

Package ‘CHMIpower’

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Title Power analysis for Controlled Human Malaria Infection studies

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

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Encoding UTF-8

LazyData true

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

RoxygenNote 6.1.1

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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)
```

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	<i>Power calculation</i>
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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 λ 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 ρ 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 β between treatment and control group is constant and has the form of $(\frac{\lambda_0}{\lambda_1})^k$.

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

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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