

# ZYPINE

## ZYPINE ODT

*Olanzapine*

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### 1 NAME OF THE MEDICINE

Olanzapine

### 2 QUALITATIVE AND QUANTITATIVE COMPOSITION

#### ZYPINE Tablets

Each tablet contains either 2.5 mg, 5 mg, 7.5 mg or 10 mg of olanzapine as the active ingredient.

Excipients with known effect: lactose monohydrate.

#### ZYPINE ODT Wafers

Each wafer contains either 5 mg, 10 mg, 15 mg or 20 mg olanzapine as the active ingredient.

Excipients with known effect: aspartame (which is a source of phenylalanine) and sulfites.

For the full list of excipients, see section 6.1 List of Excipients.

### 3 PHARMACEUTICAL FORM

#### ZYPINE Tablets

ZYPINE tablets are white film-coated tablets.

- |               |   |   |
|---------------|---|---|
| ZYPINE 2.5 mg | : | Each 2.5 mg tablet contains 2.5 mg of olanzapine – 7.0 mm normal convex, white film-coated tablets debossed with “OZ” over “2.5” on one side and “G” on the other side. |
| ZYPINE 5 mg   | : | Each 5 mg tablet contains 5 mg of olanzapine – 8.0 mm normal convex, white film-coated tablets debossed with “OZ” over “5” on one side and “G” on the other side.       |
| ZYPINE 7.5 mg | : | Each 7.5 mg tablet contains 7.5 mg of olanzapine – 9.0 mm normal convex, white film-coated tablets debossed with “OZ” over “7.5” on one side and “G” on the other side. |
| ZYPINE 10 mg  | : | Each 10 mg tablet contains 10 mg of olanzapine – 10.2 mm normal convex, white film-coated tablets debossed with “OZ” over “10” on one side and “G” on the other side.   |

#### ZYPINE ODT Wafers

ZYPINE ODT wafers are yellow.

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|---------------------|---|---|
| ZYPINE ODT<br>5 mg  | : | Each 5 mg wafer contains 5 mg of olanzapine – Light yellow to yellow coloured, plain to mottled, round, flat faced, bevelled edged tablets debossed with “M” on one side and “OE1” on other side.   |
| ZYPINE ODT<br>10 mg | : | Each 10 mg wafer contains 10 mg of olanzapine – Light yellow to yellow coloured, plain to mottled, round, flat faced, bevelled edged tablets debossed with “M” on one side and “OE2” on other side. |

ZYPINE ODT 15 mg	:	Each 15 mg wafer contains 15 mg of olanzapine – Light yellow to yellow coloured, plain to mottled, round, flat faced, bevelled edged tablets debossed with “M” on one side and “OE3” on other side.
ZYPINE ODT 20 mg	:	Each 20 mg wafer contains 20 mg of olanzapine – Light yellow to yellow coloured, plain to mottled, round, flat faced, bevelled edged tablets debossed with “M” on one side and “OE4” on other side.

## 4 CLINICAL PARTICULARS

### 4.1 THERAPEUTIC INDICATIONS

Olanzapine is indicated for the treatment of schizophrenia and related psychoses.

Olanzapine alone or in combination with lithium or valproate is indicated for the short-term treatment of acute manic episodes associated with Bipolar I Disorder.

Olanzapine is indicated for preventing recurrence of manic, mixed or depressive episodes in Bipolar I Disorder.

### 4.2 DOSE AND METHOD OF ADMINISTRATION

ZYPINE tablets are intended for oral administration only.

ZYPINE ODT wafers (orodispersible tablets) are a rapid-dispersing preparation to be placed in the mouth or alternatively to be dispersed in water for administration.

#### **Schizophrenia and Related Disorders**

The recommended starting dose for olanzapine is 5 to 10 mg/day, administered as a single daily dose without regard to meals. Daily dosage may subsequently be adjusted on the basis of individual clinical status within the range of 5 to 20 mg daily. An increase to a dose greater than the routine therapeutic dose of 10 mg/day is recommended only after appropriate clinical reassessment.

#### **Acute Mania Associated with Bipolar Disorder**

The recommended starting dose for olanzapine is 10 or 15 mg administered once a day as monotherapy or 10 mg administered once daily in combination therapy with lithium or valproate. It may be given without regard to meals. Dosage adjustments, if indicated, should generally occur at intervals of not less than 24 hours. When dosage adjustments are necessary, dose increments/decrements of 5 mg daily are recommended. Antimanic efficacy was demonstrated in a dose range of 5 to 20 mg/day in clinical trials. The safety of doses above 20 mg/day has not been evaluated in clinical trials.

#### **Preventing Recurrence in Bipolar Disorder**

Patients who have been receiving olanzapine for the treatment of acute mania should initially continue therapy for preventing recurrence in bipolar disorder at the same dose. For patients already in remission, the suggested starting dose for olanzapine is 10 mg once a day. Subsequent daily dosage should be adjusted on the basis of clinical status within a range of 5 to 20 mg/day. Olanzapine may be given without regard to meals, as its absorption is not affected by food.

ZYPINE ODT wafers should be placed in the mouth, where the tablet will rapidly disperse in saliva, so it can be easily swallowed. Removal of the intact tablet from the mouth is difficult. Since the tablet is fragile, it should be taken immediately on opening the blister. Alternatively, it may be dispersed in a full glass of water immediately before administration.

ZYPINE ODT wafers are bioequivalent to ZYPINE tablets, with a similar rate and extent of absorption. ZYPINE ODT wafers have the same dosage and frequency of administration as ZYPINE tablets. ZYPINE ODT wafers may be used as an alternative to ZYPINE tablets.

### **Elderly Patients**

A low starting dose of 5 mg/day should be considered for those patients 65 years of age and over when clinical factors warrant.

### **Patients with Hepatic and/or Renal Impairment**

Small, single dose clinical pharmacology studies did not reveal any major alterations in olanzapine pharmacokinetics in subjects with renal or hepatic impairment. However, as clinical experience is limited in these patients, a lower starting dose (5 mg/day) should be considered. Further dose adjustments, when indicated, should be conservative in these patients

### **Female Compared with Male Patients**

The starting dose and dose range need not be routinely altered for female patients relative to male patients.

### **Non-smoking Patients Compared with Smoking Patients**

The starting dose and dose range need not be routinely altered for non-smoking patients relative to smoking patients.

When more than one factor is present which might result in slower metabolism (female gender, geriatric age, non-smoking status), consideration should be given to decreasing the starting dose. Dose escalation, when indicated, should be conservative in such patients (see section 4.4 Special Warnings and Precautions for Use; section 4.5 Interactions with Other Medicines and Other Forms of Interactions and section 5.2 Pharmacokinetic Properties).

## **4.3 CONTRAINDICATIONS**

Olanzapine is contraindicated in those patients with a known hypersensitivity to any ingredient of the product.

## **4.4 SPECIAL WARNINGS AND PRECAUTIONS FOR USE**

During antipsychotic treatment, improvement in the patient's clinical condition may take several days to some weeks. Patients should be closely monitored during this period.

### **Concomitant Illness**

While olanzapine demonstrated anticholinergic activity in vitro, experience during clinical trials revealed a low incidence of related events. As clinical experience with olanzapine in patients with concomitant illness is limited, caution is advised when prescribing for patients with prostatic hypertrophy, narrow angle glaucoma or paralytic ileus and related conditions.

