Effects on mental function. Oxybutynin was associated with the development of acute confusional states in 4 patients with Parkinson's disease and some cognitive impairment.[1] A study[2] of healthy subjects, aged 65 years or older, also found oxybutynin to cause cognitive impairment.

1. Donnellan CA, *et al.* Oxybutynin and cognitive dysfunction. *BMJ* 1997; **315:** 1363–4.
2. Katz IR, *et al.* Identification of medications that cause cognitive impairment in older people: the case of oxybutynin chloride. *J Am Geriatr Soc* 1998; **46:** 8–13.

Night terrors. Night terrors have been reported in 5 patients taking oxybutynin.[1] Four of the patients were young children and the fifth was an elderly woman. Rechallenge was positive in 2 cases.

1. Valsecia ME, *et al.* New adverse effect of oxybutynin: "night terror". *Ann Pharmacother* 1998; **32:** 506.

Overdosage. A report[1] of a 34-year-old woman who ingested 100 mg of oxybutynin. The main symptoms were antimuscarinic effects and included drowsiness, hallucinations, dilatation of pupils, and urinary retention. Tachycardia resolved shortly after admission to hospital but ventricular ectopic beats and bigeminy persisted for over 24 hours. The patient recovered with symptomatic treatment.

1. Banerjee S, *et al.* Poisoning with oxybutynin. *Hum Exp Toxicol* 1991; **10:** 225–6.

Porphyria. Oxybutynin hydrochloride is considered to be unsafe in patients with porphyria because it has been shown to be porphyrinogenic in *animals* or *in-vitro* systems.

Interactions

As for antimuscarinics in general (see Atropine Sulfate, p.1220).

Itraconazole. Use of itraconazole with oxybutynin resulted in moderate increases of serum concentrations of the latter.[1] However, concentrations of the active metabolite of oxybutynin, *N*-desethyloxybutynin, were virtually unchanged and the interaction was considered to be of minor clinical significance.

1. Lukkari E, *et al.* Itraconazole moderately increases serum concentrations of oxybutynin but does not affect those of the active metabolite. *Eur J Clin Pharmacol* 1997; **52:** 403–6.

Pharmacokinetics

After oral doses of oxybutynin, peak plasma concentrations are reached within one hour. Oxybutynin is also absorbed after application to the skin. It is highly bound to plasma proteins. Oxybutynin undergoes extensive first-pass metabolism, particularly by the cytochrome P450 isoenzyme CYP3A4, and systemic oral bioavailability has been reported to be only 6%. *N*-desethyloxybutynin is an active metabolite. Oxybutynin and its metabolites are excreted in the urine and faeces, and an elimination half-life of 2 to 3 hours has been reported. Oxybutynin has been detected in breast milk. Evidence suggests that it may cross the blood-brain barrier.

◊ References.

1. Gupta SK, Sathyan G. Pharmacokinetics of an oral once-a-day controlled-release oxybutynin formulation compared with immediate-release oxybutynin. *J Clin Pharmacol* 1999; **39:** 289–96.
2. Appell RA, *et al.* Pharmacokinetics, metabolism, and saliva output during transdermal and extended-release oral oxybutynin administration in healthy subjects. *Mayo Clin Proc* 2003; **78:** 696–702.
3. Reiz JL, *et al.* Pharmacokinetics and pharmacodynamics of once-daily controlled-release oxybutynin and immediate-release oxybutynin. *J Clin Pharmacol* 2007; **47:** 351–7.

Uses and Administration

Oxybutynin hydrochloride is a tertiary amine antimuscarinic with actions similar to those of atropine (p.1220); it also has direct effects on smooth muscle. It is used for the management of urinary frequency, urgency, and incontinence in neurogenic bladder disorders and in idiopathic detrusor instability, and as an adjunct to nonpharmacological therapy for nocturnal enuresis.

Usual oral doses of oxybutynin hydrochloride are 5 mg two or three times daily, increased to 5 mg four times daily if required. In elderly patients lower doses of 2.5 or 3 mg twice daily initially, increased to 5 mg twice daily if necessary, may be adequate. Modified-release preparations of oxybutynin hydrochloride are also available. The initial dose is 5 mg once daily, increased by 5 mg at weekly intervals if necessary, up to a maximum of 20 or 30 mg daily, depending on the preparation. Oxybutynin is also given via a transdermal patch that supplies 3.9 mg of oxybutynin daily. The patch should be applied to intact skin on the abdomen, hip, or buttocks and replaced every 3 to 4 days; re-application to the same site should be avoided for 7 days.

