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## Syquet film coated tablets

### PRODUCT INFORMATION

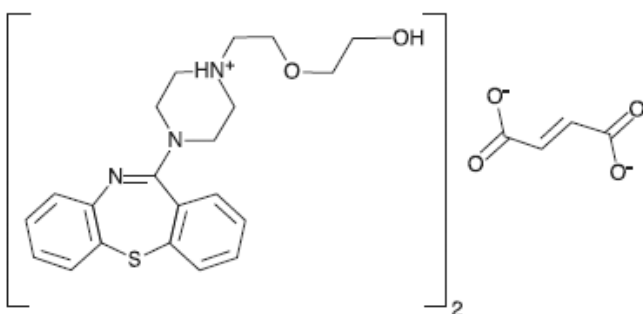
#### Name of the medicine

Quetiapine fumarate

Chemical name: bis[2-(2- [4-(dibenzo[b,f][1,4]-thiazepin-11-yl) piperazin-1-yl] ethoxy) ethanol] fumarate.

Quetiapine fumarate has no chiral centres and only one morphological entity has been detected throughout development.

*Structural Formula:*



CAS: 111974-72-2

#### Description

Quetiapine fumarate is a weak acid (pKa 3.3, 6.8) which exhibits moderate pH dependent solubility (94.3 to 2.37 mg/mL at pH values from 1 to 9) and lipophilicity characteristics (log P) which vary with pH (0.45 in water, 1.37 at pH 5, 2.65 at pH 7 and 2.59 at pH 9).

Quetiapine fumarate displays good solid state stability, has an aqueous solubility of 3.29 mg/mL at 25°C and exhibits suitable tableting properties when combined with appropriate excipients.

Syquet 25 mg, 100 mg, 150 mg, 200 mg, and 300 mg tablets contain quetiapine fumarate equivalent to 25 mg, 100 mg, 150 mg, 200 mg, and 300 mg quetiapine free base respectively.

**Excipients** povidone, calcium hydrogen phosphate dihydrate, cellulose - microcrystalline, lactose, sodium starch glycollate, silica - colloidal anhydrous, magnesium stearate, hypromellose, macrogol 400, titanium dioxide, iron oxide yellow CI 77492 (25, 100 and 150 mg) and iron oxide red CI 77491 (25 mg)

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## Pharmacology

### Mechanism of Action

Quetiapine is an atypical antipsychotic agent. Quetiapine and the human plasma metabolite, norquetiapine, interact with a broad range of neurotransmitter receptors. Quetiapine and norquetiapine exhibit affinity for brain serotonin (5HT<sub>2</sub>) and dopamine D<sub>1</sub> and D<sub>2</sub> -receptors; this combination of receptor antagonism with a higher selectivity for 5HT<sub>2</sub> relative to D<sub>2</sub> -receptors is believed to contribute to the clinical antipsychotic properties and low extrapyramidal side effects (EPS) liability of quetiapine compared to typical antipsychotics. Additionally, norquetiapine has high affinity (higher than quetiapine) for the noradrenaline transporter, 5HT<sub>1B</sub> and muscarinic receptors. Quetiapine and norquetiapine also have high affinity at histaminergic H<sub>1</sub> and adrenergic  $\alpha_{1B}$  and  $\alpha_{1A}$  -receptors, with a lower affinity at adrenergic  $\alpha_2$  and 5HT<sub>1A</sub> -receptors. Quetiapine has no appreciable affinity at cholinergic, muscarinic or benzodiazepine receptors. The norquetiapine metabolite 7-hydroxy norquetiapine also has affinity for histaminergic H<sub>1</sub> and 5HT<sub>2B</sub> and 5HT<sub>2C</sub> -receptors at clinically relevant concentrations.

### Pharmacodynamics

Quetiapine is active in tests for antipsychotic activity, e.g. conditioned avoidance. It also reverses the action of dopamine agonists, measured either behaviourally or electrophysiologically, and elevates dopamine metabolite concentrations, a neurochemical index of D<sub>2</sub> -receptor blockade. The extent to which the metabolites norquetiapine and 7-hydroxy norquetiapine contribute to the pharmacological activity of quetiapine in humans is uncertain.

In preclinical tests predictive of EPS, quetiapine is unlike typical antipsychotics and has an atypical profile. Quetiapine does not produce dopamine D<sub>2</sub> -receptor supersensitivity after chronic administration. Quetiapine produces only weak catalepsy at effective dopamine D<sub>2</sub>-receptor blocking doses. Quetiapine demonstrates selectivity for the limbic system by producing depolarization blockade of the mesolimbic but not the nigrostriatal dopamine containing neurons following chronic administration. Quetiapine exhibits minimal dystonic liability in haloperidol sensitised or drug naive cebus monkeys after acute and chronic administration.

It has been demonstrated that quetiapine is effective when given once or twice a day, although quetiapine has a pharmacokinetic half-life of approximately seven hours. This is further supported by the data from a positron emission tomography (PET) study which identified that for quetiapine, 5HT<sub>2</sub> and D<sub>2</sub> receptor occupancy are maintained for up to 12 hours. The safety and efficacy of doses greater than 800 mg/day have not been evaluated.

### Pharmacokinetics

#### *Absorption*

Quetiapine is well absorbed and the bioavailability of quetiapine is not significantly affected by administration with food.

#### *Distribution*

The elimination half-lives of quetiapine and norquetiapine are approximately 7 and 12 hours, respectively. Quetiapine is approximately 83% bound to plasma proteins. Steady-state peak molar concentrations of the active metabolite norquetiapine are 35% of that observed for quetiapine.

The pharmacokinetics of quetiapine and norquetiapine are linear across the approved dosage range. The kinetics of quetiapine do not differ between men and women.

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## **Metabolism**

Quetiapine is extensively metabolised by the liver following oral administration, with parent compound accounting for less than 5% of unchanged drug related material in the urine or faeces, following the administration of radiolabelled quetiapine. The average molar dose fraction of free quetiapine and the active human plasma metabolite norquetiapine is < 5% excreted in the urine.

*In vitro* investigations established that CYP3A4 is likely to be the primary enzyme responsible for cytochrome P450 mediated metabolism of quetiapine.

Norquetiapine is primarily formed and eliminated via CYP3A4. CYP2D6 and CYP2C9 are also involved in quetiapine metabolism.

Quetiapine and several of its metabolites (including norquetiapine) were found to be weak to modest inhibitors of human cytochrome P450 3A4, 2C19, 2D6, 1A2 and 2C9 activities *in vitro*. *In vitro* CYP inhibition is observed only at concentrations approximately 5 to 50-fold higher than those observed at a dose range of 300 to 800 mg/day in humans. Based on these *in vitro* results, it is unlikely that coadministration of quetiapine with other drugs will result in clinically significant drug inhibition of cytochrome P450 mediated metabolism of the other drug. From animal studies it appears that quetiapine can induce cytochrome P450 enzymes. In a specific interaction study in psychotic patients, however, no increase in the cytochrome P450 activity was found after administration of quetiapine.

The mean clearance of quetiapine in the elderly is approximately 30 to 50% lower than that seen in adults aged 18 to 65 years.

**Excretion** Approximately 73% of the radioactivity is excreted in the urine and 21% in the faeces.

### ***Use in renal impairment***

The mean plasma clearance of quetiapine was reduced by approximately 25% in subjects with severe renal impairment (creatinine clearance less than 30 mL/minute/1.73m<sup>2</sup>), but the individual clearance values are within the range for normal subjects.

### ***Use in hepatic impairment***

The mean plasma clearance of quetiapine was reduced by approximately 25% in subjects with hepatic impairment (stable alcoholic cirrhosis), but the individual clearance values are within the range for normal subjects. Since quetiapine is extensively metabolised by the liver, higher plasma levels are expected in the hepatically impaired population, and dosage adjustment may be needed in these patients (see Dosage and Administration).

### ***Use in children and adolescents (10 to 17 years of age)***

At steady-state the pharmacokinetics of the parent compound in children and adolescents (10 -17 years of age) were similar to adults, while AUC and C<sub>max</sub> of the active metabolite, norquetiapine, were higher in children and adolescents than in adults, 45% and 31%, respectively. However, when adjusted for weight AUC and C<sub>max</sub> of the parent compound in children and adolescents were lower than in adults, 41% and 39%, respectively, while the pharmacokinetics of the metabolite, norquetiapine, was similar (see **Dosage and Administration**). Preclinical data

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### **Acute toxicity studies**

Quetiapine has low acute toxicity. Findings in mice (median lethal dose > 500 mg/kg PO; 100 mg/kg IP), rats (median lethal dose > 500 mg/kg PO; 100 mg/kg IP) and dogs (dose limit study 10 to 75 mg/kg PO) were typical of neuroleptic agents and included decreased motor activity, ptosis, loss of righting reflex, prostration, fluid around the mouth and convulsions.

### **Repeat dose toxicity studies**

In multiple dose studies in rats, dogs and monkeys, anticipated central nervous system effects of an antipsychotic drug were observed with quetiapine (e.g. sedation at lower doses and tremor, convulsions or prostration at higher exposures).

Hyperprolactinaemia, induced through the dopamine D<sub>2</sub> -receptor antagonist activity of quetiapine or its metabolites, varied between species but was most marked in the rat, and a range of effects consequent to this were seen in the 12 month study, including mammary hyperplasia, increased pituitary weight, decreased uterine weight and enhanced growth of females.

Reversible morphological and functional effects on the liver, consistent with hepatic enzyme induction, were seen in mouse, rat and monkey.

Thyroid follicular cell hypertrophy was seen in mice, rats and monkeys. This hypertrophy was secondary to compensatory elevations of circulating thyroid stimulating hormone (TSH) brought about by increased hepatic metabolism of thyroid hormones. Pigmentation of a number of tissues, particularly the thyroid, was not associated with any morphological or functional effects. Transient increases in heart rate were not accompanied by consistent effects on blood pressure in dogs.

Posterior triangular cataracts seen after six months in dogs at 100 mg/kg/day were consistent with inhibition of cholesterol biosynthesis in the lens. No cataracts were observed in cynomolgus monkeys dosed up to 225 mg/kg/day, although an increase in lens relucency was seen at the highest dose. No effects on the lens were seen in rodents. Monitoring in clinical studies did not reveal drug related corneal opacities in man. (see **Adverse Effects – Clinical study experience - Other findings observed during clinical studies**).

No evidence of neutrophil reduction or agranulocytosis was seen in any of the toxicity studies, however there was evidence for reduced lymphocytes in the bone marrow of dogs and in the circulation of monkeys.

## **Clinical trials**

### **Bipolar disorder (adults)**

#### ***Maintenance treatment in combination with lithium or sodium valproate***

The efficacy of quetiapine in the maintenance treatment of bipolar disorder was established in two similarly designed placebo controlled trials in patients who met DSM-IV criteria for bipolar I disorder. These trials included patients whose most recent mood episode was mania (approximately 36%), depression (approximately 30%) or mixed state (approximately 34%) and patients with or without psychotic features. Patients with rapid cycling (approximately 37%) were also included.

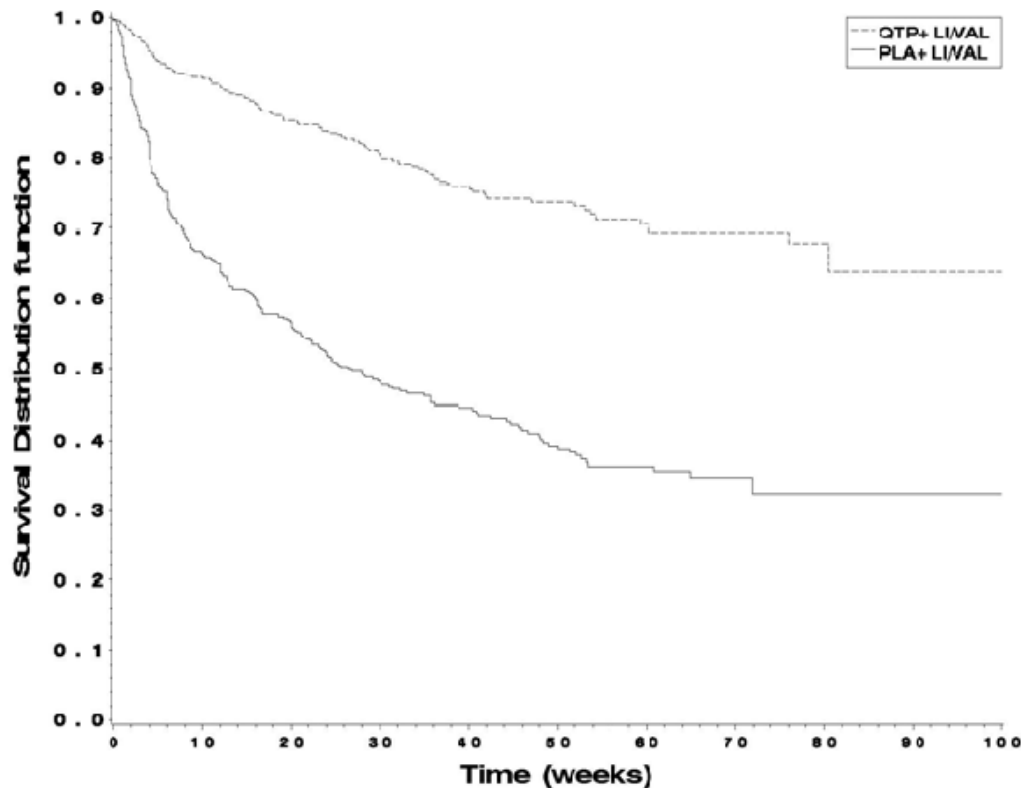
Both trials consisted of an open label phase followed by a randomised treatment phase. In the open label phase (n = 3,414), patients were required to be stabilised on quetiapine (400 to 800 mg/day) in combination with a mood stabiliser (lithium or valproate) for at least 12 weeks prior to randomisation. In the randomisation phase, patients who were symptomatically stable for at least 12 weeks (n = 1,326) either continued treatment with

quetiapine (at the same dose, then adjusted as clinically indicated) in combination with a mood stabiliser or received placebo in combination with a mood stabiliser for up to 104 weeks. Approximately 40% of patients received lithium and 60% received valproate.

