

# Package ‘Fletcher2013a’

January 7, 2025

**Title** Gene expression data from breast cancer cells under FGFR2 signalling perturbation

**Version** 1.42.0

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**Description** The package Fletcher2013a contains time-course gene expression data from MCF-7 cells treated under different experimental systems in order to perturb FGFR2 signalling. The data comes from Fletcher et al. (Nature Comms 4:2464, 2013) where further details about the background and the experimental design of the study can be found.

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**Depends** R (>= 2.15), limma

**Imports** Biobase , VennDiagram, gplots, grid

**License** GPL (>= 2)

**biocViews** ExperimentData, ExpressionData, CancerData, BreastCancerData, MicroarrayData

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**InstallableEverywhere** yes

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Exp1

*Exp1 dataset: endogenous FGFRs experiments.*

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### Description

The data consists of 46 microarray samples from MCF-7 cells treated under different conditions, at 3 time points (0, 6 and 24 h). The data have been normalized (RMA algorithm) and are presented in the form of an `exprSet` object. The experiment was carried out on 4 Humanv4 arrays using 12 samples per array. The original arrays contain 48324 features, with an average of 22 beads per feature (Standard Deviation of 5). Additional description about sample groups can be retrieved from `phenoData` slot (see examples).

### Usage

```
data(Exp1)
```

### Format

The format is: An `ExpressionSet` object with covariates representing experimental conditions:

- `Sample`: Sample IDs.
- `Time`: Treatment time.
- `Replicates`: Biological replicates (numerical sequence).
- `UT`: Control group (vehicle).
- `E2`: E2 treatment group.
- `E2FGF10`: E2+FGF10 treatment group.
- `E2FGF10PD`: E2+FGF10+PD173074 treatment group.
- `Treatment`: Group names.
- `TreatmentGroups`: Group names with common starting point.
- `Target`: Group names for differential expression analysis (e.g. targets for limma). The corresponding contrasts can be retrieved by `notes(Exp1)`.

### Note

The differential expression analysis documented in the vignette is available at 'Exp1limma'.

### Source

Michael NC Fletcher, Mauro AA Castro, Suet-Feung Chin, Oscar Rueda, Xin Wang, Carlos Caldas, Bruce AJ Ponder, Florian Markowetz, Kerstin B Meyer. Master regulators of FGFR2 signalling and breast cancer risk. *Nature Communications*, 4:2464, 2013.

### Examples

```
data(Exp1)
#gexp<-exprs(Exp1)
#geneids<-fData(Exp1)
#targets<-pData(Exp1)
#mycontrasts<-notes(Exp1)$contrasts

#limma pre-processed dataset
#data(Exp1limma)
```

---

Exp2

*Exp2 dataset: iF2 construct experiments.*

---

### Description

The data consists of 71 microarray samples from MCF-7 cells treated under different conditions, at 3 time points (0, 6 and 24 h). The data have been normalized (RMA algorithm) and are presented in the form of an `exprSet` object. The experiment was carried out on 6 Humanv4 BeadChips using 12 samples per BeadChip. The original arrays contain 48324 features, with a mean of 22 beads per feature (Standard Deviation of 5). Additional description about sample groups can be retrieved from `phenoData` slot (see examples).

### Usage

```
data(Exp2)
```

### Format

The format is: An `ExpressionSet` object with covariates representing experimental conditions:

- `Sample`: Sample IDs.
- `Time`: Treatment time.
- `Replicates`: Biological replicates (numerical sequence).
- `UT`: Control group (vehicle).
- `E2`: E2 treatment group.
- `E2.AP20187`: E2+AP20187 treatment group.
- `E2.AP20187.PD`: E2+AP20187+PD173074 treatment group.
- `E2.FGF10`: E2+FGF10 treatment group.
- `Treatment`: Group names.
- `TreatmentGroups`: Group names with common starting point.
- `Target`: Group names for differential expression analysis (e.g. targets for limma). The corresponding contrasts can be retrieved by `notes(Exp2)`.
- `TecRep`: Technical replicates.
- `isOriginal`: Simple vector mapping all samples (excluding technical replicates).

### Note

The differential expression analysis documented in the vignette is available at 'Exp2limma'.

