

## Paliperidone

### Introduction

The treatment of bipolar disorder is complex due to the presence of varying configurations of symptoms in patients. The primary treatments for bipolar disorder are pharmacological, and often involve antipsychotic drugs such as the second-generation antipsychotic, paliperidone.

### Method

We have included only systematic reviews (systematic literature search, detailed methodology with inclusion/exclusion criteria) published in full text, in English, from the year 2010 that report results separately for people with a diagnosis of bipolar or related disorders. Reviews were identified by searching the databases MEDLINE, EMBASE, and PsycINFO. Hand searching reference lists of identified reviews was also conducted. When multiple copies of review topics were found, the most recent and/or comprehensive review was included. Reviews with pooled data are prioritised for inclusion.

Review reporting assessment was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist that describes a preferred way to present a meta-analysis<sup>1</sup>. Reviews reporting less than 50% of items have been excluded from the library. The PRISMA flow diagram is a suggested way of providing information about studies included and excluded with reasons for exclusion. Where no flow diagram has been presented by individual reviews, but identified studies have been described in the text, reviews have been checked for this item. Note that early reviews may have been guided by less stringent reporting checklists than the PRISMA, and that some reviews may have been limited by journal guidelines.

Evidence was graded using the Grading of Recommendations Assessment, Development and Evaluation ([GRADE](#)) Working Group approach where high quality evidence such as

that gained from randomised controlled trials (RCTs) may be downgraded to moderate or low if review and study quality is limited, if there is inconsistency in results, indirect comparisons, imprecise or sparse data and high probability of reporting bias. It may also be downgraded if risks associated with the intervention or other matter under review are high. Conversely, low quality evidence such as that gained from observational studies may be upgraded if effect sizes are large or if there is a dose dependent response. We have also taken into account sample size and whether results are consistent, precise and direct with low associated risks (see end of table for an explanation of these terms)<sup>2</sup>. The resulting table represents an objective summary of the available evidence, although the conclusions are solely the opinion of staff of NeuRA (Neuroscience Research Australia).

### Results

We found four reviews that met our inclusion criteria<sup>3-6</sup>.

- Moderate quality evidence suggests small to medium-sized effects of greater improvement in acute mania symptoms with paliperidone than with placebo or topiramate, although there was greater improvement with tamoxifen than with paliperidone. There was less all-cause discontinuation with paliperidone than with topiramate.
- Moderate to low quality evidence suggests there may be lower rates of somnolence with paliperidone than with quetiapine.
- Moderate to low quality evidence suggests no consistent differences in rates of weight gain between paliperidone and placebo.
- Moderate quality evidence suggests paliperidone may be more likely to elevate prolactin levels than placebo, quetiapine or olanzapine.



## Paliperidone

Fang F, Sun H, Wang Z, Ren M, Calabrese JR, Gao K

### Antipsychotic Drug-Induced Somnolence: Incidence, Mechanisms, and Management

CNS Drugs 2016; 30: 845-67

[View review abstract online](#)

<b>Comparison</b>	Paliperidone vs. placebo or other medications.
<b>Summary of evidence</b>	Moderate to low quality evidence (medium to large samples, inconsistent, imprecise, direct) suggests no consistent differences in rates of somnolence between paliperidone and placebo. There may be lower rates of somnolence with paliperidone than with quetiapine.
<b>Somnolence</b>	
<p><i>Paliperidone had significantly higher rates of somnolence than placebo in one of two trials;</i>                      1 x 24 month trial (3-12 mg/d), N = 296, absolute risk increase = 3.4, 95%CI 0.2 to 7.6, <math>p &lt; 0.05</math>                      1 x 3 week trial (3-12 mg/d), N = 299, absolute risk increase = 6.0, 95%CI -0.6 to 11.5, <math>p &gt; 0.05</math></p> <p><i>Paliperidone had significantly lower rates of somnolence than quetiapine;</i>                      1 x 3-12 week trial (3-12 mg/d), N = 386, absolute risk increase = -8.4, 95%CI -15.4 to -1.5, <math>p &lt; 0.05</math></p> <p><i>There were no significant differences between paliperidone and olanzapine;</i>                      1 x 24 month trial (3-12 mg/d), N = 232, absolute risk increase = 1.1, 95%CI -1.5 to 6.5, <math>p &gt; 0.05</math></p>	
<b>Consistency in results<sup>†</sup></b>	Appears inconsistent for placebo, N/A for 1 RCT.
<b>Precision in results<sup>§</sup></b>	Appears imprecise.
<b>Directness of results<sup>  </sup></b>	Direct

