



APO-OLANZAPINE

**Olanzapine 2.5mg, 5mg, 7.5mg, 10mg, 20mg film coated tablets
and
Olanzapine 5mg, 10mg, 15mg, 20mg orally-disintegrating tablets**

Presentation

APO- OLANZAPINE is available as oral, film coated tablets in the following strengths:

2.5mg APO-OLANZAPINE: White, round, biconvex film-coated tablet. Engraved "APO' on one side, "OLA" over "2.5" on the other side.

5mg APO-OLANZAPINE: White, round, biconvex film-coated tablet. Engraved "APO' on one side, "OLA" over "5" on the other side.

7.5mg APO-OLANZAPINE: White, round, biconvex film-coated tablet. Engraved "APO' on one side, "OLA" over "7.5" on the other side.

10mg APO-OLANZAPINE: White, round, biconvex film-coated tablet. Engraved "APO' on one side, "OLA" over "10" on the other side.

15mg APO-OLANZAPINE: Light blue, elliptical, biconvex film-coated tablet. Engraved "APO' on one side, "OLA 15" on the other side.

20mg APO-OLANZAPINE: Light pink, elliptical, biconvex film-coated tablet. Engraved "APO' on one side, "OLA 20" on the other side.

APO- OLANZAPINE is also available as orally-disintegrating tablets in the following strengths:

5mg APO-OLANZAPINE ODT: Yellow, round, flat faced beveled edge tablet. Engraved "APO' on one side, "OL" over "5" on the other side.

10mg APO-OLANZAPINE ODT: Yellow, round, flat faced beveled edge tablet. Engraved "APO' on one side, "OL" over "10" on the other side.

15mg APO-OLANZAPINE ODT: Yellow, round, flat faced beveled edge tablet. Engraved "APO' on one side, "OL" over "15" on the other side.

20mg APO-OLANZAPINE ODT: Yellow, round, flat faced beveled edge tablet. Engraved "APO' on one side, "OL" over "20" on the other side.

Uses

Actions

Pharmacodynamics

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



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In preclinical studies, olanzapine exhibited a range of receptor affinities (K_i ; < 100 nmol) for serotonin 5HT_{2A/2C}, 5HT₃, 5HT₆; dopamine D₁, D₂, D₃, D₄, D₅; cholinergic muscarinic receptors m₁ - m₅; α ₁ 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 5HT₂ than dopamine D₂ receptors and in *in-vivo* models, greater 5HT₂ than D₂ 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 responding 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_{2A} receptor than at the dopamine D₂ receptor. A Single Photon Emission Computed Tomography (SPECT) imaging study in schizophrenic patients revealed that olanzapine-responsive patients had lower striatal D₂ 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 schizophrenic patients, with both positive and negative symptoms, olanzapine film coated tablets was associated with statistically significantly greater improvements in negative as well as positive symptoms of schizophrenia.

Pharmacokinetics

Olanzapine is well absorbed after oral administration, reaching peak plasma concentrations within 5 to 8 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.

Olanzapine is metabolised in the liver by conjugative and oxidative pathways. The major circulating metabolite is the 10-N-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-hydroxy-methyl metabolites, both exhibited significantly less *in vivo* pharmacological activity than olanzapine in animal studies. The predominant pharmacologic activity is from the parent olanzapine.

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/hr (12 to 47 L/hr 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 hr vs 33.8 hr) and the clearance was reduced (17.5 L/hr vs 18.2 L/hr). The pharmacokinetic variability observed in elderly subjects is within the variability seen in non-elderly subjects. In 44 patients with schizophrenia > 65 years of age, dosing from 5 to 20 mg/day was not associated with any distinguishing profile of adverse events.



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In female versus male subjects, the mean elimination half-life was somewhat prolonged (36.7 hr vs 32.3 hr) and the clearance was reduced (18.9 L/hr vs 27.3 L/hr). However, olanzapine film coated tablets (5-20 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 nonsmokers.