### Source

Michael NC Fletcher, Mauro AA Castro, Suet-Feung Chin, Oscar Rueda, Xin Wang, Carlos Caldas, Bruce AJ Ponder, Florian Markowitz, Kerstin B Meyer. Master regulators of FGFR2 signalling and breast cancer risk. *Nature Communications*, 4:2464, 2013.

## Examples

```
data(Exp2)
#gexp<-exprs(Exp2)
#geneids<-fData(Exp2)
#targets<-pData(Exp2)
#mycontrasts<-notes(Exp2)$contrasts

#limma pre-processed dataset
#data(Exp2limma)
```

---

Exp3

*Exp3 dataset: FGFR2b over-expression experiments.*

---

## Description

The data consists of 125 microarray samples from MCF-7 cells treated under different conditions, at 5 time points (0, 3, 6, 12 and 24 h). The data have been normalized (RMA algorithm) and are presented in the form of an `exprSet` object. The experiment was carried out on 11 Humanv4 BeadChips using 12 samples per BeadChip. The original arrays contains 48324 features, with a mean of 22 beads per feature (Standard Deviation of 5). Additional description about sample groups can be retrieved from `phenoData` slot (see examples).

## Usage

```
data(Exp3)
```

## Format

The format is: An `ExpressionSet` object with covariates representing experimental conditions:

- `Sample`: Sample IDs.
- `Group`: Major experimental groups (MinusTet and PlusTet).
- `Time`: Treatment time.
- `Replicates`: Biological replicates (numerical sequence).
- `MinusTet.UT`: Control group (vehicle for MinusTet group).
- `MinusTet.E2`: E2 treatment group.
- `MinusTet.E2.FGF10`: E2+FGF10 treatment group.
- `PlusTet.UT`: Control group (vehicle for PlusTet group).
- `PlusTet.E2`: E2 treatment group.
- `PlusTet.E2.FGF10`: E2+FGF10 treatment group.
- `Treatment`: Group names (treatments).
- `Target`: Group names for differential expression analysis (e.g. targets for limma). The corresponding contrasts can be retrieved by `notes(Exp3)`.

## Note

The differential expression analysis documented in the vignette is available at 'Exp3limma'.

**Source**

Michael NC Fletcher, Mauro AA Castro, Suet-Feung Chin, Oscar Rueda, Xin Wang, Carlos Caldas, Bruce AJ Ponder, Florian Markowetz, Kerstin B Meyer. Master regulators of FGFR2 signalling and breast cancer risk. *Nature Communications*, 4:2464, 2013.

**Examples**

```
data(Exp3)
#gexp<-exprs(Exp3)
#geneids<-fData(Exp3)
#targets<-pData(Exp3)
#mycontrasts<-notes(Exp3)$contrasts

#limma pre-processed dataset
#data(Exp3limma)
```

---

Fletcher2013a.pipelines

*A pipeline to reproduce results for Fletcher et al. 2013.*

---

**Description**

Pipeline functions to reproduce results in Fletcher et al. 2013.

**Usage**

```
Fletcher2013pipeline.limma(exprSet, par=list(method="global", adjust.method="BH", p.value=1e-2,
Fletcher2013pipeline.pca(exprSet)
Fletcher2013pipeline.deg(what="Exp1", idtype="probeid", response="all", mode="all")
Fletcher2013pipeline.supp()
```

**Arguments**

|          |                                                                                                                                                                                                            |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| exprSet  | Any ExpressionSet object available in the package Fletcher2013a: <a href="#">Exp1</a> , <a href="#">Exp2</a> and <a href="#">Exp3</a> .                                                                    |
| par      | a list with parameters for limma analysis (see <a href="#">decideTests</a> ) for details.                                                                                                                  |
| what     | a single character value specifying an experimental system: "Exp1", "Exp2" or "Exp3".                                                                                                                      |
| idtype   | a single character value specifying a signature report option: "probeid" or "entrez".                                                                                                                      |
| response | a single character value specifying how signatures should be consolidated across time points: "early", "late" or "all". (see <a href="#">Details</a> for a detailed time-course dataset).                  |
| mode     | a single character value specifying how signatures should be consolidated regarding the mode of action: "positive", "negative" or "all". (see <a href="#">Details</a> for a detailed time-course dataset). |

## Details

These functions reproduce results of the differential expression analysis in Fletcher et al., 2013:

(1) `Fletcher2013pipeline.limma`: main function to run the limma analysis on the gene expression datasets.