Fang F, Wang Z, Wu R, Calabrese JR, Gao K

### Is there a 'weight neutral' second-generation antipsychotic for bipolar disorder?

Expert Review of Neurotherapeutics 2017; 17: 407-18

[View review abstract online](#)

## Paliperidone

<b>Comparison</b>	<b>Paliperidone vs. placebo.</b>
<b>Summary of evidence</b>	<b>Moderate to low quality evidence (medium to large sample, inconsistent, unable to assess precision, direct) suggests no consistent differences in rates of weight gain between paliperidone and placebo.</b>
<b>Weight gain</b>	
<p><i>Paliperidone had a significantly higher rate of weight than placebo in one of two trials;</i></p> <p>1 x 3 week trial (3-12 mg/d), N = 467, <math>p &lt; 0.05</math></p> <p>1 x 3 week trial (3-12 mg/d), N not reported, <math>p &gt; 0.05</math></p>	
<b>Consistency in results<sup>†</sup></b>	Appears inconsistent.
<b>Precision in results<sup>§</sup></b>	Unable to assess; no CIs are reported.
<b>Directness of results<sup>  </sup></b>	Direct

*Pacchiarotti I, Murru A, Kotzalidis GD, Bonnin CM, Mazzarini L, Colom F, Vieta E*

### **Hyperprolactinemia and medications for bipolar disorder: systematic review of a neglected issue in clinical practice**

**European Neuropsychopharmacology 2015; 25: 1045-59**

[View review abstract online](#)

<b>Comparison</b>	<b>Paliperidone vs. placebo or other medications.</b>
<b>Summary of evidence</b>	<b>Moderate quality evidence (large samples, appears consistent, direct, unable to assess precision) suggests paliperidone may be more likely to elevate prolactin levels than placebo, quetiapine or olanzapine.</b>
<b>Hyperprolactemia</b>	
<p>1 x 3 week RCT (N = 469) found paliperidone was more likely to cause elevated prolactin levels than placebo.</p> <p>1 x 6 week RCT (N = 300) found paliperidone was more likely to cause elevated prolactin levels than placebo.</p> <p>1 x 3 week RCT (N = 414) found paliperidone was more likely to cause elevated prolactin levels than placebo or quetiapine.</p>	

## Paliperidone

1 x 3 week RCT (N = unclear) found paliperidone was more likely to cause elevated prolactin levels than placebo or olanzapine.	
<b>Consistency in results</b>	Appears consistent.
<b>Precision in results</b>	Unable to assess; no measure of precision is reported.
<b>Directness of results</b>	Direct

*Yildiz A, Nikodem M, Vieta E, Correll CU, Baldessarini RJ*

### **A network meta-analysis on comparative efficacy and all-cause discontinuation of antimanic treatments in acute bipolar mania**

**Psychological Medicine 2015; 45: 299-317**

[View review abstract online](#)

