

# Package ‘chlorpromazineR’

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**Title** Convert Antipsychotic Doses to Chlorpromazine Equivalents

**Version** 0.2.0

**Description** As different antipsychotic medications have different potencies, the doses of different medications cannot be directly compared. Various strategies are used to convert doses into a common reference so that comparison is meaningful. Chlorpromazine (CPZ) has historically been used as a reference medication into which other antipsychotic doses can be converted, as “chlorpromazine-equivalent doses”. Using conversion keys generated from widely-cited scientific papers, e.g. Gardner et. al 2010 <[doi:10.1176/appi.ajp.2009.09060802](https://doi.org/10.1176/appi.ajp.2009.09060802)> and Leucht et al. 2016 <[doi:10.1093/schbul/sbv167](https://doi.org/10.1093/schbul/sbv167)>, antipsychotic doses are converted to CPZ (or any specified antipsychotic) equivalents. The use of the package is described in the included vignette. Not for clinical use.

**URL** <https://docs.ropensci.org/chlorpromazineR/>,  
<https://github.com/ropensci/chlorpromazineR>

**BugReports** <https://github.com/ropensci/chlorpromazineR/issues>

**Depends** R (>= 3.5)

**License** GPL-3

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 7.1.1

**Suggests** knitr, rmarkdown, testthat, covr

**VignetteBuilder** knitr

**NeedsCompilation** no

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add_key	<i>Combine 2 keys with base key taking precedence</i>
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### Description

Use this to combine 2 keys by using the whole "base" key, and adding any antipsychotics from the "added" key that are not in the "base" key.

### Usage

```
add_key(base, added, trim, verbose = TRUE)
```

### Arguments

base	the base key
added	the key from which other antipsychotics are found to add
trim	TRUE to use trim_key on both the base and added key, needed when one does not use the full names (e.g. leucht2016).
verbose	If TRUE, added antipsychotic names will be shown in a message

### Value

a merged key

### See Also

Other key functions: [check\\_key\(\)](#), [trim\\_key\(\)](#)

### Examples

```
add_key(gardner2010, leucht2016, trim = TRUE)
```

---

check_ap	<i>Checks whether antipsychotic names are in the key</i>
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### Description

Provided a data.frame, x, this checks that the antipsychotic names stored in the x's variable ap\_label are present in the key.

### Usage

```
check_ap(  
  input_data,  
  key = chlorpromazineR::gardner2010,  
  ap_label,  
  route,  
  route_label  
)
```

### Arguments

input_data	data.frame with antipsychotic name and dose data
key	source of the conversion factors—defaults to Gardner et al. 2010
ap_label	column in x that stores antipsychotic name
route	options include "oral", "sai", "lai" or "mixed"
route_label	if "mixed" route is specified, provide the column that stores the route information

### Value

number of antipsychotic names in x[,ap\_label] that don't match key

### Examples

```
participant_ID <- c("P01", "P02", "P03", "P04")  
age <- c(42, 29, 30, 60) # not used in calculation, just shows other data  
# can exist in the data.frame  
antipsychotic <- c("olanzapine", "olanzapine", "quetiapine", "ziprasidone")  
dose <- c(10, 12.5, 300, 60)  
example_oral <- data.frame(participant_ID, age, antipsychotic, dose,  
  stringsAsFactors = FALSE)  
check_ap(example_oral, ap_label = "antipsychotic", route = "oral",  
  key = gardner2010)
```

---

check_key	<i>Check whether a conversion key is the expected format</i>
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---

**Description**

chlorpromazineR uses conversion factors stored in a named list of 3 named lists. This verifies that the key is in a usable format, which can be helpful when creating custom keys or modifying included keys.

**Usage**

```
check_key(key)
```

**Arguments**

key            the key to check

**Value**

TRUE if the key is valid, otherwise a error is thrown.