The plasma clearance of olanzapine is lower in elderly versus non-elderly 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.

The plasma protein binding of olanzapine is about 93% over the concentration range of about 7 to about 1000 ng/mL. Olanzapine is bound to albumin and α 1 acid glycoprotein.

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 renal-impaired patients (creatinine clearance < 10 mL/min) versus healthy subjects, suggesting there was no significant difference in mean elimination half-life (37.7 hr vs 32.4 hr) or drug clearance (21.2 L/hr vs 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 and 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 (Childs Pugh Classification A and B) cirrhosis revealed little effect on the pharmacokinetics of olanzapine in the dose range 2.5 - 7.5 mg daily. Consequently, dosage adjustment may not be necessary if hepatic impairment is the sole consideration.

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



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Table 1: Mean and range of olanzapine pharmacokinetic variables for a single dose of olanzapine as 10 mg orally versus 10 mg intramuscularly administered as two 5 mg doses 4 hours apart.

Pharmacokinetic Variable	(units)	Orally Administered Olanzapine 10 mg		Intramuscularly Administered Olanzapine 2x5 mg 4 hrs Apart	
		Mean	(range)	Mean	(range)
C _{max}	(ng/mL)	15.1	(6.6 to 22.4)	23.7 ^a	(13.1 to 43.2) ^a
AUC _{0-∞}	(hr)	499	(287 to 838)	522	(353 to 792)
CL _p	(L/hr)	22.1	(11.9 to 34.8)	20.2	(12.6 to 28.3)
t _{1/2}	(hr)	31.0	(20.0 to 44.2)	30.4	(20.4 to 39.1)

^a The C_{max} values in this table for olanzapine IM cannot be directly compared to those for the 10 mg oral dose. The IM dose was divided into two 5 mg doses 4 hours apart and the C_{max} values generally reflect the second IM 5 mg dose.

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 3, well-controlled clinical trials of psychotic inpatients who, at entry met the DSM-III-R criteria for schizophrenia (most with a course at entry of "chronic with acute exacerbation") and 1 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 were 18-86 years. The results of the trials follow:

1. A 6 week, placebo-controlled trial (n=335) compared 3 fixed dosage ranges of olanzapine [5 ± 2.5, 10 ± 2.5 and 15 ± 2.5 mg/day (once daily)], 1 dosage range of haloperidol (15 ± 5 mg/day BID) and placebo. The 2 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 2 fixed doses 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.



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3. A 6-week, dose comparison trial (n = 431) compared 3 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 BD). 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 = 1996, 2:1 randomisation, olanzapine : haloperidol) compared 1 dosage range of olanzapine [5 to 20 mg/day (once daily)] and 1 dosage range of haloperidol [5 to 20 mg/day (once daily)]. The acute mean maintenance modal doses (for those patients with at least 3 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, ie. > 6 weeks, was evaluated in 3 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 regime in a double-blind, long-term extension maintenance phase. Long-term maintenance of response (ie. 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 3 of 3 active comparator-controlled trials.

The above trials (including open-label extension) and an additional trial comprising geriatric patients with primary degenerative dementia of the Alzheimer's type constitute the integrated primary database (n = 2500 patients treated with olanzapine, corresponding to 1122.2 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 2 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 11-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



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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 (HAMD-21). The results of the trials follow:

1. In a 3-week placebo controlled trial (n=139) which involved a dose range of olanzapine (5-20 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 (5-20 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 2 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 6 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 3 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 vs 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 Young Mania Rating Scale (Y-MRS) or Hamilton Psychiatric Rating Scale for Depression-21 Items (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% vs 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



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recurrence (119 days until 25% of olanzapine patients experienced recurrence vs 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.

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.

Dosage and Administration

Schizophrenia and Related Disorders

The recommended starting dose for olanzapine is 5-10 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 - 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 mg to 20 mg/day in clinical trials. The safety of doses above 20mg/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 mg to 20 mg per day. Olanzapine may be given without regard to meals, as its absorption is not affected by food.