The primary endpoint was time to recurrence of any mood event (mania, depression or mixed state). A mood event was defined as medication initiation, hospitalisation, Young Mania Rating Scale (YMRS) score  $\geq 20$  or Montgomery-Asberg Depression Rating Scale (MADRS) score  $\geq 20$  on two consecutive assessments or study discontinuation due to a mood event.

Quetiapine was superior to placebo in increasing the time to recurrence of a mood event in both studies. Patients on quetiapine had a 70% less risk of experiencing a recurrence of a mood event (see Figure 1 and Table 1) compared to patients on placebo. Patients on quetiapine had a lower risk of experiencing a mood event prior to week 28 and week 52 compared to patients on placebo (see Table 2).

**Figure 1 Time to recurrence of a mood event for the combined maintenance treatment studies, Kaplan Meier curves (ITT population)**



ITT Intention to treat. PLA Placebo. QTP Quetiapine. LI Lithium. VAL Valproate

**Table 1 Summary of efficacy results (ITT population) for maintenance treatment**

	<b>Study 1</b> <b>QTP + LI/VAL vs</b> <b>PLA + LI/VAL</b> <b>QTP N=336 / PLA N=367</b>	<b>Study 2</b> <b>QTP + LI/VAL vs</b> <b>PLA + LI/VAL</b> <b>QTP N=310 / PLA N=313</b>	<b>Combined studies</b> <b>QTP + LI/VAL vs</b> <b>PLA + LI/VAL</b> <b>QTP N=646 / PLA N=680</b>
<i>Analysis of time to recurrence of a mood event</i>			
Hazard ratio			
[95% CI]	0.28 [0.21, 0.37]	0.32 [0.24, 0.42]	0.30 [0.24, 0.37]
p-value	<0.0001	<0.0001	<0.0001
<i>Analysis of time to recurrence as a manic event</i>			
Hazard ratio			
[95% CI]	0.30 [0.20, 0.44]	0.30 [0.18, 0.49]	0.30 [0.22, 0.41]
p-value	<0.0001	<0.0001	<0.0001
<i>Analysis of time to recurrence as a depression event</i>			
Hazard ratio			
[95% CI]	0.26 [0.17, 0.41]	0.33 [0.23, 0.48]	0.30 [0.23, 0.40]
p-value	<0.0001	<0.0001	<0.0001

ITT Intent-to-treat. PLA Placebo. QTP Quetiapine. LI Lithium. VAL Valproate. N Number of patients in treatment group.

**Table 2 Kaplan Meier estimates of mood, manic and depressive event rates at weeks 28 and 52 (ITT population) – combined studies**

<b>Time to event</b>	<b>Kaplan Meier survival estimate of event rates (%)</b>		
	<b>QTP + LI/VAL (N=646)</b>	<b>PLA + LI/VAL (N=680)</b>	<b>p value</b>
<i>Mood event rates</i>			
Week 28	82.5%	49.7%	<0.0001
Week 52	73.7%	38.8%	<0.0001
<i>Manic event rates</i>			
Week 28	91.9%	73.6%	<0.0001
Week 52	86.0%	63.8%	<0.0001
<i>Depressive event rates</i>			
Week 28	89.9%	68.4%	<0.0001
Week 52	85.8%	61.8%	<0.0001

ITT Intent-to-treat. PLA Placebo. QTP Quetiapine. LI Lithium. VAL Valproate. N Number of patients in treatment group.

Maintenance treatment with quetiapine was superior to placebo in increasing the time to recurrence of a depressive or a manic event (see Table 1). Patients on quetiapine also had a lower risk of experiencing a depressive or a manic event prior to week 28 and week 52 compared to patients on placebo (see Table 2). Efficacy was demonstrated to be independent of the nature of the most recent episode (manic, mixed or depressive), the mood stabiliser (lithium or valproate), rapid cycling course, gender, age or ethnicity.

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### ***Maintenance treatment as monotherapy***

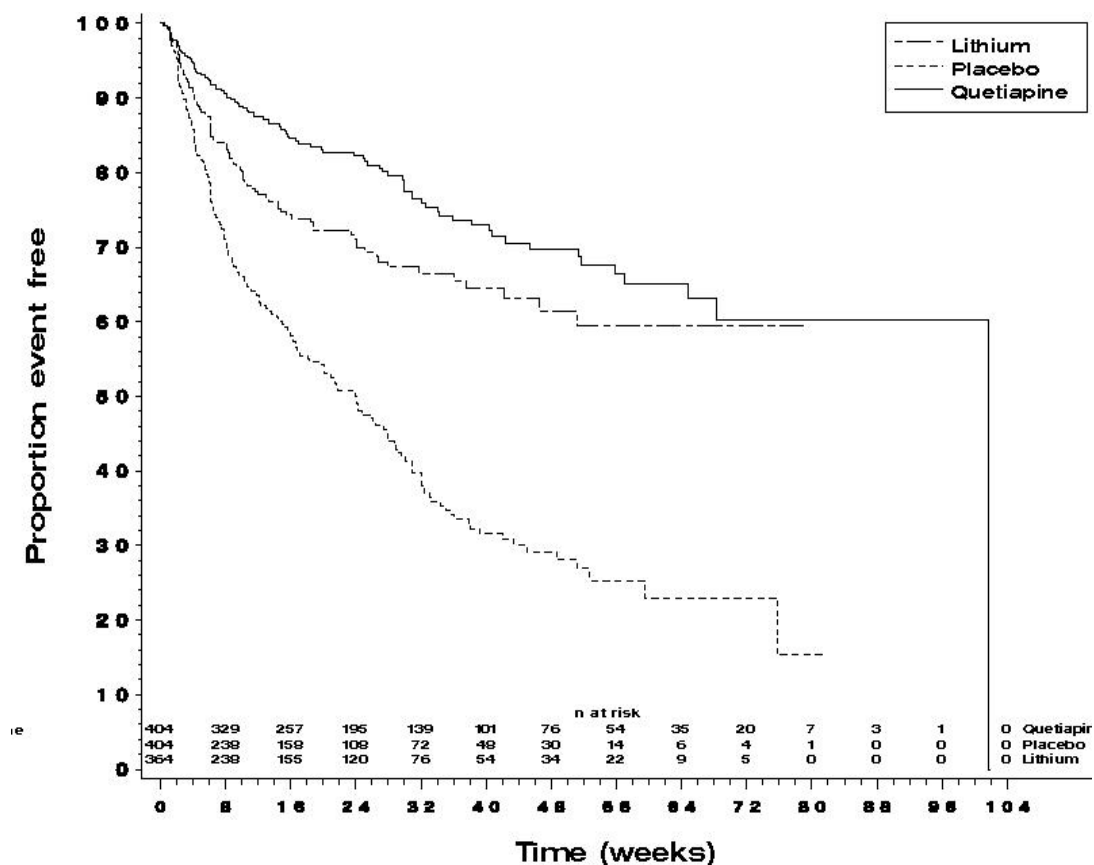
The efficacy of quetiapine in the maintenance treatment of bipolar disorder as monotherapy was established in a placebo-controlled trial in 1172 patients who met DSM-IV criteria for bipolar I disorder. Approximately 50% of the 2438 patients initially treated with quetiapine for their index episode achieved stabilisation and were eligible for enrolment in the placebo-controlled randomised phase. The most recent mood episode of patients included was mania (approximately 54%), depression (approximately 28%) or mixed state (approximately 18%). Patients with rapid cycling were also included.

The trial consisted of an open label phase followed by a randomised treatment phase. In the open label phase, patients were required to be stabilised on quetiapine (300 – 800 mg/day) for at least 4 weeks prior to randomisation to quetiapine, placebo or lithium. In the randomisation phase, the dose of quetiapine and lithium could be adjusted as clinically indicated. Randomised treatment was intended for up to 104 weeks however the study was stopped early following a positive interim analysis.

The primary endpoint was time to relapse/recurrence of any mood event (mania, depression or mixed state). A mood event was defined as medication initiation, hospitalisation, YMRS score  $\geq 20$  or MADRS score  $\geq 20$  on two consecutive assessments or study discontinuation due to a mood event. Quetiapine was superior to placebo in increasing the time to relapse/recurrence of a mood event. Patients on quetiapine had a 71% less risk of experiencing a relapse/recurrence of a mood event (refer Figure 2 and Table 3) compared to patients on placebo.

Quetiapine was also superior to placebo in increasing time to relapse/recurrence of manic events and depressed events (refer Table 3). Efficacy was demonstrated to be independent of the nature of the most recent episode (manic, mixed or depressive), rapid cycling course, gender, age or ethnicity.

**Figure 2 Time to relapse/recurrence of a mood event, manic event and depressive event, Kaplan Meier curves (ITT population)**



ITT Intent-to-treat. The numbers above the x-axis indicate the number of patients at risk of having an event at given time-points

**Table 3 Summary of efficacy results (ITT population) for maintenance treatment**

	Quetiapine vs Placebo N <sub>QTP</sub> =404/N <sub>PLA</sub> =404	Lithium vs Placebo N <sub>LI</sub> =364/ N <sub>PLA</sub> =404	Quetiapine vs Lithium N <sub>QTP</sub> =404/ N <sub>LI</sub> =364
<i>Analysis of time to relapse/recurrence of a mood event</i>			
Hazard ratio [95% CI]	0.29 [0.23, 0.38]	0.46 [0.36, 0.59]	0.66 [0.49, 0.88]
p-value	<0.0001	<0.0001	0.005
<i>Analysis of time to relapse/recurrence of a manic event</i>			
Hazard ratio [95% CI]	0.29 [0.21, 0.40]	0.37 [0.27, 0.53]	0.78 [0.53, 1.16]
p-value	<0.0001	<0.0001	0.226
<i>Analysis of time to relapse/recurrence of a depressed event</i>			
Hazard ratio [95% CI]	0.30 [0.20, 0.44]	0.59 [0.42, 0.84]	0.54 [0.35, 0.84]
p-value	<0.0001	0.004	0.006

ITT Intent-to-treat. PLA Placebo. QTP Quetiapine. LI Lithium. VAL Valproate. N Number of patients in treatment group.



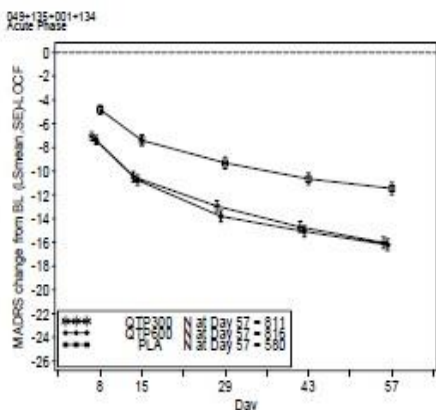
## Bipolar depression

The safety and efficacy of quetiapine 300 and 600 mg once daily for the treatment of bipolar depression was established in four similarly designed placebo controlled clinical trials (n = 2,461) over eight weeks with two of these studies assessing maintenance of effect for up to 52 weeks. Patients met the DSM-IV criteria for bipolar I or II disorder, with or without rapid cycling courses. In the eight week study period approximately 35% of patients met the criteria for bipolar II disorder.

