 1989; **29:** 798–802.

Alopecia. Minoxidil is used topically to stimulate hair growth in alopecia (p.1577), although its mechanism of action is poorly understood.[1] Increases in pigmented non-vellus hair may be due to thickening and pigmentation of existing vellus rather than new growth.[2] Measurement over 96 weeks showed[3] that minoxidil in solutions of 2 or 5% had a greater effect on hair weight than number of hairs in men with androgenetic alopecia (male-pattern baldness) with the 5% solution being more effective; 24 weeks after treatment was stopped both values had returned to baseline. Another study[4] also showed that 5% minoxidil had a greater effect than 2%, and produced an earlier response. However, 5% minoxidil has been found[5] less effective than oral finasteride. Even with continued use there is a waning of effect with minoxidil.[6,7] It may be more effective in retarding the progression of male-pattern baldness than in reversing it,[2] and users are advised to abandon treatment if there is insufficient benefit after a year.[8]

Minoxidil has also been used in women with female pattern hair loss, and as with men the 5% solution has been found[9] more effective than the 2%. In women with no evidence of biochemical hyperandrogenism minoxidil 2% was more effective[10] than oral cyproterone; where there was such evidence, cyproterone was superior.

Topical minoxidil has been shown to be safe in a large prospective study[11] of men and women with androgenetic alopecia.

Minoxidil appeared to have no beneficial effect on alopecia areata,[12] although one study indicated that topical minoxidil with 0.5% dithranol cream was more effective than either treatment alone.[13]

1. Messenger AG, Rundegren J. Minoxidil: mechanisms of action on hair growth. *Br J Dermatol* 2004; **150:** 186–94.
2. Katz HI. Topical minoxidil: review of efficacy and safety. *Cutis* 1989; **43:** 94–8.
3. Price VH, *et al.* Changes in hair weight and hair count in men with androgenetic alopecia, after application of 5% and 2% topical minoxidil, placebo, or no treatment. *J Am Acad Dermatol* 1999; **41:** 717–21.
4. Olsen EA, *et al.* A randomized clinical trial of 5% topical minoxidil versus 2% topical minoxidil and placebo in the treatment of androgenetic alopecia in men. *J Am Acad Dermatol* 2002; **47:** 377–85.
5. Arca E, *et al.* An open, randomized, comparative study of oral finasteride and 5% topical minoxidil in male androgenetic alopecia. *Dermatology* 2004; **209:** 117–25.
6. de Groot AC, *et al.* Minoxidil: hope for the bald? *Lancet* 1987; **i:** 1019–22.
7. Anonymous. Topical minoxidil does little for baldness. *Drug Ther Bull* 1989; **27:** 74–5.
8. Shrank AB. Treating young men with hair loss. *BMJ* 1989; **298:** 847–8.
9. Lucky AW, *et al.* A randomized, placebo-controlled trial of 5% and 2% topical minoxidil solutions in the treatment of female pattern hair loss. *J Am Acad Dermatol* 2004; **50:** 541–53.
10. Vexiau P, *et al.* Effects of minoxidil 2% vs. cyproterone acetate treatment on female androgenetic alopecia: a controlled, 12-month randomized trial. *Br J Dermatol* 2002; **146:** 992–9.
11. Shapiro J. Safety of topical minoxidil solution: a one-year, prospective, observational study. *J Cutan Med Surg* 2003; **7:** 322–9.
12. Anonymous. Topical minoxidil for baldness: a reappraisal. *Med Lett Drugs Ther* 1994; **36:** 9–10.
13. Fiedler VC, *et al.* Treatment-resistant alopecia areata. *Arch Dermatol* 1990; **126:** 756–9.

CHEMOTHERAPY-INDUCED ALOPECIA. Minoxidil 2% solution was applied daily to the scalp of a boy with acute lymphoblastic leukaemia whose hair had failed to regrow satisfactorily after intensive chemotherapy.[1] Almost normal hair growth, achieved over a 9-month period, was attributed to the use of minoxidil.

A small study[2] in women undergoing combination chemotherapy including doxorubicin found that topical minoxidil applied throughout therapy and for up to 4 months afterwards reduced the duration of alopecia by an average of 50 days.

Other methods for reducing chemotherapy-induced alopecia are described under the Treatment of Adverse Effects of Antineoplastics, p.639.

1. Vickers MA, Barton CJ. Minoxidil induced hair growth after leukaemia treatment? *Arch Dis Child* 1995; **73:** 184.
2. Duvic M, *et al.* A randomized trial of minoxidil in chemotherapy-induced alopecia. *J Am Acad Dermatol* 1996; **35:** 74–8.

Preparations

BP 2008: Minoxidil Scalp Application;
USP 31: Minoxidil Tablets; Minoxidil Topical Solution.