Olanzapine Zydys wafers should be placed in the mouth, where the wafer will rapidly disperse in saliva, so it can be easily swallowed. Removal of the intact wafer from the mouth is difficult. Since the wafer is fragile, it should be taken immediately on opening the blister. Alternatively, it may be dispersed in a full glass of water or other suitable beverage (orange juice, apple juice, milk or coffee) immediately before administration. The wafer should not be dispersed in cola beverages.



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Olanzapine orally-disintegrating tablets are bioequivalent to olanzapine film coated tablets, with a similar rate and extent of absorption. Olanzapine orally-disintegrating tablets have the same dosage and frequency of administration as olanzapine film coated tablets. Olanzapine orally-disintegrating tablets may be used as an alternative to olanzapine film coated tablets.

Children

Olanzapine has not been studied in patients under 18 years of age.

Elderly patients

A low starting dose of 5 mg/day should be considered for those patients 65 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 PRECAUTIONS - Drug Interactions and PHARMACOLOGY - Pharmacokinetics).

Contraindications

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

Warnings and Precautions

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 illnesses

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



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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 anti-diabetic treatment despite discontinuation of the suspect drug.

Lipid Alterations

Undesirable alterations in lipids have been observed in olanzapine-treated patients in placebo-controlled trials. Appropriate clinical monitoring is recommended (see Adverse 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 Adverse Effects).

Hepatic

Transient, asymptomatic elevations of hepatic transaminases, alanine transferase (ALT), aspartate transferase (AST) have been seen occasionally, especially in early treatment. Rare postmarketing reports of hepatitis have been received. Very rare cases of jaundice, cholestatic or mixed liver injury have also been reported in the postmarketing period (see Adverse 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. In the event of elevated ALT and/or AST during treatment, follow-up should be organised and dose reduction should be considered.



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Blood

As with other neuroleptic drugs, caution should be exercised in patients with low leukocyte 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 with myeloproliferative disease. Thirty-two 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 3-4 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 haematologic 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 Adverse Effects).

Neuroleptic Malignant Syndrome (NMS)

NMS, a potentially fatal syndrome complex, is associated with antipsychotic drugs, including olanzapine (see Adverse 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 creatinine 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 Adverse Effects).

Tardive dyskinesia

In comparator studies of one year or less 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 temporally deteriorate or even arise after discontinuation of treatment.

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.



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In clinical trials, olanzapine was not associated with a persistent increase in absolute QT intervals. Only 8 of 1685 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% vs. 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 ischemic 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% vs. 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 ischemic 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 ZYPREXA 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. ZYPREXA and other antipsychotic agents should be used cautiously in patients at risk for aspiration pneumonia.



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

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.

Carcinogenicity and Mutagenicity

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. 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. 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 familial history or previously detected breast cancer should be avoided. Caution should also be exercised when considering olanzapine treatment in patients with pituitary tumours.

Impairment of Fertility

In male rats dosed orally with olanzapine at 22.5 mg/kg/day, mating performance was impaired as a result of the drug's sedative activity, but fertility was normal 10 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

Category B3. There are no adequate and well-controlled studies in pregnant women. Patients should be advised to notify their physician if they become pregnant or intend to become pregnant during treatment with olanzapine. Since there is limited clinical experience, olanzapine should be used in pregnancy only if the potential benefits justify the potential risk to the foetus.

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. Foetal weight was decreased in both species at oral doses greater than 1 and 8 mg/kg/day respectively, and foetal 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.



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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 breast feed if they are taking olanzapine.

Hyperprolactinaemia

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

Adverse Effects

Adverse events identified from clinical trials of olanzapine:

Body as a whole - Very common (≥ 10%): weight gain: weight gain ≥ 7% baseline body weight. Common (≥ 1% and < 10%): asthenia, fatigue, weight gain ≥ 15% baseline body weight. Uncommon (≥ 0.1% and < 1%): photosensitivity reaction.