**See Also**

Other key functions: [add\\_key\(\)](#), [trim\\_key\(\)](#)

**Examples**

```
check_key(gardner2010)
```

---

davis1974	<i>Chlorpromazine equivalent key from Davis 1974 data</i>
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**Description**

A list of antipsychotics and their chlorpromazine equivalent doses, generated from the following file included with the package: `system.file("extdata", "davis1974.csv", package="chlorpromazineR")`.

**Usage**

```
davis1974
```

**Format**

A named list of 3 named lists (1 for each route) and each sub-list contains the conversion factors for each antipsychotic. The 3 top-level lists are named 'oral', 'sai', and 'lai' (route), and the lists they contain have names corresponding to the antipsychotic, e.g. 'olanzapine'.

**Source**

John Davis (1974). Dose equivalence of the anti-psychotic drugs. *Journal of Psychiatric Research*, 11, 65-69. <[https://doi.org/10.1016/0022-3956\(74\)90071-5](https://doi.org/10.1016/0022-3956(74)90071-5)>

---

gardner2010

*Chlorpromazine equivalent key from Gardner et al. 2010 data*

---

**Description**

A list of antipsychotics and their chlorpromazine equivalent doses, generated from the following file included with the package: `system.file("extdata", "gardner2010.csv", package="chlorpromazineR")`.

**Usage**

```
gardner2010
```

**Format**

A named list of 3 named lists (1 for each route) and each sub-list contains the conversion factors for each antipsychotic. The 3 top-level lists are named 'oral', 'sai', and 'lai' (route), and the lists they contain have names corresponding to the antipsychotic, e.g. 'olanzapine'.

**Details**

The SAI data is not included in this key, because the original study did not specify a conversion factor from chlorpromazine LAI to oral. The alternative key `gardner2010_withsai` can be used, which includes the SAI data, but the chlorpromazine equivalent doses produced are equivalent to chlorpromazine SAI not chlorpromazine oral. They could be manually converted (e.g. by multiplying the SAI doses by 3 per equivalence noted by Davis 1974 <[https://doi.org/10.1016/0022-3956\(74\)90071-5](https://doi.org/10.1016/0022-3956(74)90071-5)>)

**Source**

Gardner, D. M., Murphy, A. L., O'Donnell, H., Centorrino, F., & Baldessarini, R. J. (2010). International consensus study of antipsychotic dosing. *The American Journal of Psychiatry*, 167(6), 686–693. <<https://doi.org/10.1176/appi.ajp.2009.09060802>>

---

gardner2010\_withsai     *Chlorpromazine equivalent key from Gardner et al. 2010 data*

---

**Description**

A list of antipsychotics and their chlorpromazine equivalent doses, generated from the following file included with the package: `system.file("extdata", "gardner2010.csv", package="chlorpromazineR")`.

**Usage**

```
gardner2010_withsai
```

**Format**

A named list of 3 named lists (1 for each route) and each sub-list contains the conversion factors for each antipsychotic. The 3 top-level lists are named 'oral', 'sai', and 'lai' (route), and the lists they contain have names corresponding to the antipsychotic, e.g. 'olanzapine'.

**Details**

The SAI equivalents produced by this key are equivalent to chlorpromazine SAI not oral. They could be manually converted.

**Source**

Gardner, D. M., Murphy, A. L., O'Donnell, H., Centorrino, F., & Baldessarini, R. J. (2010). International consensus study of antipsychotic dosing. *The American Journal of Psychiatry*, 167(6), 686–693. <<https://doi.org/10.1176/appi.ajp.2009.09060802>>

---

leucht2016     *Chlorpromazine equivalent key from Leucht et al. 2016 data*

---

**Description**

A list of antipsychotics and their chlorpromazine equivalent doses, generated from the following file included with the package: `system.file("extdata", "leucht2016.csv", package="chlorpromazineR")`.