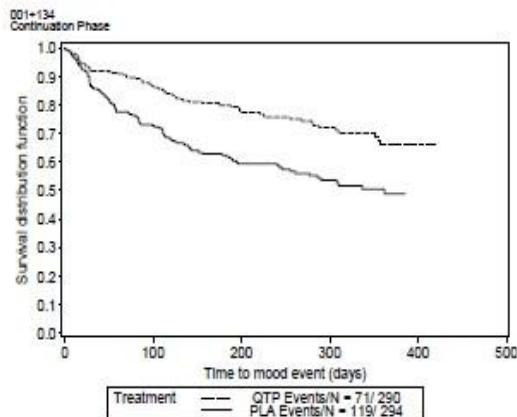
Antidepressant activity was assessed by the change from baseline for MADRS total score (primary endpoint) at eight weeks (day 57). In all four studies quetiapine doses of 300 and 600 mg/day demonstrated clinical and statistical superiority to placebo in the treatment of depression at eight weeks (see Figure 3A). The antidepressant effect of quetiapine was superior compared to placebo as early as day 8 (week 1) and was maintained through to week 8 (see Figure 3A)

**Figure 3 Treatment (A) and maintenance of effect (B) of quetiapine in bipolar depression (combined intention to treat population)**

**A MADRS total score change from baseline over time by treatment (LOCF)**



**B Time to recurrence of a mood event (Kaplan Meier curves)**



BL baseline. ITT Intention-to-treat. LOCF Last observation carried forward. LS Least squares. MADRS Montgomery-Asberg Depression Rating Scale. N Number of patients in treatment group. PLA Placebo. QTP Quetiapine. SE standard error.

The magnitude of the antidepressant effect was supported by the secondary outcome variables (Hamilton Rating Scale for Depression (HAM-D) total score, the item analyses of the MADRS and HAM-D item 1 (depressed mood) score). Response rates (defined as  $\geq 50\%$  reduction in MADRS total score) and remission rates (defined as MADRS total score of 12 or less) were superior for quetiapine compared to placebo at week 8. The Clinical Global Impression (CGI) severity of illness (CGI-S) and CGI improvement (CGI-I), measures of the clinician's impression of the severity of the patient's overall illness and improvement from baseline, were also assessed with quetiapine superior to placebo at week 8 in all four studies.

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Alleviation of anxiety symptoms by quetiapine in all four studies was confirmed by a statistically superior Hamilton Rating Scale for Anxiety (HAM-A) total score change from baseline compared to placebo.

The change from baseline for total MADRS score for quetiapine versus placebo was statistically significant for patients with bipolar I or bipolar II disorder. Efficacy was also demonstrated to be independent of cycling frequency, gender or age.

Quality of life assessments as measured by Q-LES-Q (Quality of Life Enjoyment and Satisfaction Scale) total score revealed superior improvement with quetiapine 300 mg treatment and improvement was also seen with quetiapine 600 mg compared to placebo.

Maintenance of the quetiapine effect in bipolar depression was demonstrated during the continuation phase with patients treated with quetiapine experiencing a significantly longer time to recurrence of any mood event (depression, mixed state or mania; defined as a MADRS score  $\geq$  20 or a YMRS score  $\geq$  16; initiation of an antipsychotic, antidepressant, mood stabiliser etc; hospitalisation for symptoms of depression and/or mania/ hypomania; discontinuation due to symptoms of depression and/or mania/ hypomania), compared to placebo as shown in Figure 3B. Quetiapine patients had a lower risk of experiencing a mood event at weeks 26 and 52 compared to patients on placebo. Patients on quetiapine had a 49% less risk of experiencing a mood event compared with patients treated with placebo (HR 0.51 (95% CI 0.38, 0.69;  $p < 0.001$ )). The risk of a mood event for quetiapine versus placebo was reduced by 41% for the 300 mg dose and by 55% for the 600 mg dose.

Quetiapine patients also had a lower risk of experiencing a depressive event at weeks 26 and 52 compared to patients on placebo. The analysis of time to a depressive event mirrored the overall mood event results with patients on quetiapine having a 57% less risk of experiencing a depressed event compared with patients treated with placebo (HR 0.43 (95% CI 0.30, 0.62;  $p < 0.001$ )). The risk of a depressive event for quetiapine versus placebo was reduced by 52% for the 300 mg dose and by 61% for the 600 mg dose.

No increased risk for a manic or hypomanic event was observed. Quetiapine treatment of a depressed episode was also not associated with a switch to mania or hypomania.

Time to all cause discontinuation, including the composite mood event, was also examined with the Kaplan-Meier estimate of time to 50% all cause discontinuation being 311 days for quetiapine treatment compared to 156 days for placebo treatment.

The maintenance of effect observed in patients treated with quetiapine was demonstrated to be independent of bipolar diagnosis (i.e. I or II), gender or age.

In the majority of studies in the acute phase statistically significant improvements over placebo were seen in reductions in suicidal thinking as measured by MADRS item 10. There was also no increased risk of suicidal behaviour or ideation associated with quetiapine treatment for bipolar depression in either the acute or continuation phase.

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## ***Acute mania***

The efficacy of quetiapine in the treatment of manic episodes was established in three short-term placebo controlled trials in patients who met DSM-IV criteria for bipolar I disorder. These trials included patients with or without psychotic features and excluded patients with rapid cycling or mixed episodes.

The primary outcome variable for these trials was change from baseline to day 21 in the YMRS total score, an instrument used to assess manic symptoms. Various secondary outcomes were also assessed. The CGI-Bipolar Version reflects the clinician's impression of the severity of the patient's overall bipolar illness and improvement from baseline (CGI-BP Severity and CGI-BP Improvement). In addition, MADRS was used to assess depressive symptoms, and the Positive and Negative Symptoms Scale (PANSS) was used to assess the efficacy in psychosis, agitation and aggression. The Global Assessment Scale (GAS) was used to assess improvement in functional status.

The results of the trials follow.

In two 12 week trials (n = 300, n = 299) comparing quetiapine to placebo, Quetiapine was superior to placebo in reducing manic symptoms. Of those patients with a clinical response, 87% received doses of quetiapine between 400 and 800 mg/day. The mean last week median dose of quetiapine in responders was approximately 600 mg/day.

The majority of patients who responded at day 21 maintained responses to day 84. On secondary endpoints, quetiapine was also clinically and statistically superior to placebo. Improvements were observed in CGI-BP Severity and Improvement, MADRS total score, PANSS total score, PANSS activation subscale and in the GAS score. The effectiveness of quetiapine was unaffected by age, gender, ethnicity or the presence of psychotic symptoms at baseline.

In a three week placebo controlled trial (n = 170) comparing quetiapine to placebo in patients on a mood stabiliser (lithium or valproate), quetiapine was superior to placebo in reducing manic symptoms. Improvements were observed in CGI-BP Severity and Improvement and PANSS total score. Of those patients with a clinical response, 91% received doses of quetiapine between 400 and 800 mg/day. The mean last week median dose of quetiapine in responders was approximately 600 mg/day. In a similarly designed six week placebo controlled trial (n = 200) quetiapine demonstrated a similar improvement in YMRS scores but did not demonstrate superiority to placebo at either day 21 or day 42, possibly due to a higher placebo effect.

## ***Schizophrenia (adults)***

The efficacy of quetiapine was established in short-term controlled trials of psychotic inpatients who met DSM III-R criteria for schizophrenia. Several instruments were used for assessing psychiatric signs and symptoms in these studies, among them the Brief Psychiatric Rating Scale (BPRS), CGI and Scale for Assessing Negative Symptoms (SANS).

The main trials were as follows.

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1. A six week placebo controlled trial (n = 361) involving five fixed doses of quetiapine (75, 150, 300, 600 and 750 mg/day on a three times a day dosing schedule).
  2. A six week placebo controlled trial (n = 109) involving titration of quetiapine in doses up to 750 mg/day on a three times a day dosing schedule.
  3. A six week placebo controlled trial (n = 286) involving titration of quetiapine in high (up to 750 mg/day on three times a day dosing schedule) and low (up to 250 mg/day on a three times a day dosing schedule) doses.
  4. A six week dose and dose regimen comparison trial (n = 618) involving two fixed doses of quetiapine (450 mg/day on both twice a day and three times a day dosing schedules and 50 mg/day on a twice a day dosing schedule).

Quetiapine has been shown to be effective in the treatment of both positive and negative symptoms of schizophrenia. In a comparative clinical trial of ten weeks duration, Quetiapine has been shown to be as effective as risperidone, using a 40% or more decline in the baseline PANSS score as a definition of response; although statistically comparative efficacy was not demonstrated when using a 30% decline in PANSS score, the differences between treatments were modest in absolute terms and in all probability not clinically meaningful.

### **Children and adolescents (10 to 17 years of age)**

Three clinical trials have been conducted with quetiapine in children and adolescents; two short-term randomised placebo-controlled trials – a 3 week trial in schizophrenia (patients aged 13-17 years) and a 6 week trial in bipolar mania (patients aged 10 to 17 years) – and an open-label 26 week safety and tolerability trial (see **Adverse Effects – Clinical study experience**) which also assessed efficacy measures. The safety and efficacy of quetiapine in children and adolescents have not been assessed beyond these time periods.

### ***Acute mania (monotherapy)***

The efficacy of quetiapine in the treatment of acute manic episodes associated with bipolar I disorder in children and adolescents (10 to 17 years of age) was demonstrated in a 3-week, double-blind, placebo-controlled, multicentre trial. Patients who met DSM-IV diagnostic criteria for a manic episode were randomized into one of three treatment groups: quetiapine 400 mg/day, quetiapine 600 mg/day, or placebo. Approximately 45% (n=124) of patients (n=277) had co-morbid attention deficit hyperactivity disorder (ADHD), with 59 (21%) of patients receiving concomitant psychostimulants (see **Interaction with other medicines**).

Study medication was initiated at 50 mg/day and on Day 2 increased to 100 mg/day. Subsequently, the dose was titrated to a target dose of 400 or 600 mg using increments of 100 mg/day, given two or three times daily. Results of the study demonstrated superior efficacy of quetiapine 400 mg/day and 600 mg/day compared with placebo (see Table 4).

**Table 4 Summary of YMRS efficacy results (ITT population) for treatment of acute mania (monotherapy) in children/adolescents**

YMRS endpoint	QTP 400mg vs PLA QTP N=93 / PLA N=89	QTP 600mg vs PLA QTP N=95 / PLA N=89
Total score – LS mean change from baseline to Day 21 (primary endpoint)	-14.25 vs -9.04; p<0.001	-15.60 vs -9.04; p<0.001
Response <sup>a</sup> (% patients) at Day 21	63 vs 37%; p=0.001	58 vs 37%; p=0.005
Remission <sup>b</sup> (% patients)	53 vs 30%; p=0.010	54 vs 30%; p=0.003

YMRS – Young Mania Rating Scale, ITT Intent-to-treat. LS – Least square, PLA Placebo.

QTP Quetiapine. N Number of patients in treatment group, <sup>a</sup> ≥50% reduction for YMRS total score, <sup>b</sup> ≤12 YMRS total score

### Schizophrenia

The efficacy of quetiapine in the treatment of schizophrenia in adolescents (13 to 17 years of age) was demonstrated in a 6-week, double-blind, placebo-controlled trial. Patients who met DSM-IV diagnostic criteria for schizophrenia were randomized into one of three treatment groups: quetiapine 400 mg/day, quetiapine 800 mg/day, or placebo. Study medication was initiated at 50 mg/day and on Day 2 increased to 100 mg/per day. Subsequently, the dose was titrated to a target dose of 400 or 800 mg using increments of 100 mg/day, given two or three times daily.

Results of the study demonstrated superior efficacy of quetiapine 400 mg/day and 800 mg/day compared to placebo (see Table 5).

**Table 5 Summary of key efficacy results (ITT population) for treatment of schizophrenia in adolescents**

Endpoint at Day 42	QTP 400mg vs PLA QTP N=73 / PLA N=73	QTP 800mg vs PLA QTP N=74 / PLA N=73
PANSS total score (MMRM) – LS mean change from baseline (primary endpoint)	-27.31 vs -19.15; p=0.043	-28.44 vs -19.15; p=0.009
PANSS response <sup>a</sup> (LOCF; % patients)	38.4 v 26.0; NS	36.5 v 26.0; NS <sup>b</sup>
CGI - Global Improvement (LOCF; % patients with improvement)	49.3 v 27.4; p=0.009 <sup>c</sup>	52.7 v 27.4; p=0.014 <sup>c</sup>

MMRM - mixed model repeated measures; LOCF - last observation carried forward; ITT Intent-to-treat.

PANSS – Positive and Negative Syndrome Scale; CGI - Clinical Global Impression; LS – Least square, PLA Placebo. QTP Quetiapine.