### **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 olanzapine. 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 antidiabetic treatment despite discontinuation of the suspect drug.

### **Lipid Alterations**

Undesirable alterations in lipids have been observed in olanzapine treated patients in placebo-controlled trials. Olanzapine treated patients had a greater mean increase in fasting total cholesterol, low density lipoprotein (LDL) cholesterol and triglycerides compared to placebo treated patients. Mean increases in fasting lipid values (total cholesterol, LDL cholesterol and triglycerides) were greater in patients without evidence of lipid dysregulation at baseline. Appropriate clinical monitoring is recommended (see section 4.8 Adverse Effects (Undesirable Effects)).

### **Weight Gain**

Potential consequences of weight gain should be considered prior to starting olanzapine. As with all antipsychotics, patients receiving olanzapine should receive regular monitoring of weight. In clinical trials significant weight gain was observed across all baseline body mass index (BMI) categories in olanzapine treated patients (see section 4.8 Adverse Effects (Undesirable Effects)).

### **Blood**

As with other neuroleptic drugs, caution should be exercised in patients with low leucocyte and/or neutrophil counts for any reason, in patients with a history of drug induced bone marrow depression/ toxicity, in patients with bone marrow depression caused by concomitant illness, radiation therapy or chemotherapy, and in patients with hypereosinophilic conditions or myeloproliferative disease. 32 patients with clozapine related neutropenia or agranulocytosis histories received olanzapine without decreases in baseline neutrophil counts.

In animal studies, dose related reductions in circulating leucocytes were observed in mice and rats at oral doses greater than 3 to 4 mg/kg/day; however, no evidence of bone marrow cytotoxicity was found. Reversible neutropenia, thrombocytopenia or anaemia developed in a few dogs treated with 8 or 10 mg/kg/day. In cytopenic dogs, there were no adverse effects on progenitor and proliferating cells in the bone marrow. No haematological effects were seen in dogs receiving 5 mg/kg/day. In clinical trials, there were no data to suggest olanzapine adversely affected bone marrow function, even in patients with a history of drug associated neutropenia or leucopenia (see section 4.8 Adverse Effects (Undesirable Effects)).

### **Neuroleptic malignant syndrome**

Neuroleptic malignant syndrome (NMS), a potentially fatal syndrome complex, is associated with antipsychotic drugs, including olanzapine (see section 4.8 Adverse Effects (Undesirable Effects)). Clinical manifestations of NMS are hyperpyrexia, muscle rigidity, altered mental status and evidence of autonomic instability (irregular pulse or blood pressure, tachycardia, diaphoresis and cardiac dysrhythmia). Additional signs may include elevated creatine phosphokinase, myoglobinuria (rhabdomyolysis) and acute renal failure. In such an event or with unexplained high fever without additional clinical manifestations of NMS, all antipsychotic drugs, including olanzapine, should be discontinued.

**Seizures**

Olanzapine should be used cautiously in patients who have a history of seizures or are subject to factors which may lower the seizure threshold. Seizures have been reported to occur rarely in such patients when treated with olanzapine (see section 4.8 Adverse Effects (Undesirable Effects)).

**Drug Reaction with Eosinophilia and Systemic Symptoms (DRESS)**

Drug Reaction with Eosinophilia and Systemic Symptoms (DRESS) has been reported with olanzapine exposure. DRESS consists of a combination of three or more of the following: cutaneous reaction (such as rash or exfoliative dermatitis), eosinophilia, fever, lymphadenopathy and one or more systemic complications such as hepatitis, nephritis, pneumonitis, myocarditis, and pericarditis. Discontinue olanzapine if DRESS is suspected.

**Tardive Dyskinesia**

In comparator studies of one year or less in duration, olanzapine was associated with a statistically significantly lower incidence of treatment emergent dyskinesia. However, the risk of tardive dyskinesia increases with long-term exposure and therefore if signs or symptoms of tardive dyskinesia appear in a patient on olanzapine, a dose reduction or drug discontinuation should be considered. These symptoms can temporarily deteriorate or even arise after discontinuation of treatment.

**Akathisia**

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 monitoring for such signs and symptoms as, left untreated, akathisia is associated with poor compliance and an increased risk of relapse.

**Cardiac**

Postural hypotension was infrequently observed in elderly subjects in clinical trials. As with other antipsychotics, it is recommended that blood pressure is measured periodically in patients over 65 years.

In clinical trials, olanzapine was not associated with a persistent increase in absolute QT intervals. Only 8 of 1,685 subjects had an increase in the corrected QT interval (QTc) on multiple occasions. As with other antipsychotics, caution should be exercised when olanzapine is prescribed with drugs known to increase QTc interval, especially in elderly patients.

**Sudden Cardiac Death**

In a retrospective observational study, patients treated with atypical antipsychotics (including olanzapine) or typical antipsychotics had a similar dose related increase of presumed sudden cardiac death compared to non-users of antipsychotics, with almost twice the risk than that for non-users. In post-marketing reports with olanzapine, the event of sudden cardiac death has been reported very rarely.

**Safety Experience in Elderly Patients with Dementia Related Psychosis**

In elderly patients with dementia related psychosis, the efficacy of olanzapine has not been established. In placebo controlled clinical trials of elderly patients with dementia related psychosis, the incidence of death in olanzapine treated patients was significantly greater than placebo treated patients (3.5 versus 1.5%, respectively). Risk factors that may predispose this patient population to increased mortality when treated with olanzapine include age > 80 years, sedation, concomitant use of benzodiazepines or presence of pulmonary conditions (e.g. pneumonia, with or without aspiration).

**Cerebrovascular Adverse Events (CVAE), including stroke in elderly patients with dementia**

Cerebrovascular adverse events (e.g. stroke, transient ischaemic attack), including fatalities, were reported in trials of olanzapine in elderly patients with dementia related psychosis. In placebo-controlled studies, there was a higher incidence of CVAE in patients treated with olanzapine compared to patients treated with placebo (1.3 versus 0.4%, respectively). All patients who experienced a cerebrovascular event had pre-existing risk factors known to be associated with an increased risk for a CVAE (e.g. history of previous CVAE or transient ischaemic attack, hypertension, cigarette smoking) and presented with concurrent medical conditions and/or concomitant medications having a temporal association with CVAE. Olanzapine is not approved for the treatment of patients with dementia related psychosis.

**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 olanzapine 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.

**Dysphagia**

Oesophageal dysmotility and aspiration have been associated with antipsychotic drug use. Olanzapine and other antipsychotic agents should be used cautiously in patients at risk for aspiration pneumonia.

**Suicide**

The possibility of a suicide attempt is inherent in schizophrenia and in bipolar disorder, and close supervision of high-risk patients should accompany therapy. Prescriptions for olanzapine should be written for the smallest quantity of tablets consistent with good patient management, in order to reduce the risk of overdose.

**Sleep apnoea**

Sleep apnoea and related disorders have been reported in patients treated with olanzapine, with or without prior history of sleep apnoea, and with or without concomitant weight-gain. Olanzapine should be used with caution in patients who have sleep apnoea or risk factors for developing sleep apnoea, and also in patients who are concomitantly using central nervous system depressants.

