

PEC-1

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```
#if (!requireNamespace("BiocManager", quietly = TRUE))  
#install.packages("BiocManager")  
#BiocManager::install(version = '3.20')
```

```
#BiocManager::install("SummarizedExperiment")  
library(SummarizedExperiment)
```

```
## Cargando paquete requerido: MatrixGenerics
```

```
## Cargando paquete requerido: matrixStats
```

```
##
```

```
## Adjuntando el paquete: 'MatrixGenerics'
```

```
## The following objects are masked from 'package:matrixStats':
```

```
##
```

```
## colAlls, colAnyNAs, colAnys, colAvgsPerRowSet, colCollapse,  
## colCounts, colCummaxs, colCummins, colCumprods, colCumsums,  
## colDiffs, colIQRDiffs, colIQRs, colLogSumExps, colMadDiffs,  
## colMads, colMaxs, colMeans2, colMedians, colMins, colOrderStats,  
## colProds, colQuantiles, colRanges, colRanks, colSdDiffs, colSds,  
## colSums2, colTabulates, colVarDiffs, colVars, colWeightedMads,  
## colWeightedMeans, colWeightedMedians, colWeightedSds,  
## colWeightedVars, rowAlls, rowAnyNAs, rowAnys, rowAvgsPerColSet,  
## rowCollapse, rowCounts, rowCummaxs, rowCummins, rowCumprods,  
## rowCumsums, rowDiffs, rowIQRDiffs, rowIQRs, rowLogSumExps,  
## rowMadDiffs, rowMads, rowMaxs, rowMeans2, rowMedians, rowMins,  
## rowOrderStats, rowProds, rowQuantiles, rowRanges, rowRanks,  
## rowSdDiffs, rowSds, rowSums2, rowTabulates, rowVarDiffs, rowVars,  
## rowWeightedMads, rowWeightedMeans, rowWeightedMedians,  
## rowWeightedSds, rowWeightedVars
```

```
## Cargando paquete requerido: GenomicRanges
```

```
## Cargando paquete requerido: stats4
```

```
## Cargando paquete requerido: BiocGenerics
```

```
##
```

```
## Adjuntando el paquete: 'BiocGenerics'
```

```

## The following objects are masked from 'package:stats':
##
##     IQR, mad, sd, var, xtabs

## The following objects are masked from 'package:base':
##
##     anyDuplicated, aperm, append, as.data.frame, basename, cbind,
##     colnames, dirname, do.call, duplicated, eval, evalq, Filter, Find,
##     get, grep, grepl, intersect, is.unsorted, lapply, Map, mapply,
##     match, mget, order, paste, pmax, pmax.int, pmin, pmin.int,
##     Position, rank, rbind, Reduce, rownames, sapply, saveRDS, setdiff,
##     table, tapply, union, unique, unsplit, which.max, which.min

## Cargando paquete requerido: S4Vectors

##
## Adjuntando el paquete: 'S4Vectors'

## The following object is masked from 'package:utils':
##
##     findMatches

## The following objects are masked from 'package:base':
##
##     expand.grid, I, unname

## Cargando paquete requerido: IRanges

##
## Adjuntando el paquete: 'IRanges'

## The following object is masked from 'package:grDevices':
##
##     windows

## Cargando paquete requerido: GenomeInfoDb

## Cargando paquete requerido: Biobase

## Welcome to Bioconductor
##
##     Vignettes contain introductory material; view with
##     'browseVignettes()'. To cite Bioconductor, see
##     'citation("Biobase")', and for packages 'citation("pkgname)".

##
## Adjuntando el paquete: 'Biobase'

## The following object is masked from 'package:MatrixGenerics':
##
##     rowMedians

```

```
## The following objects are masked from 'package:matrixStats':
##
## anyMissing, rowMedians

## Warning: replacing previous import 'S4Arrays::read_block' by
## 'DelayedArray::read_block' when loading 'SummarizedExperiment'
```

```
library(readxl)
GastricCancer_NMR <- read_excel("C:/Users/smjrk/OneDrive/Escritorio/Análisis de datos ómicos/GastricCancer.xlsx")
View(GastricCancer_NMR)
```

