





Get medical help right away if you have these serious allergic reactions.

- Higher chance of a more serious form of prostate cancer.**
- Eye problems during cataract surgery.** During cataract surgery, a condition called intraoperative floppy iris syndrome (IFIS) can happen if you take or have taken dutasteride and tamsulosin hydrochloride capsules in the past. If you need to have cataract surgery, tell your surgeon if you take or have taken dutasteride and tamsulosin hydrochloride capsules.
- A painful erection that will not go away.** Rarely, dutasteride and tamsulosin hydrochloride capsules can cause a painful erection (priapism), which cannot be relieved by having sex. If this happens, get medical help right away. If priapism is not treated, there could be lasting damage to your penis, including not being able to have an erection.

The most common side effects of dutasteride and tamsulosin hydrochloride capsules include:

- ejaculation problems\*
- trouble getting or keeping an erection (impotence)\*
- a decrease in sex drive (libido)\*
- dizziness
- enlarged or painful breasts. If you notice breast lumps or nipple discharge, you should talk to your healthcare provider.
- runny nose

- \*Some of these events may continue after you stop taking dutasteride and tamsulosin hydrochloride capsules.

Depressed mood has been reported in patients receiving dutasteride, an ingredient of dutasteride and tamsulosin hydrochloride capsules.

Dutasteride, an ingredient of dutasteride and tamsulosin hydrochloride capsules, has been shown to reduce sperm count, semen volume, and sperm movement. However, the effect of dutasteride and tamsulosin hydrochloride capsules on male fertility is not known.

**Prostate-Specific Antigen (PSA) Test:** Your healthcare provider may check you for other prostate problems, including prostate cancer before you start and while you take dutasteride and tamsulosin hydrochloride capsules. A blood test called PSA (prostate-specific antigen) is sometimes used to see if you might have prostate cancer. Dutasteride and tamsulosin hydrochloride capsules will reduce the amount of PSA measured in your blood. Your healthcare provider is aware of this effect and can still use PSA to see if you might have prostate cancer. Increases in your PSA levels while on treatment with dutasteride and tamsulosin hydrochloride capsules (even if the PSA levels are in the normal range) should be evaluated by your healthcare provider.

Tell your healthcare provider if you have any side effect that bothers you or that does not go away.

These are not all the possible side effects with dutasteride and tamsulosin hydrochloride capsules. For more information, ask your healthcare provider or pharmacist.

Call your doctor for medical advice about side effects. You may report side effects to FDA at 1-800-FDA-1088.

**How should I store dutasteride and tamsulosin hydrochloride capsules?**

- Store dutasteride and tamsulosin hydrochloride capsules at 20° to 25°C (68° to 77°F) [see USP Controlled Room Temperature].
- Dutasteride and tamsulosin hydrochloride capsules may become deformed and/or discolored if kept at high temperatures.
- Do not use or touch dutasteride and tamsulosin hydrochloride capsules if your capsules are deformed, discolored, or leaking.
- Safely throw away medicine that is no longer needed.

Keep dutasteride and tamsulosin hydrochloride capsules and all medicines out of the reach of children.

Medicines are sometimes prescribed for purposes other than those listed in a patient leaflet. Do not use dutasteride and tamsulosin hydrochloride capsules for a condition for which it was not prescribed. Do not give dutasteride and tamsulosin hydrochloride capsules to other people, even if they have the same symptoms that you have. It may harm them.

This patient information leaflet summarizes the most important information about dutasteride and tamsulosin hydrochloride capsules. If you would like more information, talk with your healthcare provider. You can ask your pharmacist or healthcare provider for information about dutasteride and tamsulosin hydrochloride capsules that is written for health professionals.