**Use in Hepatic Impairment**

Transient, asymptomatic elevations of hepatic transaminases, alanine transferase (ALT) and aspartate transferase (AST), have been seen occasionally, especially in early treatment. Rare post-marketing reports of hepatitis have been received. Very rare cases of jaundice, cholestatic or mixed liver injury have also been reported in the post-marketing period (see section 4.8 Adverse Effects (Undesirable Effects)). Caution should be exercised in patients with elevated ALT and/or AST, in patients with signs and symptoms of hepatic impairment, in patients with pre-existing conditions associated with limited hepatic functional reserve and in patients who are being treated with potentially hepatotoxic drugs.

**Use in the Elderly**

Caution should be used when olanzapine is administered to the elderly, especially if there are other factors that may influence drug metabolism and/or pharmacodynamic parameters.

**Paediatric Use**

The safety and efficacy of olanzapine have not been established in patients under 18 years of age.

**Effects on Laboratory Tests**

No information is available on the effect of olanzapine on laboratory tests.

## 4.5 INTERACTIONS WITH OTHER MEDICINES AND OTHER FORMS OF INTERACTIONS

Given the primary central nervous system effects of olanzapine, caution should be used when it is taken in combination with other centrally acting drugs and alcohol. As it exhibits *in vitro* dopamine antagonism, olanzapine may antagonise the effects of direct and indirect dopamine agonists

Caution should be exercised when olanzapine is used concomitantly with medicines known to cause electrolyte imbalance or to increase QT interval (see section 4.4 Special Warnings and Precautions for Use - Cardiac).

### Potential for Olanzapine to Affect Other Medicines

In clinical trials with single doses of olanzapine, no inhibition of the metabolism of imipramine/desipramine (P450 2D6, P450 3A or P450 1A2), warfarin (P450 2C19), theophylline (P450 1A2) or diazepam (P450 3A4 and P450 2C19) was evident. Olanzapine showed no interaction when co-administered with lithium or biperiden. The *in vitro* ability of olanzapine to inhibit metabolism by five principal cytochromes has been examined. These studies found inhibitory constants for 3A4 (491 micromolar), 2C9 (751 micromolar), 1A2 (36 micromolar), 2C19 (920 micromolar) and 2D6 (89 micromolar) that, compared to olanzapine plasma concentrations of approximately 0.2 micromolar, would mean maximum inhibition of these P450 systems by olanzapine would be less than 0.7%. The clinical relevance of these findings is unknown.

Steady-state concentrations of olanzapine had no effect on the pharmacokinetics of ethanol (45 mg/70 kg). However, additive pharmacological effects such as increased sedation may occur when ethanol is ingested together with olanzapine.

Studies *in vitro* using human liver microsomes showed that olanzapine has little potential to inhibit the major metabolic pathway of valproate, which is glucuronidation. Further, valproate was found to have little effect on the oxidative metabolism of olanzapine *in vitro*. Daily concomitant *in vivo* administration of olanzapine 10 mg for 2 weeks did not affect steady-state plasma concentrations of valproate. Therefore, concomitant olanzapine administration does not require dosage adjustment of valproate.

### Potential for Other Medicines to Affect Olanzapine

Single doses of antacids (containing aluminium and magnesium) or cimetidine do not affect the oral bioavailability of olanzapine. The concomitant administration of activated charcoal reduces the oral bioavailability of olanzapine by 50% to 60%.

Fluoxetine (60 mg single dose or 60 mg daily for 8 days) caused a 16% increase in the maximum plasma concentration of olanzapine and a 16% decrease in olanzapine clearance. The magnitude of this is small in comparison to the overall variability between individuals and therefore dose modification is not routinely recommended.

The metabolism of olanzapine may be induced by concomitant smoking (the clearance of olanzapine is 33% lower and the terminal elimination half-life is 21% longer in non-smokers compared to smokers) or carbamazepine therapy (clearance is increased 44% and the terminal elimination half-life is reduced by 20% when administered with carbamazepine). Smoking and carbamazepine therapy induce P450 1A2 activity. The pharmacokinetics of theophylline, which is metabolised by P450 1A2, are not altered by olanzapine.

Fluvoxamine, a CYP1A2 inhibitor, decreases the clearance of olanzapine. This results in a mean increase in olanzapine  $C_{max}$  following fluvoxamine of 54% in female non-smokers and 77% in male smokers. The mean increase in olanzapine AUC is 52 and 108%, respectively. Lower doses of olanzapine should be considered in patients receiving concomitant treatment with fluvoxamine or any other P450 1A2 inhibitor, e.g. ciprofloxacin.

## 4.6 FERTILITY, PREGNANCY AND LACTATION

### Effects on Fertility

In male rats dosed orally with olanzapine 22.5 mg/kg/day, mating performance was impaired as a result of the drug's sedative activity, but fertility was normal ten days after stopping treatment. In male dogs, hypospermatogenesis was seen at oral doses greater than 5 mg/kg/day. In female rats, oestrous cycles were disrupted at oral doses greater than 0.25 mg/kg/day and fertility was impaired at dose levels greater than 1 mg/kg/day.

### Use in Pregnancy

Pregnancy category: C

There are no adequate and well controlled studies in pregnant women. Patients should be advised to notify their doctor if they become pregnant or intend to become pregnant during treatment with olanzapine.

Neonates exposed to antipsychotic drugs (including olanzapine) 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.

Olanzapine 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.

Olanzapine had no teratogenic effects in rats or rabbits at oral dose levels up to 18 and 30 mg/kg/day respectively. However, resorptions were increased in rats at oral doses greater than 4 mg/kg/day. Fetal weight was decreased in both species at oral doses greater than 1 and 8 mg/kg/day, respectively, and fetal development was retarded in rats at doses greater than 4 mg/kg/day. Oral administration of olanzapine to pregnant rats resulted in prolonged gestation and an increased incidence of stillbirths at doses greater than 5 mg/kg/day. Oral administration of olanzapine to rats prior to mating and throughout mating, gestation and lactation was associated with transient decreases in offspring activity levels at doses of 0.25 mg/kg/day or greater.

### *Labour and delivery*

In rats, oral administration of olanzapine to pregnant rats resulted in prolonged gestation and an increased incidence of stillbirths at doses greater than 5 mg/kg/day.

### Use in Lactation

In a study in lactating, healthy women olanzapine was excreted in breast milk. Mean infant exposure (mg/kg) at steady state was estimated to be 1.8% of the maternal olanzapine dose (mg/kg). Patients should be advised not to breastfeed if they are taking olanzapine.

### Hyperprolactinaemia

When prescribing olanzapine, there is the possibility of secondary amenorrhoea and hypoeestrogenism arising from treatment (see section 4.8 Adverse Effects (Undesirable Effects)). Premenopausal women should be questioned regarding menstrual irregularities and those who experience secondary amenorrhoea for longer than six months while taking olanzapine should be appropriately investigated and offered appropriate therapy.

## 4.7 EFFECTS ON ABILITY TO DRIVE AND USE MACHINES

Patients should be cautioned about operating hazardous machinery, including motor vehicles, because olanzapine may cause somnolence.

## 4.8 ADVERSE EFFECTS (UNDESIRABLE EFFECTS)

### Adverse Events Identified from Clinical Trials of Olanzapine

#### Body as a Whole

Very common ( $\geq 10\%$ ): weight gain, weight gain  $> 7\%$  baseline bodyweight.