N Number of patients in treatment group, <sup>a</sup> ≥30% reduction for PANSS total score; <sup>b</sup> Generalised estimating equation for statistics (N=220);

<sup>c</sup> Generalised estimating equation for statistics (N=219)

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## Indications

Quetiapine is indicated for:

### ***Bipolar disorder.***

#### *Adults*

- Maintenance treatment of bipolar I disorder, as monotherapy, or in combination with lithium or sodium valproate, for the prevention of relapse/recurrence of manic, depressive or mixed episodes.
- Treatment of depressive episodes associated with bipolar disorder (see Dosage and Administration).
- Treatment of acute mania associated with bipolar I disorder as monotherapy or in combination with lithium or sodium valproate.

#### ***Children/adolescents aged 10 to 17 years***

- Monotherapy treatment of acute mania associated with bipolar I disorder

#### ***Schizophrenia. (adults and adolescents aged 13 to 17 years)***

- Treatment of schizophrenia.

## Contraindications

Quetiapine is contraindicated in patients who are hypersensitive to any component of this product.

## Precautions

### **Concomitant Cardiovascular illness**

Quetiapine should be used with caution in patients with known cardiovascular disease (history of myocardial infarction or ischaemic heart disease, heart failure or conduction abnormalities), cerebrovascular disease or other conditions predisposing to hypotension (dehydration, hypovolaemia and treatment with antihypertensive medications).

Quetiapine has not been evaluated or used to any appreciable extent in patients with a recent history of myocardial infarction or unstable heart disease. Patients with these diagnoses were excluded from premarketing clinical studies. Because of the risk of orthostatic hypotension with quetiapine, caution should be observed in cardiac patients.

### **Orthostatic hypotension**

Quetiapine may induce orthostatic hypotension associated with dizziness, tachycardia and, in some patients, syncope especially during the initial dose titration period, probably reflecting its  $\alpha_1$ -adrenergic antagonist properties. Syncope has been commonly reported (see **Adverse Effects**). Orthostatic hypotension, dizziness and syncope may lead to falls (see **Adverse Effects**). If hypotension occurs during titration to the target dose, a return to the previous dose in the titration schedule is appropriate.

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## QT interval

In clinical trials, quetiapine was not associated with a persistent increase in QTc intervals. However, in post marketing experience there were cases reported of QT prolongation with overdose (see **Overdosage**), in patients with concomitant illness, and in patients taking medicines known to cause electrolyte imbalance or increase QT interval. As with other antipsychotics, caution should be exercised when quetiapine is prescribed in patients, including children and adolescents, with cardiovascular disease or family history of QT prolongation. Particularly in the elderly, the use of quetiapine should be avoided in combination with neuroleptics and drugs that are known to prolong QT<sub>c</sub> including Class Ia antiarrhythmics (e.g. disopyramide) or Class III antiarrhythmics (e.g. amiodarone, sotalol), antipsychotic medications (e.g. ziprasidone, chlorpromazine, haloperidol), antibiotics (e.g. moxifloxacin, erythromycin), or any other class of medications known to prolong the QT<sub>c</sub> interval (e.g. citalopram, pentamidine, methadone). Quetiapine should also be avoided in circumstances that may increase the risk of occurrence of torsades de pointes and/or sudden death, including (1) a history of cardiac arrhythmias such as bradycardia; (2) hypokalemia or hypomagnesemia; (3) concomitant use of other drugs that prolong the QT<sub>c</sub> interval; and (4) presence of congenital prolongation of the QT interval.

## Cardiomyopathy and myocarditis

Cardiomyopathy and myocarditis have been reported in clinical trials and during the post-marketing experience, however, a causal relationship to quetiapine has not been established. Treatment with quetiapine should be reassessed in patients with suspected cardiomyopathy or myocarditis.

## Seizures

In controlled clinical trials there was no difference in the incidence of seizures in patients treated with quetiapine or placebo (see **Adverse Effects**). As with other antipsychotics, caution is recommended when treating patients with a history of seizures or with conditions that potentially lower the seizure threshold. Conditions that lower the seizure threshold may be more prevalent in a population of 65 years or older.

## Clinical worsening and suicide risk associated with psychiatric disorders

The risk of suicide attempt is inherent in depression and may persist until significant remission occurs. The risk must be considered in all depressed patients.

Patients with depression may experience worsening of their depressive symptoms and/or the emergence of suicidal ideation and behaviour (suicidality), whether or not they are taking antidepressant medications and this risk may persist until significant remission occurs. As improvement may not occur during the first few weeks or more of treatment, patients should be closely monitored for clinical worsening and suicidality, especially at the beginning of a course of treatment or at the time of dose changes, either increases or decreases.

Consideration should be given to changing the therapeutic regimen, including possibly discontinuing the medication, in patients whose depression is persistently worse or whose emergent suicidality is severe, abrupt in onset or was not part of the patient's presenting symptoms.

Patients (and caregivers of patients) should be alerted about the need to monitor for any worsening of their condition and/or the emergence of suicidal ideation/behaviour or thoughts of harming themselves and to seek medical advice immediately if these symptoms present. Patients with comorbid depression associated with other psychiatric disorders being treated with antidepressants should be similarly observed for clinical worsening and suicidality.

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Pooled analysis of 24 short-term (4 to 16 weeks) placebo controlled trials of nine antidepressant medicines (SSRIs and others) in 4,400 children and adolescents with major depressive disorder (16 trials), obsessive compulsive disorder (four trials) or other psychiatric disorders (four trials) have revealed a greater risk of adverse events representing suicidal behaviour or thinking (suicidality) during the first few months of treatment in those receiving antidepressants. The average risk of such events in patients treated with an antidepressant was 4% compared with 2% of patients taking a placebo. There was considerable variation in risk among the antidepressants but there was a tendency towards an increase for almost all antidepressants studied. This meta-analysis did not include trials involving quetiapine.

The risk of suicidality was most consistently observed in the major depressive disorder trials but there were signals of risk arising from the trials in other psychiatric indications (obsessive compulsive disorder and social anxiety disorder) as well. No suicides occurred in these trials. It is unknown whether the suicidality risk in children and adolescent patients extends to use beyond several months. The nine antidepressant medicines in the pooled analyses included five SSRIs (citalopram, fluoxetine, fluvoxamine, paroxetine, sertraline) and four non-SSRIs (bupropion, mirtazapine, nefazodone, venlafaxine).

Symptoms of anxiety, agitation, panic attacks, insomnia, irritability, hostility (aggressiveness), impulsivity, akathisia (psychomotor restlessness), hypomania and mania have been reported in adults, adolescents and children being treated with antidepressants for major depressive disorder as well as for other indications, both psychiatric and nonpsychiatric. Although a causal link between the emergence of such symptoms and either worsening of depression and/or emergence of suicidal impulses has not been established there is concern that such symptoms may be precursors of emerging suicidality.

Families and caregivers of patients being treated with antidepressants for major depressive disorder or for any other condition (psychiatric or nonpsychiatric) should be informed about the need to monitor these patients for the emergence of agitation, irritability, unusual changes in behaviour and other symptoms described above, as well as emergence of suicidality, and to report such symptoms immediately to health care providers. It is particularly important that monitoring be undertaken during the initial few months of antidepressant treatment or at times of dose increase or decrease.

The possibility of a suicide attempt is inherent in schizophrenia; close supervision of high risk patients should accompany drug therapy.

Prescriptions for quetiapine should be written for the smallest quantity of tablets consistent with good patient management in order to reduce the risk of overdose.

### **Venous thromboembolism**

Cases of venous thromboembolism (VTE) have been reported with antipsychotic drugs. Since patients treated with antipsychotics often present with acquired risk factors for VTE, all possible risk factors for VTE should be identified before and during treatment with quetiapine, and preventative measures undertaken.

### **Extrapyramidal symptoms (EPS)**

In placebo controlled clinical trials of adult patients with schizophrenia, bipolar mania and maintenance treatment of bipolar disorder, the incidence of EPS was no different from that of placebo across the recommended therapeutic dose range. In short-term, placebo controlled clinical trials for bipolar depression, the incidence of EPS was higher in quetiapine treated patients than in placebo treated patients (see **Adverse Effects** for rates of EPS observed in all indications).



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*Class effect:* Akathisia has been reported in patients treated with quetiapine. The presentation of akathisia may be variable and comprises subjective complaints of restlessness and an overwhelming urge to move and either distress or motor phenomena such as pacing, swinging of the legs while seated, rocking from foot to foot or both. Particular attention should be paid to the monitoring for such symptoms and signs as, left untreated, akathisia is associated with poor compliance and an increased risk of relapse.

### **Tardive dyskinesia**

Quetiapine should be prescribed in a manner that is most likely to minimise the occurrence of tardive dyskinesia.

The risk of developing tardive dyskinesia and the likelihood that it will become irreversible are believed to increase as the duration of treatment and total cumulative dose of antipsychotic medicines administered to the patient increase. However, tardive dyskinesia can develop, although much less commonly, after relatively brief treatment periods at low doses.

If signs and symptoms of tardive dyskinesia appear, dose reduction or discontinuation of quetiapine should be considered. The symptoms of tardive dyskinesia can worsen or even arise after discontinuation of treatment (see **Adverse Effects**).

### **Neuroleptic malignant syndrome**

Neuroleptic malignant syndrome has been associated with antipsychotic treatment, including quetiapine. Clinical manifestations include hyperthermia, altered mental status, muscular rigidity, autonomic instability and increased creatine phosphokinase. In such an event, quetiapine should be discontinued and appropriate medical treatment given.

### **Body temperature regulation**

Disruption of the body's ability to reduce core body temperature has been attributed to antipsychotic agents. Appropriate care is advised when prescribing quetiapine for patients who will be experiencing conditions which may contribute to an elevation in core body temperature, e.g., exercising strenuously, exposure to extreme heat, receiving concomitant medication with anticholinergic activity, or being subject to dehydration.

### **Neutropenia and agranulocytosis**

Severe neutropenia ( $< 0.5 \times 10^9/L$ ) without infection has been uncommonly reported in short term placebo controlled monotherapy clinical trials with quetiapine. There have been reports of agranulocytosis (severe neutropenia with infection) among all patients treated with quetiapine during clinical trials (rare) as well as post-marketing reports (including fatal cases). Most of these cases of severe neutropenia have occurred within the first two months of starting therapy with quetiapine. There was no apparent dose relationship. Possible risk factors for neutropenia include pre-existing low white cell count (WBC), a history of drug induced neutropenia and concomitant use of other medicines that have been associated with neutropenia.

There have been cases of agranulocytosis in patients without pre-existing risk factors. Neutropenia should be considered in patients presenting with infection, particularly in the absence of obvious predisposing factor(s), or in patients with unexplained fever, and should be managed as clinically appropriate.

Quetiapine should be discontinued in patients with a neutrophil count  $< 1.0 \times 10^9/L$ . These patients should be observed for signs and symptoms of infection and neutrophil counts

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followed (until they exceed  $1.5 \times 10^9/L$ ) (see **Adverse Effects**).

### **Hepatic enzyme inducers**

Concomitant use of quetiapine with hepatic enzyme inducers, e.g. carbamazepine, may substantially decrease systemic exposure to quetiapine. Depending on clinical response, higher doses of quetiapine may need to be considered if quetiapine is used concomitantly with a hepatic enzyme inducer.

### **CYP3A4 inhibitors**

During concomitant administration of medicines which are potent CYP3A4 inhibitors (e.g. azole antifungals, macrolide antibiotics and protease inhibitors), plasma concentrations of quetiapine can be significantly higher than observed in patients in clinical trials. As a consequence of this, lower doses of quetiapine should be used. Special consideration should be given in elderly and debilitated patients. The risk/ benefit ratio needs to be considered on an individual basis in all patients (see **Interactions with Other Medicines**).

### **Hyperglycaemia and diabetes mellitus**

Hyperglycaemia, in some cases extreme and associated with ketoacidosis or hyperosmolar coma or death, has been reported in patients treated with atypical antipsychotics including quetiapine (see **Adverse Effects**). Assessment of the relationship between atypical antipsychotic use and glucose abnormalities is complicated by the possibility of an increased background risk of diabetes mellitus in patients with schizophrenia and the increasing incidence of diabetes mellitus in the general population. Given these confounders, the relationship between atypical antipsychotic use and hyperglycaemia-related adverse events is not completely understood. However, epidemiological studies suggest an increased risk of treatment-emergent hyperglycaemia-related adverse events in patients treated with the atypical antipsychotics. Precise risk estimates for hyperglycaemia related adverse events in patients treated with atypical antipsychotics are not available.