Proprietary Preparations (details are given in Part 3)
Arg.: Anagen; Ivix; Locemix; Macbirs Minoxidil; Minoxile; Toneon†; Tricolocion; Tricoplus; Tricoxane†; Ylox; ***Austral.:*** Loniten; Regaine; ***Austria:*** Loniten; Regaine; Rogaine; ***Belg.:*** Neoxidil; Regaine; ***Braz.:*** Loniten; Neoxidil†; Regaine; ***Canad.:*** Apo-Gain; Loniten; Minox†; Rogaine; ***Chile:*** Alopek; Regaine; Tricoxane; ***Cz.:*** Minoxitrim†; Neocapil; Regaine; ***Denm.:*** Regaine; ***Fin.:*** Recrea; Regaine†; Rogaine; ***Fr.:*** Alopexy; Alostil; Lonoten; Regaine; ***Ger.:*** Lonolox; Regaine; ***Gr.:*** Axelan; Botafex; Dermolantyl; Ebersedin; Hairway; Loniten; Lotorin; Minodril; Monoxidil†; Neo-Pruristam; Nherea; Oxofenil; Regaine; Stemeral; ***Hong Kong:*** Apo-Gain†; Hairgrow; Headway; Loniten; Minoxi; Neoxidil†; Regaine; Regro; ***Hung.:*** Neocapil; Regaine; ***India:*** Mintop; ***Indon.:*** Aloxid; Eminox; Regaine; Regrou; ***Irl.:*** Loniten; Rogaine; ***Israel:*** Alopexy; Hair-Treat; Hairgaine; Minoxi; Neoxidil; Regaine; ***Ital.:*** Aloxidil; Loniten; Minovital; Minoximen; Normoxidil†; Regaine; Tricoxidil; ***Malaysia:*** Apo-Gain; Epokelan†; Headway; Regaine; Regro; ***Mex.:*** Folcres†; Regaine; ***Neth.:*** Alopexy; Lonnoten; Regaine; ***Norw.:*** Regaine†; Rogaine; ***NZ:*** Headway; Rogaine; ***Philipp.:*** Regroe; ***Pol.:*** Loxon; Piloxidil; Regaine; ***Port.:*** Biocrinal; Crinalsofex; Hairtene; Loniten†; Mantai; Minocalve; Minox; Neoxidil; Regaine; Tricovivax; Zeldilon; ***Rus.:*** Regaine (Регейн); ***S.Afr.:*** Loniten; Regaine; ***Singapore:*** Growell; Minoxitrim; Neoxidil†; Regaine; Regro; ***Spain:*** Alopexy; Carexidil; Dinaxil Capilar; Lacovin; Loniten; Regaine; Regaxidil; Riteban†; ***Swed.:*** Recrea; Regaine†; Revexan; Rogaine; ***Switz.:*** Alopexy; Loniten; Neocapil; Piloxil†; Regaine; ***Thai.:*** Loniten; Manoxidil; Minoxitrim†; Modil; Noxidil; Nuhair; Regaine; Regrowth; Reten; ***UK:*** Loniten; Regaine; ***USA:*** Loniten†; Rogaine; ***Venez.:*** Guayaten; Regaine†; Topixidil; Zitoxil.

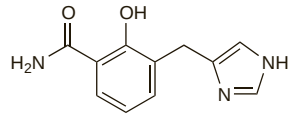
Multi-ingredient: ***Arg.:*** Tricoplus Coneff†.

Mivazerol *(rINN)*

Mivazérol; Mivazerolum; UCB-22073. α-Imidazol-4-yl-2,3-cresotamide.

Мивазерол

$C_{11}H_{11}N_3O_2$ = 217.2.
CAS — 125472-02-8.



Profile

Mivazerol is an alpha$_2$-adrenoceptor agonist that has been investigated for the prevention of perioperative complications resulting from myocardial ischaemia in patients with ischaemic heart disease undergoing non-cardiac surgery.

◊ References.

1. Oliver MF, *et al.* Effect of mivazerol on perioperative cardiac complications during non-cardiac surgery in patients with coronary heart disease: the European Mivazerol Trial (EMIT). *Anesthesiology* 1999: **91:** 951–61.

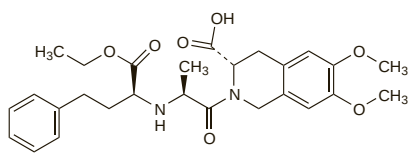
Moxipril Hydrochloride

(BANM, USAN, rINNM)

CI-925; Hidrocloruro de moexipril; Moeksipril Hidroklorür; Moexipril, Chlorhydrate de; Moexiprili Hydrochloridum; RS-10085-197; SPM-925. (3*S*-{2[*R**(*R**)],3*R**})-2-(2-{[1-(Ethoxycarbonyl)-3-phenylpropyl]amino}-1-oxopropyl)-1,2,3,4-tetrahydro-6,7-dimethoxy-3-isoquinoline-carboxylic acid hydrochloride.

Моэксиприла Гидрохлорид

$C_{27}H_{34}N_2O_7$,HCl = 535.0.
CAS — 103775-10-6 (moexipril); 82586-52-5 (moexipril hydrochloride).
ATC — C09AA13.
ATC Vet — QC09AA13.