In the UK, oxybutynin hydrochloride is licensed for neurogenic bladder disorders in children from the age of 5 years; in both the UK and the USA it is licensed from the age of 6 years as a modified-release formulation. The initial oral dose of conventional formulations is 2.5 or 3 mg twice daily, increased to 5 mg two or three times daily according to response; as a modified-release tablet the initial dose is 5 mg once daily, increased by 5-mg increments to a maximum daily dose of 15 or 20 mg, depending on the preparation, and according to response. Modified-release preparations are not recommended for children who are unable to swallow the tablet whole. The *BNFC* suggests that children aged 2 to 5 years may be given a dose of 1.25 to 2.5 mg as a conventional oral formulation 2 or 3 times daily. Children from the age of 2 years may also be given oxybutynin by intravesical instillation, in a dose of 5 mg (as the hydrochloride) in 30 mL of solution, 2 or 3 times daily.

Oxybutynin is also licensed in the treatment of nocturnal enuresis in children over 5 years, as the conventional formulations, in similar doses to those used for neurogenic bladder disorders; the last dose should usually be given before bedtime. However, the *BNFC* considers that drug therapy for nocturnal enuresis is usually not needed in children under 7 years of age.

Nocturnal enuresis. Antimuscarinics such as oxybutynin reduce uninhibited bladder contractions but, although they may be of use in diurnal enuresis, they are rarely of benefit in nocturnal enuresis (p.2180) alone. Oxybutynin did not appear to be effective in treating primary nocturnal enuresis in children with normal bladders.[1] However, children with low bladder capacity and detrusor instability may derive some benefit from oxybutynin.[2,3]

1. Lovering JS, *et al.* Oxybutynin efficacy in the treatment of primary enuresis. *Pediatrics* 1988; **82:** 104–6.
2. Koşar A, *et al.* Effectiveness of oxybutynin hydrochloride in the treatment of enuresis nocturna: a clinical and urodynamic study. *Scand J Urol Nephrol* 1999; **33:** 115–18.
3. Nevéus T. Oxybutynin, desmopressin and enuresis. *J Urol (Baltimore)* 2001; **166:** 2459–62.

Urinary incontinence. In addition to its antimuscarinic effect, oxybutynin has a direct antispasmodic effect which also contributes to reducing the number of uninhibited bladder contractions in urge incontinence (see p.2180). It is effective when given orally[1-4] or via a transdermal patch.[5-7] NICE considers conventional oral oxybutynin formulations to be the drug of first choice in women with overactive bladder syndrome or mixed incontinence if bladder training has been ineffective.[8] However, adverse effects may limit its use; if immediate-release oxybutynin is not well tolerated, a controlled-release or transdermal formulation may be considered as an alternative.[8]

Oxybutynin given orally can be useful in the management of neurogenic detrusor hyperreflexia in adults[9,10] and children.[11] Direct instillation of oxybutynin into the bladder has also been tried. In one study[12] that included patients aged 1 to 34 years, 21 out of 32 patients became totally continent using an intravesical dose of 300 micrograms/kg daily, given in 3 divided doses. A further 7 patients became continent with doses titrated up to a maximum of 900 micrograms/kg daily, but another 4 remained incontinent. Other reports[13,14] have used single or multiple doses of 5 mg, often prepared by dispersing a crushed 5-mg tablet in 30 mL of distilled water or sodium chloride 0.9%.

