

Summary of Product Characteristics

1 NAME OF THE MEDICINAL PRODUCT

CanOral 150mg Capsule

2 QUALITATIVE AND QUANTITATIVE COMPOSITION

Each hard capsule contains Fluconazole 150 mg.

Excipients with known effect

Each hard capsule contains 141.0mg of Lactose Monohydrate

For the full list of excipients, see section 6.1.

3 PHARMACEUTICAL FORM

Capsule, hard

Opaque light blue capsule (size 1) printed "CAN150".

4 CLINICAL PARTICULARS

4.1 Therapeutic Indications

CanOral 150mg Capsule is indicated in the following fungal infections in adults (see section 5.1):

- Acute vaginal candidiasis when local therapy is not appropriate.
- *Candidal balanitis* when local therapy is not appropriate.

Therapy may be instituted before the results of the cultures and other laboratory studies are known; however, once these results become available, anti-infective therapy should be adjusted accordingly.

Consideration should be given to official guidance on the appropriate use of antifungals.

4.2 Posology and method of administration

Adults

Single dose 150mg

Special populations

Elderly

Where there is no evidence of renal impairment, normal dose recommendations should be adopted.

Renal Impairment

Fluconazole is predominantly excreted in the urine as unchanged active substance. No adjustments in single dose therapy are necessary.

Hepatic Impairment

Limited data are available in patients with hepatic impairment, therefore fluconazole should be administered with caution to patients with liver dysfunction (see sections 4.4 and 4.8).

Paediatric Population

Safety and efficacy for genital candidiasis indication in paediatric population has not been established. Current available data for other paediatric indications are described in section 4.8. If treatment is imperative in adolescents (from 12 to 17 years old), the posology should be the same as adults posology.

Method of administration

The capsules should be swallowed whole and independent of food intake.

4.3 Contraindications

Hypersensitivity to the active substance, to related azole substances, or to any of the excipients listed in section 6.1.

Coadministration of terfenadine is contraindicated in patients receiving CanOral at multiple doses of 400 mg per day or higher based upon results of a multiple dose interaction study. Coadministration of other medicinal products known to prolong the QT interval and which are metabolised via the cytochrome P450 (CYP) 3A4 such as cisapride, astemizole, pimozone, quinidine and erythromycin are contraindicated in patients receiving fluconazole (see sections 4.4 and 4.5).

4.4 Special warnings and precautions for use

Candidiasis

Studies have shown an increasing prevalence of infections with *Candida* species other than *C. albicans*. These are often inherently resistant (e.g. *C. krusei* and *C. auris*) or show reduced susceptibility to fluconazole (*C. glabrata*). Such infections may require alternative antifungal therapy secondary to treatment failure. Therefore, prescribers are advised to take into account the prevalence of resistance in various *Candida* species to fluconazole.

Renal system

CanOral should be administered with caution to patients with renal dysfunction (see section 4.2).

Adrenal insufficiency

Ketoconazole is known to cause adrenal insufficiency, and this could also although rarely seen, be applicable to fluconazole. Adrenal insufficiency relating to concomitant treatment with prednisone is described in section 4.5 "The effect of fluconazole on other medicinal products".

Hepatobiliary system

Fluconazole should be administered with caution to patients with liver dysfunction.

CanOral has been associated with rare cases of serious hepatic toxicity including fatalities, primarily in patients with serious underlying medical conditions. In cases of fluconazole associated hepatotoxicity, no obvious relationship to total daily dose, duration of therapy, sex or age of patient has been observed. Fluconazole hepatotoxicity has usually been reversible on discontinuation of therapy.

Patients who develop abnormal liver function tests during fluconazole therapy must be monitored closely for the development of more serious hepatic injury.

The patient should be informed of suggestive symptoms of serious hepatic effect (important asthenia, anorexia, persistent nausea, vomiting and jaundice). Treatment of fluconazole should be immediately discontinued and the patient should consult a physician.

Cardiovascular system

Some azoles, including fluconazole, have been associated with prolongation of the QT interval on the electrocardiogram. Fluconazole causes QT prolongation via the inhibition of Rectifier Potassium Channels current (I_{Kr}). The QT prolongation caused by other medicinal products (such as amiodarone) may be amplified via the inhibition of cytochrome P450(CYP)3A4. During post-marketing surveillance, there have been very rare cases of QT prolongation and *torsades de pointes* in patients taking CanOral. These reports included seriously ill patients with multiple confounding risk factors, such as structural heart disease, electrolyte abnormalities and concomitant treatment that may have been contributory. Patients with hypokalemia and advanced cardiac failure are at an increased risk for the occurrence of life threatening ventricular arrhythmias and *torsades de pointes*.

CanOral should be administered with caution to patients with congenital or acquired QT prolongation, known cardiomyopathy, sinus bradycardia, cardiac arrhythmia, or history of *torsades de pointes* or other potentially proarrhythmic conditions. Coadministration of other medicinal products known to prolong the QT interval and which are metabolised via the cytochrome P450 (CYP) 3A4 are contraindicated (see sections 4.3 and 4.5).

Halofantrine

Halofantrine has been shown to prolong QTc interval at the recommended therapeutic dose and is a substrate of CYP3A4. The concomitant use of fluconazole and halofantrine is therefore not recommended (see section 4.5).

Dermatological reactions

Drug reaction with eosinophilia and systemic symptoms (DRESS) has been reported.