**Usage**

```
leucht2016
```

**Format**

A named list of 3 named lists (1 for each route) and each sub-list contains the conversion factors for each antipsychotic. The 3 top-level lists are named 'oral', 'sai', and 'lai' (route), and the lists they contain have names corresponding to the antipsychotic, e.g. 'olanzapine'.

**Source**

Leucht, S., Samara, M., Heres, S., & Davis, J. M. (2016). Dose Equivalents for Antipsychotic Drugs: The DDD Method. *Schizophrenia Bulletin*, 42(suppl\_1), S90–S94. <<https://doi.org/10.1093/schbul/sbv167>>

---

leucht2020

*Antipsychotic equivalent key from Leucht et al. 2020 data*


---

**Description**

A list of antipsychotics and their olanzapine-equivalent doses, generated from the following file included with the package: `system.file("extdata", "leucht2020.csv", package="chlorpromazineR")`.

**Usage**

```
leucht2020
```

**Format**

A named list of 3 named lists (1 for each route) and each sub-list contains the conversion factors for each antipsychotic. The 3 top-level lists are named 'oral', 'sai', and 'lai' (route), and the lists they contain have names corresponding to the antipsychotic, e.g. 'olanzapine'.

**Details**

This reference does not include chlorpromazine, so the conversion from leucht2016 is implied (i.e.  $\text{chlorpromazine} = \text{olanzapine} * 30$ ).

**Source**

Leucht, S., Crippa, A., Sifakis, S., Patel, M., Orsini, N. & Davis, J. M. (2020). Dose-Response Meta-Analysis of Antipsychotic Drugs for Acute Schizophrenia. *American Journal of Psychiatry*. 117(4). <<https://doi.org/10.1176/appi.ajp.2019.19010034>>

---

to\_ap

*Calculates equivalent doses*


---

**Description**

As in `to_cpz()`, `to_ap()` converts doses of antipsychotics into equivalent doses to a reference antipsychotic. Whereas in `to_cpz()` the reference antipsychotic is chlorpromazine (CPZ), `to_ap()` converts to equivalents of an arbitrary antipsychotic specified as a string to `convert_to_ap`. Conversion factors are specified in the key.

**Usage**

```
to_ap(
  input_data,
  convert_to_ap = "olanzapine",
  convert_to_route = "oral",
  ap_label,
  dose_label,
  route = "oral",
  key = chlorpromazineR::gardner2010,
  cpz_eq_label = "cpz_eq",
  ref_eq_label = "ap_eq",
  factor_label = "cpz_conv_factor",
  route_label = NULL,
  q_label = NULL
)
```

**Arguments**

<code>input_data</code>	data.frame with antipsychotic name and dose data
<code>convert_to_ap</code>	name of desired reference antipsychotic
<code>convert_to_route</code>	the route of the desired reference antipsychotic
<code>ap_label</code>	column in x that stores antipsychotic name
<code>dose_label</code>	column in x that stores dose
<code>route</code>	options include "oral", "sai", "lai" or "mixed"
<code>key</code>	source of the conversion factors—defaults to Gardner et al. 2010
<code>cpz_eq_label</code>	the name of the column to be created, to save the calculated CPZ-equivalent dose
<code>ref_eq_label</code>	the name of the column to be created to save the doses in terms of the specified reference antipsychotic (in <code>convert_to_ap</code> )
<code>factor_label</code>	the name of the column to be created to store the conversion factors
<code>route_label</code>	if "mixed" route is specified, provide the column that stores the route information
<code>q_label</code>	if long-acting injectable doses are included, provide the column that stores the injection frequency (days), or only if the doses have already been divided, set <code>q_label = 1</code> .