1. Riva D, Casolati E. Oxybutynin chloride in the treatment of female idiopathic bladder instability: results from double blind treatment. *Clin Exp Obstet Gynecol* 1984; **11:** 37–42.
2. Moore KH, *et al.* Oxybutynin hydrochloride (3 mg) in the treatment of women with idiopathic detrusor instability. *Br J Urol* 1990; **66:** 479–85.
3. Tapp AJS, *et al.* The treatment of detrusor instability in postmenopausal women with oxybutynin chloride: a double blind placebo controlled study. *Br J Obstet Gynaecol* 1990; **97:** 521–6.
4. Siddiqui MA, *et al.* Oxybutynin extended-release: a review of its use in the management of overactive bladder. *Drugs* 2004; **64:** 885–912.
5. Davila GW, *et al.* A short-term, multicenter, randomized double-blind dose titration study of the efficacy and anticholinergic side effects of transdermal compared to immediate release oral oxybutynin treatment of patients with urge urinary incontinence. *J Urol (Baltimore)* 2001; **166:** 140–5.
6. Dmochowski RR, *et al.* Efficacy and safety of transdermal oxybutynin in patients with urge and mixed urinary incontinence. *J Urol (Baltimore)* 2002; **168:** 580–6.
7. Dmochowski RR, *et al.* Comparative efficacy and safety of transdermal oxybutynin and oral tolterodine versus placebo in previously treated patients with urge and mixed urinary incontinence. *Urology* 2003; **62:** 237–42.
8. NICE. Urinary incontinence: the management of urinary incontinence in women (issued October 2006). Available at: http://www.nice.org.uk/nicemedia/pdf/CG40NICEguideline.pdf (accessed 02/09/08)
9. O'Leary M, *et al.* Effect of controlled-release oxybutynin on neurogenic bladder function in spinal cord injury. *J Spinal Cord Med* 2003; **26:** 159–62.
10. Bennett N, *et al.* Can higher doses of oxybutynin improve efficacy in neurogenic bladder? *J Urol (Baltimore)* 2004; **171:** 749–51.
11. Franco I, *et al.* Efficacy and safety of oxybutynin in children with detrusor hyperreflexia secondary to neurogenic bladder dysfunction. *J Urol (Baltimore)* 2005; **173:** 221–5.
12. Haferkamp A, *et al.* Dosage escalation of intravesical oxybutynin in the treatment of neurogenic bladder patients. *Spinal Cord* 2000; **38:** 250–4.
13. Szollar SM, Lee SM. Intravesical oxybutynin for spinal cord injury patients. *Spinal Cord* 1996; **34:** 284–7.
14. Lose G, Nørgaard JP. Intravesical oxybutynin for treating incontinence resulting from an overactive detrusor. *BJU Int* 2001; **87:** 767–73.

Preparations

BP 2008: Oxybutynin Tablets;
USP 31: Oxybutynin Chloride Extended-Release Tablets; Oxybutynin Chloride Syrup; Oxybutynin Chloride Tablets.

Proprietary Preparations (details are given in Part 3)
Arg.: Continex†; Delak; Ditropan; Oxi-Q; Oxitina; Oxyurin; Retebem; Retemicon; Soxsup; Urequin; ***Austral.:*** Ditropan; Oxytrol; ***Austria:*** Cystrin; Detrusan; Ditropan; Lyrinel; ***Belg.:*** Ditropan; Driptane†; ***Braz.:*** Frenurin†; Incontinol; Retemic; ***Canad.:*** Ditropan; Nu-Oxybutyn; Oxybutyn†; Oxytrol; ***Chile:*** Odranal; Oxiburin†; Urazol; Uricont; ***Cz.:*** Cystrin†; Ditropan; Driptane†; Kentera; Uroxal; ***Denm.:*** Kentera; ***Fin.:*** Cystrin; Ditropan; Kentera; Oksibutin†; Spasmoxyl†; ***Fr.:*** Ditropan; Driptane; Zatur†; ***Ger.:*** Cystonorm†; Dridase; Lyrinel; Oxyb; Oxybase†; Oxybugamma; Oxybutin; Oxybuton; Oxymedin; Ryol; Spasyt; ***Gr.:*** Ditropan; Kentera; Lyrinel; Oxybase; ***Hong Kong:*** Ditropan†; ***Hung.:*** Ditropan; Uroxal; ***India:*** Oxyspas; ***Irl.:*** Cystrin; Ditropan; Kentera; Lyrinel XL; Renamel†; ***Israel:*** Novitropan; ***Ital.:*** Ditropan; ***Malaysia:*** Ditropan†; ***Mex.:*** Inprax; Lyrinel; Nefryl; Tavor; ***Neth.:*** Cystrin†; Dridase; Kentera; ***Norw.:*** Kentera; ***Philipp.:*** Driptane; ***Pol.:*** Cystrin; Ditropan; Driptane; Uroton; ***Port.:*** Ditropan; Kentera; Lyrinel; ***Rus.:*** Driptane (Дриптан); Novitropan (Новитропан)†; ***S.Afr.:*** Ditropan; Lenditro; Oxyspas†; Urihexal; ***Singapore:*** Ditropan†; Obutin; ***Spain:*** Ditropan; Dresplan; ***Swed.:*** Ditropan; Kentera; Oxybase†; ***Switz.:*** Ditropan; ***Thai.:*** Diutropan; ***Turk.:*** Uropan; ***UK:*** Cystrin; Ditropan; Kentera; Lyrinel XL; ***USA:*** Ditropan; Oxytrol; ***Venez.:*** Reteven.