**What are the ingredients in dutasteride and tamsulosin hydrochloride capsules?**

**Active ingredients:** dutasteride and tamsulosin hydrochloride

**Inactive ingredients:** butylated hydroxytoluene, ethylcellulose, gelatin, glycerin, lecithin, medium chain triglycerides, methacrylic acid copolymer, mono- and di-glycerides of capryl/capric acid, polyethylene glycol, sugar spheres, talc, triethyl citrate, iron oxide black, hypromellose, titanium dioxide, D&C yellow #10, iron oxide yellow, FD&C blue #2, FD&C blue #1, propylene glycol, FD&C red #40, shellac, polyvinyl acetate phthalate, macrogol, ammonium hydroxide.

**How do dutasteride and tamsulosin hydrochloride capsules work?**

Dutasteride and tamsulosin hydrochloride capsules contain 2 medications, dutasteride and tamsulosin. These 2 medications work in different ways to improve symptoms of BPH. Dutasteride shrinks the enlarged prostate and tamsulosin relaxes muscles in the prostate and neck of the bladder. These 2 medications, when used together, can improve symptoms of BPH better than either medication when used alone.

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adrenoceptors can cause smooth muscles in the bladder neck and prostate to relax, resulting in an improvement in urine flow rate and a reduction in symptoms of BPH.

Tamsulosin, an alpha<sub>1</sub>-adrenoceptor blocking agent, exhibits selectivity for alpha<sub>1A</sub>-receptors in the human prostate. At least 3 discrete alpha<sub>1</sub>-adrenoceptor subtypes have been identified: alpha<sub>1A</sub>, alpha<sub>1B</sub>, and alpha<sub>1C</sub>; their distribution differs between human organs and tissue. Approximately 70% of the alpha<sub>1</sub>-receptors in human prostate are of the alpha<sub>1A</sub> subtype. Tamsulosin is not intended for use as an antihypertensive.

**12.2 Pharmacodynamics**  
**Dutasteride.** *Effect on 5 Alpha-Dihydrotestosterone and Testosterone.* The maximum effect of daily doses of dutasteride on the reduction of DHT is dose-dependent and is observed within 1 to 2 weeks. After 1 and 2 weeks of daily dosing with dutasteride 0.5 mg, median serum DHT concentrations were reduced by 65% and 90%, respectively. In patients with BPH treated with dutasteride 0.5 mg/day for 4 years, the median decrease in serum DHT was 94% at 1 year, 93% at 2 years, and 95% at both 3 and 4 years. The median increase in serum testosterone was 19% at both 1 and 2 years, 26% at 3 years, and 22% at 4 years, but the mean and median levels remained within the physiologic range.

In patients with BPH treated with 5 mg/day of dutasteride or placebo for up to 12 weeks prior to transurethral resection of the prostate, mean serum DHT concentrations in prostatic tissue were significantly lower in the dutasteride group compared with placebo (764 and 5,793 pg/g, respectively, *P*<0.001). Mean prostatic tissue concentrations of testosterone were significantly higher in the dutasteride group compared with placebo (2,073 and 93 pg/g, respectively, *P*<0.001).

Adult males with genetically inherited type 2 5 alpha-reductase deficiency also have decreased DHT levels. These 5 alpha-reductase-deficient males have a small prostate pit and do not develop BPH. Except for the associated urogenital defects present at birth, no other clinical abnormalities related to 5 alpha-reductase deficiency have been observed in these individuals.

*Effects on Other Hormones:* In healthy volunteers, 52 weeks of treatment with dutasteride 0.5 mg/day (*n* = 26) resulted in no clinically significant change compared with placebo (*n* = 23) in sex hormone-binding globulin, estradiol, luteinizing hormone, thyroxine (free T4), and dehydroepiandrosterone. Statistically significant, baseline-adjusted mean increases compared with placebo were observed for total testosterone at 8 weeks (97.1 ng/dL, *P*<0.003) and thyroid-stimulating hormone at 52 weeks (0.4 mIU/mL, *P*<0.05). The median percent increase in baseline total testosterone was unaffected by dutasteride for testosterone at 8 weeks and 12.4% for thyroid-stimulating hormone at 52 weeks. After stopping dutasteride for 24 weeks, the mean levels of testosterone and thyroid-stimulating hormone had returned to baseline in the group of subjects with available data at the visit. In subjects with BPH treated with dutasteride in a large randomized, double-blind, placebo-controlled trial, there was a median percent increase in luteinizing hormone of 12% at 6 months and 19% at both 12 and 24 months.