<b>Comparison</b>	<b>Paliperidone vs. placebo or other medications.</b>
<b>Summary of evidence</b>	<b>Moderate quality evidence (large sample size, consistent, some imprecision and indirectness) suggests small to medium-sized effects of greater improvement in acute mania symptoms with paliperidone than with placebo or topiramate, although there was greater improvement with tamoxefin than with paliperidone. There was less all-cause discontinuation with paliperidone than with topiramate.</b>
<b>Acute mania symptoms</b>	
<p><i>A significant, small to medium-sized effect of greater improvement with paliperidone than with placebo;</i>            Network meta-analysis; 57 studies, N = 14,256, SMD = 0.37, 95%CrI 0.08 to 0.66, <math>p &lt; 0.05</math></p> <p><i>A significant, medium-sized effect of greater improvement with paliperidone than with topiramate;</i>            Network meta-analysis; 57 studies, N = 14,256, SMD = 0.44, 95%CrI 0.08 to 0.80, <math>p &lt; 0.05</math></p> <p><i>A significant, large effect of greater improvement with tamoxefin than with paliperidone;</i>            Network meta-analysis; 57 studies, N = 14,256, SMD = 2.54, 95%CrI 1.94 to 3.19, <math>p &lt; 0.05</math></p> <p>Authors report no other significant differences between paliperidone and other medications.</p>	
<b>Risks</b>	There was less all-cause discontinuation with paliperidone than with topiramate.
<b>Consistency in results</b>	Authors report data are consistent.

## Paliperidone

<b>Precision in results</b>	Precise for placebo and topiramate comparisons, imprecise for tamoxefin comparison.
<b>Directness of results</b>	Some indirectness.

### Explanation of acronyms

CI = Confidence Interval, CrI = credible interval,  $I^2$  = the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance), N = number of participants,  $p$  = statistical probability of obtaining that result ( $p < 0.05$  generally regarded as significant), RCT = randomised controlled trial, SMD = standardised mean difference, vs. = versus

## Paliperidone

### Explanation of technical terms

\* Bias has the potential to affect reviews of both RCT and observational studies. Forms of bias include; reporting bias – selective reporting of results; publication bias - trials that are not formally published tend to show less effect than published trials, further if there are statistically significant differences between groups in a trial, these trial results tend to get published before those of trials without significant differences; language bias – only including English language reports; funding bias - source of funding for the primary research with selective reporting of results within primary studies; outcome variable selection bias; database bias - including reports from some databases and not others; citation bias - preferential citation of authors. Trials can also be subject to bias when evaluators are not blind to treatment condition and selection bias of participants if trial samples are small<sup>7</sup>.

† Different effect measures are reported by different reviews.

Prevalence refers to how many existing cases there are at a particular point in time. Incidence refers to how many new cases there are per population in a specified time period. Incidence is usually reported as the number of new cases per 100,000 people per year. Alternatively some studies present the number of new cases that have accumulated over several years against a person-years denominator. This denominator is the sum of individual units of time that the persons in the population are at risk of becoming a case. It takes into account the size of the underlying population sample and its age structure over the duration of observation.

Reliability and validity refers to how accurate the instrument is. Sensitivity is the proportion

of actual positives that are correctly identified (100% sensitivity = correct identification of all actual positives) and specificity is the proportion of negatives that are correctly identified (100% specificity = not identifying anyone as positive if they are truly not).

Mean difference scores refer to mean differences between treatment and comparison groups after treatment (or occasionally pre to post treatment) and in a randomised trial there is an assumption that both groups are comparable on this measure prior to treatment. Standardised mean differences are divided by the pooled standard deviation (or the standard deviation of one group when groups are homogenous) which allows results from different scales to be combined and compared. Each study's mean difference is then given a weighting depending on the size of the sample and the variability in the data. Less than 0.4 represents a small effect, around 0.5 a medium effect, and over 0.8 represents a large effect<sup>7</sup>.

Odds ratio (OR) or relative risk (RR) refers to the probability of a reduction ( $< 1$ ) or an increase ( $> 1$ ) in a particular outcome in a treatment group, or a group exposed to a risk factor, relative to the comparison group. For example, a RR of 0.75 translates to a reduction in risk of an outcome of 25% relative to those not receiving the treatment or not exposed to the risk factor. Conversely, a RR of 1.25 translates to an increased risk of 25% relative to those not receiving treatment or not having been exposed to a risk factor. A RR or OR of 1.00 means there is no difference between groups. A medium effect is considered if  $RR > 2$  or  $< 0.5$  and a large effect if  $RR > 5$  or  $< 0.2$ <sup>8</sup>. InOR stands for logarithmic OR where a InOR of 0 shows no difference between groups. Hazard ratios measure the effect of an explanatory variable on the hazard or risk of an event.