Patients have rarely developed exfoliative cutaneous reactions, such as Stevens-Johnson syndrome and toxic epidermal necrolysis, during treatment with fluconazole. AIDS patients are more prone to the development of severe cutaneous reactions to many medicinal products. If a rash, which is considered attributable to fluconazole, develops in a patient treated for a superficial fungal infection, further therapy with this medicinal product should be discontinued. If patients with invasive/systemic fungal infections develop rashes, they should be monitored closely and fluconazole discontinued if *bullous* lesions or *erythema* multiforme develop.

Hypersensitivity

In rare cases anaphylaxis has been reported (see section 4.3).

Cytochrome P450

Fluconazole is a moderate CYP2C9 and CYP3A4 inhibitor. Fluconazole is also a strong inhibitor of CYP2C19. CanOral treated patients who are concomitantly treated with medicinal products with a narrow therapeutic window metabolised through CYP2C9, CYP2C19 and CYP3A4, should be monitored (see section 4.5).

Terfenadine

The coadministration of fluconazole at doses lower than 400 mg per day with terfenadine should be carefully monitored (see sections 4.3 and 4.5).

Excipients

Capsules contain lactose monohydrate. Patients with rare hereditary problems of galactose intolerance, total lactase deficiency or glucose-galactose malabsorption should not take this medicine.

4.5 Interaction with other medicinal products and other forms of interactions

Concomitant use of the following medicinal products is contraindicated:

Medicinal products by therapeutic areas	Effects	Recommendation
Propulsives		
Cisapride	There have been reports of cardiac events including <i>torsades de pointes</i> in patients to whom fluconazole and cisapride were coadministered. A controlled study found that concomitant fluconazole 200 mg once daily and cisapride 20 mg four times a day yielded a significant increase in cisapride plasma levels and prolongation of QTc interval.	Concomitant treatment with fluconazole and cisapride is contraindicated (see section 4.3).
Antihistamines		
Astemizole	Concomitant administration of fluconazole with astemizole may decrease the clearance of astemizole. Resulting increased plasma concentrations of astemizole can lead to QT prolongation and rare occurrences of <i>torsades de pointes</i> .	Coadministration of fluconazole and astemizole is contraindicated (see section 4.3).
Terfenadine	Because of the occurrence of serious cardiac dysrhythmias secondary to prolongation of the QTc interval in patients receiving azole antifungals in conjunction with terfenadine, interaction studies have been performed. One study at a 200 mg daily dose of fluconazole failed to demonstrate a prolongation in QTc interval. Another study at a 400 mg and 800 mg daily dose of fluconazole demonstrated that fluconazole taken in doses of 400 mg per day or greater significantly increases plasma levels of terfenadine	The combined use of fluconazole at doses of 400 mg or greater with terfenadine is contraindicated (see section 4.3). The coadministration of fluconazole at doses lower than 400 mg per day with terfenadine

Medicinal products by therapeutic areas	Effects	Recommendation
	when taken concomitantly.	should be carefully monitored.
Antipsychotics		
Pimozide	Although not studied <i>in vitro</i> or <i>in vivo</i> , concomitant administration of fluconazole with pimozide may result in inhibition of pimozide metabolism. Increased pimozide plasma concentrations can lead to QT prolongation and rare occurrences of <i>torsades de pointes</i> .	Coadministration of fluconazole and pimozide is contraindicated (see section 4.3).
Antiarrhythmics		
Quinidine	Although not studied <i>in vitro</i> or <i>in vivo</i> , concomitant administration of fluconazole with quinidine may result in inhibition of quinidine metabolism. Use of quinidine has been associated with QT prolongation and rare occurrences of <i>torsades de pointes</i> .	Coadministration of fluconazole and quinidine is contraindicated (see section 4.3).
Anti-infectives		
Erythromycin	Concomitant use of fluconazole and erythromycin has the potential to increase the risk of cardiotoxicity (prolonged QT interval, <i>torsades de pointes</i>) and consequently sudden heart death.	Coadministration of fluconazole and erythromycin is contraindicated (see section 4.3).

Concomitant use of the following other medicinal products cannot be recommended:

Medicinal products by therapeutic areas	Effects	Recommendation
Antimalarials		
Halofantrine	Fluconazole can increase halofantrine plasma concentration due to an inhibitory effect on CYP3A4. Concomitant use of fluconazole and halofantrine has the potential to increase the risk of cardiotoxicity (prolonged QT interval, <i>torsades de pointes</i>) and consequently sudden heart death.	This combination should be avoided (see section 4.4).

Concomitant use that should be used with caution:

Medicinal products by therapeutic areas	Effects	Recommendation
Antiarrhythmics		
Amiodarone	Concomitant administration of fluconazole with amiodarone may increase QT prolongation.	Therefore, caution should be taken when both drugs are combined, notably with high doses fluconazole (800 mg).

Concomitant use of the following other medicinal products lead to precautions and dose adjustments:

The effect of other medicinal products on fluconazole

Medicinal products by therapeutic areas	Effects	Recommendation
Anti-infective		
Rifampicin	Concomitant administration of fluconazole and rifampicin resulted in a 25% decrease in the AUC and a 20% shorter half-life of fluconazole.	In patients receiving concomitant rifampicin, an increase of the fluconazole dose should be considered.
Diuretics		
Hydrochloro-thiazide	In a pharmacokinetic interaction study, coadministration of multiple-dose hydrochlorothiazide to healthy volunteers receiving fluconazole increased plasma concentration of fluconazole by 40%. An effect of this magnitude should not necessitate a change in the fluconazole dose regimen in subjects receiving concomitant diuretics.	
Control of gastric secretions and/or pH		
Food	Interaction studies have shown that when oral fluconazole is co-administered with food, cimetidine, antacids or following total body irradiation for bone marrow transplantation, no clinically significant impairment of fluconazole absorption occurs.	
Cimetidine		
Antacids		
Irradiation		
Total body irradiation for bone marrow transplantation		