*Other Effects:* Plasma lipid panel and bone mineral density were evaluated following 52 weeks of dutasteride 0.5 mg once daily in healthy volunteers. There was no change in bone mineral density as measured by dual energy x-ray absorptiometry compared with either placebo or baseline. In addition, the plasma lipid profile (i.e., total cholesterol, low-density lipoprotein, and high-density lipoprotein) was unaffected by dutasteride. No clinically significant changes in adrenal hormone responses to adrenocorticotropic hormone (ACTH) stimulation were observed in a subset population (*n* = 13) of the 1 year healthy volunteer trial.

**12.3 Pharmacokinetics**  
The pharmacokinetics of dutasteride and tamsulosin from dutasteride and tamsulosin hydrochloride capsules are comparable to the pharmacokinetics of dutasteride and tamsulosin when administered separately.

**Absorption:**

The pharmacokinetic parameters of dutasteride and tamsulosin observed after administration of dutasteride and tamsulosin hydrochloride capsules in a single-dose, randomized, 3-period partial cross-over trial are summarized in **Table 2** below.

Component	N	Pharmacokinetic Parameters Under Fed Conditions			
		AUC <sub>0-12</sub> (ng hr/mL)	C <sub>max</sub>	T <sub>max</sub> (hr) <sup>a</sup>	t <sub>1/2</sub> (hr)
Dutasteride	92	39.6 (23.1)	2.14 (0.77)	3.00 (1.00-10.00)	
Tamsulosin	92	187.2 (95.7)	11.3 (4.44)	6.00 (2.00-24.00)	13.5 (3.92) <sup>b</sup>

<sup>a</sup> Median (range).

<sup>b</sup> *n* = 91.

*Dutasteride:* Following administration of a single 0.5 mg dose of a soft gelatin capsule, time to peak absolute bioavailability in 5 healthy subjects is approximately 60% (range: 40% to 94%).

*Tamsulosin:* Absorption of tamsulosin is essentially complete (>90%) following oral administration of 0.4 mg tamsulosin hydrochloride capsules under fasting conditions. Tamsulosin exhibits linear kinetics following single and multiple dosing, with achievement of steady-state concentrations by the fifth day of once-daily dosing.

**Effect of Food:**

Food does not affect the pharmacokinetics of dutasteride following administration of dutasteride and tamsulosin hydrochloride capsules. However, a mean 30% decrease in tamsulosin C<sub>max</sub> was observed when dutasteride and tamsulosin hydrochloride capsules was administered with food, similar to that seen when tamsulosin monotherapy was administered under fed versus fasting conditions.

**Distribution:**

*Dutasteride:* Pharmacokinetic data following single and repeat oral doses show that dutasteride has a large volume of distribution (300 to 500 L). Dutasteride is highly bound to plasma albumin (99.0%) and alpha-1 acid glycoprotein (96.6%).

In a trial of healthy subjects (*n* = 26) receiving dutasteride 0.5 mg/day for 12 months, serum, achieved dutasteride concentrations averaged 3.4 ng/mL (range: 0.4 to 14 ng/mL) at 0.2 months and, similar to serum, achieved steady-state concentrations at 6 months. On average, at 12 months 11.5% of serum dutasteride concentrations partitioned into semen.

*Tamsulosin:* The mean steady-state apparent volume of distribution of tamsulosin after intravenous administration to 10 healthy male adults was 16 L, which is suggestive of distribution into extracellular fluids in the body.