Common ( $> 1\%$  and  $< 10\%$ ): asthenia, fatigue, weight gain  $> 15\%$  of baseline bodyweight, pyrexia.

Uncommon ( $\geq 0.1\%$  and  $< 1\%$ ): photosensitivity reaction.

#### Weight

In an analysis of 13 placebo-controlled olanzapine monotherapy studies, olanzapine-treated patients gained an average of 2.6 kg compared to an average 0.3 kg weight loss in placebo-treated patients with a median exposure of 6 weeks. Clinically significant weight gain was observed across all baseline Body Mass Index (BMI) categories. Discontinuation due to weight gain occurred in 0.2% of olanzapine-treated patients and 0% of placebo-treated patients.

In long-term studies (at least 48 weeks) the mean weight gain was 5.6 kg. Both the magnitude of weight gain and the proportion of olanzapine-treated patients who had a clinically significant weight gain were greater than in the short-term studies. Gain of  $\geq 25\%$  of baseline body weight was very common with long term exposure to olanzapine. Discontinuation due to weight gain occurred in 0.4% of olanzapine-treated patients following at least 48 weeks of exposure.

#### Cardiovascular System

Very common ( $\geq 10\%$ ): orthostatic hypotension.

Uncommon ( $\geq 0.1\%$  and  $< 1\%$ ): bradycardia.

#### Digestive System

Common ( $\geq 1\%$  and  $< 10\%$ ): constipation, dry mouth, increased appetite.

Uncommon ( $\geq 0.1\%$  and  $< 1\%$ ): abdominal distension.

#### Metabolic

Common ( $\geq 1\%$  and  $< 10\%$ ): peripheral oedema.

Rare ( $< 0.1\%$  and  $> 0.01\%$ ): elevated creatine kinase levels.

#### Musculoskeletal System

Common ( $\geq 1\%$  and  $< 10\%$ ): arthralgia.

#### Nervous System

Very common ( $\geq 10\%$ ): somnolence.

Common ( $> 1\%$  and  $< 10\%$ ): dizziness; akathisia.

Uncommon ( $\geq 0.1\%$  and  $< 1\%$ ): amnesia; restless legs syndrome.

In active controlled studies, olanzapine treated patients had a lower incidence of parkinsonism, akathisia, dyskinesia and dystonia compared with titrated doses of haloperidol. In the absence of detailed information on the pre-existing history of individual acute and tardive extrapyramidal movement disorders, it cannot be concluded at present that olanzapine produces less tardive dyskinesia and/or other tardive extrapyramidal syndromes.

## Clinical Chemistry

Very common ( $\geq 10\%$ ): prolactin increased, cholesterol total (fasting borderline to high), triglycerides (fasting borderline to high), glucose (fasting borderline to high).

Common ( $\geq 1\%$  and  $< 10\%$ ): alanine transferase (ALT) increased, aspartate transferase (AST) increased, cholesterol total (fasting normal to high), triglycerides (fasting normal to high), glucose (fasting normal to high), glycosuria, alkaline phosphatase increased, gamma glutamyl transferase (GGT) high, uric acid high.

### Glucose

In adult clinical trials (up to 52 weeks) olanzapine was associated with a greater mean increase in both non-fasting and fasting blood glucose concentrations than placebo. In patients with baseline glucose dysregulation (including those with diabetes mellitus or who met criteria suggestive of hyperglycaemia) the mean increase in the non-fasting blood glucose concentration was significantly greater in those treated with olanzapine compared to placebo. A smaller between treatment difference was also seen in fasting blood glucose concentrations in patients with baseline glucose dysregulation. Olanzapine was also associated with a greater increase in HbA1c concentration than placebo in patients with baseline glucose dysregulation.

The proportion of patients who had a change in glucose level from normal or borderline at baseline to high increased over time. In patients who had at least 48 weeks exposure to olanzapine, 12.8% of patients who had normal baseline fasting glucose levels experienced high glucose levels at least once. For patients with borderline baseline fasting glucose levels, 26.0% experienced high glucose levels at least once. In an analysis of patients who completed 9 to 12 months of olanzapine therapy, the rate of increase in mean blood glucose slowed after approximately 6 months.

### Hepatic Transaminases

Transient, asymptomatic elevations of hepatic transaminases, ALT and AST, have been seen occasionally.

### Lipids

In an analysis of five placebo-controlled clinical trials of up to 12 weeks in duration, olanzapine treated adult patients had a greater mean increase in fasting total cholesterol, LDL cholesterol and triglycerides compared to placebo treated patients. Mean increases in fasting lipid values (total cholesterol, LDL cholesterol and triglycerides) were greater in patients without evidence of lipid dysregulation at baseline. For fasting high density lipoprotein (HDL) cholesterol, no statistically significant differences were observed between olanzapine treated patients and placebo treated patients.

The proportion of patients who had changes in total cholesterol, LDL, cholesterol or triglycerides from normal or borderline to high, or changes in HDL cholesterol from normal or borderline to low, was greater in long term studies (at least 48 weeks) than in short term studies. In long term studies the proportion of patients who had normal or borderline baseline levels of fasting triglycerides and experienced high levels was 32.4% and 70.7%, respectively. In long term studies the proportion of patients who had normal or borderline baseline levels of fasting total cholesterol and experienced high levels was 14.8% and 55.2%, respectively. In long term studies the proportion of patients who had normal or borderline baseline levels of fasting LDL cholesterol and experienced high levels 7.3% and 31.0%, respectively. In an analysis of patients who completed 12 months of therapy, the mean non-fasting total cholesterol did not increase further after approximately 4 to 6 months.

### Prolactin

In clinical trials of olanzapine in schizophrenia and other psychiatric indications of up to 12 weeks duration, plasma prolactin levels were elevated from normal at baseline to high in approximately 30% of olanzapine treated patients compared with 10.5% of placebo-treated patients. In the majority of patients these elevations were mild. Across all indications, potentially associated clinical manifestations included sexual function-related events such as erectile dysfunction in males and decreased libido in both genders (commonly observed), menstrual-related

events such as amenorrhoea (uncommonly observed), and breast-related events such as breast enlargement and galactorrhoea in females and gynaecomastia and breast enlargement in males (uncommonly observed).

#### Haematology

Common ( $\geq 1\%$  and  $< 10\%$ ): eosinophilia, leucopenia including neutropenia.

#### Eosinophilia

Asymptomatic eosinophilia was occasionally seen.

#### Respiratory

Uncommon ( $\geq 0.1\%$  and  $< 1\%$ ): epistaxis.

### **Undesirable Effects for Special Populations**

Undesirable effects associated with the use of olanzapine in clinical trials with elderly patients with dementia related psychosis are as follows.

#### Body as a Whole

Very common ( $\geq 10\%$ ): falls.

#### Nervous System

Very common ( $\geq 10\%$ ): abnormal gait.

#### Urogenital System

Common ( $\geq 1\%$  and  $< 10\%$ ): urinary incontinence.

#### Respiratory System

Common ( $\geq 1\%$  and  $< 10\%$ ): pneumonia.

Undesirable effects associated with the use of olanzapine in clinical trials in patients with drug-induced (dopamine agonist) psychosis associated with Parkinson's disease are as follows.