The effect of fluconazole on other medicinal products

Fluconazole is a potent inhibitor of cytochrome P450 (CYP) isoenzyme 2C9 and a moderate inhibitor of CYP3A4. Fluconazole is also an inhibitor of the isozyme CYP2C19. In addition to the observed/documentated interactions mentioned below, there is a risk of increased plasma concentration of other compounds metabolized by CYP2C9, CYP2C19 and CYP3A4 coadministered with fluconazole. Therefore caution should be exercised when using these combinations and the patients should be carefully monitored. The enzyme inhibiting effect of fluconazole persists 4-5 days after discontinuation of fluconazole treatment due to the long half-life of fluconazole (see section 4.3).

Medicinal products by therapeutic areas	Effects	Recommendation
Angiotensin II Antagonists		
Losartan	Fluconazole inhibits the metabolism of losartan to its active metabolite (E-31 74) which is responsible for most of the angiotensin II receptor antagonism which occurs during treatment with losartan.	Patients should have their blood pressure monitored continuously.
Antibacterials		
Azithromycin	An open-label, randomized, three-way crossover study in 18 healthy subjects assessed the effect of a single 1200 mg oral dose of azithromycin on the pharmacokinetics of a single 800 mg oral dose of fluconazole as well as the effects of fluconazole on the pharmacokinetics of azithromycin. There was no significant pharmacokinetic interaction between fluconazole and azithromycin.	
Antidepressants		
Amitriptyline,	Fluconazole increases the effect of amitriptyline and nortriptyline.	Dose of amitriptyline/

Nortriptyline	5-nortriptyline and / or S-amitriptyline may be measured at initiation of the combination therapy and after one week.	nortriptyline should be adjusted, if necessary.
Antiepileptics		
Carbamazepine	Fluconazole inhibits the metabolism of carbamazepine and an increase in serum carbamazepine of 30% has been observed. There is a risk of developing carbamazepine toxicity.	Dose adjustment of carbamazepine may be necessary depending on concentration measurements/ effect.
Phenytoin	Fluconazole inhibits the hepatic metabolism of phenytoin. Concomitant repeated administration of 200 mg fluconazole and 250 mg phenytoin intravenously, caused an increase of the phenytoin AUC ₂₄ by 75% and C _{min} by 128%.	With coadministration, serum phenytoin concentration levels should be monitored in order to avoid phenytoin toxicity.
Anti-infectives		
Amphotericin B	Concurrent administration of fluconazole and amphotericin B in infected normal and immunosuppressed mice showed the following results: a small additive antifungal effect in systemic infection with <i>C. albicans</i> , no interaction in intracranial infection with <i>Cryptococcus neoformans</i> , and antagonism of the two medicinal products in systemic infection with <i>Aspergillus fumigatus</i> . The clinical significance of results obtained in these studies is unknown.	
Rifabutin	Fluconazole increases serum concentrations of rifabutin, leading to increase in the AUC of rifabutin up to 80%. There have been reports of uveitis in patients to whom fluconazole and rifabutin were coadministered.	In combination therapy, symptoms of rifabutin toxicity should be taken into consideration.
Antimycotics		
Voriconazole	CYP2C9, CYP2C19 and CYP3A4 inhibitor: Coadministration of oral voriconazole (400 mg Q12h for 1 day, then 200 mg Q12h for 2.5 days) and oral fluconazole (400 mg on day 1, then 200 mg Q24h for 4 days) to 8 healthy male subjects resulted in an increase in C _{max} and AUC of voriconazole by an average of 57% (90% CI: 20%, 107%) and 79% (90% CI: 40%, 128%), respectively. The reduced dose and/or frequency of voriconazole and fluconazole that would eliminate this effect have not been established.	Monitoring for voriconazole associated adverse events is recommended if voriconazole is used sequentially after fluconazole.
Antineoplastics		
Cyclophosphamide	Combination therapy with cyclophosphamide and fluconazole results in an increase in serum bilirubin and serum creatinine.	The combination may be used while taking increased consideration to the risk of increased serum bilirubin and serum creatinine.
Analgesics/Anesthetics		
Alfentanil	During concomitant treatment with fluconazole (400 mg) and intravenous alfentanil (20 µg/kg) in healthy volunteers the alfentanil AUC ₁₀ increased 2-fold, probably through inhibition of CYP3A4.	Dose adjustment of alfentanil may be necessary.
Fentanyl	One fatal case of fentanyl intoxication due to possible fentanyl fluconazole interaction was reported. Furthermore, it was shown in healthy volunteers that fluconazole delayed the elimination of fentanyl significantly. Elevated fentanyl concentration may lead to respiratory	Patients should be monitored closely for the potential risk of respiratory depression. Dosage