Tamsulosin is extensively bound to human plasma proteins (94% to 99%), primarily alpha-1 acid glycoprotein (AAG), with linear binding over a wide concentration range (20 to 600 ng/mL). The results of 2-way *in vitro* studies indicate that the binding of tamsulosin to human plasma proteins is not affected by amitriptyline, diclofenac, glyburide, simvastatin plus simvastatin-hydroxy acid metabolite, warfarin, diazepam, or propranolol. Likewise, tamsulosin had no effect on the extent of binding of these drugs.

**Metabolism:** *Dutasteride:* Dutasteride is extensively metabolized in humans. *In vitro* studies showed that dutasteride is metabolized by the CYP3A4 and CYP3A5 isoenzymes. Both of these isoenzymes produced the 4-hydroxydutasteride, 6-hydroxydutasteride, and the 6,4-dihydroxydutasteride metabolites. In addition, the 15-hydroxydutasteride metabolite was formed by CYP3A4. Dutasteride is not metabolized *in vitro* by human cytochrome P450 isoenzymes CYP1A2, CYP2A6, CYP2B6, CYP2C8, CYP2C9, CYP2C19, CYP2D6, and CYP2E1. In human serum following dosing to steady state, unchanged dutasteride, 3 major metabolites (4-hydroxydutasteride, 6-hydroxydutasteride, and 6,4-dihydroxydutasteride) and 2 minor metabolites (6,4-dihydroxydutasteride and 15-hydroxydutasteride), as assessed by mass spectrometric response, have been detected. The absolute stereochemistry of the hydroxyl additions in the 6 and 15 positions is not known. *In vitro*, the 4-hydroxydutasteride and 6-hydroxydutasteride metabolites are formed by CYP3A4 and CYP3A5, respectively. Both isomers of human 5α-reductase, the activity of 6β-hydroxydutasteride is comparable to that of dutasteride.

*Tamsulosin:* There is no enantiomeric bioconversion from tamsulosin (R) to the S(+) isomer in humans. Tamsulosin is extensively metabolized by cytochrome P450 enzymes in the liver and less than 10% of the dose is excreted in urine unchanged. However, the pharmacokinetic profile of the metabolites in humans has not been established. *In vitro* studies indicate that CYP3A4 and CYP2D6 are involved in metabolism of tamsulosin as well as some minor participation of other CYP isoenzymes. Inhibition of hepatic drug metabolizing enzymes may lead to increased exposure to tamsulosin [see **Drug Interactions** (7.2)]. The metabolites of tamsulosin undergo extensive conjugation to glucuronide or sulfate prior to excretion.

Incubations with human liver microsomes showed no evidence of clinically significant metabolic interactions between tamsulosin and amitriptyline, albuterol, glyburide, and flinasteride. However, results of the *in vitro* testing of the tamsulosin interaction with diclofenac and warfarin were equivocal.

**Excretion:** *Dutasteride:* Dutasteride and its metabolites were excreted mainly in feces. As a percent of dose, there was approximately 5% unchanged dutasteride (approximately 1% to approximately 15%) and 40% as dutasteride-related metabolites (~2% to ~90%). Only trace amounts of unchanged dutasteride were found in urine (<1%). Therefore, on average, the dose unaccounted for approximated 55% (range: 5% to 97%). The terminal elimination half-life of dutasteride is approximately 5 weeks at steady state. The average steady-state serum dutasteride concentration following oral dosing is approximately 3.4 ng/mL. The average steady-state serum concentrations achieve 65% of steady-state concentration after 1 month and approximately 90% after 3 months. Due to the long half-life of dutasteride, serum concentrations remain detectable (greater than 0.1 ng/mL) for up to 4 to 6 months after discontinuation of treatment.

*Tamsulosin:* On administration of the radiolabeled dose of tamsulosin to 4 healthy volunteers, 97% of the administered radioactivity was recovered, with urine (76%) representing the primary route of excretion compared to feces (21%) over 168 hours.

Following intravenous or oral administration of an immediate-release formulation, the elimination half-life of tamsulosin in plasma ranges from 10 to 13 hours in healthy patients. The following text reflects information for the individual components.