Weight: In randomised controlled trials, mean weight gain was greater in patients treated with olanzapine than with placebo. Clinically significant weight gain was observed across all baseline Body Mass Index (BMI) categories.

Cardiovascular system - Common (≥ 1% and < 10%): orthostatic hypotension. Uncommon (≥ 0.1% and < 1%): bradycardia.

Digestive system - Common (≥ 1% and < 10%): constipation; dry mouth; increased appetite.

Metabolic - Common (≥ 1% and < 10%): peripheral oedema. Rare (< 0.1% and ≥ 0.01%): elevated creatinine phosphokinase levels.

Nervous system - Very common (≥ 10%): somnolence. Common (≥ 1% and < 10%): dizziness; akathisia.

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 can not be concluded at present that olanzapine produces less tardive dyskinesia and/or other tardive extrapyramidal syndromes.



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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.

Glucose: In adult clinical trials (up to 52 weeks) olanzapine was associated with a greater mean change in glucose relative to placebo. The difference in mean changes between olanzapine and placebo was greater in patients with evidence of glucose dysregulation at baseline (including those patients with diabetes mellitus or who met criteria suggestive of hyperglycaemia), and these patients had a greater increase in HbA1c compared to placebo.

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

Lipids: In adult clinical trials of up to 12 weeks in duration, olanzapine-treated 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 HDL cholesterol, no statistically significant differences were observed between olanzapine-treated patients and placebo-treated patients.

Prolactin: Plasma prolactin levels were sometimes elevated, but associated clinical manifestations (eg. gynaecomastia, galactorrhoea and breast enlargement) were rare. In most patients, levels returned to normal ranges without cessation of treatment.

Haematology - Common ($\geq 1\%$ and $< 10\%$): eosinophilia.

Eosinophilia: Asymptomatic eosinophilia was occasionally seen.

Undesirable Effects for Special Populations

Undesirable effects associated with the use of olanzapine in clinical trials with elderly patients with dementia-related psychosis:

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:



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Nervous system - Very common (≥ 10%): Hallucinations and worsening of Parkinsonian symptomatology. In these trials, patients were required to be stable on the lowest effective dose of anti-Parkinsonian medications (dopamine agonist) prior to the beginning of the study and to remain on the same anti-Parkinsonian 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 judgement.

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

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 3 weeks median duration of exposure) was greater than in adults (2.6 kg over 7 weeks median duration 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.

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

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):

Body as a whole - Very common (≥ 10%): weight gain ≥ 7% of baseline body weight. Common (≥ 1% and < 10%): weight gain ≥ 15% of baseline body weight.

Digestive system - Very common (≥ 10%): increased appetite. Common (≥ 1% and < 10%): dry mouth.

Nervous system - Very common (≥ 10%): sedation (including hypersomnia, lethargy, sedation, somnolence).

Clinical chemistry - Very common (≥ 10%): ALT > 3xULN (all randomised patients with ALT baseline ≤ 3xULN), AST-increased, total bilirubin-decreased, GGT-increased, prolactin-increased, cholesterol-total (fasting borderline to high), triglycerides (fasting normal to high), triglycerides (fasting borderline to high), glucose (fasting borderline to high). Common (≥ 1% and < 10%): cholesterol-total (fasting normal to high). Very rare (< 0.01%): glucose (fasting normal to high).



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Adverse events based on post marketing spontaneous reports with oral olanzapine:

Body as a Whole - Very rare (< 0.01%): allergic reaction (e.g. anaphylactoid reaction, angioedema, pruritis 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 - Very rare (< 0.01%): pancreatitis.

Hepatobiliary disorders - Rare (< 0.1% and ≥ 0.01%): hepatitis. Very rare (< 0.01%): jaundice.

