

# Package ‘KONPsurv’

January 3, 2022

**Type** Package

**Title** KONP Tests: Powerful K-Sample Tests for Right-Censored Data

**Version** 1.0.4

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**Description** The K-sample omnibus non-proportional hazards (KONP) tests are powerful non-parametric tests for comparing K ( $\geq 2$ ) hazard functions based on right-censored data (Gorfine, Schlesinger and Hsu, 2020, <doi:10.1177/0962280220907355>). These tests are consistent against any differences between the hazard functions of the groups. The KONP tests are often more powerful than other existing tests, especially under non-proportional hazard functions.

**License** GPL ( $\geq 2$ )

**Imports** survival,Rcpp ( $\geq 0.12.16$ )

**LinkingTo** Rcpp

**RoxygenNote** 7.0.0

**Encoding** UTF-8

**Suggests** testthat

**NeedsCompilation** yes

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KONPsurv-package

*KONP Tests for Testing the Equality of  $K$  Distributions for Right-Censored Data*

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### Description

An implementation of the  $K$ -sample omnibus non-proportional hazards (KONP) tests.

The KONP tests are powerful non-parametric tests for comparing  $K$  ( $\geq 2$ ) hazard functions based on right-censored data. These tests are consistent against any differences between the hazard functions of the groups. The KONP tests are often more powerful than other existing tests, especially under non-proportional hazard functions.

### Details

The package contains one function:

`konp_test`: non-parametric tests for equality of  $K$  distributions using right-censored data.

### Author(s)

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Author: Malka Gorfine <gorfinem@tauex.tau.ac.il>

### References

Gorfine, M., Schlesinger, M., & Hsu, L. (2020).  $K$ -sample omnibus non-proportional hazards tests based on right-censored data. *Statistical Methods in Medical Research*, 29(10), 2830–2850. doi: [10.1177/0962280220907355](https://doi.org/10.1177/0962280220907355)

### Examples

```
# gastric cancer data
data(gastric)

konp_test(gastric$time, gastric$status, gastric$group, n_perm=10^3)
```

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carcinoma

*Urothelial carcinoma.*

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### Description

Survival data from a trial comparing chemotherapy versus atezolizumab in the treatment of Urothelial carcinoma.

**Usage**

```
data(carcinoma)
```

**Format**

A data frame with 625 observations (316 in the atezolizumab group and 309 chemotherapy group) with the following 3 columns:

**time** the observed follow-up times in days.

**status** the event indicators, 0=right censored, 1= event.

**group** the group labels, 1 = atezolizumab, 2 = chemotherapy.

**References**

Powles T, Dura?n I, van der Heijden MS, et al. Atezolizumab versus chemotherapy in patients with platinum-treated locally advanced or metastatic urothelial carcinoma (IMvigor211): a multicentre, open-label, phase 3 randomised controlled trial. *Lancet* 2018; 391: 748-757.

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gastric

*Gastric Cancer Data.*

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**Description**

Survival data from a trial comparing chemotherapy versus combined chemotherapy plus radiotherapy in the treatment of gastric cancer.

**Usage**

```
data(gastric)
```

**Format**

A data frame with 90 observations (45 in each treatment group) with the following 3 columns:

**time** the observed follow-up times in days.

**status** the event indicators, 0=right censored, 1= event.

**group** the group labels, 1 = chemotherapy, 2 = chemotherapy plus radiotherapy.

**Source**

Stablein, D. M. and Koutrouvelis, I. A. (1985) A two-sample test sensitive to crossing hazards in uncensored and singly censored data. *Biometrics* 41, 643–652. (Page 649).

**References**

Gastrointestinal Tumor Study Group: Schein, P. D., Stablein, D. M., Bruckner, H. W., Douglass, H. O., Mayer, R., et al. (1982). A comparison of combination chemotherapy and combined modality therapy for locally advanced gastric carcinoma. *Cancer* 49, 1771-1777.

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konp_test	<i>KONP tests are K-sample Omnibus Non-Proportional hazards tests for right-censored data.</i>
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### Description

KONP tests are  $K$ -sample Omnibus Non-Proportional hazards tests for right-censored data.

### Usage

```
konp_test(time, status, group, n_perm, n_imp = 1)
```

### Arguments

time	A vector of the observed follow-up times.
status	A vector of event indicators, 0=right censored, 1= event at time.
group	A vector denoting the group labels, must contain at least two different values.
n_perm	The number of permutations.
n_imp	The number of imputations, for each imputation n_perm permutations will be executed.

### Details

The KONP tests are powerful non-parametric tests for comparing  $K$  ( $\geq 2$ ) hazard functions based on right-censored data. These tests are consistent against any differences between the hazard functions of the groups. The KONP tests are often more powerful than other existing tests, especially under non-proportional hazard functions.

### Value

Three test statistics and their respective p-values are returned:

pv\_chisq - returns the p-value based on the KONP test chi-square statistic.  
 pv\_lr - returns the p-value based on the KONP test likelihood ratio statistic.  
 pv\_cauchy - returns the p-value based on the KONP-based Cauchy-combination test statistic.  
 chisq\_test\_stat - returns the KONP test chi-squared test statistic.  
 lr\_test\_stat - returns the KONP test likelihood-ratio test statistic.  
 cauchy\_test\_stat - returns the KONP-based Cauchy-combination test statistic.

### Examples

```
# gastric cancer data
data(gastric)

konp_test(gastric$time, gastric$status, gastric$group, n_perm=10^3)
```

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