	depression.	adjustment of fentanyl may be necessary.
Methadone	Fluconazole may enhance the serum concentration of methadone.	Dose adjustment of methadone may be necessary.
Antivirals		
Zidovudin	Fluconazole increases C_{max} and AUC of zidovudine by 84% and 74%, respectively, due to an approx. 45% decrease in oral zidovudine clearance. The half-life of zidovudine was likewise prolonged by approximately 128% following combination therapy with fluconazole.	Patients receiving this combination should be monitored for the development of zidovudine-related adverse reactions. Dose reduction of zidovudine may be considered.
Saquinavir	Fluconazole increases the AUC and C_{max} of saquinavir with approximately 50% and 55% respectively, due to inhibition of saquinavir's hepatic metabolism by CYP3A4 and inhibition of P-glycoprotein. Interaction with saquinavir/ritonavir has not been studied and might be more marked.	Dose adjustment of saquinavir may be necessary.
Benzodiazepines (short acting)		
Midazolam Triazolam	Following oral administration of midazolam, fluconazole resulted in substantial increases in midazolam concentrations and psychomotor effects. Concomitant intake of fluconazole 200 mg and midazolam 7.5 mg orally increased the midazolam AUC and half-life 3.7-fold and 2.2-fold, respectively. Fluconazole 200 mg daily given concurrently with triazolam 0.25 mg orally increased the triazolam AUC and half-life 4.4-fold and 2.3-fold, respectively. Potentiated and prolonged effects of triazolam have been observed at concomitant treatment with fluconazole.	If concomitant benzodiazepine therapy is necessary in patients being treated with fluconazole, consideration should be given to decreasing the benzodiazepine dose, and the patients should be appropriately monitored.
Calcium channel blockers		
Nifedipine, Isradipine Amlodipine Verapamil Felodipine	Certain calcium channel antagonists are metabolized by CYP3A4. Fluconazole has the potential to increase the systemic exposure of the calcium channel antagonists.	Frequent monitoring for adverse events is recommended.
Corticosteroids		
Prednisone	There was a case report that a liver-transplanted patient treated with prednisone developed acute adrenal cortex insufficiency when a three month therapy with fluconazole was discontinued. The discontinuation of fluconazole presumably caused an enhanced CYP3A4 activity which led to increased metabolism of prednisone.	Patients on long-term treatment with fluconazole and prednisone should be carefully monitored for adrenal cortex insufficiency when fluconazole is discontinued.
Cystic fibrosis transmembrane conductance regulator (CFTR) potentiator		
Ivacaftor	Co-administration with ivacaftor, increased ivacaftor exposure by 3-fold and hydroxymethyl-ivacaftor (M1) exposure by 1.9-fold.	A reduction of the ivacaftor dose to 150 mg once daily is recommended for patients

		taking concomitant moderate CYP3A inhibitors, such as fluconazole and erythromycin.
HMG CoA reductase inhibitors		
Atorvastatin Simvastatin Fluvastatin	The risk of myopathy and rhabdomyolysis increases when fluconazole is coadministered with HMG-CoA reductase inhibitors metabolised through CYP3A4, such as atorvastatin and simvastatin, or through CYP2C9, such as fluvastatin. If concomitant therapy is necessary, the patient should be observed for symptoms of myopathy and rhabdomyolysis and creatine kinase should be monitored.	HMG-CoA reductase inhibitors should be discontinued if a marked increase in creatine kinase is observed or myopathy/rhabdomyolysis is diagnosed or suspected.
Immuno-suppressants		
Ciclosporin	Fluconazole significantly increases the concentration and AUC of ciclosporin. During concomitant treatment with fluconazole 200 mg daily and ciclosporin (2.7 mg/kg/day) there was a 1.8 fold increase in ciclosporin AUC.	This combination may be used by reducing the dose of ciclosporin depending on ciclosporin concentration.
Everolimus	Although not studied <i>in vivo</i> or <i>in vitro</i> , fluconazole may increase serum concentrations of everolimus through inhibition of CYP3A4.	
Sirolimus	Fluconazole increases plasma concentrations of sirolimus presumably by inhibiting the metabolism of sirolimus via CYP3A4 and P-glycoprotein.	This combination may be used with a dose adjustment of sirolimus depending on the effect/concentration measurements.
Tacrolimus	Fluconazole may increase the serum concentrations of orally administered tacrolimus up to 5 times due to inhibition of tacrolimus metabolism through CYP3A4 in the intestines. No significant pharmacokinetic changes have been observed when tacrolimus is given intravenously. Increased tacrolimus levels have been associated with nephrotoxicity.	Dose of orally administered tacrolimus should be decreased depending on tacrolimus concentration.
Tofacitinib	Exposure of tofacitinib is increased when tofacitinib is co-administered with medications that result in both moderate inhibition of CYP3A4 and strong inhibition of CYP2C19 (e.g. fluconazole).	Therefore, it is recommended to reduce tofacitinib dose to 5 mg once daily when it is combined with these drugs.
Kinase Inhibitor		
Ibrutinib	Moderate inhibitors of CYP3A4 such as fluconazole increase plasma ibrutinib concentrations and may increase risk of toxicity.	If the combination cannot be avoided, reduce the dose of ibrutinib to 280 mg once daily (two capsules) for the duration of the inhibitor use and provide close clinical monitoring.
Non-steroidal anti-inflammatory drugs		