Patients with an established diagnosis of diabetes mellitus who are started on atypical antipsychotics should be monitored regularly for worsening of glucose control. **Patients with risk factors for diabetes mellitus (e.g. obesity, family history of diabetes) who are starting treatment with atypical antipsychotics should undergo fasting blood glucose testing at the beginning of treatment and periodically during treatment.** Any patient treated with atypical antipsychotics should be monitored for symptoms of hyperglycaemia including polydipsia, polyuria, polyphagia and weakness. Patients who develop symptoms of hyperglycaemia during treatment with atypical antipsychotics should undergo fasting blood glucose testing. In some cases, hyperglycaemia has resolved when the atypical antipsychotic was discontinued; however, some patients required continuation of anti-diabetic treatment despite discontinuation of the suspect drug.

### **Lipids**

Increases in triglycerides and cholesterol, and decreases in fasting HDL cholesterol have been observed in clinical trials with quetiapine (see **Adverse Effects**). Monitoring is recommended at baseline and periodically during treatment for all patients. Lipid changes should be managed as clinically appropriate.

### **Metabolic factors**

In some patients, a worsening of more than one of the metabolic factors of weight, blood glucose and lipids was observed in clinical studies. All patients taking antipsychotic medications such as quetiapine should be monitored for metabolic factors at the start of treatment and at intervals during treatment in accordance with current local

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guidelines. The results of monitoring should be managed as clinically appropriate.

### **Pancreatitis**

Pancreatitis has been reported in clinical trials and during post marketing experience. Among the post marketing reports, many patients had factors which are known to be associated with pancreatitis such as increased triglycerides (see **Lipids** section above and in **Effects on laboratory tests**), gallstones and alcohol consumption.

### **Increased risk of mortality in elderly patients with dementia related psychosis**

Elderly patients with dementia related psychosis treated with atypical antipsychotics are at an increased risk of death compared to placebo. A meta-analysis of 17 placebo controlled trials with dementia related behavioural disorders showed a risk of death in the drug treated patients of approximately 1.6 to 1.7 times that seen in placebo treated patients. The clinical trials included in the meta-analysis were undertaken with olanzapine, aripiprazole, risperidone and quetiapine. Over the course of these trials averaging about ten weeks in duration, the rate of death in drug-treated patients was about 4.5% compared to a rate of about 2.6% in the placebo group. Although the causes of death were varied, most of the deaths appeared to be either cardiovascular (e.g. heart failure, sudden death) or infectious (e.g. pneumonia) in nature. Quetiapine is not approved for the treatment of elderly patients with dementia related psychosis or behavioural disorders.

### **Withdrawal**

Acute withdrawal symptoms, e.g. nausea, vomiting and insomnia, have been described after abrupt cessation of antipsychotic drugs including quetiapine. Gradual withdrawal over a period of at least one to two weeks is advisable (see **Adverse Effects**).

### **Dysphagia**

Oesophageal dysmotility and aspiration have been associated with antipsychotic drug use. Quetiapine and other antipsychotic drugs should be used cautiously in patients at risk for aspiration pneumonia (e.g. elderly patients).

### **Constipation and intestinal obstruction**

Constipation represents a risk factor for intestinal obstruction. Constipation and intestinal obstruction have been reported with quetiapine (see **Adverse Effects**). This includes fatal reports in patients who are at higher risk of intestinal obstruction, including those that are receiving multiple concomitant medications that decrease intestinal motility and/or may not report symptoms of constipation.

### **Lactose**

Quetiapine tablets contain lactose. Patients with rare hereditary problems of galactose intolerance, the Lapp lactase deficiency, or glucose-galactose malabsorption should not take this medicine.

### **Effects on fertility**

Effects related to elevated prolactin levels (marginal reduction in male fertility and pseudopregnancy, protracted periods of diestrus, increased pre-coital interval and reduced pregnancy rate) were seen in rats, although these are not directly relevant to humans because of species differences in hormonal control of reproduction.

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## Use in pregnancy- Category C

The safety and efficacy of quetiapine during human pregnancy have not been established.

*Non-teratogenic class effect:* Neonates exposed to antipsychotic drugs (including quetiapine) during the third trimester of pregnancy are at risk of experiencing extrapyramidal neurological disturbances and/or withdrawal symptoms following delivery. There have been post-market reports of agitation, hypertonia, hypotonia, tremor, somnolence, respiratory distress and feeding disorder in these neonates. These complications have varied in severity; while in some cases symptoms have been self-limited, in other cases neonates have required additional medical treatment or monitoring. Quetiapine should be used during pregnancy only if the anticipated benefit outweighs the risk and the administered dose and duration of treatment should be as low and as short as possible.

Teratogenic effects were not observed following administration of quetiapine at oral doses up to 200 mg/kg in rats (less than the exposure to quetiapine at the maximum recommended clinical dose based on area under the curve (AUC) and 100 mg/kg in rabbits (approximately twice the maximum clinical exposure based on body surface area (BSA)).

## Use in lactation

There have been published reports of quetiapine excretion into human breast milk, however the degree of excretion was not consistent. In a study in lactating rats the concentration of quetiapine and/or its metabolites was higher in milk than in plasma. Women who are breastfeeding should, therefore be advised to avoid breastfeeding while taking quetiapine.

## Use in children and adolescents (10 to 17 years of age)

Paediatric schizophrenia and bipolar I disorder are serious mental disorders, however, diagnosis can be challenging. For paediatric schizophrenia, symptom profiles can be variable, and for bipolar I disorder, patients may have variable patterns of periodicity of manic or mixed symptoms. It is recommended that medication therapy for paediatric schizophrenia and bipolar I disorder be initiated only after a thorough diagnostic evaluation has been performed and careful consideration given to the potential benefits and risks associated with medication treatment. Medication treatment for both paediatric schizophrenia and bipolar I disorder is indicated as part of a total treatment program that often includes psychological, educational and social interventions.

Efficacy and safety of quetiapine have been demonstrated for adolescents aged from 13 years with schizophrenia and for children/adolescents aged from 10 years with bipolar I disorder experiencing acute mania in two clinical trials of 3 and 6 weeks duration, respectively. Safety data was provided for up to 26 weeks in a third open-label safety and tolerability trial (see **Clinical trials – Children and adolescents**). The safety and efficacy of quetiapine in children and adolescents have not been assessed beyond these time periods.

Although not all adverse reactions that have been identified in adult patients have been observed in clinical trials with quetiapine in children and adolescent patients, the same precautions that appear above for adults should be considered for children and adolescents. As seen in adults, increases in TSH, serum cholesterol, triglycerides, and weight have been observed (see **Precautions – Effects on laboratory tests** and **Adverse Effects**).

The following events were reported more frequently in the short-term studies in children and adolescents than in studies in adults: EPS, increases in appetite and serum prolactin. Increased blood pressure has not been identified in the adult population but was seen in children and adolescents. Blood pressure should be monitored at the beginning of, and periodically during treatment in children and adolescents (see **Adverse Effects**).

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Long-term safety data including growth, maturation and behavioural development, beyond 26 weeks of treatment with quetiapine, are not available for children and adolescents (10 to 17 years of age).

### **Genotoxicity**

Genetic toxicity studies with quetiapine show that it is not a mutagen or clastogen. Quetiapine showed no evidence of genotoxicity in a series of assays for gene mutation (bacteria and Chinese hamster ovary cells) and chromosomal damage (human lymphocytes and the *in vivo* micronucleus test).

### **Carcinogenicity**

In the rat study (20, 75 and 250 mg/kg/day) the incidence of mammary adenocarcinomas was increased at all doses in female rats, consequential to prolonged hyperprolactinaemia. The incidence of carcinoma of the adrenal cortex was increased in male rats at the highest dose.

In the male rat (250 mg/kg/day) and mouse (250 and 750 mg/kg/day), there was an increased incidence of thyroid follicular cell benign adenomas, consistent with known rodent-specific mechanisms resulting from enhanced hepatic thyroxine clearance.

### **Effects on Laboratory tests**

#### ***Leucopenia and/or neutropenia***

As with other antipsychotics, transient leucopenia and/or neutropenia have been observed in patients administered quetiapine. Possible risk factors for leucopenia and/or neutropenia include pre-existing low white cell count and history of drug induced leucopenia and/or neutropenia. Occasionally, eosinophilia has been observed (see **Adverse Effects**).

#### ***Serum transaminase***

Asymptomatic elevations in serum transaminase (ALT, AST) or gamma-glutamyl transferase levels have been observed in some patients administered quetiapine. These elevations were usually reversible on continued quetiapine treatment (see **Adverse Effects**).

#### ***Lipids***

Increases in triglyceride levels and total cholesterol (predominantly LDL cholesterol) have been observed during treatment with quetiapine. Decreases in fasting HDL cholesterol have also been observed (see **Adverse Effects**).

#### ***Thyroid hormone levels***

Quetiapine treatment was associated with dose related decreases in thyroid hormone levels. In short term placebo-controlled clinical trials the incidence of potentially clinically significant shifts in thyroid hormone levels were: total T<sub>4</sub> – 3.4% for quetiapine versus 0.6% for placebo; free T<sub>4</sub> – 0.7% for quetiapine versus 0.1% for placebo; total T<sub>3</sub> – 0.54% for quetiapine versus 0.0% for placebo and free T<sub>3</sub> – 0.2% for quetiapine versus 0.0% for placebo. The incidence of shifts in TSH was 3.2% for quetiapine versus 2.7% for placebo. In short term placebo-controlled monotherapy trials, the incidence of reciprocal, potentially clinically significant shifts in T<sub>3</sub> and TSH was 0.0% for both quetiapine and placebo and 0.1% for quetiapine versus 0.0% for placebo for shifts in T<sub>4</sub> and TSH. As supported by the literature, these changes in thyroid hormone levels are generally not associated with clinically symptomatic hypothyroidism. The reduction in total and free T<sub>4</sub> was maximal within the first six weeks of quetiapine treatment,

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with no further reduction during long-term treatment. In nearly all cases, cessation of quetiapine treatment was associated with a reversal of the effects on total and free T4, irrespective of the duration of treatment. (see **Adverse Effects**)

### ***Methadone and tricyclic antidepressant enzyme immunoassays***

There have been reports of false positive results in enzyme immunoassays for methadone and tricyclic antidepressants in patients who have taken quetiapine. Confirmation of questionable immunoassay screening results by an appropriate chromatographic technique is recommended.

### **Effect on ability to drive and use machines**

Somnolence has been very commonly reported in patients treated with quetiapine. Given its primary central nervous system effects, quetiapine has the potential to impair judgment, thinking or motor skills. Patients likely to drive or operate other machines should, therefore, be cautioned appropriately.

### **Sleep apnea**

In patients who have a history of or are at risk for sleep apnea, and are receiving concomitant central nervous system (CNS) depressants, quetiapine should be used with caution.

### **Anti-cholinergic (muscarinic) effects**

Norquetiapine, an active metabolite of quetiapine, has moderate to strong affinity for several muscarinic receptor subtypes. This contributes to adverse drug reactions reflecting anti-cholinergic effects when quetiapine is used at recommended doses, when used concomitantly with other medications having anti-cholinergic effects, and in the setting of overdose. Quetiapine should be used with caution in patients receiving medications having anti-cholinergic (muscarinic) effects. Quetiapine should be used with caution in patients with a current diagnosis or prior history of urinary retention, clinically significant prostatic hypertrophy, intestinal obstruction or related conditions, increased intraocular pressure or narrow angle glaucoma (see **Pharmacology – Mechanism of Action, Interaction with Other Medicines, Adverse Effects and Overdosage**).

## **Interactions with Other Medicines**

### ***Antipsychotic and other centrally acting medicines***

Given the primary central nervous system effects of quetiapine, quetiapine should be used with caution in combination with other centrally acting drugs and alcohol.

#### Thioridazine

Thioridazine (200 mg twice a day) increased the oral clearance of quetiapine (300 mg twice a day) by 65%.

#### Lorazepam

The mean oral clearance of lorazepam (2 mg, single dose) was reduced by 20% in the presence of quetiapine administered as 250 mg three times a day dosing.

Dosage adjustment is not required. Levodopa and dopamine agonists

As it exhibits *in vitro* dopamine antagonism, quetiapine may antagonise the effects of levodopa and dopamine agonists.

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## Carbamazepine and phenytoin

See Hepatic enzyme inducers below.

### ***Potential interactions that have been excluded.***

#### Antipsychotics

The pharmacokinetics of quetiapine were not significantly altered following coadministration with the antipsychotics risperidone (3 mg twice a day) or haloperidol (7.5 mg twice a day). The pharmacokinetics of lithium were not altered when coadministered with quetiapine (250 mg three times a day). The pharmacokinetics of sodium valproate and quetiapine were not altered to a clinically relevant extent when coadministered.

Imipramine and fluoxetine See CYP inhibitors below.

### ***CYP inhibitors***

CYP3A4 is the primary enzyme responsible for cytochrome P450 mediated metabolism of quetiapine (see **Metabolism** section). CYP2D6 and CYP2C9 are also involved.