*Dutasteride:* No dosage adjustment is necessary in the elderly. The pharmacokinetics and pharmacodynamics of dutasteride were evaluated in 36 healthy male subjects aged between 24 and 87 years following administration of a single 5 mg dose of dutasteride. In this single-dose trial, dutasteride half-life increased with age (approximately 170 hours in men aged 20 to 29 years, approximately 260 hours in men aged 50 to 69 years, and approximately 300 hours in men aged 70 years).

*Tamsulosin:* Cross-study comparison of tamsulosin overall exposure (AUC) and half-life indicate that the pharmacokinetic disposition of tamsulosin may be slightly prolonged in geriatric males compared with young, healthy male volunteers. Intrinsic clearance is independent of tamsulosin binding to AAG, but diminishes with age, resulting in a 40% overall higher exposure (AUC) in subjects aged 55 to 75 years compared with subjects aged 20 to 32 years.

*Gender:*

*Dutasteride:* Dutasteride is contraindicated in pregnancy and women of childbearing potential and is not indicated for use in other women (see **CONTRAINDICATIONS** (4), **Warnings and Precautions** (5.6)). The pharmacokinetics of dutasteride in women have not been studied.

*Tamsulosin:* Tamsulosin is not indicated for use in women. No information is available on the pharmacokinetics of tamsulosin in women.

*Race:* The effect of race on pharmacokinetics of dutasteride and tamsulosin administered together or separately has not been studied.

*Renal Impairment:* The effect of renal impairment on dutasteride and tamsulosin pharmacokinetics has not been studied using dutasteride and tamsulosin hydrochloride capsules. The following text reflects information for the individual components.

*Dutasteride:* The effect of renal impairment on dutasteride pharmacokinetics has not been studied. However, less than 1% of a steady-state 0.5 mg dose of dutasteride is recovered in human urine, so no adjustment in dosage is anticipated for patients with renal impairment.

*Tamsulosin:* The pharmacokinetics of tamsulosin have been compared in 6 subjects with mild-moderate (30s CL<sub>cr</sub> <70 mL/min/1.73 m<sup>2</sup>) or moderate-severe (10s CL<sub>cr</sub> <30 mL/min/1.73 m<sup>2</sup>) renal impairment and 6 normal subjects (CL<sub>cr</sub> >90 mL/min/1.73 m<sup>2</sup>). While a change in the overall plasma concentration of tamsulosin was observed as the result of altered binding to AAG, the unbound (active) concentration of tamsulosin, as well as the intrinsic clearance, remained relatively constant. Therefore, patients with renal impairment do not require an adjustment in tamsulosin dosing. However, patients with end-stage renal disease (CL<sub>cr</sub> <10 mL/min/1.73 m<sup>2</sup>) have not been studied.

*Hepatic Impairment:* The effect of hepatic impairment on dutasteride and tamsulosin pharmacokinetics has not been studied using dutasteride and tamsulosin hydrochloride capsules. The following text reflects information available for the individual components.

*Dutasteride:* The effect of hepatic impairment on dutasteride pharmacokinetics has not been studied. Because dutasteride is extensively metabolized, exposure could be higher in hepatically impaired patients.

*Tamsulosin:* The pharmacokinetics of tamsulosin have been compared in 8 subjects with moderate hepatic impairment (Child-Pugh classification: Grades A and B) and 8 normal subjects. While a change in the overall plasma concentration of tamsulosin was observed as the result of altered binding to AAG, the unbound (active) concentration of tamsulosin was not significantly changed. The mean percent increase in intrinsic clearance of unbound tamsulosin. Therefore, patients with moderate hepatic impairment do not require an adjustment in tamsulosin dosage. Tamsulosin has not been studied in patients with severe hepatic impairment.

**Drug Interactions:**

There have been no drug interaction studies using dutasteride and tamsulosin hydrochloride capsules. The following text reflects information available for the individual components.