Celecoxib	During concomitant treatment with fluconazole (200 mg daily) and celecoxib (200 mg) the celecoxib C_{max} and AUC increased by 68% and 134%, respectively.	Half of the celecoxib dose may be necessary when combined with fluconazole.
Flurbiprofen, Ibuprofen, Naproxen, Lornoxicam, Meloxicam, Diclofenac	The C_{max} and AUC of flurbiprofen were increased by 23% and 81%, respectively, when coadministered with fluconazole compared to administration of flurbiprofen alone. Similarly, the C_{max} and AUC of the pharmacologically active isomer [S-(+)-ibuprofen] was increased by 15% and 82%, respectively, when fluconazole was coadministered with racemic ibuprofen (400 mg) compared to administration of racemic ibuprofen alone. Although not specifically studied, fluconazole has the potential to increase the systemic exposure of other NSAIDs that are metabolized by CYP2C9 (e.g. naproxen, lornoxicam, meloxicam, diclofenac).	Frequent monitoring for adverse events and toxicity related to NSAIDs is recommended. Adjustment of dose of NSAIDs may be needed.
Oral anticoagulants		
Coumarin-type / Warfarin Indanedione	In post-marketing experience, as with other azole antifungals, bleeding events (bruising, epistaxis, gastro-intestinal bleeding, hematuria, and melena) have been reported, in association with increases in prothrombin time in patients receiving fluconazole concurrently with warfarin. During concomitant treatment with fluconazole and warfarin the prothrombin time was prolonged up to 2-fold, probably due to an inhibition of the warfarin metabolism through CYP2C9.	In patients receiving coumarin-type or indanedione anticoagulants concurrently with fluconazole the prothrombin time should be carefully monitored. Dose adjustment of the anticoagulant may be necessary.
Oral contraceptives		
Ethinylestradiol, Levonorgestrel	Two pharmacokinetic studies with a combined oral contraceptive have been performed using multiple doses of fluconazole. There were no relevant effects on hormone level in the 50 mg fluconazole study, while at 200 mg daily, the AUCs of ethinyl estradiol and levonorgestrel were increased 40% and 24%, respectively. Thus, multiple dose use of fluconazole at these doses is unlikely to have an effect on the efficacy of the combined oral contraceptive.	
Poly(ADP-ribose) polymerase (PARP) Inhibitor		
Olaparib	Moderate inhibitors of CYP3A4 such as fluconazole increase olaparib plasma concentrations.	Concomitant use is not recommended. If the combination cannot be avoided, limit the dose of olaparib to 200 mg twice daily.
Selective Vasopressin V2-Receptor Antagonist		
Tolvaptan	Exposure to tolvaptan is significantly increased (200% in AUC; 80% in C_{max}) when tolvaptan, a CYP3A4 substrate, is co-administered with fluconazole, a moderate CYP3A4 inhibitor, with risk of significant increase in adverse reactions particularly significant	In case of concomitant use, the tolvaptan dose should be reduced as instructed in the tolvaptan prescribing information and the patient should be

	diuresis, dehydration and acute renal failure.	frequently monitored for any adverse reactions associated with tolvaptan.
Sulfonylureas		
Chlorpropamide, Glibenclamide, Glipizide, Tolbutamide	Fluconazole has been shown to prolong the serum half-life of concomitantly administered oral sulfonylureas (e.g. chlorpropamide, glibenclamide, glipizide, tolbutamide) in healthy volunteers.	Frequent monitoring of blood glucose and appropriate reduction of sulfonylurea dose is recommended during coadministration.
Vinca alkaloids		
Vincristine Vinblastine	Although not studied, fluconazole may increase the plasma levels of the vinca alkaloids (e.g. vincristine and vinblastine) and lead to neurotoxicity, which is possibly due to an inhibitory effect on CYP3A4.	
Vitamin A		
Vitamin A	Based on a case-report in one patient receiving combination therapy with all-trans-retinoid acid (an acid form of vitamin A) and fluconazole, CNS related undesirable effects have developed in the form of pseudotumour cerebri, which disappeared after discontinuation of fluconazole treatment.	This combination may be used but the incidence of CNS related undesirable effects should be borne in mind.
Xanthines		
Theophylline	In a placebo controlled interaction study, the administration of fluconazole 200 mg for 14 days resulted in an 18% decrease in the mean plasma clearance rate of theophylline.	Patients who are receiving high dose theophylline or who are otherwise at increased risk for theophylline toxicity should be observed for signs of theophylline toxicity while receiving fluconazole. Therapy should be modified if signs of toxicity develop.

4.6 Fertility, pregnancy and lactation

Pregnancy

An observational study has suggested an increased risk of spontaneous abortion in women treated with fluconazole during the first trimester.

Data from several thousand pregnant women treated with a cumulative dose of ≤ 150 mg of fluconazole, administered in the first trimester, show no increase in the overall risk of malformations in the foetus. In one large observational cohort study, first trimester exposure to oral fluconazole was associated with a small increased risk of musculoskeletal malformations, corresponding to approximately 1 additional case per 1000 women treated with cumulative doses ≤ 450 mg compared with women treated with topical azoles and to approximately 4 additional cases per 1000 women treated with cumulative doses over 450 mg. The adjusted relative risk was 1.29 (95% CI 1.05 to 1.58) for 150 mg oral fluconazole and 1.98 (95% CI 1.23 to 3.17) for doses over 450 mg fluconazole.

There have been reports of multiple congenital abnormalities (including brachycephalia, ears dysplasia, giant anterior fontanelle, femoral bowing and radio-humeral synostosis) in infants whose mothers were treated for at least three or more months with high doses (400-800 mg daily) of fluconazole for coccidioidomycosis. The relationship between fluconazole use and these events is unclear.

Studies in animals have shown reproductive toxicity (see section 5.3).

Fluconazole in standard doses and short-term treatments should not be used in pregnancy unless clearly necessary.

Fluconazole in high dose and/or in prolonged regimens should not be used during pregnancy except for potentially life-threatening infections.

Breast-feeding

Fluconazole passes into breast milk to reach concentrations similar to those in plasma. Breast-feeding may be maintained after a single dose 150 mg fluconazole. Breast-feeding is not recommended after repeated use or after high dose fluconazole. The developmental and health benefits of breast-feeding should be considered along with the mother's clinical need for fluconazole 150 mg and any potential adverse effects on the breast-fed child from fluconazole 150 mg or from the underlying maternal condition.