#### ***CYP3A4 inhibitors (e.g. azole antifungals, macrolide antibiotics and protease inhibitors).***

During concomitant administration of medicines which are potent CYP3A4 inhibitors (such as azole antifungals, macrolide antibiotics and protease inhibitors) plasma concentrations of quetiapine can be significantly higher than observed in patients in clinical trials (see *Ketoconazole* below). As a consequence of this, lower doses of quetiapine should be used. Special consideration should be given in elderly or debilitated patients. The risk/ benefit ratio needs to be considered on an individual basis.

It is also not recommended to take quetiapine together with grapefruit juice. Ketoconazole

In a multiple dose trial in healthy volunteers to assess the pharmacokinetics of quetiapine given before and during treatment with ketoconazole, co-administration of ketoconazole (200 mg once daily for four days) resulted in an increase in mean C<sub>max</sub> and AUC of quetiapine of 335% and 522%, respectively, with a corresponding decrease in mean oral clearance of 84%. The mean half-life of quetiapine increased from 2.6 to 6.8 hours, but the mean T<sub>max</sub> was unchanged.

### ***Potential interactions that have been excluded.***

#### Cimetidine

The pharmacokinetics of quetiapine (150 mg three times a day) were not significantly altered (20% decrease in clearance) following coadministration with cimetidine (400 mg three times a day for four days), a known P450 enzyme inhibitor. Dosage adjustment for quetiapine is not required when it is given with cimetidine.

#### Imipramine and fluoxetine

The pharmacokinetics of quetiapine were not significantly altered following coadministration with the antidepressants imipramine (75 mg twice a day; a known CYP2D6 inhibitor) or fluoxetine (60 mg once daily; a known CYP3A4 and CYP2D6 inhibitor).

### ***Hepatic enzyme inducers (e.g. carbamazepine and phenytoin)***

Quetiapine (administration of multiple daily doses up to 750 mg/day, on a three times a day dosing schedule) did not induce the hepatic enzyme systems involved in the metabolism of antipyrine. However, concomitant use of quetiapine with hepatic enzyme inducers such as carbamazepine or phenytoin may substantially decrease systemic exposure to quetiapine (see **Carbamazepine and phenytoin** below). Depending on clinical response, increased

doses of quetiapine may be required to maintain control of psychotic symptoms in patients coadministered quetiapine and hepatic enzyme inducers (e.g. carbamazepine, phenytoin, barbiturates, rifampicin, glucocorticoids). The safety of doses above 800 mg/day has not been established in the clinical trials. Continued treatment at higher doses should only be considered as a result of careful consideration of the benefit/ risk assessment for an individual patient.

The dose of quetiapine may need to be reduced if phenytoin, carbamazepine or other hepatic enzyme inducers are withdrawn and replaced with a noninducer (e.g. sodium valproate).

#### Carbamazepine and phenytoin

In a multiple dose trial in patients to assess the pharmacokinetics of quetiapine given before and during treatment with carbamazepine (a known hepatic enzyme inducer), co-administration of carbamazepine significantly increased the clearance of quetiapine. This increase in clearance reduced systemic quetiapine exposure (as measured by AUC) to an average of 13% of the exposure during administration of quetiapine alone; although a greater effect was seen in some patients. As a consequence of this interaction, lower plasma concentrations can occur, and hence, in each patient, consideration for a higher dose of quetiapine, depending on clinical response, should be considered.

Coadministration of quetiapine (250 mg three times a day) and phenytoin (100 mg three times a day; another microsomal enzyme inducer) also caused increases in clearance of quetiapine by fivefold.

#### **Cardiovascular medicines**

Caution should be used when quetiapine is used concomitantly with medicines known to cause electrolyte imbalance or to increase QTc interval.

Because of its potential for inducing hypotension, quetiapine may enhance the effects of certain antihypertensive medicines.

#### **Medications to manage attention deficit hyperactivity disorder (ADHD)**

The data regarding safety and efficacy of quetiapine for the treatment of bipolar mania in children and adolescents receiving psychostimulants for co-morbid ADHD are limited. Therefore, concomitant use of ADHD medication and quetiapine is not recommended. If concomitant therapy is considered necessary, patients should be carefully monitored for the effect of the combination of treatments on the signs and symptoms of both ADHD and acute mania. Effects on blood pressure may be cumulative and blood pressure should be carefully monitored.

#### **Anti-cholinergic (muscarinic) effects**

Caution should be exercised treating patients receiving other medications having anti-cholinergic (muscarinic effects (see **Precautions**)).

## **Adverse Effects**

### **Clinical study experience**

#### **Schizophrenia (adults)**

The treatment-emergent adverse events that occurred during acute therapy (up to six weeks) of schizophrenia in at least 1% (rounded to the nearest percent) of patients treated with quetiapine in placebo controlled phase II/III trials where the incidence in patients treated with quetiapine was greater than the incidence in placebo treated patients are listed in Table 6 regardless of causality.



**Table 6 Adverse events that occurred in at least 1% of patients treated with quetiapine for schizophrenia in placebo-controlled Phase-II/III trials<sup>1</sup>**

Body system/Adverse event <sup>2</sup>	Number (%) of patients with adverse events	
	Quetiapine (n=510)	Placebo (n=206)
<b>Body as a whole</b>		
Headache	19%	18%
Asthenia	4%	3%
Abdominal pain	3%	1%
Back Pain	2%	1%
Fever	2%	1%
<b>Nervous system</b>		
Somnolence	18%	11%
Dizziness	10%	4%
<b>Digestive system</b>		
Constipation	9%	5%
Dry mouth	7%	3%
Dyspepsia	6%	2%
γ-GT increased	2%	1%
<b>Cardiovascular system</b>		
Postural hypotension	7%	2%
Tachycardia	7%	5%
<b>Metabolic and nutritional disorders</b>		
ALT increased	6%	2%
AST increased	4%	1%
Weight gain	2%	0%
<b>Skin and appendages</b>		
Rash	4%	3%
<b>Respiratory system</b>		
Rhinitis	3%	1%
<b>Haemic and lymphatic system</b>		
Leukopenia	2%	0%
<b>Special senses</b>		
Ear pain	1%	0%

n=number of patients in each treatment group.

<sup>1</sup> Events for which the quetiapine incidence was equal to or less than placebo are not listed in the table but included the following: pain, infection, chest pain, hostility, accidental injury, hypertension, hypotension, nausea, vomiting, diarrhoea, myalgia, agitation, insomnia, anxiety, nervousness, akathisia, hypertonia, tremor, depression, paraesthesia, pharyngitis, dry skin, amblyopia and urinary tract infection.

<sup>2</sup> Adverse events recorded where the incidence in patients treated with quetiapine was greater than the incidence in placebo-treated patients

### ***Bipolar I Disorder, Acute Mania (adults)***

Adverse events that occurred during the treatment of acute mania in 5% or more of patients treated with quetiapine in either the monotherapy or adjunct therapy, placebo controlled trials and observed at a rate of at least twice that of placebo are listed in Table 7 regardless of causality.

**Table 7 Adverse events observed in at least 5% of patients treated with quetiapine as monotherapy or in combination with a mood stabilizer (lithium or valproate) for acute mania in bipolar 1 disorder**

Event	Quetiapine monotherapy		Quetiapine adjunct therapy					
			Randomised treatment			Assigned mood stabilizer		
	Number (%) of patients with adverse events							
	QTP N=209	PLA N=198	QTP+ LI/VAL N=196	PLA+ LI/VAL N=203	QTP+ LI N=122	PLA+ LI N=128	QTP+ VAL N=74	PLA+ VAL N=75
Somnolence	16.3%	4.0%	33.7%	9.4%	30.3%	5.5%	39.2%	16.0%
Dry mouth	15.8%	3.0%	19.4%	3.0%	17.2%	3.1%	23.0%	2.7%
Weight gain	9.1%	1.5%	6.1%	2.5%	4.9%	2.3%	8.1%	2.7%
Dizziness	6.7%	2.5%	9.2%	6.4%	4.9%	3.9%	16.2%	10.7%
Asthenia	5.3%	2.0%	9.7%	3.9%	4.9%	3.1%	17.6%	5.3%
Pharyngitis	2.4%	2.0%	5.6%	2.5%	4.1%	2.3%	8.1%	2.7%
Postural hypotension	4.3%	1.5%	6.6%	1.5%	3.3%	0.8%	12.2%	2.7%

PLA Placebo. QTP Quetiapine. LI Lithium. VAL Valproate. N Number of patients in treatment group.

### ***Bipolar I Disorder, Maintenance (adults)***

The safety results of two clinical trials show that quetiapine is generally safe and well tolerated when used in combination with lithium or valproate in long-term treatment. Adverse events occurring at an incidence of 5% or more in any randomised treatment group from placebo controlled clinical trials in patients with bipolar I disorder treated with quetiapine in combination with lithium or valproate as maintenance therapy is summarised by randomised treatment and by assigned mood stabiliser for the combined studies in Table 8 regardless of causality.

**Table 8 Adverse events observed in at least 5% of patients (randomized safety population) treated with quetiapine in adjunctive maintenance trials for bipolar 1 disorder**

Preferred term <sup>a</sup>	Number (%) of patients with adverse effects					
	Randomised treatment		Assigned mood stabiliser			
	QTP+LI/VAL (N=646)	PLA+LI/VAL (N=680)	QTP+LI (N=274)	PLA+LI (N=287)	QTP+VAL (N=372)	PLA+VAL (N=393)
Headache	7.4%	9.3%	9.1%	10.5%	6.2%	8.4%
Nasopharyngitis	7.1%	7.2%	6.6%	7.3%	7.5%	7.1%
Upper respiratory tract infection	6.7%	4.0%	7.7%	4.9%	5.9%	3.3%
Insomnia	6.5%	16.6%	8.0%	19.5%	5.4%	14.5%
Tremor	6.0%	5.0%	5.1%	6.3%	6.7%	4.1%
Nausea	5.9%	7.6%	8.8%	11.8%	3.8%	4.6%
Diarrhoea	2.9%	6.0%	3.3%	8.0%	2.7%	4.6%

<sup>a</sup> Patients with multiple events falling under the same preferred term are counted only once in that term. PLA=placebo, QTP=quetiapine, LI=lithium, VAL=valproate, N= number of patients in treatment group,

Adverse events occurring at an incidence of 5% or more in any randomised treatment group from placebo-controlled clinical trials in patients with bipolar I disorder treated with quetiapine as monotherapy maintenance therapy is summarised by randomised treatment in Table 9 regardless of causality.

**Table 9 Adverse events observed in at least 5% of patients (randomised safety population) treated with quetiapine in monotherapy maintenance trials for bipolar I disorder**

Preferred term <sup>a</sup>	Number [n (%)] of patients with adverse events		
	Quetiapine (N=404)	Placebo (N=404)	Lithium (N=418)

Headache	36 (8.9)	32 (7.9)	48 (11.5)
Somnolence	27 (6.7)	17 (4.2)	11 (2.6)
Insomnia	26 (6.4)	69 (17.1)	52 (12.4)
Nausea	18 (4.5)	33 (8.2)	53 (12.7)
Tremor	12 (3.0)	8 (2.0)	31 (7.4)
Diarrhoea	11 (2.7)	21 (5.2)	26 (6.2)
Vomiting	8 (2.0)	12 (3.0)	47 (11.2)

<sup>a</sup> Patients with multiple events falling under the same preferred term are counted only once in that term. N Number of patients in treatment group. n Number of patients.

### ***Bipolar Depression (adults)***

The safety results of four placebo controlled clinical trials show that quetiapine is generally safe and well tolerated when used for treatment of bipolar depression. All four studies contained an eight week acute phase with two of these studies containing a continuation phase of an additional 52 weeks. Adverse events occurring at an incidence of 5% or more in any treatment group in the acute phase for the combined studies are summarised in Table 10 regardless of causality.

Adverse events occurring at an incidence of 5% or more in any treatment group in the continuation phase for the combined studies are summarised in Table 11 regardless of causality.

**Table 10 Adverse events observed in at least 5% of patients (safety population) in any treatment group in the acute phase of bipolar depression trials**

Preferred term <sup>a</sup>	Number (%) of patients with adverse events		
	Quetiapine 300mg N=853	Quetiapine 600 mg N=859	Placebo N=602
Dry mouth	28.4%	29.8%	8.8%
Somnolence	22.6%	21.4%	6.3%
Sedation	18.2%	18.3%	6.0%
Dizziness	12.5%	15.4%	6.3%
Headache	9.4%	9.2%	16.3%
Constipation	7.2%	9.3%	3.0%
Fatigue	6.4%	8.1%	5.5%
Nausea	6.0%	8.3%	10.3%

<sup>a</sup> Patients with multiple events falling under the same preferred term are counted only once in that term. N: number of patients in each treatment group,

**Table 11 Adverse events (treatment emergent only<sup>b</sup>) observed in at least 5% of patients (safety population) in any treatment group in the continuation phase of bipolar depression trials**

Preferred term <sup>a</sup>	Number (%) of patients with adverse events		
	Quetiapine 300mg N=141	Quetiapine 600 mg N=150	Placebo N=294
Headache	13.5%	11.3%	9.5%
Nasopharyngitis	9.9%	2.7%	5.4%
Nausea	7.1%	2.0%	3.7%
Diarrhoea	5.7%	0.7%	1.7%
Dry mouth	3.5%	6.0%	1.4%

<sup>a</sup> Patients with multiple events falling under the same preferred term are counted only once in that term. <sup>b</sup> Events first reported or worsened intensity during continuation phase. N: number of patients in each treatment group,

### Other findings observed during clinical studies

#### *Somnolence*

Somnolence may occur, usually during the first two weeks of treatment and generally resolves with the continued administration of quetiapine. Somnolence may lead to falls.