*Cytochrome P450 Inhibitors:*

*Dutasteride:* No clinical drug interaction trials have been performed to evaluate the impact of CYP3A enzyme inhibitors on dutasteride pharmacokinetics. However, based on *in vitro* data, blood concentrations of dutasteride may increase in the presence of inhibitors of CYP3A4/5 such as ritonavir, ketoconazole, verapamil, diltiazem, cimetidine, troleanandomycin, and ciprofloxacin.

Dutasteride does not inhibit the *in vitro* metabolism of model substrates for the major human cytochrome P450 enzymes. There was no significant effect on significant increase in tamsulosin exposure when tamsulosin 0.4 mg was administered with steady-state serum concentrations in humans.

*Tamsulosin:*

*Strong and Moderate Inhibitors of CYP3A4 or CYP2D6:* The effects of ketoconazole (a strong inhibitor of CYP3A4) at 400 mg once daily for 5 days on the pharmacokinetics of a single tamsulosin hydrochloride capsule 0.4 mg dose was investigated in 24 healthy volunteers (age range: 23 to 47 years). Concomitant treatment with ketoconazole resulted in increases in the C<sub>max</sub> and AUC of tamsulosin by factors of 2.2 and 2.8, respectively. The effects of concomitant administration of a moderate CYP3A4 inhibitor (i.e., erythromycin) on the pharmacokinetics of tamsulosin have not been evaluated.

The effects of paroxetine (a strong inhibitor of CYP2D6) at 20 mg once daily for 9 days on the pharmacokinetics of a single tamsulosin capsule 0.4 mg dose was investigated in 24 healthy volunteers (age range: 23 to 47 years). Paroxetine had no effect on the increase in the C<sub>max</sub> and AUC of tamsulosin by factors of 1.3 and 1.6, respectively. A similar increase in exposure is expected in poor metabolizers (PM) of CYP2D6 as compared to extensive metabolizers (EM). A fraction of the population (about 7% of Caucasians and 2% of African-Americans) are CYP2D6 PMs. Since CYP2D6 PMs cannot be readily identified and the potential for significant increase in tamsulosin exposure exists when tamsulosin 0.4 mg is coadministered with strong CYP3A4 inhibitors in CYP2D6 PMs, tamsulosin 0.4 mg capsules should not be used in combination with strong inhibitors of CYP3A4 (e.g., ketoconazole).

The effects of concomitant administration of a moderate CYP2D6 inhibitor (e.g., terbinafine) on the pharmacokinetics of tamsulosin have not been evaluated.

The effects of coadministration of both a CYP3A4 and a CYP2D6 inhibitor with tamsulosin capsules have not been evaluated. However, the effects of coadministration of tamsulosin exposure when tamsulosin 0.4 mg is coadministered with a combination of both CYP3A4 and CYP2D6 inhibitors.

*Cimetidine:* The effects of cimetidine at the highest recommended dose (400 mg every 6 hours for 6 days) on the pharmacokinetics of a single tamsulosin capsule 0.4 mg dose was investigated in 10 healthy volunteers (age range: 21 to 38 years). Treatment with cimetidine resulted in a significant decrease (26%) in the clearance of tamsulosin hydrochloride, which resulted in a moderate increase in tamsulosin hydrochloride AUC (44%).

**Alpha Adrenergic Antagonists:**

*Dutasteride:* In a single-sequence, crossover trial in healthy volunteers, the administration of tamsulosin or terazosin hydrochloride capsules had no effect on the steady-state pharmacokinetics of either alpha-adrenergic antagonist. Although the effect of administration of tamsulosin or terazosin on dutasteride pharmacokinetic parameters was not evaluated, the percent change in DHT concentrations was similar for dutasteride, alone or in combination with tamsulosin or terazosin.

*Warfarin:*

*Dutasteride:* In a trial of 23 healthy volunteers, 3 weeks of treatment with dutasteride 0.5 mg/day did not alter the steady-state pharmacokinetics of the S- or R-warfarin isomers or alter the effect of warfarin on prothrombin time when administered with warfarin.