Metabolic - Rare (< 0.01% and ≥ 0.01%): hyperglycaemia. Very rare (< 0.01%): diabetic coma; diabetic ketoacidosis; exacerbation of pre-existing diabetes; hypertriglyceridemia (random triglyceride levels of ≥ 11.29 mmol/L); hypercholesterolaemia (random cholesterol levels of ≥ 6.21 mmol/L).

Nervous system - Rare (< 0.1% and ≥ 0.01%): seizures. Very rare (< 0.01%): neuroleptic malignant syndrome.

Skin and Appendages - Rare (< 0.1% and ≥ 0.01%): rash. Very rare (< 0.01%): alopecia.

Urogenital system - Very rare (< 0.01%): priapism; urinary hesitation.

Haematology - Rare (< 0.1% and ≥ 0.01%): leucopenia, including neutropenia. Very rare (< 0.01%): thrombocytopenia.

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

Musculoskeletal System - Very rare (< 0.01%): rhabdomyolysis.

Clinical chemistry - Very rare (< 0.01%): alkaline phosphatase increased; total bilirubin increased.

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.

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



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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, is 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, such as ciprofloxacin.

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 coadministered with lithium or biperiden. The *in vitro* ability of olanzapine to inhibit metabolism by five principle cytochromes has been examined. These studies found inhibitory constants for 3A4 (491 mcM), 2C9 (751 mcM), 1A2 (36 mcM), 2C19 (920 mcM), 2D6 (89 mcM) that compared to olanzapine plasma concentrations of approximately 0.2 mcM, 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 10 mg olanzapine for 2 weeks did not affect steady state plasma concentrations of valproate. Therefore, concomitant olanzapine administration does not require dosage adjustment of valproate.

Effects on Ability to Drive and Operate Machinery

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

Effects on Laboratory Tests

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



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Overdosage

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 semi-consciousness 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 1500 mg.

Management of Overdose -

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. Adrenaline, dopamine or other sympathomimetic agents should not be used since beta stimulation may worsen hypotension in the setting of alpha blockade induced by olanzapine. Cardio-vascular monitoring should be considered to detect possible arrhythmias. Close medical supervision and monitoring should continue until the patient recovers.

Contact the Poisons Information Centre in Australia (telephone 13 11 26) or the National Poisons Centre in New Zealand (telephone 0800 POISON or 0800 764 766) for advice on management of overdose with olanzapine.



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Pharmaceutical Precautions

Shelf-life: 24 months stored at or below 25°C protected from heat, light and moisture.

Medicine Classification

Prescription Medicine

Package Quantities

APO-OLANZAPINE 2.5mg, 5mg, 7.5mg, 10mg, 15mg & 20mg film coated tablets are available as Blister packs of 28 tablets and bottle packs of 100 & 500 tablets.

APO-OLANZAPINE ODT 5mg, 10mg, 15mg & 20mg orally-disintegrating tablets are available as Blister packs of 28 tablets and bottle packs of 100 & 500 tablets.

Further Information

APO-OLANZAPINE film coated tablets contain the following excipients:

Lactose Monohydrate, Microcrystalline Cellulose, Corn Starch, Magnesium Stearate (Vegetable Source), Hydroxypropyl Methylcellulose, Hydroxypropyl Cellulose Type LF, Polyethylene Glycol 8000, Titanium Dioxide, Indigotine Al Lake 12-14% (Blue#2) (15mg tablets only), Red Ferric Oxide and Yellow Ferric Oxide (20mg tablets only).

APO-OLANZAPINE ODT orally-disintegrating tablets contain the following excipients:

Mannitol, Microcrystalline Cellulose, Carboxymethylcellulose Calcium, Sucralose, Magnesium Stearate (Vegetable Source) and Colloidal Silicon Dioxide.

APO-OLANZAPINE contains lactose.

APO-OLANZAPINE ODT contains sucralose.

APO-OLANZAPINE and APO-OLANZAPINE ODT does not contain gluten.

Name and Address

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Date of Preparation

31 August 2010