(moexipril)

Adverse Effects, Treatment, and Precautions

As for ACE inhibitors, p.1193.

Interactions

As for ACE inhibitors, p.1196.

Pharmacokinetics

Moexipril acts as a prodrug of the diacid moexiprilat, its active metabolite. After oral doses moexipril is rapidly but incompletely absorbed and is metabolised to moexiprilat in the gastrointestinal mucosa and liver. Absorption is reduced in the presence of food. The bioavailability of moexiprilat is about 13% after oral doses of moexipril, and peak plasma concentrations of moexiprilat are reached in about 1.5 hours. Both moexipril and moexiprilat are moderately bound to plasma proteins. Moexipril is excreted mainly in the urine as moexiprilat, unchanged drug, and other metabolites; some moexiprilat may also be excreted in the faeces. The functional elimination half-life of moexiprilat is about 12 hours.

Uses and Administration

Moexipril is an ACE inhibitor (p.1193). It is used in the treatment of hypertension (p.1171).

Moexipril owes its activity to moexiprilat, to which it is converted after oral doses. The haemodynamic effects are seen about 1 hour after an oral dose and the maximum effect occurs after about 3 to 6 hours, although the full effect may not develop for 2 to 4 weeks during chronic dosing. Moexipril is given orally as the hydrochloride.

In the treatment of hypertension, the usual initial dose of moexipril hydrochloride is 7.5 mg once daily. Since there may be a precipitous fall in blood pressure in some patients when starting therapy with an ACE inhibitor, the first dose should preferably be given at bedtime. An initial dose of 3.75 mg once daily, given under close medical supervision, is suggested for patients who are taking a *diuretic*; if possible the diuretic should be withdrawn 2 or 3 days before moexipril is started and resumed later if necessary. An initial dose of 3.75 mg once daily is also recommended for patients with renal or hepatic impairment and for the elderly.

The usual maintenance dose is 7.5 to 30 mg daily, which may be given in 2 divided doses if control is inadequate with a single dose.

◊ Reviews.

1. Brogden RN, Wiseman LR. Moexipril: a review of its use in the management of essential hypertension. *Drugs* 1998; **55:** 845–60.
2. Chrysant SG, Chrysant GS. Pharmacological and clinical profile of moexipril: a concise review. *J Clin Pharmacol* 2004; **44:** 827–36.

Administration in renal impairment. In patients with renal impairment (creatinine clearance 40 mL/minute or less) an initial dose of moexipril hydrochloride 3.75 mg is given; in the USA it is required that the maximum dose in such patients should not exceed 15 mg daily.

Preparations

Proprietary Preparations (details are given in Part 3)
Austria: Fempress; ***Cz.:*** Moex; ***Fr.:*** Moex; ***Ger.:*** Fempress; ***Gr.:*** Tensotec†; ***Hong Kong:*** Moex; ***Irl.:*** Perdix†; ***Israel:*** Perdix; ***Ital.:*** Fempires; ***Malaysia:*** Tensotec†; ***Philipp.:*** Univasc; ***Pol.:*** Cardiotensin; ***Port.:*** Tensotec; ***Rus.:*** Moex (Моэкс); ***S.Afr.:*** Perdix; ***Turk.:*** Univasc; ***UK:*** Perdix; ***USA:*** Univasc.

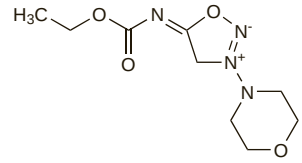
Multi-ingredient: ***Austria:*** Fempress Plus; ***Ger.:*** Fempress Plus; ***Ital.:*** Enulid; Femipres Plus; ***Philipp.:*** Uniretic; ***Rus.:*** Moex Plus (Моэкс Плюс); ***USA:*** Uniretic.

Molsidomine *(BAN, USAN, rINN)*

CAS-276; Molsidomiini; Molsidomin; Molsidomina; Molsidominum; Morsydomine; SIN-10. *N*-Ethoxycarbonyl-3-morpholinosydnonimine.

Молсидомин

$C_9H_{14}N_4O_4$ = 242.2.
CAS — 25717-80-0.
ATC — C01DX12.
ATC Vet — QC01DX12.



Pharmacopoeias. In *Eur.* (see p.vii).
Ph. Eur. 6.2 (Molsidomine). A white or almost white, crystalline powder. Sparingly soluble in water; soluble in anhydrous alcohol and in dichloromethane. A 1% solution in water has a pH of 5.5 to 7.5. Protect from light.

Profile

Molsidomine is a nitrovasodilator used in angina pectoris (p.1157). It may also be used in heart failure (p.1165) and after myocardial infarction (below).

Molsidomine is given in usual oral doses of 1 to 4 mg two to four times daily. Modified-release preparations are also available. It is also given intravenously in single doses of 2 to 4 mg and doses of 2 mg may be repeated at intervals of at least 2 hours if necessary; total doses of up to 40 mg daily have been given. Infusions may be given at a rate of up to 3 mg/hour.