#### Nervous System

Very common ( $\geq 10\%$ ): hallucinations and worsening of parkinsonian symptomatology. In these trials, patients were required to be stable on the lowest effective dose of antiparkinsonian medications (dopamine agonist) prior to the beginning of the study and to remain on the same antiparkinsonian medications and dosages throughout the study. Olanzapine was started at 2.5 mg/day and titrated up to a maximum of 15 mg/day based on investigator judgment.

In clinical trials in patients with bipolar mania, olanzapine administered with lithium or valproate resulted in increased levels ( $\geq 10\%$ ) of tremor, dry mouth, increased appetite and weight gain. Speech disorder was also reported commonly (1% to 10%).

### **Adolescents (ages 13 to 17 years)**

The types of undesirable effects observed in adolescent patients treated with olanzapine were similar to those seen in adult patients. Although no clinical trials designed to compare adolescents to adults were conducted, the data from the adolescent trials were compared to those of the adult trials.

Mean increases in weight in adolescents (4.6 kg over three weeks median duration of exposure) was greater than in adults (2.6 kg over seven weeks median duration of exposure). In four placebo-controlled trials, discontinuation due to weight gain occurred in 1% of olanzapine-treated adolescent patients compared to 0% of placebo-treated adolescent patients.

In long term studies (at least 24 weeks), both the magnitude of weight gain and the proportion of adolescent patients treated with olanzapine who had clinically significant weight gain were greater than in short term studies and were greater than in adult patients with comparable exposure. The mean weight gain in adolescent patients in long-term studies was 11.2 kg. With long term exposure, approximately half of adolescent patients gained  $\geq 15\%$  and almost a third gained  $\geq 25\%$  of their baseline body weight. Among adolescent patients, mean weight gain was greatest in patients who were overweight or obese at baseline. Discontinuation due to weight gain occurred in 2.2% of olanzapine-treated adolescent patients following at least 24 weeks of exposure.

Increases in fasting glucose were similar in adolescents and adults treated with olanzapine, however the difference between olanzapine and placebo groups was greater in adolescents compared to adults.

In long term studies (at least 24 weeks), changes in fasting glucose from normal at baseline to high in adolescents were uncommon. Changes from borderline at baseline to high were very common.

Increases in fasting total cholesterol, LDL cholesterol and triglycerides were generally greater in adolescents than in adults treated with olanzapine. However, in short term studies, the differences between olanzapine and placebo were similar between adolescents and adults.

Adolescents treated with olanzapine experienced a significantly higher incidence of elevated prolactin levels and significantly higher mean increases in prolactin levels compared with adults. In adolescents elevated plasma prolactin levels were reported in approximately 47% of olanzapine-treated patients and 7% of placebo-treated patients.

The information below summarises core adverse drug reaction terms and their frequencies identified only during clinical trials in adolescent patients (ages 13 to 17 years). Actual percentages are provided for aggregate data from up to four separate studies of olanzapine in adolescent patients.

#### Body as a Whole

Very common ( $\geq 10\%$ ): weight gain  $\geq 7\%$  of baseline body weight (40.6%).

Common ( $\geq 1\%$  and  $< 10\%$ ): weight gain  $\geq 15\%$  of baseline bodyweight (7.1%).

#### Digestive System

Very common ( $\geq 10\%$ ): increased appetite (24.0%).

Common ( $\geq 1\%$  and  $< 10\%$ ): dry mouth (6.1%).

#### Nervous System

Very common ( $\geq 10\%$ ): sedation (including hypersomnia, lethargy, sedation, somnolence) (44.1%).

#### Clinical Chemistry

Very common ( $\geq 10\%$ ): ALT  $> 3$  x upper limit of normal (ULN) (all randomised patients with ALT baseline less than or equal to 3 x ULN) (12.1%), AST increased (27.6%), total bilirubin decreased (22.1%), gamma-glutamyl transferase (GGT) increased (10.1%), prolactin increased (47.4%), cholesterol total (fasting borderline to high) (38.9%), triglycerides (fasting normal to high) (26.9%), triglycerides (fasting borderline to high) (59.5%), glucose (fasting borderline to high) (14.3%).

Common ( $\geq 1\%$  and  $< 10\%$ ): cholesterol total (fasting normal to high) (6.9%).

Very rare ( $< 0.01\%$ ): glucose (fasting normal to high).

## **Adverse Events Based on Post-marketing Spontaneous Reports with Olanzapine**

### Body as a Whole

Very rare (< 0.01%): allergic reaction (e.g. anaphylactoid reaction, angioedema, pruritus or urticaria); discontinuation reaction (acute symptoms such as sweating, insomnia, tremor, anxiety, nausea or vomiting have been reported very rarely when olanzapine is stopped suddenly).

### Digestive System

Uncommon (<1% and  $\geq$ 0.1%): salivary hypersecretion.

Very rare (< 0.01%): pancreatitis.

### Hepatobiliary Disorders

Rare (< 0.1% and  $\geq$  0.01%): hepatitis.

Very rare (< 0.01%): jaundice.

### Metabolic

Rare (< 0.1% and  $\geq$  0.01%): hyperglycaemia.

Very rare (< 0.01%): diabetic coma, diabetic ketoacidosis, exacerbation of pre-existing diabetes; hypertriglyceridaemia (random triglyceride levels of  $\geq$  11.29 mmol/L); hypercholesterolaemia (random cholesterol levels of  $\geq$  6.21 mmol/L).

### Nervous System

Uncommon (< 1% and  $\geq$  0.1%): stuttering. Rare (< 0.1% and  $\geq$  0.01%): seizures.

Very rare (< 0.01%): neuroleptic malignant syndrome.

### Skin and Appendages

Rare (< 0.1% and  $\geq$  0.01%): rash.

Very rare (< 0.01%): alopecia, Drug Reaction with Eosinophilia and Systemic Symptom (DRESS).

### Urogenital System

Very rare (< 0.01%): priapism, urinary hesitation, urinary retention, urinary incontinence.

### Haematology

Very rare (< 0.01%): thrombocytopenia.

### Cardiovascular

Very rare (<0.01%): venous thromboembolism, including pulmonary embolism and deep vein thrombosis.

Cases of QT prolongation, ventricular arrhythmia, sudden unexplained death, cardiac arrest and torsades de pointes have been reported very rarely with the use of neuroleptics may be considered as a class effect.

### Musculoskeletal System

Very rare (< 0.01%): rhabdomyolysis.

### Clinical Chemistry

Very rare (< 0.01%): total bilirubin increased, creatine kinase increased.

Respiratory - Sleep apnoea syndrome. A causal association between olanzapine and sleep apnoea syndrome is suspected but has not been definitively established.

## Reporting Suspected Adverse Effects

Reporting suspected adverse reactions after registration of the medicinal product is important. It allows continued monitoring of the benefit-risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions at [www.tga.gov.au/reporting-problems](http://www.tga.gov.au/reporting-problems).

## 4.9 OVERDOSE

### Symptoms

Signs of oral toxicity in rodents were characteristic of potent neuroleptic compounds: hypoactivity, coma, tremors, clonic convulsions and salivation. In dogs, olanzapine caused sedation, ataxia, tremors, tachycardia, laboured respiration, miosis and anorexia. In monkeys, prostration and semiconsciousness were observed.

### Signs and Symptoms

Very common symptoms ( $\geq 10\%$  incidence) reported in olanzapine overdose include tachycardia, agitation/aggressiveness, dysarthria, various extrapyramidal symptoms and reduced level of consciousness ranging from sedation to coma.