Papaverine *(BAN)*

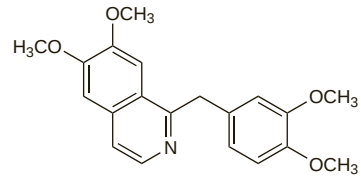
Papaveriini; Papaverin; Papaverina; Papaverinum. 6,7-Dimethoxy-1-(3,4-dimethoxybenzyl)isoquinoline.

$C_{20}H_{21}NO_4$ = 339.4.

CAS — 58-74-2.

ATC — A03AD01; G04BE02.

ATC Vet — QA03AD01; QG04BE02.



NOTE. Papaverine should not be confused with papaveretum (p.105).

Papaverine Hydrochloride *(BANM)*

Papaveriinihydrokloridi; Papaverina, hidrocloruro de; Papavérine, chlorhydrate de; Papaverin-hidroklorid; Papaverin-hydrochlorid; Papaverinhydrokloríd; Papaverini hydrochloridum; Papaverinii Chloridum; Papaverinium Chloride; Papaverino hidrochloridas; Papaweryny chlorowodorek. 6,7-Dimethoxy-1-(3,4-dimethoxybenzyl)isoquinoline hydrochloride.

$C_{20}H_{21}NO_4$,HCl = 375.8.

CAS — 63817-84-5 (papaverine cromesilate); 61-25-6 (papaverine hydrochloride); 39024-96-9 (papaverine monophosadenine); 2053-26-1 (anhydrous papaverine sulfate).

ATC — A03AD01; G04BE02.

ATC Vet — QA03AD01; QG04BE02.

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

Ph. Eur. 6.2 (Papaverine Hydrochloride). White or almost white crystals or crystalline powder. Sparingly soluble in water; slightly soluble in alcohol. A 2% solution in water has a pH of 3.0 to 4.0.

USP 31 (Papaverine Hydrochloride). Odourless white crystals or white, crystalline powder. Soluble 1 in 30 of water and 1 in 120 of alcohol; soluble in chloroform; practically insoluble in ether. pH of a 2% solution in water is between 3.0 and 4.5. Store in airtight containers at a temperature of 25°, excursions permitted between 15° and 30°. Protect from light.

Adverse Effects and Precautions

Adverse effects of oral papaverine include gastrointestinal disturbance, flushing of the face, headache, malaise, drowsiness, skin rash, sweating, orthostatic hypotension, and dizziness. Jaundice, eosinophilia, and signs of altered liver function may occur, sometimes

due to hypersensitivity. In addition high parenteral doses can result in cardiac arrhythmias; intravenous or intramuscular doses should be given slowly. Thrombosis has been reported at the injection site.

Intracavernosal injection can cause dose-related priapism and local fibrosis has been reported after long-term therapy.

Papaverine should be given with caution to patients with reduced gastrointestinal motility. Caution is also advised in the presence of cardiac conduction disorders or unstable cardiovascular disease, especially when papaverine is given parenterally. Intravenous dosage is contra-indicated in patients with complete AV block.

Glaucoma. There appeared to be no basis for the manufacturers' recommendation that papaverine should be used with caution in patients with glaucoma.[1] There was no obvious mechanism to support such a warning and only 1 report of an adverse reaction had been received by the FDA. The author had given papaverine intracavernosally to patients with glaucoma and had observed no deterioration.

1. Swartz DA, Todd MW. Intracavernous papaverine and glaucoma. *JAMA* 1990; **264:** 570.

Intracavernosal administration. Systemic adverse effects occurring after intracavernosal injection of papaverine are infrequent but include dizziness and syncope,[1,2] probably related to the hypotensive effects of papaverine; abnormal liver function test results have also occurred.[1-3]

The most serious acute adverse effect is priapism[1,2,4] and patients should be instructed to seek medical help if an erection lasts for more than 4 hours. Detumescence can be effected by aspiration of blood from the corpus or by local injection of an alpha-adrenergic agonist such as adrenaline, metaraminol, or phenylephrine (see Priapism under Alprostadil, p.2184). Other local effects include haematoma, infection, and, on long-term therapy, fibrosis and penile distortion.[1,2]