Fertility

Fluconazole did not affect the fertility of male or female rats (see section 5.3)

4.7 Effects on ability to drive and use machines

No studies have been performed on the effects of CanOral on the ability to drive or use machines. Patients should be warned about the potential for dizziness or seizures (see section 4.8) while taking CanOral and should be advised not to drive or operate machines if any of these symptoms occur.

4.8 Undesirable effects

The most frequently (> 1/10) reported adverse reactions are headache, abdominal pain, diarrhoea, nausea, vomiting, alanine aminotransferase increased, aspartate aminotransferase increased, blood alkaline phosphatase increased and rash.

Drug reaction with eosinophilia and systemic symptoms (DRESS) has been reported in association with fluconazole treatment (see section 4.4).

The following adverse reactions have been observed and reported during treatment with CanOral with the following frequencies: Very common ($\geq 1/10$); common ($\geq 1/100$ to $< 1/10$); uncommon ($\geq 1/1,000$ to $< 1/100$); rare ($\geq 1/10,000$ to $< 1/1,000$); very rare ($< 1/10,000$), not known (cannot be estimated from the available data).

System Organ Class	Common	Uncommon	Rare	Not Known
Blood and the lymphatic system disorders		Anaemia	Agranulocytosis, Leucopenia, Thrombocytopenia, neutropenia	
Immune system disorders			Anaphylaxis	
Metabolism and nutrition disorders		Decreased appetite	Hypercholesterolaemia, Hypertriglyceridaemia, hypokalemia	
Psychiatric disorders		Somnolence, insomnia		
Nervous system disorders	Headache	Seizures, paraesthesia, dizziness, taste perversion	Tremor	
Ear and labyrinth disorders		Vertigo		
Cardiac disorders			<i>Torsades de pointes</i> (see section 4.4), QT prolongation (see section 4.4)	

Gastrointestinal disorders	Abdominal pain, vomiting, diarrhoea, nausea	Constipation, dyspepsia, flatulence, dry mouth		
Hepatobiliary disorders	Alanine aminotransferase increased (see section 4.4), aspartate aminotransferase increased (see section 4.4), blood alkaline phosphatase increased (see section 4.4)	Cholestasis (see section 4.4), jaundice (see section 4.4), bilirubin increased (see section 4.4)	Hepatic failure (see section 4.4), hepatocellular necrosis (see section 4.4), hepatitis (see section 4.4), hepatocellular damage (see section 4.4)	
Skin and subcutaneous tissue disorders	Rash (see section 4.4)	Drug eruption (see section 4.4), urticaria (see section 4.4), pruritus, increased sweating	Toxic epidermal necrolysis, (see section 4.4), Stevens-Johnson syndrome (see section 4.4), acute generalised exanthematous-pustulosis (see section 4.4), dermatitis exfoliative, angioedema, face odema, alopecia	Drug reaction with eosinophilia and systemic symptoms (DRESS)
Musculoskeletal and connective tissue disorders		Myalgia		
General disorders and administration site conditions		Fatigue, malaise, asthenia, fever		

Paediatric population

The pattern and incidence of adverse reactions and laboratory abnormalities recorded during paediatric clinical trials, excluding the genital candidiasis indication, are comparable to those seen in adults.

Reporting of suspected adverse reactions

Reporting suspected adverse reactions after authorisation of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via HPRC Pharmacovigilance Website: www.hpra.ie.

4.9 Overdose

There have been reports of overdose with CanOral and hallucination and paranoid behaviour have been concomitantly reported.

In the event of overdose, symptomatic treatment (with supportive measures and gastric lavage if necessary) may be adequate.

Fluconazole is largely excreted in the urine; forced volume diuresis would probably increase the elimination rate. A three-hour haemodialysis session decreases plasma levels by approximately 50%.

5 PHARMACOLOGICAL PROPERTIES

5.1 Pharmacodynamic properties

ATC classification

Pharmacotherapeutic group: Antimycotics for systemic use, triazole derivatives, ATC code: J02AC01.

Mode of action

Fluconazole is a triazole antifungal agent. Its primary mode of action is the inhibition of fungal cytochrome P-450-mediated 14 alpha-lanosterol demethylation, an essential step in fungal ergosterol biosynthesis. The accumulation of 14 alpha-methyl sterols correlates with the subsequent loss of ergosterol in the fungal cell membrane and may be responsible for the antifungal activity of fluconazole. Fluconazole has been shown to be more selective for fungal cytochrome P-450 enzymes than for various mammalian cytochrome P-450 enzyme systems.

Fluconazole 50 mg daily given up to 28 days has been shown not to effect testosterone plasma concentrations in males or steroid concentration in females of child-bearing age. Fluconazole 200 mg to 400 mg daily has no clinically significant effect on endogenous steroid levels or on ACTH stimulated response in healthy male volunteers. Interaction studies with antipyrine indicate that single or multiple doses of fluconazole 50 mg do not affect its metabolism.

Susceptibility *in vitro*

In vitro, fluconazole displays antifungal activity against most clinically common *Candida* species (including *C. albicans*, *C. parapsilosis*, *C. tropicalis*). *C. glabrata* reduced susceptibility to fluconazole while *C. krusei* and *C. auris* are resistant to fluconazole. Fluconazole also exhibits activity *in vitro* against *Cryptococcus neoformans* and *Cryptococcus gattii* as well as the endemic moulds *Blastomyces dermatitidis*, *Coccidioides immitis*, *Histoplasma capsulatum* and *Paracoccidioides brasiliensis*.