## Paliperidone

Correlation coefficients (eg,  $r$ ) indicate the strength of association or relationship between variables. They can provide an indirect indication of prediction, but do not confirm causality due to possible and often unforeseen confounding variables. An  $r$  of 0.10 represents a weak association, 0.25 a medium association and 0.40 and over represents a strong association. Unstandardised ( $b$ ) regression coefficients indicate the average change in the dependent variable associated with a 1 unit change in the independent variable, statistically controlling for the other independent variables. Standardised regression coefficients represent the change being in units of standard deviations to allow comparison across different scales.

‡ Inconsistency refers to differing estimates of effect across studies (i.e. heterogeneity or variability in results) that is not explained by subgroup analyses and therefore reduces confidence in the effect estimate.  $I^2$  is the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance) - 0% to 40%: heterogeneity might not be important, 30% to 60%: may represent moderate heterogeneity, 50% to 90%: may represent considerable heterogeneity and over this is considerable heterogeneity.  $I^2$  can be calculated from  $Q$  (chi-square) for the test of heterogeneity with the following formula<sup>7</sup>;

$$I^2 = \left( \frac{Q - df}{Q} \right) \times 100\%$$

§ Imprecision refers to wide confidence intervals indicating a lack of confidence in the effect estimate. Based on GRADE recommendations, a result for continuous

data (standardised mean differences, not weighted mean differences) is considered imprecise if the upper or lower confidence limit crosses an effect size of 0.5 in either direction, and for binary and correlation data, an effect size of 0.25. GRADE also recommends downgrading the evidence when sample size is smaller than 300 (for binary data) and 400 (for continuous data), although for some topics, these criteria should be relaxed<sup>9</sup>.

|| Indirectness of comparison occurs when a comparison of intervention A versus B is not available but A was compared with C and B was compared with C that allows indirect comparisons of the magnitude of effect of A versus B. Indirectness of population, comparator and/or outcome can also occur when the available evidence regarding a particular population, intervention, comparator, or outcome is not available and is therefore inferred from available evidence. These inferred treatment effect sizes are of lower quality than those gained from head-to-head comparisons of A and B.

## Paliperidone

### References

1. Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group (2009): Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *British Medical Journal* 151: 264-9.
2. GRADE Working Group (2004): Grading quality of evidence and strength of recommendations. *British Medical Journal* 328: 1490.
3. Fang F, Sun H, Wang Z, Ren M, Calabrese JR, Gao K (2016): Antipsychotic Drug-Induced Somnolence: Incidence, Mechanisms, and Management. *CNS Drugs* 30: 845-67.
4. Fang F, Wang Z, Wu R, Calabrese JR, Gao K (2017): Is there a 'weight neutral' second-generation antipsychotic for bipolar disorder? *Expert Review of Neurotherapeutics* 17: 407-18.
5. Pacchiarotti I, Murru A, Kotzalidis GD, Bonnin CM, Mazarini L, Colom F, *et al.* (2015): Hyperprolactinemia and medications for bipolar disorder: systematic review of a neglected issue in clinical practice. *European Neuropsychopharmacology* 25: 1045-59.
6. Yildiz A, Nikodem M, Vieta E, Correll CU, Baldessarini RJ (2015): A network meta-analysis on comparative efficacy and all-cause discontinuation of antimanic treatments in acute bipolar mania. *Psychological Medicine* 45: 299-317.
7. Cochrane Collaboration (2008): Cochrane Handbook for Systematic Reviews of Interventions. Accessed 24/06/2011.
8. Rosenthal JA (1996): Qualitative Descriptors of Strength of Association and Effect Size. *Journal of Social Service Research* 21: 37-59.
9. GRADEpro (2008): [Computer program]. Jan Brozek, Andrew Oxman, Holger Schünemann. *Version 3.2 for Windows*.