Dispensing errors have resulted in inadvertent injection of *papaveretum* with potentially fatal consequences.[2,5,6]

1. Krane RJ, *et al.* Impotence. *N Engl J Med* 1989; **321:** 1648–59.
2. Bénard F, Lue TF. Self-administration in the pharmacological treatment of impotence. *Drugs* 1990; **39:** 394–8.
3. Levine SB, *et al.* Side effects of self-administration of intracavernous papaverine and phentolamine for the treatment of impotence. *J Urol (Baltimore)* 1989; **141:** 54–7.
4. Virag R. About pharmacologically induced prolonged erection. *Lancet* 1985; **i:** 519–20.
5. Robinson LQ, Stephenson TP. Self injection treatment for impotence. *BMJ* 1989; **299:** 1568.
6. Gregoire A. Self injection treatment for impotence. *BMJ* 1990; **300:** 537.

Interactions

Levodopa. For the effects of papaverine on levodopa, see p.808.

Pharmacokinetics

The biological half-life of papaverine given orally is reported to be between 1 and 2 hours, but there is wide interindividual variation. It is about 90% bound to plasma proteins.

Papaverine is mainly metabolised in the liver and excreted in the urine, almost entirely as glucuronide-conjugated phenolic metabolites.

The reports of infrequent systemic effects after intracavernosal injection of papaverine indicate that there is some distribution to the systemic circulation from the corpus cavernosus.

Uses and Administration

Papaverine is an alkaloid present in opium, although it is not related chemically or pharmacologically to the other opium alkaloids. Papaverine has a direct relaxant effect on smooth muscle which is attributed in part to its ability to inhibit phosphodiesterase. It has been given in the management of cerebral, peripheral, and coronary vascular disorders; it is also given as an antispasmodic for gastrointestinal disorders and coughs. However, there is little evidence to justify its clinical use in these conditions.

Papaverine hydrochloride has been given orally in doses of up to 600 mg daily. Sustained-release preparations have been used. The codecarboxylase derivative, cromesilate, hydrobromide, monophosadenine, nicotinate, sulfate, and teprosilate have also been used. Papaverine hydrochloride has also been given in doses of 30 to 120 mg by intramuscular or slow intravenous injection, repeated every 3 hours as needed (but see Adverse Effects and Precautions, above).

Papaverine hydrochloride has been given by injection into the corpus cavernosum of the penis for the treatment of erectile dysfunction (p.2179). Doses have ranged from 2.5 to 60 mg, but must be initially titrated by the prescriber. Doses up to about 30 mg have been combined with phentolamine.

Preparations

BP 2008: Papaverine Injection;
USP 31: Papaverine Hydrochloride Injection; Papaverine Hydrochloride Tablets.

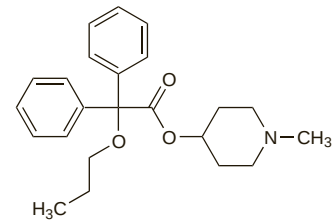
Proprietary Preparations (details are given in Part 3)
Arg.: Mesotina; Ova†; ***Braz.:*** Dipaverina†; ***USA:*** Pavabid†; ***Venez.:*** Atrophena†; Atroveran; Papaveryl; Tropaverin†.

Multi-ingredient: ***Arg.:*** Antipasmol; Antispasmina; Gastranil†; Hepatodirectol; Saltos†; Trixol†; ***Austria:*** Androskat; Asthma 23 D; Myocardon; Ora-Gallin compositum; ***Braz.:*** Analgosedan†; Calmazin†; Codeverin†; Dipirol†; Ductoveran; Espasmalgon†; Espasmocron; Gaba†; Melpaz†; Monotrean; Monotrean B6; Nicopaverina B6†; Nicopaverina†; Pasmalgin†; Plenocedan†; Revulsan†; Sedalene; Sedalin; Spasmotropin; Vagostesyl; ***Chile:*** Belupan†; Buton; Dipatropin; Dolospam; Papatropin†; ***Cz.:*** Contraspan†; Spasmoveralgin Neo†; ***Fr.:*** Acticarbine; ***Hong Kong:*** Bromhexine Compound; Codolax; Codomex Orange†; Codomex Purple†; Codoplex; Enterocin Compound; Methor-Co; Metoplex; ***Hung.:*** Bilagit†; Meristin; Neo-Bilagit; Troparinum; ***India:*** Brovon; ***Indon.:*** Sanmag; Spaslic; Spasmal; Spasminal; ***Israel:*** Patropin; Spasmalgin; ***Ital.:*** Antispasmina Colica; Monotrean†; ***Mex.:*** Acilin; Ayoral†; Taliviform†; ***Neth.:*** Androskat; ***Pol.:*** Biospasmil; Fortestomachicae; Spasticol; Tolargin; ***Port.:*** Antispasmina Colica; Cosmaxil†; ***Spain:*** Sulmetin Papaver; Sulmetin Papaverina†; ***Swed.:*** Spasmofen; ***Switz.:*** Dolopyrine†; Spasmosol; ***UK:*** Brovon; ***USA:*** Tri-Mix; ***Venez.:*** Atrobel; Cloverin†; Neo-Atropan†; Tropifen†.

