

Package ‘Single.mTEC.Transcriptomes’

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Type Package

Title Single Cell Transcriptome Data and Analysis of Mouse mTEC cells

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Description This data package contains the code used to analyse the single-cell RNA-seq and the bulk ATAC-seq data from the manuscript titled: Single-cell transcriptome analysis reveals coordinated ectopic-gene expression patterns in medullary thymic epithelial cells. This paper was published in Nature Immunology 16,933-941(2015). The data objects provided in this package has been pre-processed: the raw data files can be downloaded from ArrayExpress under the accession identifiers E-MTAB-3346 and E-MTAB-3624. The vignette of this data package provides a documented and reproducible workflow that includes the code that was used to generate each statistic and figure from the manuscript.

License LGPL

biocViews ExperimentData

VignetteBuilder knitr

Depends R (>= 3.5.0)

Suggests DESeq2, GenomicRanges, GenomicFeatures, genefilter, statmod, gdata, RColorBrewer, ggplot2, gplots, cluster, clue, grid, gridExtra, ggbio, Gviz, geneplotter, matrixStats, pheatmap, BiocStyle, knitr, BiocParallel

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Single.mTec.Transcriptomes-package

Single-cell transcriptome data of medullary thymic epithelial cells

Description

This document contains all the code used to analyse the single-cell RNA-seq and the bulk ATAC-seq data from the manuscript by Brennecke et al, 2015. The purpose of this package is to provide full reproducibility of the results presented in the manuscript. This package provides a documented and reproducible workflow of the code that was used to generate each number and figure from the manuscript.

References

Brennecke et al. Single-cell transcriptome analysis reveals coordinated ectopic gene-expression patterns in medullary thymic epithelial cells. *Nature Immunology* 16,933-941 (2015)

aireDependentSansom *List of Aire-dependent genes*

Description

A character vector of ensembl gene identifiers defined by Sansom et al, 2014. This list was downloaded from the supplementary material of the manuscript.

Usage

```
data(aireDependentSansom)
```

References

Sansom et al. Population and single-cell genomics reveal the Aire dependency, relief from Polycomb silencing, and distribution of self-antigen expression in thymic epithelia. *Genome Res.* 24, 1918–1931 (2014).

biotype *Mouse biotypes*

Description

A character vector defining biotype for each mouse ensembl gene identifier. Biotypes were queried using **biomaRt**.

Usage

```
data(biotypes)
```

biotypesHuman *Human biotypes*

Description

A character vector defining biotype for each human ensembl gene identifier. Biotypes were queried using **biomaRt**.

Usage

```
data(biotypesHuman)
```

cea1Coexpression	<i>Cea1 co-expression group data</i>
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Description

A data frame containing information about the Cea1 co-expression group defined in Pinto et al, 2013.

Usage

```
data(cea1Coexpression)
```

References

Pinto et al. Overlapping gene coexpression patterns in human medullary thymic epithelial cells generate self-antigen diversity. Proc. Natl. Acad. Sci. U.S.A. 110, E3497–3505, (2013).

corMatsNoMarker	<i>Gene-gene correlation network</i>
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Description

A matrix containing the gene-gene Spearman correlation across single unselected cells.

A matrix containing the gene-gene Spearman correlation across single unselected cells, using the data from Sansom et al, 2014.

Usage

```
data(corMatsNoMarker)
```

```
data(corMatsSansom)
```

References

Sansom et al. Population and single-cell genomics reveal the Aire dependency, relief from Polycomb silencing, and distribution of self-antigen expression in thymic epithelia. Genome Res. 24, 1918–1931 (2014).

deGenesNone	<i>Highly variable genes.</i>
-------------	-------------------------------

Description

List of highly variable genes according to the method by Brennecke et al, 2013.

Usage

```
data(deGenesNone)
```

References

Brennecke et al. Accounting for technical noise in single-cell RNA-seq experiments. *Nat. Methods.* 10, 1093-1095 (2013).

deGenesSansom	<i>Highly variable genes from Sansom et al.</i>
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Description

List of highly variable genes according to the method by Brennecke et al, 2013, using the data by Santom et al.

Usage

```
data(deGenesSansom)
```

References

Brennecke et al. Accounting for technical noise in single-cell RNA-seq experiments. *Nat. Methods.* 10, 1093-1095 (2013). Sansom et al. Population and single-cell genomics reveal the Aire dependency, relief from Polycomb silencing, and distribution of self-antigen expression in thymic epithelia. *Genome Res.* 24, 1918–1931 (2014).

dxdATAC	<i>ATAC-seq summarized counts.</i>
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Description

DESeqDataSet object summarizing the ATAC-seq data presented in the manuscript. This object contains the read counts of each sample over a window of 4Kb around transcription start sites.

Usage

```
data(dxdATAC)
```

fantom	<i>FANTOM dataset</i>
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Description

DESeqDataSet object of the read counts from selected tissues from the FANTOM dataset.

Usage

```
data(fantom)
```

References

Forrest et al. A promoter-level mammalian expression atlas. *Nature* 24, 1918–1931. (2014).

geneNames	<i>Mouse gene names</i>
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Description

Character vector of mouse gene names. The gene names were queried using **biomaRt**.

Usage

```
data(geneNames)
```

geneNamesHuman	<i>Human gene names</i>
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Description

Character vector of human gene names. The gene names were queried using **biomaRt**.

Usage

```
data(geneNamesHuman)
```

geneRanges	<i>Genomic range coordinates.</i>
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Description

GenomicRanges object containing the coordinate ranges of mouse protein coding genes used in the manuscript.

Usage

```
data(geneRanges)
```

mTECdx	<i>Count data from the single-mTEC data.</i>
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Description

DESeqDataSet object containing the read counts from the single-cell RNA-seq dataset generated by Brennecke et al, 2015.

Usage

```
data(mTECdx)
```

References

Brennecke et al. Single-cell transcriptome analysis reveals coordinated ectopic gene-expression patterns in medullary thymic epithelial cells. *Nature Immunology* 16,933-941 (2015)

muc1Coexpression	<i>Muc1 co-expression group data</i>
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Description

A data frame containing information about the Muc1 co-expression group defined in Pinto et al, 2013.

Usage

```
data(muc1Coexpression)
```

References

Pinto et al. Overlapping gene coexpression patterns in human medullary thymic epithelial cells generate self-antigen diversity. *Proc. Natl. Acad. Sci. U.S.A.* 110, E3497–3505, (2013).

nomarkerCellsClustering	<i>Clustering results</i>
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Description

List containing the results from the clustering analysis from Figure 2 from the manuscript.

Usage

```
data(nomarkerCellsClustering)
```

percentsGG	<i>Mapping statistics</i>
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Description

Data frame containing the mapping statistics from the single-cell RNA-seq data.

Usage

```
data(percentsGG)
```

permutationResults	<i>Permutation results</i>
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Description

Result from the gene permutations from Figure 5 from the manuscript.

Usage

```
data(permutationResults)
```

scLVM_output	<i>Output from scLVM</i>
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Description

Objects containing the output scLVM on the single-mTEC RNA-seq data.

Usage

```
data(scLVM_output)
```

References

Buettner et al. Computational analysis of cell-to-cell heterogeneity in single-cell RNA-sequencing data reveals hidden subpopulations of cells. Nat. Biotechnol. 2015.

tras	<i>Tissue restricted antigens lists.</i>
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Description

Data frame containing the TRA classification from Pinto et al, 2013.

Usage

```
data(tras)
```

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