Other medically significant sequelae of olanzapine overdose include delirium, convulsion, possible neuroleptic malignant syndrome, respiratory depression, aspiration, hypertension or hypotension, cardiac arrhythmias ( $< 2\%$  of overdose cases) and cardiopulmonary arrest. Fatal outcomes have been reported for acute overdoses as low as 450 mg but survival has also been reported following acute overdose of 2 g.

### Treatment

There is no specific antidote to olanzapine. Induction of emesis is not recommended. Standard procedures for management of overdose may be indicated. The possibility of multiple drug involvement should be considered.

In case of acute overdosage, establish and maintain an airway and ensure adequate oxygenation and ventilation. The use of activated charcoal for overdose should be considered because the concomitant administration of activated charcoal was shown to reduce the oral bioavailability of olanzapine by 50% to 60%. In patients who are not fully conscious or who have impaired gag reflex, consideration should be given to administering activated charcoal via a nasogastric tube, once the airway is protected. Olanzapine is not substantially removed by haemodialysis.

Symptomatic treatment and monitoring of vital organ function should be instituted according to clinical presentation, including treatment of hypotension and circulatory collapse and support of respiratory function. Hypotension and circulatory collapse should be treated with appropriate measures such as intravenous fluids and/or sympathomimetic agents such as noradrenaline (norepinephrine). Adrenaline (epinephrine), dopamine or other sympathomimetic agents should not be used since beta-stimulation may worsen hypotension in the setting of alpha-blockade induced by olanzapine. Cardiovascular monitoring should be considered to detect possible arrhythmias. Close medical supervision and monitoring should continue until the patient recovers.

For information on the management of overdosage, contact the Poisons Information Centre 13 11 26 (Australia).

## 5 PHARMACOLOGICAL PROPERTIES

### 5.1 PHARMACODYNAMIC PROPERTIES

#### Mechanism of Action

Olanzapine is an atypical antipsychotic, antimanic and mood stabilising agent that demonstrates a broad pharmacological profile across a number of receptor systems.

In preclinical studies, olanzapine exhibited a range of receptor affinities ( $K_i < 100$  nanomol) for serotonin 5HT<sub>2A/2C</sub>, 5HT<sub>3</sub>, 5HT<sub>6</sub>; dopamine D<sub>1</sub>, D<sub>2</sub>, D<sub>3</sub>, D<sub>4</sub>, D<sub>5</sub>; cholinergic muscarinic receptors m<sub>1</sub> to m<sub>5</sub>;

alpha1-adrenergic; and histamine H1-receptors. Animal behavioural studies with olanzapine indicated 5HT, dopamine and cholinergic antagonism consistent with the receptor binding profile. Olanzapine demonstrated a greater in vitro affinity for serotonin 5HT<sub>2</sub> than dopamine D<sub>2</sub>-receptors and in in vivo models, greater 5HT<sub>2</sub> than D<sub>2</sub> activity. Electrophysiological studies demonstrated that olanzapine selectively reduced the firing of mesolimbic (A10) dopaminergic neurons, while having little effect on the striatal (A9) pathways involved in motor function. Olanzapine reduced a conditioned avoidance response (a test indicative of antipsychotic activity) at doses below those producing catalepsy, an effect indicative of motor side effects. Unlike some other antipsychotic agents, olanzapine increased response in an 'anxiolytic' test.

In a single 10 mg oral dose positron emission tomography (PET) study in healthy volunteers, olanzapine produced higher receptor occupancy at the 5HT<sub>2A</sub>-receptor than at the dopamine D<sub>2</sub>-receptor. A single photon emission computed tomography (SPECT) imaging study in patients with schizophrenia revealed that olanzapine responsive patients had lower striatal D<sub>2</sub> occupancy than some other antipsychotic and risperidone responsive patients, while being comparable to clozapine responsive patients.

In two of two placebo- and two of three comparator-controlled clinical trials with over 2,900 patients with schizophrenia with both positive and negative symptoms, olanzapine was associated with statistically significantly greater improvements in negative as well as positive symptoms of schizophrenia.

## Clinical Trials

### Schizophrenia and Related Disorders

The efficacy of olanzapine in the reduction of and maintenance of the reduction of the manifestations of schizophrenia and related psychotic disorders was established in three well controlled clinical trials of psychotic inpatients who, at entry, met the Diagnostic and Statistical Manual of Mental Disorders (DSM)-III-R criteria for schizophrenia (most with a course at entry of 'chronic with acute exacerbation') and one well controlled clinical trial of psychotic inpatients and outpatients who, at entry, met the DSM-III-R criteria for schizophrenia, schizophreniform disorder or schizoaffective disorder. The age range of patients in these pivotal efficacy studies was 18 to 86 years. The results of the trials follow.

1. A 6-week placebo-controlled trial (n = 335) compared three fixed dosage ranges of olanzapine (5 +/- 2.5, 10 +/- 2.5 and 15 +/- 2.5 mg/day, once daily), one dosage range of haloperidol (15 +/- 5 mg/day, b.i.d. (twice daily)) and placebo. The two higher dosage ranges of olanzapine were statistically significantly superior to placebo on the brief psychiatric rating scale (BPRS) total, the clinical global impressions - severity of illness (CGI-S) scale, and the BPRS positive psychosis cluster. The highest dosage range of olanzapine was statistically significantly superior to placebo and to haloperidol on the scale for the assessment of negative symptoms (SANS). Efficacy of olanzapine generally increased with dose.
2. A 6-week placebo-controlled trial (n = 152) compared two fixed dosages of olanzapine (1 or 10 mg/day, once daily) and placebo. Olanzapine 10 mg/day was statistically significantly superior to placebo on the BPRS total, the BPRS positive psychosis cluster, the CGI-S scale, the positive and negative syndrome scale (PANSS) total, the PANSS positive subscale and the PANSS negative subscale.
3. A 6-week dose comparison trial (n = 431) compared three fixed dosage ranges of olanzapine (5 +/- 2.5, 10 +/- 2.5 and 15 +/- 2.5 mg/day, once daily), olanzapine (1 mg/day, once daily) and haloperidol (15 +/- 5 mg/day, b.i.d.). There were no statistically significant differences between groups on efficacy measures except for the highest dosage range of olanzapine, which was statistically significantly superior to olanzapine 1 mg on the BPRS positive psychosis cluster, PANSS positive subscale and the CGI-S scale.
4. A 6-week comparator-controlled trial (n = 1,996, 2:1 randomisation, olanzapine: haloperidol) compared one dosage range of olanzapine (5 to 20 mg/day, once daily) and one dosage range of haloperidol (5 to 20 mg/day, once daily). The acute mean maintenance modal doses (for those patients with at least three weeks of treatment) were 13.2 mg/day for olanzapine and 11.8 mg/day for haloperidol. Olanzapine

was statistically significantly superior to haloperidol on the BPRS total, the BPRS negative psychosis cluster, the PANSS negative subscale and the CGI-S scale. Olanzapine was also statistically significantly superior to haloperidol on the Montgomery-Asberg depression rating scale (MADRS).