*Tamsulosin:* A definitive drug-drug interaction trial between tamsulosin and warfarin was not conducted. Results from *in vitro* and *in vivo* studies are inconclusive. Therefore, caution should be exercised with concomitant administration of warfarin and tamsulosin.

*Nifedipine, Atenolol, Enalapril:*  
*Tamsulosin:* In 3 trials in hypertensive subjects (age range: 47 to 79 years) whose blood pressure was controlled with stable doses of nifedipine extended-release, atenolol, or enalapril for at least 3 months, tamsulosin hydrochloride capsules 0.4 mg for 7 days followed by tamsulosin hydrochloride capsules 0.8 mg for another 7 days (total 14 days) had no effect on blood pressure and heart rate. The effects of tamsulosin (0.4 mg) on the effects of nifedipine (n = 4 per trial). Therefore, dosage adjustments are not necessary when tamsulosin is administered concomitantly with nifedipine extended-release, atenolol, or enalapril.

**Digoxin and Theophylline:**

*Dutasteride:* In a trial of 20 healthy volunteers, dutasteride did not alter the steady-state pharmacokinetics of digoxin when administered concomitantly at a dose of 0.5 mg/day for 3 weeks.

*Tamsulosin:* In 2 trials in healthy volunteers (n = 10 per trial; age range: 19 to 39 years) receiving tamsulosin capsules 0.4 mg/day for 2 days, followed by tamsulosin capsules 0.8 mg/day for 5 to 8 days, single intravenous doses of digoxin 0.5 mg or theophylline 5 mg/kg resulted in no change in the pharmacokinetics of digoxin or theophylline. Therefore, dosage adjustments are not necessary when a tamsulosin capsule is administered concomitantly with digoxin or theophylline.

**Furosemide:**

*Tamsulosin:* The pharmacokinetic and pharmacodynamic interaction between tamsulosin hydrochloride capsules 0.8 mg/day (steady-state) and furosemide 20 mg intravenously (single dose) was evaluated in 10 healthy volunteers (age range: 21 to 40 years). Tamsulosin had no effect on the pharmacodynamics (excretion of electrolytes) of furosemide. While furosemide produced an 11% to 12% reduction in tamsulosin C<sub>max</sub> and AUC, these changes are expected to be clinically insignificant and do not require dose adjustment for tamsulosin.

**Calcium Channel Antagonists:**

*Dutasteride:* In a population pharmacokinetics analysis, a decrease in clearance of dutasteride was noted when coadministered with the CYP3A4 inhibitors verapamil (~37%, *n* = 6) and diltiazem (~44%, *n* = 5). In contrast, no decrease in clearance was seen when amitidipine, another calcium channel antagonist that is not a CYP3A4 inhibitor, was coadministered with dutasteride (~7%, *n* = 4). The decrease in clearance and subsequent increase in exposure to dutasteride in the presence of verapamil and diltiazem is not considered to be clinically significant. No dosage adjustment is recommended.

**Cholestyramine:**

*Dutasteride:* Administration of a single 5 mg dose of dutasteride followed 1 hour later by 12 g cholestyramine did not affect the relative bioavailability of dutasteride in 12 normal volunteers.

### 13 NONCLINICAL TOXICOLOGY

#### 13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

No non-clinical studies have been conducted with dutasteride and tamsulosin hydrochloride capsules. The following information is based on studies performed with dutasteride or tamsulosin.

**Carcinogenesis:**

*Dutasteride:* A 2-year carcinogenicity study was conducted in B6C3F1 mice at doses of 3, 35, 250, and 500 mg/kg/day for males and 3, 35, and 250 mg/kg/day for females; an increased incidence of benign hepatocellular adenomas was noted at 250 mg/kg/day (290-fold the MRHD of a 0.5 mg daily dose) in female mice only. Two of the 3 major human metabolites have been detected in mice. The exposure to these metabolites in mice is either lower than in humans or is not known.