#### *Weight gain (adults)*

In schizophrenia trials the proportions of patients meeting a weight gain criterion of  $\geq 7\%$  of bodyweight from baseline were compared in a pool of four 3-6 week placebo controlled clinical trials, revealing a statistically significantly greater incidence of weight gain for quetiapine (23%) compared to placebo (6%). In mania monotherapy trials the proportions of patients meeting the same weight gain criterion were 21% compared to 7% for placebo and in mania adjunct therapy trials the proportion of patients meeting the same weight criterion were 13% compared to 4% for placebo. In bipolar depression trials, the proportions of patients meeting the same weight gain criterion were 8% compared to 2% for placebo.

#### *Withdrawal (discontinuation symptoms)*

In acute placebo controlled monotherapy clinical trials which evaluated discontinuation symptoms, the aggregated incidence of discontinuation symptoms after abrupt cessation was 16.0% for quetiapine and 7.3% for placebo. The aggregated incidence of individual adverse events (eg, insomnia, nausea, headache, diarrhoea, vomiting, dizziness and irritability) did not exceed 6.7% in any treatment group and usually resolved after one week postdiscontinuation (see **Precautions**).

#### *Leucopenia/neutropenia*

Possible risk factors for leucopenia and/or neutropenia include pre-existing low white cell count and history of drug induced leucopenia and/or neutropenia. Neutrophil count decreases have commonly been observed. In all short-term placebo controlled monotherapy clinical trials in adults, among patients with a baseline neutrophil count  $\geq 1.5 \times 10^9/L$ , the incidence of at least one occurrence of neutrophil count  $< 1.5 \times 10^9/L$  was 1.9% in patients treated with quetiapine, compared to 1.5% in placebo treated patients. The incidence  $\geq 0.5 - < 1.0 \times 10^9/L$  (moderate neutropenia) was 0.2% (uncommon) in patients treated with quetiapine and 0.2% in placebo-treated patients. In clinical trials conducted prior to a protocol amendment for discontinuation of patients with treatment emergent neutrophil count  $< 1.0 \times 10^9/L$ , among patients with a baseline neutrophil count  $\geq 1.5$

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$\times 10^9/L$ , the incidence of at least one occurrence of neutrophil count  $< 0.5 \times 10^9 /L$  (severe neutropenia) was 0.21% (uncommon) in patients treated with quetiapine and 0% in placebo treated patients and the incidence  $\geq 0.5 \times 10^9/L$  (severe neutropenia) was 0.21% (uncommon) in patients treated with quetiapine and 0% in placebo treated patients (see **Precautions**).

#### *Lipid changes (adults)*

In schizophrenia trials, the proportions of patients with elevations to levels of cholesterol  $\geq 6.2064$  mmol/L and triglycerides  $\geq 2.258$  mmol/L were 16 and 23% for quetiapine treated patients, respectively, compared to 7% and 16% for placebo treated patients, respectively. In bipolar depression trials, the proportion of patients with cholesterol and triglycerides elevations to these levels were 9 and 14% for quetiapine treated patients, respectively, compared to 6 and 9% for placebo treated patients, respectively.

In placebo controlled trials decreases in fasting HDL cholesterol have been observed. In short-term placebo-controlled clinical trials the incidence of patients who shifted from  $\geq 1.025$  mmol/L to  $< 1.025$  mmol/L was 18.3% in quetiapine and 10.9% in placebo.

#### *Increases in blood glucose levels*

In placebo controlled clinical trials in adults, the percentage of patients who had a shift to a high blood glucose level (fasting blood glucose  $\geq 7$  mmol/L or a nonfasting blood glucose  $\geq 11.1$  mmol/L on at least one occasion) was 5.1% in patients treated with quetiapine and 4.2% in placebo treated patients (see **Precautions**).

#### *Decreases in haemoglobin levels*

Decreased haemoglobin to 8.07 mmol/L males, 7.45 mmol/L females on at least one occasion occurred in 11% of quetiapine patients in all trials including open label extensions. In short-term placebo controlled trials, decreased haemoglobin to 8.07 mmol/L males, 7.45 mmol/L females on at least one occasion in 8.3% of quetiapine patients compared to 6.2% placebo patients.

#### *Extrapyramidal Symptoms (adults)*

The following clinical trials included treatment with quetiapine immediate release and quetiapine modified release tablets. In short-term placebo controlled clinical trials in schizophrenia and bipolar mania the aggregate incidence of EPS was similar to placebo (schizophrenia: quetiapine 7.8%, placebo 8.0%; bipolar mania: quetiapine 11.2%, placebo 11.4%).

In short-term, placebo controlled clinical trials in bipolar depression the aggregate incidence of EPS from the combined data was 8.9% for quetiapine compared to 3.8% for placebo though the incidence of the individual adverse events (e.g. akathisia, extrapyramidal disorder, tremor, dyskinesia, dystonia, restlessness, muscle contractions involuntary, psychomotor hyperactivity and muscle rigidity) were generally low and did not exceed 4% in any treatment group. In long term studies of schizophrenia and bipolar disorder the aggregated exposure adjusted incidence of treatment-emergent extrapyramidal symptoms was similar between quetiapine and placebo. (See **Precautions - Extrapyramidal symptoms** and Table 12 below.)

#### *Irritability*

In acute placebo-controlled clinical trials in patients  $\geq 18$  years of age, the incidence of irritability was 2.3% for quetiapine and 1.7% for placebo.

## Dysphagia

An increase in the rate of dysphagia with quetiapine vs placebo was only observed in the adult clinical trials in bipolar depression.

## Other adverse drug reactions

In addition to the above, the following adverse drug reactions have also been observed in adult clinical trials (placebo-controlled trials, active-arm controlled trials and open-label uncontrolled trials) with quetiapine.

**Table 12**

Frequency	System Organ Class	Reaction
Very common (≥10%)	Nervous system disorders	Extrapyramidal symptoms
Common (≥1% to < 10%)	Cardiac disorders	Palpitations <sup>4</sup>
	Eye disorder	Vision Blurred
	Gastrointestinal disorders	Vomiting <sup>6</sup>
	General disorders and administration site conditions	Peripheral oedema; irritability; Pyrexia
	Investigations	Elevations in serum alanine transferase (ALT) <sup>8</sup> ; Elevations in γ-GT levels <sup>8</sup> ; Elevations in serum prolactin <sup>3</sup> ; Decreases in total T <sub>4</sub> , free T <sub>4</sub> and total T <sub>3</sub> , and increases in TSH <sup>5</sup> ; Eosinophils increased <sup>7</sup>
	Metabolism & nutritional disorders	Increased appetite
	Nervous system disorders	Dysarthria
	Psychiatric disorders	Abnormal dreams and nightmares
Uncommon (≥ 0.1% to <1%)	Respiratory, thoracic and mediastinal disorders	Dyspnoea <sup>4</sup>
	Blood disorder	Leukopenia
	Cardiac disorders	Bradycardia <sup>9</sup>
	Gastrointestinal disorders	Dysphagia <sup>2</sup>
	Investigations	Elevations in serum aspartate aminotransferase (AST) <sup>8</sup> ; Platelet count decreased <sup>1</sup> ; Decreases in free T <sub>3</sub> <sup>5</sup>
	Immune system disorders	Hypersensitivity;
	Nervous system disorders	Syncope <sup>2</sup> ; Seizure <sup>2</sup> ; Restless legs syndrome; Tardive dyskinesia <sup>2</sup>
Respiratory, thoracic and mediastinal disorders	Rhinitis	
Renal and urinary disorders	Urinary retention	

Frequency	System Organ Class	Reaction
Rare (≥0.01% to <0.1%)	General disorders and administration site conditions  Investigations  Psychiatric disorders  Reproductive system and breast disorders  Gastrointestinal disorders  Hepatobiliary disorders	Neuroleptic malignant syndrome <sup>2</sup> ; Hypothermia  Elevations in blood creatinine phosphokinase (not associated with neuroleptic malignant syndrome); Agranulocytosis <sup>10</sup>  Somnambulism and other related events  Priapism  Intestinal obstruction/Ileus  Hepatitis (with or without jaundice)
Not known	General disorders and administration site conditions	Neonatal withdrawal <sup>11</sup>

1. Platelets  $\leq 100 \times 10^9/L$  on at least one occasion
2. See **Precautions**
3. Prolactin levels (patients  $\geq 18$  years of age):  $>20\mu g/L$  males;  $>30\mu g/L$  females at any time
4. These reports often occurred in the setting of tachycardia, dizziness, orthostatic hypotension and/or underlying cardiac/respiratory disease
5. Based on shifts from normal baseline to potentially clinically important value at anytime post-baseline in all trials. Shifts in total  $T_4$ , free  $T_4$ , total  $T_3$  and  $T_3$  are defined as  $<0.08 \times LLN$  (pmol/L) and shift in TSH is  $>5mIU/L$  at any time.
6. Based upon the increased rate of vomiting in elderly patients ( $\geq 65$  years of age).
7. Based on shifts from normal baseline to potentially clinically important value at anytime post-baseline in all trials. Shifts in eosinophils are defined as  $\geq 1 \times 10^9$  cells/L at any time.
8. Asymptomatic elevations (shift from normal to  $\geq 3 \times ULN$  at any time) in serum transaminases (ALT and AST) or  $\gamma$ -GT levels have been observed in some patients administered quetiapine. These elevations were usually reversible on continued quetiapine treatment.
9. May occur at or near initiation of treatment and be associated with hypotension and/or syncope. Frequency based on adverse event reports of bradycardia and related events in all clinical trials with quetiapine.
10. Based on the frequency of patients during all quetiapine clinical trials with severe neutropenia ( $<0.5 \times 10^9/L$ ) and infection.
11. See **Use in Pregnancy**.

### **Children and adolescents (schizophrenia and acute mania)**

The incidence of common ( $\geq 5\%$ ) adverse events that occurred in children and adolescent (10-17 years) in two short-term treatment placebo-controlled trials in schizophrenia and bipolar mania is listed below in Table 13 regardless of causality.



**Table 13 Adverse events that occurred in at least 5% of child/adolescent patients treated with quetiapine in short-term schizophrenia and bipolar mania studies (pooled safety analysis set)**

Preferred term	Number (%) of patients with adverse events	
	Quetiapine * (N=340)	Placebo (N=165)
Somnolence	29.4%	8.5%
Sedation	16.2%	4.2%
Dizziness	15.3%	3.6%
Headache	14.7%	17.0%
Fatigue	8.8%	4.2%
Increased appetite	7.6%	2.4%
Dry mouth	7.1%	0.6%
Insomnia	6.8%	14.5%
Nausea	6.8%	10.3%
Tachycardia	6.8%	0%
Vomiting	6.5%	5.5%
Agitation	5.6%	9.7%
Weight increased	5.0%	1.2%

\*400-800 mg/day; N – number of patients

The adverse events  $\geq 5\%$  reported in a 26-week, open-label clinical trial with quetiapine in children and adolescents with schizophrenia and bipolar mania were: somnolence (22.9%), headache (18.7%), sedation (14.2%), weight increased (13.4%), vomiting (10.8%), nausea (9.5%), dizziness (8.7%), fatigue (8.2%), insomnia (8.2%), increased appetite (7.1%), upper respiratory tract infection (6.8%), agitation (5.3%), irritability (5.0%), tachycardia (5.0%).

#### *Comparison to adult adverse drug reactions*

The same adverse drug reactions described for adults should be considered for children and adolescents. The following table summarises adverse drug reactions that occur in a higher frequency category in children and adolescents patients (10- 17 years of age) than in the adult population, or adverse drug reactions that have not been identified in the adult population.