(2) `Fletcher2013pipeline.pca`: complementary function to run a principal components analysis on the gene expression datasets.

(3) `Fletcher2013pipeline.deg`: function to extract results computed in `Fletcher2013pipeline.limma`. Useful to retrieve consolidated gene lists from the differential expression analyses. For detailed time-course information, please use the full pre-processed datasets [Exp1limma](#), [Exp2limma](#) and [Exp3limma](#).

(4) `Fletcher2013pipeline.suppl`: this function generates additional figures for the vignette.

## Value

All results will be saved in the current work directory.

## Author(s)

Mauro Castro <mauro.a.castro@gmail.com>

## Source

Michael NC Fletcher, Mauro AA Castro, Suet-Feung Chin, Oscar Rueda, Xin Wang, Carlos Caldas, Bruce AJ Ponder, Florian Markowetz, Kerstin B Meyer. Master regulators of FGFR2 signalling and breast cancer risk. *Nature Communications*, 4:2464, 2013.

## Examples

```
## Not run:  
data(Exp1)  
#Fletcher2013pipeline.limma(Exp1)  
#Fletcher2013pipeline.pca(Exp1)  
  
## End(Not run)
```

---

siESR1

*Knockdown dataset: siESR1 in MCF-7 cells.*

---

## Description

The data consists of 6 microarray samples after knocking down ESR1 in MCF-7 cells, retrieved from GEO dataset (Series GSE18431). The data have been normalized (quantile normalization and log2 transform) as described in the original dataset, and are presented here in the form of an `exprSet` object.

## Usage

```
data(siESR1)
```

**Format**

The format is: An ExpressionSet object with covariates representing experimental conditions:

- Sample: Sample IDs
- Target: Group names for differential expression analysis (e.g. targets for limma). The corresponding contrasts can be retrieved by notes(siESR1)

**Note**

The differential expression analysis documented in the vignette is available at 'siESR1limma'.

**Source**

Park YY, Kim K, Kim SB, Hennessy BT et al. Reconstruction of nuclear receptor network reveals that NR2E3 is a novel upstream regulator of ESR1 in breast cancer. *EMBO Mol Med* 2012 Jan;4(1):52-67.

**Examples**

```
data(siESR1)
#notes(siESR1)

#limma pre-processed dataset
#data(siESR1limma)
```

---

siOTHERS

*Knockdown dataset: siPTTG1, siSPDEF, siE2F2 and siELF3 in MCF-7 cells.*

---

**Description**

The data consists of 30 microarray samples after knocking down PTTG1, SPDEF, E2F2 or ELF3 in MCF-7 cells. The data have been normalized (RMA algorithm) and are presented in the form of an exprSet object. The experiment was carried out on 3 Humanv4 BeadChips using 30 arrays (1 samples per BeadChip). These arrays interrogate 48107 randomly-distributed bead-types, and in this experiment there was a mean of 22 beads per bead-type (Standard Deviation of 5). In total, there are 21642 genes being interrogated, with 7872 genes being interrogated by more than one bead-type and 13167 bead-types not being assigned to a gene symbol.

**Usage**

```
data(siOTHERS)
```

**Format**

The format is: An ExpressionSet object with covariates representing experimental conditions:

- Sample: Sample IDs.
- Target: Group names for differential expression analysis (e.g. targets for limma). The corresponding contrasts can be retrieved by notes(siOTHERS).

**Note**

The differential expression analysis documented in the vignette is available at 'siOTHERSlimma'.

**Source**

Michael NC Fletcher, Mauro AA Castro, Suet-Feung Chin, Oscar Rueda, Xin Wang, Carlos Caldas, Bruce AJ Ponder, Florian Markowitz, Kerstin B Meyer. Master regulators of FGFR2 signalling and breast cancer risk. Nature Communications, 4:2464, 2013.

**Examples**

```
data(siOTHERS)
#notes(siOTHERS)

#limma pre-processed dataset
#data(siOTHERSlimma)
```



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