5. The effectiveness of olanzapine in long-term therapy (i.e. > 6-weeks) was evaluated in three double blind controlled extension maintenance trials (of acute trials 1, 3 and 4, above). Patients who showed adequate clinical improvement following double blind acute therapy were allowed to continue on their acute dosage regimen in a double-blind long-term extension maintenance phase. Long-term maintenance of response (i.e. continued reduction in signs and symptoms sufficient to not require hospitalisation for psychosis) was compared over time and the percentage of patients completing one year of treatment was compared. Olanzapine was statistically significantly superior to placebo in the one placebo-controlled trial and was comparable or statistically significantly superior to haloperidol in three of three active comparator-controlled trials.

The above trials (including open label extensions) and an additional trial comprising elderly patients with primary degenerative dementia of the Alzheimer's type constitute the integrated primary database (n = 2,500 patients treated with olanzapine, corresponding to 1,122.2 patient years; n = 810 patients treated with haloperidol, corresponding to 193.0 patient years; n = 236 patients treated with placebo, corresponding to 27.1 patient years).

#### Acute Mania Associated with Bipolar Disorder

The efficacy of olanzapine in the treatment of acute manic episodes was established in two short-term (one 3-week and one 4-week) placebo-controlled trials and one 6-week comparator-controlled trial, comparing olanzapine to placebo when each was added to lithium or valproate, in patients who met the DSM-IV criteria for bipolar I disorder with manic or mixed episodes. These trials included patients with or without psychotic features and with or without a rapid cycling course.

Several instruments were used for assessing manic symptoms in these trials. The Young Mania Rating Scale (Y-MRS) is an eleven-item clinician rated scale traditionally used to assess the degree of manic symptomatology in a range from 0 (no manic features) to 60 (maximum score). A second assessment, the Clinical Global Impression - Bipolar Version (CGI-BP), reflects the clinician's impression of the severity of the patient's mania and overall bipolar illness in a range from 1 (normal, not ill) to 7 (very severely ill). Additional secondary assessments in the comparator-controlled trial included the Positive and Negative Symptom Scale (PANSS) (total, positive and negative) and the Hamilton Depression Rating Scale-21 (HAM-D-21). The results of the trials follow:

1. In a 3-week placebo-controlled trial (n = 139) which involved a dose range of olanzapine (5 to 20 mg/day, once daily, starting at 10 mg/day), olanzapine was superior to placebo in the reduction of Y-MRS total score, the PANSS total score, the PANSS positive subscale and the CGI-BP severity of mania score.
2. In a 4-week placebo-controlled trial (n = 115) which involved a dose range of olanzapine (5 to 20 mg/day, once daily, starting at 15 mg/day), olanzapine was superior to placebo in the reduction of Y-MRS total score, the PANSS total score, the PANSS positive subscale, the CGI-BP severity of mania score and the CGI-BP severity of overall bipolar illness score.
3. In a 6-week co-therapy study (n = 344) of patients treated with lithium or valproate for a minimum of two weeks, the addition of olanzapine 10 mg (co-therapy with lithium or valproate) resulted in a greater reduction in symptoms of mania (Y-MRS total score) than lithium or valproate monotherapy after six weeks.

In patients with a manic or mixed episode of bipolar disorder, olanzapine demonstrated superior efficacy to valproate semisodium (divalproex) in reduction of manic symptoms over three weeks.

#### Preventing Recurrence in Bipolar Disorder

In a 12-month recurrence prevention study, patients (n = 361) who met DSM-IV criteria for Bipolar I Disorder and who were in symptomatic remission following a 6- to 12-week period of olanzapine treatment were randomised to continuation of their current olanzapine doses (ranging from 5 to 20 mg) or placebo for up to 12 months. Olanzapine demonstrated statistically significant superiority over placebo in delaying time to symptomatic bipolar recurrence (174 days until 50% of olanzapine patients experienced recurrence versus 22 days for placebo). Olanzapine also showed a statistically significant advantage over placebo in terms of either recurrence into mania or recurrence into depression, although a greater advantage was seen in preventing recurrence into mania. The criteria for recurrence were hospitalisation for relapse or worsening in total scores of Y-MRS or HAMD-21. In a second 12-month recurrence prevention study in manic episode patients stabilised with a combination of olanzapine and lithium and then randomised to olanzapine or lithium alone, olanzapine was numerically but not statistically superior to lithium in rate of symptomatic bipolar recurrence (30.0 versus 38.8%, respectively; p = 0.055). Olanzapine showed a statistically significant advantage over lithium on recurrence into mania and was not statistically significantly different from lithium on recurrence into depression.

In an 18-month co-therapy recurrence prevention study in manic episode patients stabilised with olanzapine plus mood stabilisers (lithium or valproate), olanzapine co-therapy was numerically but not statistically superior to mood stabiliser alone in delaying time to syndromic bipolar recurrence (119 days until 25% of olanzapine patients experienced recurrence versus 29 days for placebo). The incidence of recurrence of mania was statistically significantly less for olanzapine co-therapy than for patients receiving placebo plus mood stabiliser.

## 5.2 PHARMACOKINETIC PROPERTIES

### Absorption

Olanzapine is well absorbed after oral administration, reaching peak plasma concentrations within five to eight hours. Absorption is not affected by food. Plasma concentrations of olanzapine after oral administration were linear and dose proportional in trials studying doses from 1 to 20 mg.

### Distribution

The plasma protein binding of olanzapine is about 93% over the concentration range of about 7 to about 1,000 ng/mL. Olanzapine is bound to albumin and  $\alpha$ 1-acid glycoprotein.

### Metabolism

Olanzapine is metabolised in the liver by conjugative and oxidative pathways. The major circulating metabolite is the N-10-glucuronide which does not pass the blood brain barrier. Cytochromes P450 CYP1A2 and P450 CYP2D6 contribute to the formation of the N-desmethyl and 2-hydroxymethyl metabolites. Both metabolites exhibited significantly less in vivo pharmacological activity than olanzapine in animal studies. The predominant pharmacological activity is from the parent olanzapine.

### Excretion

After oral administration to healthy subjects, the mean terminal elimination half-life was 33 hours (21 to 54 hours for 5th to 95th percentile) and the mean olanzapine plasma clearance was 26 L/hour (12 to 47 L/hour for the 5th to 95th percentile). Olanzapine pharmacokinetics varied on the basis of smoking status, gender and age.

In healthy elderly ( $\geq 65$  years) subjects versus non-elderly healthy subjects, the mean elimination half-life of olanzapine was prolonged (51.8 hours versus 33.8 hours) and the clearance was reduced (17.5 L/hour versus 18.2 L/hour). The pharmacokinetic variability observed in elderly subjects is within the variability seen in non-elderly subjects. In 44 patients greater than 65 years of age with schizophrenia, dosing from 5 to 20 mg/day was not associated with any distinguishing profile of adverse events.

In female versus male subjects, the mean elimination half-life was somewhat prolonged (36.7 hours versus 32.3 hours) and the clearance was reduced (18.9 L/hour versus 27.3 L/hour). However, olanzapine (5 to 20 mg) demonstrated a comparable safety profile in female (n = 467) as in male patients (n = 869).

Smoking induces the CYP1A2 metabolism of olanzapine. Therefore, in smokers the clearance of olanzapine is higher, on average, than the clearance in non-smokers.

The plasma clearance of olanzapine is lower in elderly versus nonelderly subjects and in females versus males. The magnitude of the impact of age, gender or smoking on olanzapine clearance and half-life is small in comparison to the overall variability between individuals.