**Value**

data.frame with new variables storing conversion factor and CPZ-equivalent doses

**See Also**

Other conversion functions: [to\\_cpz\(\)](#)



**Examples**

```

participant_ID <- c("P01", "P02", "P03", "P04")
age <- c(42, 29, 30, 60) # not used in calculation, just shows other data
                        # can exist in the data.frame
antipsychotic <- c("olanzapine", "olanzapine", "quetiapine", "ziprasidone")
dose <- c(10, 12.5, 300, 60)
example_oral <- data.frame(participant_ID, age, antipsychotic, dose,
                           stringsAsFactors = FALSE)
to_ap(example_oral, convert_to_ap="olanzapine", convert_to_route="oral",
       ap_label = "antipsychotic", dose_label = "dose", route = "oral")

```

to\_cpz

*Calculates chlorpromazine-equivalent doses***Description**

Given a data.frame containing doses of antipsychotics to\_cpz() converts the doses into the equivalent chlorpromazine (CPZ) doses, using the conversion factors specified in the key.

**Usage**

```

to_cpz(
  input_data,
  ap_label,
  dose_label,
  route = "oral",
  key = chlorpromazineR::gardner2010,
  eq_label = "cpz_eq",
  factor_label = "cpz_conv_factor",
  route_label = NULL,
  q_label = NULL
)

```

**Arguments**

input_data	data.frame with antipsychotic name and dose data
ap_label	column in x that stores antipsychotic name
dose_label	column in x that stores dose
route	options include "oral", "sai", "lai" or "mixed"
key	source of the conversion factors—defaults to Gardner et al. 2010
eq_label	the name of the column to be created, to save the calculated CPZ-equivalent dose
factor_label	the name of the column to be created to store the conversion factors
route_label	if "mixed" route is specified, provide the column that stores the route information

q\_label if long-acting injectable doses are included, provide the column that stores the injection frequency (days), or only if the doses have already been divided, set q\_label = 1.

### Details

The default key is gardner2010 which has data for both oral and long-acting antipsychotic medications. See help(gardner2010) for the source reference.

### Value

data.frame with new variables storing conversion factor and CPZ-equivalent doses

### See Also

Other conversion functions: [to\\_ap\(\)](#)

### Examples

```
participant_ID <- c("P01", "P02", "P03", "P04")
age <- c(42, 29, 30, 60)
antipsychotic <- c("olanzapine", "olanzapine", "quetiapine", "ziprasidone")
dose <- c(10, 12.5, 300, 60)
example_oral <- data.frame(participant_ID, age, antipsychotic, dose,
                          stringsAsFactors = FALSE)
to_cpz(example_oral, ap_label = "antipsychotic", dose_label = "dose",
        route = "oral")
```

---

trim\_key

*Modify the names in a conversion key to only include the first word*

---

### Description

For parenteral (sai) and long-acting/depot (lai) antipsychotics, the name consists of the usual generic name (such as haloperidol) and a second word describing the formulation (e.g. haloperidol decanoate). Since to\_cpz() and add\_key() require exact matches to work properly, removing the second word may be required, but should be done with care as it can add ambiguity (e.g. fluphenazine enanthate and decanoate).

### Usage

```
trim_key(key)
```

### Arguments

key the key to trim

### Value

the key that was trimmed (a named list of 3 named lists)

**See Also**

Other key functions: [add\\_key\(\)](#), [check\\_key\(\)](#)

**Examples**

```
trim_key(gardner2010)
```

---

woods2003

*Chlorpromazine equivalent key from Woods 2003 data*

---

**Description**

A list of antipsychotics and their chlorpromazine equivalent doses, generated from the following file included with the package: `system.file("extdata", "woods2003.csv", package="chlorpromazineR")`.

**Usage**

```
woods2003
```

**Format**

A named list of 3 named lists (1 for each route) and each sub-list contains the conversion factors for each antipsychotic. The 3 top-level lists are named 'oral', 'sai', and 'lai' (route), and the lists they contain have names corresponding to the antipsychotic, e.g. 'olanzapine'.

**Source**

Scott Woods (2003). Chlorpromazine Equivalent Doses for the Newer Atypical Antipsychotics. *Journal of Clinical Psychiatry*. 64(6). 663-667. <<https://doi.org/10.4088/JCP.v64n0607>>

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