Propiverine Hydrochloride *(BANM, rINNM)*

BUP-4 (propiverine); Hidrocloruro de propiverina; Propiverin Hidroklorür; Propivérine, Chlorhydrate de; Propiverini Hydrochloridum. 1-Methyl-4-piperidyl diphenylpropoxyacetate hydrochloride.

Пропиверина Гидрохлорид
$C_{23}H_{29}NO_3,HCl$ = 403.9.
CAS — 60569-19-9 (propiverine); 54556-98-8 (propiverine hydrochloride).
ATC — G04BD06.
ATC Vet — QG04BD06.



(propiverine)

Adverse Effects, Treatment, and Precautions

As for Atropine Sulfate, p.1219. Hypotension and drowsiness may also occur with propiverine. Propiverine is contra-indicated in patients with moderate or severe hepatic impairment (but see below). Liver enzyme values should be monitored in patients receiving long-term therapy. Skeletal retardation has occurred in the offspring of *animals* given high doses of propiverine during pregnancy and therefore its use is not recommended during pregnancy.

Interactions

As for antimuscarinics in general (see Atropine Sulfate, p.1220). Hypotension may occur in patients treated with propiverine and isoniazid. Drowsiness may be enhanced by drugs with CNS-depressant properties.

Pharmacokinetics

Propiverine is absorbed from the gastrointestinal tract and peak plasma concentrations are achieved about 2.3 hours after oral doses. It undergoes extensive first-pass metabolism and the average absolute bioavailability is reported to be about 41%. Plasma concentrations of the principal metabolite, the *N*-oxide, greatly exceed those of the parent compound. Protein binding is about 90% for propiverine and 60% for the *N*-oxide metabolite. Propiverine and its metabolites are excreted in the urine, bile, and faeces. The elimination half-life is about 20 hours.

◊ References.

1. Haustein K-O, Hüller G. On the pharmacokinetics and metabolism of propiverine in man. *Eur J Drug Metab Pharmacokinet* 1988; **13:** 81–90.

Uses and Administration

Propiverine hydrochloride is a tertiary antimuscarinic with actions similar to those of atropine (p.1220). It is used for the management of urinary frequency, urgency, and incontinence (p.2180) in neurogenic bladder disorders and in idiopathic detrusor instability. Usual oral doses of propiverine hydrochloride are 15 mg two or three times daily, increased to 4 times daily if required. Some patients may respond to 15 mg once daily. A daily dose of 60 mg should not be exceeded. Propiverine hydrochloride can also be given as a modified-release preparation in a dose of 30 mg once daily.

Administration in hepatic impairment. Although UK licensed product information for propiverine does not recommend its use in patients with moderate or severe hepatic impairment some[1] suggest that on pharmacokinetic grounds it may be given to those with mild to moderate degrees of impairment at recommended doses without increasing the risk of adverse effects.

1. Siepmann M, *et al.* Pharmacokinetics and safety of propiverine in patients with fatty liver disease. *Eur J Clin Pharmacol* 1998; **54:** 767–71.

Urinary incontinence. Although propiverine is licensed in the UK for use in urinary frequency, urgency, and incontinence (see above), guidelines subsequently issued by NICE consider that although it should be an option for urinary frequency in women with overactive bladder syndrome, use in women with overt incontinence is not recommended.[1]

1. NICE. Urinary incontinence: the management of urinary incontinence in women (issued October 2006). Available at: http://www.nice.org.uk/nicemedia/pdf/CG40NICEguideline.pdf (accessed 02/09/08)

Preparations

Proprietary Preparations (details are given in Part 3)
Cz.: Mictonetten; Mictonorm; ***Ger.:*** Mictonetten; Mictonorm; ***Jpn:*** BUP-4; ***Port.:*** Detrunorm†; Mictonorm; ***S.Afr.:*** Detrunorm; ***Thai.:*** Mictonorm; ***UK:*** Detrunorm.