In a 2-year carcinogenicity study in Han Wistar rats, at doses of 1.5, 7.5, and 53 mg/kg/day in males and 0.8, 6.3, and 15 mg/kg/day in females, there was an increase in Leydig cell adenomas in the testes at 135-fold the MRHD (53 mg/kg/day and greater). An increased incidence of Leydig cell hyperplasia was present at 52-fold the MRHD (25 mg/kg/day and greater). A positive correlation between changes in the Leydig cells and an increase in circulating luteinizing hormone levels has been demonstrated with 5 alpha-reductase inhibitors and is consistent with an effect on the hypothalamic-pituitary-testicular axis following 5 alpha-reductase inhibition. At tumorigenic doses, luteinizing hormone levels in rats were increased by 167%. In this study, the major human metabolites were tested for carcinogenicity at approximately 1 to 13 times the expected clinical exposure.

*Tamsulosin:* In a rat carcinogenicity assay, no increases in tumor incidence was observed in rats administered up to 43 times the MRHD (based on AUC of 0.8 mg/day) for 2 years. In addition, no effect was observed at up to 52 mg/kg/day in females), with the exception of a modest increase in the frequency of mammary gland fibroadenomas in female rats receiving doses of 5.4 mg/kg or greater.

In a carcinogenicity assay, mice were administered up to 8 times the MRHD of tamsulosin (oral doses up to 127 mg/kg/day in males and 158 mg/kg/day in females). There were no significant tumor findings in male mice. Female mice treated for 2 years with the 2 highest doses of 45 and 158 mg/kg/day had statistically significant increases in the incidence of mammary gland fibroadenomas (*P*<0.001) and adenocarcinomas (*P*<0.001).

The increased incidences of mammary gland neoplasms in female rats and mice were considered secondary to tamsulosin-induced hyperproliferation. It is not known if tamsulosin elevates prolactin in humans. The relevance for human risk of the findings of prolactin-mediated endocrine tumors in rodents is not known.

**Mutagenesis:**

*Dutasteride:* Dutasteride was tested for genotoxicity in a bacterial mutagenesis assay (Ames test), a chromosomal aberration assay in CHO cells, and a micronucleus assay in rats. The results did not indicate any genotoxic potential of the parent drug. Two major human metabolites were also negative in either the Ames test or an abbreviated Ames test.

*Tamsulosin:* Tamsulosin produced no evidence of mutagenic potential *in vitro* in the Ames reverse mutation test, mouse lymphoma thymidine kinase assay, unscheduled DNA repair synthesis assay, and chromosomal aberration assays in CHO cells and human lymphocytes. There were no mutagenic effects in the *in vivo* sister chromatid exchange and mouse micronucleus assay.

**Impairment of Fertility:**

*Dutasteride:* Treatment of sexually mature male rats with dutasteride at 0.1- to 110-fold the MRHD (animal doses of 0.05, 10, 50, and 500 mg/kg/day for up to 31 weeks) resulted in dose- and time-dependent decreases in fertility; reduced cauda epididymal (absolute) sperm counts but not sperm concentration (at 50 and 500 mg/kg/day); reduced weights of the epididymis, prostate, and seminal vesicles; and microscopic changes in the male reproductive organs. The fertility effects were reversed by recovery week 6 at all doses, and sperm counts were normal at the end of a 14-week recovery period. The 5 alpha-reductase-related changes consisted of cytoplasmic vacuolation of tubular epithelium in the epididymides and decreased cytoplasmic content of epithelium, consistent with decreased secretory activity in the prostate and seminal vesicles. The microscopic changes were no longer present at recovery week 16 in the low-dose group and were partly recovered in the remaining treatment groups. Low levels of dutasteride (0.6 to 17 ng/mL) were detected in the serum of untreated female rats mated to males dosed at 10, 50, or 500 mg/kg/day for 29 to 30 weeks.

In a fertility study in female rats, oral administration of dutasteride at