**Table 14**

Frequency	System Organ Class	Reaction
Very common ( $\geq 10\%$ )	Metabolism & nutrition disorders	Increased appetite
	Investigations	Elevations in serum prolactin <sup>1</sup> ; Increases in blood pressure <sup>2</sup>
	Gastrointestinal disorders	Vomiting
Common ( $\geq 1\% - < 10\%$ )	Respiratory, thoracic & mediastinal disorders	Rhinitis
	Nervous system disorders	Syncope

<sup>1</sup> Prolactin levels (patients < 18 years of age): >20 µg/L males; > 26 µg/L females at any time. Less than 1% of patients had an increase to a prolactin level >100 µg/L

<sup>2</sup> Based on shifts above clinically significant thresholds (adapted from the National Institutes of Health criteria) or increases >20 mmHg for systolic or >10 mmHg for diastolic blood pressure at any time in two acute (3-6 weeks) placebo-controlled trials in children and adolescents

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### *Weight Gain (children and adolescents)*

In one 6-week, placebo-controlled trial in adolescent patients (13-17 years of age) with schizophrenia, the mean increase in body weight, was 2.0 kg in the quetiapine group and -0.4 kg in the placebo group. 21% of quetiapine-treated patients and 7% of placebo-treated patients gained  $\geq 7\%$  of their body weight.

In one 3-week, placebo-controlled trial in children and adolescent patients (10-17 years of age) with bipolar mania, the mean increase in body weight was 1.7 kg in the quetiapine group and 0.4 kg in the placebo group. 12% of quetiapine-treated patients and 0% of placebo-treated patients gained  $\geq 7\%$  of their body weight.

In the open-label study that enrolled patients from the above two trials, 63% of patients (241/380) completed 26 weeks of therapy with quetiapine. After 26 weeks of treatment, the mean increases in body weight and BMI were 4.4 kg and 1.1 kg/m<sup>2</sup> respectively. 45% of the patients gained  $\geq 7\%$  of their body weight, (not adjusted for normal growth). 18.3% of the patients had a clinically significant change in BMI (adjusted for growth).

### *Extrapyramidal Symptoms (EPS) [children and adolescents]*

In a short-term placebo-controlled monotherapy trial in adolescent patients (13-17 years of age) with schizophrenia, the aggregated incidence of EPS was 12.9% for quetiapine and 5.3% for placebo, though the incidence of the individual adverse events (eg, akathisia, tremor, extrapyramidal disorder, hypokinesia, restlessness, psychomotor hyperactivity, muscle rigidity, dyskinesia) was generally low and did not exceed 4.1% in any treatment group. In a short-term placebo-controlled monotherapy trial in children and adolescent patients (10-17 years of age) with bipolar mania, the aggregated incidence of EPS was 3.6% for quetiapine and 1.1% for placebo.

### *Suicide/suicidal thoughts or clinical worsening (all ages)*

In short-term placebo-controlled clinical trials across all indications and ages, the incidence of suicide-related events was 0.8% for both quetiapine (75/9238) and placebo (37/4745).

In these trials of patients with schizophrenia the incidence of suicide related events was 1.4% (3/212) for quetiapine and 1.6% (1/62) for placebo in patients 18-24 years of age, 0.8% (13/1663) for quetiapine and 1.1% (5/463) for placebo in patients  $\geq 25$  years of age, and 1.4% (2/147) for quetiapine and 1.3% (1/75) for placebo in patients  $< 18$  years of age. There has been one trial conducted in patients 10-17 years of age in which efficacy was not established. The incidence of suicide related events was 1.0% (1/92) for quetiapine and 0% (0/100) for placebo. In this study there were two additional events in two patients that occurred during an extended post-treatment follow-up phase of the study; one of these patients was on quetiapine at the time of the event (see **Precautions**).

In these trials of patients with bipolar mania the incidence of suicide related events was 0% for both quetiapine (0/60) and placebo (0/58) in patients 18-24 years of age, 1.2% for both quetiapine (6/496) and placebo (6/503) in patients  $\geq 25$  years of age, and 1.0% (2/193) for quetiapine and 0% (0/90) for placebo in patients  $< 18$  years of age.

In these trials of patients with bipolar depression the incidence of suicide related events was 3.0% (7/233) for quetiapine and 0% (0/120) for placebo in patients 18-24 and 1.8% for both quetiapine (19/1616) and placebo (11/622) in patients  $\geq 25$  years of age.

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## Cataracts/lens opacities

In a clinical trial to evaluate the cataractogenic potential of quetiapine immediate release tablets (200 – 800 mg/day) versus risperidone (2 – 8 mg/day) in patients with schizophrenia or schizoaffective disorder, the percentage of patients with increased lens opacity grade was not higher in quetiapine compared to risperidone for patients with at least 21 months of exposure (see **Preclinical** data).

## Postmarketing experience

In addition to the above, the following post-marketing adverse drug reactions have been observed with quetiapine.

**Table 15**

Frequency	System Organ Class	Reaction
Rare (≥0.01 - <1%)	Reproductive system & breast disorders	galactorrhea
Very rare (<0.01%)	Immune system disorders	anaphylactic reaction

Very rare cases of cataract and urinary retention have been reported in the post-marketing data, but no causal link between these reports and quetiapine has been established.

There have been rare post-marketing reports of pancreatitis. Among the post-marketing reports, many patients had factors which are known to be associated with pancreatitis such as increased triglycerides (see discussion on **Lipids** and **Effects on laboratory tests** in the **Precautions** section, above), gallstones and alcohol consumption.

Very rare cases of exacerbation of pre-existing diabetes have been reported.

Other adverse events reported since market introduction, which were temporally related to quetiapine therapy, but not necessarily causally related, include: cardiomyopathy, myocarditis, syndrome of inappropriate antidiuretic hormone secretion (SIADH), hyponatremia, cerebrovascular accident, and Stevens-Johnson Syndrome.

## Dosage and administration

Chronic antipsychotic treatment should generally be reserved for patients who appear to suffer from a chronic illness that (1) is known to respond to antipsychotic drugs, and (2) for whom alternative equally effective but potentially less harmful treatments are not available or appropriate. In patients who do require chronic treatment the smallest dose and the shortest duration of treatment producing a satisfactory response should be sought. The need for continued treatment should be reassessed periodically.

Quetiapine can be administered with or without food.

### Adults

#### Bipolar disorder

##### *Maintenance treatment*

Syquet should be administered twice daily.

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Patients who have responded to quetiapine for acute treatment of bipolar disorder should continue therapy at the same dose. It is generally recommended that responding patients be continued beyond the acute response, but at the lowest possible dose needed to maintain remission.

For prevention of relapse/recurrence of manic, depressive and mixed episodes in bipolar disorder, the usual effective dose is within the range of 300 to 800 mg/day (refer **Clinical Trials**).

The dose of quetiapine can be readjusted depending on the clinical response and tolerability of the individual patient. Patients should be periodically reassessed to determine the need for maintenance treatment.

### *Bipolar depression*

When treating depressive episodes in bipolar disorder, treatment should be initiated either by the treating psychiatrist or by the general practitioner after consultation with the psychiatrist.

Syquet should be administered once daily at bedtime.

Quetiapine should be titrated as follows: 50 mg (Day 1), 100 mg (Day 2), 200 mg (Day 3) and 300 mg (Day 4). The dose may be adjusted up to 600 mg/day in increments of 100 mg/day depending on the clinical response and tolerability of the individual patient.

### *Acute mania*

Quetiapine should be administered twice daily. The total daily dose for the first four days of therapy is 100 mg (Day 1), 200 mg (Day 2), 300 mg (Day 3) and 400 mg (Day 4), alone or in combination with a mood stabiliser. Further dosage adjustments, up to 800 mg/day by Day 6 should be in increments of no greater than 200 mg/day.

The dose may be adjusted depending on clinical response and tolerability of the individual patient, within the range of 200 to 800 mg/day. The usual effective dose is in the range of 400 to 800 mg/day.

### **Schizophrenia**

Quetiapine should be administered twice daily. The total daily dose for the first four days of therapy is 50 mg (Day 1), 100 mg (Day 2), 200 mg (Day 3) and 300 mg (Day 4).

From Day 4 onwards, the dose should be titrated to the usual effective dose of 300 to 450 mg/day. Depending on the clinical response and tolerability of the individual patient, the dose may be adjusted within the range 150 to 750 mg/day.

### **Elderly**

As with other antipsychotics, quetiapine should be used with caution in the elderly, especially during the initial dosing period. The rate of dose titration may need to be slower, and the daily therapeutic dose lower, than that used in younger patients, depending on the clinical response and tolerability of the individual patient. The mean plasma clearance of quetiapine was reduced by 30 to 50% in elderly subjects when compared with younger patients.

### **Children and adolescents**

The safety and efficacy of quetiapine have been evaluated in children and adolescents 10 to 17 years of age with bipolar mania (as monotherapy), and 13 to 17 years of age with schizophrenia.

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Syquet should be administered twice daily. However, Syquet may be administered three times daily based on response and tolerability.

### ***Acute mania - monotherapy (10 to 17 years of age)***

The total daily dose for the first five days of therapy is 50 mg (Day 1), 100 mg (Day 2), 200 mg (Day 3), 300 mg (Day 4) and 400 mg (Day 5). After Day 5, the dose should be adjusted within the effective dose range of 400 to 600 mg/day depending upon the clinical response and tolerability of the patient. Patients should be administered the lowest effective dose. Dosage adjustments should be in increments of no greater than 100 mg/day.

### ***Schizophrenia (13 to 17 years of age)***

The total daily dose for the first five days of therapy is 50 mg (Day 1), 100 mg (Day 2), 200 mg (Day 3), 300 mg (Day 4) and 400 mg (Day 5). After Day 5, the dose should be adjusted within the effective dose range of 400 to 800 mg/day depending upon the clinical response and tolerability of the patient. Patients should be administered the lowest effective dose. Dosage adjustments should be in increments of no greater than 100 mg/day.

### **Renal impairment**

Dosage adjustment is not necessary.

### **Hepatic impairment**

Quetiapine is extensively metabolised by the liver. Therefore, quetiapine should be used with caution in patients with known hepatic impairment, especially during the initial dosing period. Patients with hepatic impairment should be started on 25 mg/day. The dose should be increased in increments of 25 to 50 mg/day to an effective dose, depending on the clinical response and tolerability of the individual patient.

### **Overdosage**

In clinical trials, experience with quetiapine in overdosage is limited. Estimated doses of quetiapine up to 30 g have been taken, without fatal consequences and with patients recovering without sequelae, however, death has been reported in a clinical trial following an overdose of quetiapine 13.6 g alone. In postmarketing experience, there have been very rare reports of overdose of quetiapine alone resulting in death or coma.

In post marketing experience there were cases reported of QT prolongation with overdose.

Patients with pre-existing severe cardiovascular disease may be at an increased risk of the effects of overdose (see **Precautions – Concomittant cardiovascular illness**)

In general, reported signs and symptoms were those resulting from an exaggeration of the drug's known pharmacological effects, i.e. drowsiness and sedation, tachycardia, hypotension and anti-cholinergic effects.

### **Management of overdose**

There is no specific antidote to quetiapine. In cases of severe signs, the possibility of multiple drug involvement should be considered, and intensive care procedures are recommended, including establishing and maintaining a patent airway, ensuring adequate oxygenation and ventilation, and monitoring and support of the cardiovascular system. While the prevention of absorption in overdose has not been investigated, administration of activated charcoal together with a laxative should be considered.

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In cases of quetiapine overdose, refractory hypotension should be treated with appropriate measures such as intravenous fluids and/or sympathomimetic agents (adrenaline and dopamine should be avoided, since  $\beta$ -stimulation may worsen hypotension in the setting of quetiapine-induced  $\alpha$ -blockade).

Close medical supervision and monitoring should be continued until the patient recovers.

Contact the Poisons Information Centre on 131 126 for advice on management.

## **Presentation and storage conditions**

**Syquet 25 mg:** Peach coloured, round, biconvex film coated tablets, debossed with 'QTP' on one side and '25' on other side; 60s.

**Syquet 100 mg:** Yellow coloured, round, biconvex film coated tablets, debossed with 'QTP' on one side and '100' on other side; 60s & 90s

**Syquet 150 mg:** Pale yellow coloured, round, biconvex film coated tablets, debossed with 'QTP' on one side and '150' on other side; 60s\*

**Syquet 200 mg:** White coloured, round, biconvex film coated tablets, debossed with 'QTP' on one side and '200' on other side; 60s

**Syquet 300 mg:** White coloured, capsule shape, biconvex film coated tablets, debossed with 'QTP' on one side and '300' on other side; 60s

Store below 30°C.

\*not marketed in Australia

## **Name and address of the supplier**

Alphapharm Pty Limited  
Cnr Garnet & Animony Streets  
Carole Park QLD 4300

## **Poison Schedule of the Medicine**

S4 – Prescription Only Medicine

## **Date of first inclusion in the Australian Register of Therapeutic Goods (the ARTG)**

24 February 2011

## **Date of most recent amendment**

24 October 2016