Pygeum Africanum

African Prune; Afrikankirsikkapuunkuori (pygeum africanum bark); Afrikinių slyvų žievė (pygeum africanum bark); Kůra slivoně africké (pygeum africanum bark); Pruni Africanae; Pruni africanae cortex (pygeum africanum bark); Prunier d'Afrique; Prunier d'Afrique, écorce de (pygeum africanum bark).
ATC — G04CX01.
ATC Vet — QG04CX01.

Pharmacopoeias. In *Eur.* (see p.vii) and *US.*
Ph. Eur. 6.2 (Pygeum Africanum Bark; Pygeum Bark BP 2008). The whole or cut, dried bark of the stems and branches of *Prunus africana* (*Pygeum africanum*).
USP 31 (Pygeum). The bark of *Prunus africana* (*Pygeum africanum*) (Rosaceae). It contains not less than 9.0% of extractable matter.

Profile

An extract from the bark of the tree *Prunus africana* (*Pygeum africanum*) is used in the treatment of benign prostatic hyperplasia (p.2178). Like some other phytotherapies for this disorder, it appears to contain various sitosterols. A usual oral dosage is 100 mg daily.

Benign prostatic hyperplasia. Pygeum africanum appears to produce a modest benefit on urological symptoms and measures of urinary flow.

References.

1. Andro M-C, Riffaud J-P. Pygeum africanum extract for the treatment of patients with benign prostatic hyperplasia: a review of 25 years of published experience. *Curr Ther Res* 1995; **56:** 796–817.
2. Buck AC. Phytotherapy for the prostate. *Br J Urol* 1996; **78:** 325–36.
3. Ishani A, *et al.* Pygeum africanum for the treatment of patients with benign prostatic hyperplasia: a systematic review and quantitative meta-analysis. *Am J Med* 2000; **109:** 654–64.

Preparations

USP 31: Pygeum Capsules.

Proprietary Preparations (details are given in Part 3)
Austria: Tadenan; ***Braz.:*** Prostem; ***Cz.:*** Tadenan; ***Fr.:*** Tadenan; ***Gr.:*** Foudanil; Rotamat; Tadenan; ***Hung.:*** Tadenan†; ***Ital.:*** Pigenil; Tadenan; ***Mex.:*** Tadenom; ***Philipp.:*** Tadenan; ***Pol.:*** Poldanen; Tadenan; ***Port.:*** Tadenan†; ***Rus.:*** Tadenan (Таденан); Trianol (Трианол); ***Spain:*** Acubiron; Bidrolar; Pronitol; Tuzanil; ***Switz.:*** Tadenan; ***Thai.:*** Tadenan.

Multi-ingredient: ***Arg.:*** Catiz Plus; Normoprost Compuesto; Normoprost Plus; Ultracal; ***Austria:*** Prostatonin; ***Braz.:*** Prostem Plus; ***Canad.:*** Prostate Ease; Prostease; ***Cz.:*** Prostatonin†; ***Hong Kong:*** Prostease; ***Pol.:*** Neopoldanen; ***Port.:*** Neo Urgenin; ***Spain:*** Neo Urgenin; Prosturol; Tebetane Compuesto; ***Switz.:*** Prostatonin.

Saw Palmetto

American Dwarf Palm; *Brahea serrulata*; PA-109; Palmera de Florida; Sabal; Sabal, fruit de (saw palmetto fruit); *Sabal serrulata*; Sabalis Serrulatae; Sabalis serrulatae fructus (saw palmetto fruit); Sågpalmettofrukt (saw palmetto fruit); Sahapalmunhedelmä (saw palmetto fruit); *Serenoa repens*; *Serenoa serrulatum*; Serenový plod (saw palmetto fruit); Šliaužiančiųjų serenojų vaisiai (saw palmetto fruit).
ATC — G04CX02.
ATC Vet — QG04CX02.

Pharmacopoeias. In *Eur.* (see p.vii) and *US*. *US* also includes the extract and the powdered form.
Ph. Eur. 6.2 (Saw Palmetto Fruit). The dried, ripe fruit of *Ser-*