Approximately 57% of radiolabelled olanzapine is excreted in urine, principally as metabolites, approximately 7% is excreted unchanged in the urine after a single oral dose and approximately 30% is excreted in the faeces.

### **Renal Impairment**

Only incomplete information is available on excretion in patients with impaired renal function (creatinine clearance < 10 mL/minute) versus healthy subjects, suggesting there was no significant difference in mean elimination half-life (37.7 hr versus 32.4 hr) or drug clearance (21.2 L/hr versus 25.0 L/hr). The available data indicate a trend for decreased clearance and increased half-life with renal impairment. Consequently, caution should be exercised in prescribing olanzapine for patients with renal impairment, particularly in those with severe renal disease, and in the elderly. Olanzapine is not removed by dialysis. The effect of renal impairment on metabolite elimination has not been studied.

### **Hepatic Impairment**

Although the presence of hepatic impairment may be expected to reduce the clearance of olanzapine, a study of the effect of impaired liver function in male subjects (n = 6) with clinically significant (Child-Pugh Classification A and B) cirrhosis revealed little effect on the pharmacokinetics of olanzapine in the dose range 2.5 to 7.5 mg daily. Consequently, dosage adjustment may not be necessary if hepatic impairment is the sole consideration.

### **ZYPINE ODT wafers**

ZYPINE ODT wafers are bioequivalent to ZYPINE coated tablets, with a similar rate and extent of absorption. ZYPINE ODT wafers may be used as an alternative to ZYPINE coated tablets.

The pharmacokinetic results of the bioequivalence study (OLAN-07147) for olanzapine tablets are as follows:  $C_{max}$  14.51 ng/mL (9.68 – 19.86 ng/mL);  $T_{max}$  3.74 hr (2.00 – 7.50 hr) and  $t_{1/2}$  41.55 hr (29.38 – 51.49 hr).

A bioequivalence study on 24 subjects has been conducted comparing the generic olanzapine 5 mg wafers with the originator olanzapine 5 mg wafers. The generic and originator mean  $C_{max}$  for olanzapine was 9.39 and 9.38 ng/mL respectively. The  $C_{max}$  ratio of generic to originator olanzapine was 0.9934 with the 90% confidence interval between 92.20% - 107.03%. The mean  $AUC_{0-t}$  ratio of generic to originator olanzapine was 0.9826 with the 90% confidence interval between 93.72% - 103.01%. The  $T_{max}$  for generic and originator was 4.61 and 4.43 hr respectively.

## **5.3 PRECLINICAL SAFETY DATA**

### **Genotoxicity**

Olanzapine was not mutagenic or clastogenic in a full range of standard tests, which included bacterial mutation tests and in vitro and in vivo tests, indicating that it is not a genotoxic carcinogen.

### **Carcinogenicity**

Carcinogenicity studies in mice and rats showed the development of mammary adenocarcinomas at oral doses greater than 0.5 and 1 mg/kg/day respectively.

The increased incidence of mammary tumours may be due to an endocrine mechanism, possibly involving elevation of circulating prolactin levels in response to the dopamine D2-receptor antagonistic activity of olanzapine. Mammary tumours are known to occur in rats and mice treated with other drugs that antagonise dopamine D2-receptors. Neither clinical studies nor epidemiological studies conducted to date have shown an

association between these drugs and carcinogenesis, but the available evidence is considered too limited to be conclusive at this time. The use of olanzapine in patients with a familial history or previously detected breast cancer should be avoided. Caution should also be exercised when considering olanzapine treatment in patients with pituitary tumours.

## 6 PHARMACEUTICAL PARTICULARS

### 6.1 LIST OF EXCIPIENTS

#### ZYPINE Tablets

ZYPINE tablets contain the following inactive excipients:

- lactose monohydrate
- maize starch
- pregelatinized maize starch
- crospovidone
- magnesium stearate
- Opadry AMB OY-B-28920 (Proprietary Ingredient number: 10274)

#### ZYPINE ODT Wafers

ZYPINE ODT wafers contain the following inactive excipients:

- mannitol
- microcrystalline cellulose
- guar gum
- crospovidone
- magnesium stearate
- colloidal anhydrous silica
- aspartame
- sodium lauryl sulfate

### 6.2 INCOMPATIBILITIES

Incompatibilities were either not assessed or not identified as part of the registration of this medicine.

### 6.3 SHELF LIFE

In Australia, information on the shelf life can be found on the public summary of the Australian Register of Therapeutic Goods (ARTG). The expiry date can be found on the packaging.

### 6.4 SPECIAL PRECAUTIONS FOR STORAGE

#### ZYPINE Tablets

Store below 25°C.

#### ZYPINE ODT Wafers

Store below 25°C in original container. Protect from light and moisture.

## 6.5 NATURE AND CONTENTS OF CONTAINER

### ZYPINE Tablets

Container type: blister pack (PA/Al/PVC/Al)

Pack size: 28 tablets.

### ZYPINE ODT Wafers

Container type: blister pack (PA/Al/PVC/Al)

Pack sizes: 5, 7 or 28 wafers

Some strengths, pack sizes and/or pack types may not be marketed.

## 6.6 SPECIAL PRECAUTIONS FOR DISPOSAL

In Australia, any unused medicine or waste material should be disposed of by taking it to your local pharmacy.

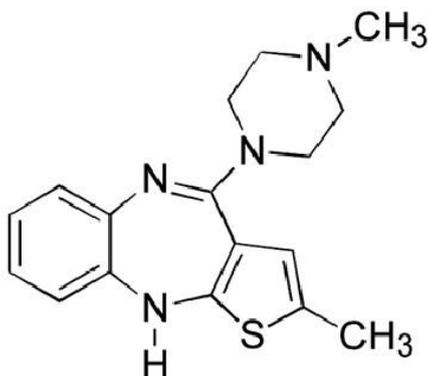
## 6.7 PHYSICOCHEMICAL PROPERTIES

Olanzapine is a yellow crystalline powder that is practically insoluble in water.

### Chemical Structure

Chemical name : 2-methyl-4-(4-methyl-1-piperazinyl)-10H-thieno[2,3-b][1,5] benzodiazepine

Structural formula :



Molecular Formula: C<sub>17</sub>H<sub>20</sub>N<sub>4</sub>S

Molecular Weight: 312.44

### CAS Number

132539-06-1

## 7 MEDICINE SCHEDULE (POISONS STANDARD)

S4 (Prescription Only Medicine)

## 8 SPONSOR

**Alphapharm Pty Limited/Mylan Health Pty Limited**

Level 1, 30 The Bond

30 – 34 Hickson Road

Millers Point NSW 2000

ABN 93 002 359 739

[www.mylan.com.au](http://www.mylan.com.au)

## 9 DATE OF FIRST APPROVAL

ZYPINE 2.5 mg, 5 mg, 7.5 mg, 10 mg – 07/11/2011

ZYPINE ODT 5 mg and 10 mg – 29/11/2011

ZYPINE ODT 20 mg - 20/06/2012

ZYPINE ODT 15 mg– 21/06/2012

## 10 DATE OF REVISION

09/01/2020

### Summary Table of Changes

Section Changed	Summary of New Information
4.4	Addition of safety information – sleep apnoea.
4.8	Addition of safety information – Digestive system, haematology, clinical chemistry and respiratory.

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