PK/PD relationship

In animal studies, there is a correlation between MIC values and efficacy against experimental mycoses due to *Candida* spp. In clinical studies, there is an almost 1:1 linear relationship between the AUC and the dose of fluconazole. There is also a direct though imperfect relationship between the AUC or dose and a successful clinical response of oral candidosis and to a lesser extent candidaemia to treatment. Similarly cure is less likely for infections caused by strains with a higher fluconazole MIC.

Mechanism(s) of resistance

Candida spp have developed a number of resistance mechanisms to azole antifungal agents. Fungal strains which have developed one or more of these resistance mechanisms are known to exhibit high minimum inhibitory concentrations (MICs) to fluconazole which impacts adversely efficacy *in vivo* and clinically.

There have been reports of superinfection with *Candida* species other than *C. albicans*, which often have inherently reduced susceptibility (*C. glabrata*) or resistance to fluconazole (e.g. *C. krusei*, *C. auris*). Such infections may require alternative antifungal therapy.

Breakpoints (according to EUCAST)

Based on analyses of pharmacokinetic/pharmacodynamic (PK/PD) data, susceptibility *in vitro* and clinical response EUCAST-AFST (European Committee on Antimicrobial susceptibility Testing-subcommittee on Antifungal Susceptibility Testing) has determined breakpoints for fluconazole for *Candida* species (EUCAST Fluconazole rational document (2007)-version 2). These have been divided into non-species related breakpoints; which have been determined mainly on the basis of PK/PD data and are independent of MIC distributions of specific species, and species related breakpoints for those species most frequently associated with human infection. These breakpoints are given in the table below:

Antifungal	Species-related breakpoints (S</R>)					Non-species related breakpoints ^A S</R>
<i>Candida albicans</i>	<i>Candida glabrata</i>		<i>Candida krusei</i>	<i>Candida parapsilosis</i>		<i>Candida tropicalis</i>
Fluconazole	2/4	IE	--	2/4	2/4	2/4

S = Susceptible, R = Resistant

A. = Non-species related breakpoints have been determined mainly on the basis of PK/PD data and are independent of MIC distributions of specific species. They are for use only for organisms that do not have specific breakpoints.

-- = susceptibility testing not recommended as the species is a poor target for therapy with the medicinal product.

IE = There is insufficient evidence that the species in question is a good target for therapy with the medicinal product.

5.2 Pharmacokinetic properties

The pharmacokinetic properties of fluconazole are similar following administration by the intravenous or oral route.

Absorption

After oral administration fluconazole is well absorbed, and plasma levels (and systemic bioavailability) are over 90% of the levels achieved after intravenous administration. Oral absorption is not affected by concomitant food intake. Peak plasma concentrations in the fasting state occur between 0.5 and 1.5 hours post-dose. Plasma concentrations are proportional to dose. Ninety percent steady state levels are reached by day 4-5 with multiple once daily dosing. Administration of a loading dose (on day 1) of twice the usual daily dose enables plasma levels to approximate to 90% steady-state levels by day 2.

Distribution

The apparent volume of distribution approximates to total body water. Plasma protein binding is low (11-12%).

Fluconazole achieves good penetration in all body fluids studied. The levels of fluconazole in saliva and sputum are similar to plasma levels. In patients with fungal meningitis, fluconazole levels in the CSF are approximately 80% the corresponding plasma levels.

High skin concentration of fluconazole, above serum concentrations, are achieved in the stratum corneum, epidermis-dermis and eccrine sweat. Fluconazole accumulates in the stratum corneum. At a dose of 50 mg once daily, the concentration of fluconazole after 12 days was 73 microgram/gram and 7 days after cessation of treatment the concentration was still 5.8 microgram/gram. At the 150 mg once-a-week dose, the concentration of fluconazole in stratum corneum on day 7 was 23.4 microgram/gram and 7 days after the second dose was still 7.1 microgram/gram.

Concentration of fluconazole in nails after 4 months of 150 mg once-a-week dosing was 4.05 microgram/gram in healthy and 1.8 microgram/gram in diseased nails; and, fluconazole was still measurable in nail samples 6 months after the end of therapy.

Biotransformation

Fluconazole is metabolised only to a minor extent. Of a radioactive dose, only 11% is excreted in a changed form in the urine. Fluconazole is a moderate inhibitor of the isozymes CYP2C9 and CYP3A4 (see section 4.5). Fluconazole is also a strong inhibitor of the isozyme CYP2C19.

Excretion

Plasma elimination half-life for fluconazole is approximately 30 hours. The major route of excretion is renal, with approximately 80% of the administered dose appearing in the urine as unchanged medicinal product. Fluconazole clearance is proportional to creatinine clearance. There is no evidence of circulating metabolites.

The long plasma elimination half-life provides the basis for single dose therapy for vaginal candidiasis, once daily and once weekly dosing for other indications.

Pharmacokinetics in renal impairment

In patients with severe renal insufficiency, (GFR < 20 ml/min) half life increased from 30 to 98 hours. Consequently, reduction of the dose is needed. Fluconazole is removed by haemodialysis and to a lesser extent by peritoneal dialysis. After three hours of haemodialysis session, around 50% of fluconazole is eliminated from blood.

Pharmacokinetics during lactation

A pharmacokinetic study in ten lactating women, who had temporarily or permanently stopped breast-feeding their infants, evaluated fluconazole concentrations in plasma and breast milk for 48 hours following a single 150 mg dose of Fluconazole. Fluconazole was detected in breast milk at an average concentration of approximately 98% of those in maternal plasma. The mean peak breast milk concentration was 2.61 mg/L at 5.2 hours post-dose. The estimated daily infant dose of fluconazole from breast milk (assuming mean milk consumption of 150 ml/kg/day) based on the mean peak milk concentration is 0.39 mg/kg/day, which is approximately 40% of the recommended neonatal dose (<2 weeks of age) or 13% of the recommended infant dose for mucosal candidiasis.

