

# Package ‘CHMIpower’

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**Title** Power analysis for Controlled Human Malaria Infection studies

**Version** 0.0.0.9000

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**Description** Power calculation and data visualization for Controlled Human Malaria Infection studies.

**License** GPL-2

**Encoding** UTF-8

**LazyData** true

**Imports** survival,  
beeswarm,  
MASS,  
stats,  
graphics,  
grDevices

**RoxygenNote** 6.1.1

## R topics documented:

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| cdfweibull | <i>CDF comparison of input data to a Weibull distribution</i> |
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## Description

Maximum-likelihood fitting of input dataset and comparison of the ecdf and fitted cdf with a user defined Weibull distribution.

## Usage

```
cdfweibull(obstime, lambda, k)
```

**Arguments**

|         |   |
|---------|---|
| obstime | user input data of time to infection    |
| lambda  | scale parameter of Weibull distribution |
| k       | shape parameter of Weibull distribution |

**Details**

See powercal for details.

**Value**

A figure comparing the (empirical) cumulative function of the input dataset, fitted Weibull distribution and a user defined Weibull distribution.

An object returned by 'fitdistr' function in the 'MASS' package.

**Examples**

```
cdfweibull(rweibull(10,3,6),lambda=8,k=5)
```

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|        |  |
|--------|--|
| pdfsim | <i>PDF comparison of simulated dataset</i> |
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**Description**

Comparison of probability density function for simulated treatment and control group.

**Usage**

```
pdfsim(beta, lambda0, k, rho, endstudy)
```

**Arguments**

|          |  |
|----------|--|
| beta     | hazard ratio between treatment and control group   |
| lambda0  | scale parameter of Weibull distribution for the control group  |
| k        | shape parameter of Weibull distribution  |
| rho      | full protection probability for the treatment group, fully protected observations are set to be censored at the end of the study |
| endstudy | time of administrative censoring   |

**Details**

See powercal for details.

**Value**

A figure comparing the probability density function of simulated treatment and control group. Mean and variance are also shown in the legend.

**Examples**

```
pdfsim(beta=0.2,lambda0=8,k=5,rho=0.2,endstudy=28)
```

powercal

Power calculation

**Description**

Power calculation for t-test, Wilconxon test, log-rank test, Lachenbruch test, and likelihood ratio test for mixture models.

**Usage**

```
powercal(beta, lambda0, k, rho, N, ratio, endstudy, testname, alpha, seed)
```

**Arguments**

|          |  |
|----------|--|
| beta     | hazard ratio between treatment and control group   |
| lambda0  | scale parameter of Weibull distribution for the control group  |
| k        | shape parameter of Weibull distribution  |
| rho      | full protection probability for the treatment group, fully protected observations are set to be censored at the end of the study |
| N        | total sample size  |
| ratio    | ratio of sample size between treatment and control group   |
| endstudy | time of administrative censoring   |
| testname | name of statistical test chosen from "t-test", "wilcox", "logrank", "lachenbruch", "mixlrt".                                     |
| alpha    | statistical significance level   |
| seed     | random seed  |

**Details**

The Weibull distribution with shape parameter  $k$  and scale parameter  $\lambda$  has density given by  $f(x) = \frac{k}{\lambda} \left(\frac{x}{\lambda}\right)^{k-1} e^{-(x/\lambda)^k}$  for  $x > 0$ . In our simulation studies, time to infection for control group is modeled by  $Weibull(\lambda_0, k)$ . Individuals in the treatment group have probability  $\rho$  being fully protected and their observations are set to be censored. Time to infection for the individuals in the treatment group who don't get full protection from the vaccine will follow  $Weibull(\lambda_1, k)$ . Note that the shape parameter  $k$  for the Weibull distribution is same for the control and treatment group. Hence the hazard ratio  $\beta$  between treatment and control group is constant and has the form of  $\left(\frac{\lambda_0}{\lambda_1}\right)^k$ .

**Value**

Power for the statistical tests calculated through 1000 simulations.

**Examples**

```
powercal(beta=0.2, lambda0=8, k=5, rho=0.2,
N=28, ratio=3, endstudy=28, testname=c('t-test', 'logrank'), alpha=0.05, seed=1)
```

simexample

*Example of simulated dataset*

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**Description**

This function visualize a simulated dataset using a boxplot and a Kaplan-Meier curve.

**Usage**

```
simexample(beta, lambda0, k, rho, N, ratio, endstudy, seed)
```

**Arguments**

|          |  |
|----------|--|
| beta     | hazard ratio between treatment and control group   |
| lambda0  | scale parameter of Weibull distribution for the control group  |
| k        | shape parameter of Weibull distribution  |
| rho      | full protection probability for the treatment group, fully protected observations are set to be censored at the end of the study |
| N        | total sample size  |
| ratio    | ratio of sample size between treatment and control group   |
| endstudy | time of administrative censoring   |
| seed     | random seed  |

**Details**

See powercal for details.

**Value**

A boxplot and a Kaplan-Meier curve comparing the simulated treatment and control group

**Examples**

```
simexample(beta=0.2, lambda0=8, k=5, rho=0.2,  
N=28, ratio=3, endstudy=28, seed=1)
```

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