Pharmacokinetics in children

Pharmacokinetic data were assessed for 113 paediatric patients from 5 studies; 2 single-dose studies, 2 multiple-dose studies, and a study in premature neonates. Data from one study were not interpretable due to changes in formulation pathway through the study. Additional data were available from a compassionate use study.

After administration of 2-8 mg/kg fluconazole to children between the ages of 9 months to 15 years, an AUC of about 38 µg.h/ml was found per 1 mg/kg dose units. The average fluconazole plasma elimination half-life varied between 15 and 18 hours and the distribution volume was approximately 880 ml/kg after multiple doses. A higher fluconazole plasma elimination half-life of approximately 24 hours was found after a single dose. This is comparable with the fluconazole plasma elimination half-life after a single administration of 3 mg/kg i.v. to children of 11 days-11 months old. The distribution volume in this age group was about 950 ml/kg.

Experience with fluconazole in neonates is limited to pharmacokinetic studies in premature newborns. The mean age at first dose was 24 hours (range 9-36 hours) and mean birth weight was 0.9 kg (range 0.75-1.10 kg) for 12 pre-term neonates of average gestation around 28 weeks. Seven patients completed the protocol; a maximum of five 6 mg/kg intravenous infusions of fluconazole were administered every 72 hours. The mean half-life (hours) was 74 (range 44-185) on day 1 which decreased, with time to a mean of 53 (range 30-131) on day 7 and 47 (range 27-68) on day 13. The area under the curve (microgram.h/ml) was 271 (range 173-385) on day 1 and increased with a mean of 490 (range 292-734) on day 7 and decreased with a mean of 360 (range 167-566) on day 13. The volume of distribution (ml/kg) was 1183 (range 1070-1470) on day 1 and increased, with time, to a mean of 1184 (range 510-2130) on day 7 and 1328 (range 1040-1680) on day 13.

Pharmacokinetics in elderly

A pharmacokinetic study was conducted in 22 subjects, 65 years of age or older receiving a single 50 mg oral dose of fluconazole. Ten of these patients were concomitantly receiving diuretics. The C_{max} was 1.54 µg/ml and occurred at 1.3 hours post-dose. The mean AUC was 76.4 ± 20.3 µg.h/ml, and the mean terminal half-life was 46.2 hours. These pharmacokinetic parameter values are higher than analogous values reported for normal young male volunteers. Co-administration of diuretics did not significantly alter AUC or C_{max}. In addition, creatinine clearance (74 ml/min), the percent of medicinal product recovered unchanged in urine (0-24 h, 22%) and the fluconazole renal clearance estimates (0.124 ml/min/kg) for the elderly were generally lower than those of younger volunteers. Thus, the alteration of fluconazole disposition in the elderly appears to be related to reduced renal function characteristics of this group.

5.3 Preclinical safety data

Effects in non-clinical studies were observed only at exposures considered sufficiently in excess of the human exposure indicating little relevance to clinical use.

Carcinogenesis

Fluconazole showed no evidence of carcinogenic potential in mice and rats treated orally for 24 months at doses of 2.5, 5, or 10 mg/kg/day (approximately 2-7 times the recommended human dose). Male rats treated with 5 and 10 mg/kg/day had an increased incidence of hepatocellular adenomas.

Reproductive toxicity

Fluconazole did not affect the fertility of male or female rats treated orally with daily doses of 5, 10, or 20 mg/kg or with parenteral doses of 5, 25, or 75 mg/kg.

There were no foetal effects at 5 or 10 mg/kg; increases in foetal anatomical variants (supernumerary ribs, renal pelvis dilation) and delays in ossification were observed at 25 and 50 mg/kg and higher doses. At doses ranging from 80 mg/kg to 320 mg/kg embryoletality in rats was increased and foetal abnormalities included wavy ribs, cleft palate, and abnormal cranio-facial ossification.

The onset of parturition was slightly delayed at 20 mg/kg orally and dystocia and prolongation of parturition were observed in a few dams at 20 mg/kg and 40 mg/kg intravenously. The disturbances in parturition were reflected by a slight increase in the number of still-born pups and decrease of neonatal survival at these dose levels. These effects on parturition are consistent with the species specific oestrogen-lowering property produced by high doses of fluconazole. Such a hormone change has not been observed in women treated with fluconazole (see section 5.1).

6 PHARMACEUTICAL PARTICULARS

6.1 List of excipients

Lactose monohydrate
Maize starch
Silica, Colloidal Anhydrous
Magnesium stearate
Sodium laurilsulfate

Capsule shells contain:

Brilliant Blue FCF (E133)
Titanium dioxide (E171)
Gelatin

Printing ink contains:

Black iron oxide (E172)

Shellac

6.2 Incompatibilities

Not applicable.

6.3 Shelf life

3 years.

6.4 Special precautions for storage

This medicinal product does not require any special storage conditions.

6.5 Nature and contents of container

Opaque, white PVC/PVdC (60g/m²) blister with 20mm aluminium foil backing containing one capsule.

Pack size: One capsule

6.6 Special precautions for disposal and other handling

No special requirements.

7 MARKETING AUTHORISATION HOLDER

Bayer Limited
The Atrium
Blackthorn Road
Dublin 18
Ireland

8 MARKETING AUTHORISATION NUMBER

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9 DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION

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10 DATE OF REVISION OF THE TEXT

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