```
#Definimos los metadatos
metadatos_GastricCancer <- GastricCancer_NMR[, 1:4]
metadatos_GastricCancer
```

```
## # A tibble: 140 x 4
##   Idx SampleID SampleType Class
##   <dbl> <chr>    <chr>    <chr>
## 1     1 sample_1 QC        QC
## 2     2 sample_2 Sample    GC
## 3     3 sample_3 Sample    BN
## 4     4 sample_4 Sample    HE
## 5     5 sample_5 Sample    GC
## 6     6 sample_6 Sample    BN
## 7     7 sample_7 Sample    GC
## 8     8 sample_8 Sample    HE
## 9     9 sample_9 Sample    GC
## 10    10 sample_10 QC        QC
## # i 130 more rows
```

```
colnames(metadatos_GastricCancer) <- c('Idx', 'SampleID', 'SampleType', 'Class')
```

```
#Definimos los datos de expresión
datosexpr_GastricCancer <- as.matrix(GastricCancer_NMR[, 5:ncol(GastricCancer_NMR)])
head(datosexpr_GastricCancer)
```

```
##      M1      M2      M3      M4      M5      M6      M7      M8      M9      M10     M11     M12
## [1,] 90.1  491.6 202.9 35.0 164.2  19.7  41.0  46.5  17.3 106.8  61.7  75.3
## [2,] 43.0  525.7 130.2  NA 694.5 114.5  37.9 125.7  57.8   NA 490.6 203.4
## [3,] 214.3 10703.2 104.7 46.8 483.4 152.3 110.1  85.1 238.3  48.0 2441.2 100.0
## [4,] 31.6   59.7  86.4 14.0  88.6  10.3 170.3  23.9   NA   NA 140.7  12.6
## [5,] 81.9  258.7 315.1  8.7 243.2  18.4 349.4  61.1  12.2  72.9  48.7  57.3
## [6,] 196.9  128.2 862.5 18.7 200.1   4.7  37.3 243.7 293.3 113.1 103.7 116.6
##      M13     M14     M15     M16     M17     M18     M19     M20     M21     M22     M23     M24     M25
## [1,] 79.7 35.3  28.8 245.9  5.8 122.2  90.9  47.0  49.0  37.2 422.0 155.1 21.4
## [2,] 330.8   NA 210.7 150.3 71.5 553.1 217.7 207.9 238.8 297.2 591.2 446.4 28.3
## [3,] 873.3 29.3  45.4 226.4 36.3 371.9  98.1 116.5  30.3  24.6 593.4 232.6 35.1
## [4,] 46.3 62.9  38.3  49.7  0.4  31.3  38.6  53.2  45.4   3.7 130.1   1.6 26.6
## [5,] 140.1 77.8  51.0  71.3 18.8 265.0  84.7  78.8 141.3  58.0 722.1 174.7 58.9
## [6,] 81.7 52.3  76.8 273.5 45.8 394.7  66.9  63.0 101.1  96.6 640.5  74.8 29.1
##      M26     M27     M28     M29     M30     M31     M32     M33     M34     M35     M36     M37
## [1,] 16.5   NA  19.9  65.0 22.0  18.9  97.8 274.1  26.3 110.8  13.0  33.7
```

```

## [2,] 47.9 126.8 12.9 291.9 58.5 1336.6 621.2 776.7 324.5 282.8 154.3 403.3
## [3,] 26.8 78.4 3772.3 144.3 52.8 0.2 360.1 532.3 507.0 3207.5 161.7 21.7
## [4,] 10.3 22.8 14.5 25.5 11.2 4.8 111.6 133.4 37.3 NA 34.5 31.0
## [5,] 65.9 2.8 15.3 63.5 38.1 11.2 233.6 328.4 79.4 7.1 305.9 12.2
## [6,] 20.3 185.5 55.9 157.6 88.8 112.0 76.4 297.9 NA NA 17.4 141.4
## M38 M39 M40 M41 M42 M43 M44 M45 M46 M47 M48 M49
## [1,] 352.3 34.7 33.8 69.9 47.7 7.9 119.1 631.6 403.7 47.4 8029.5 91.3
## [2,] 11.7 66.1 50.9 NA 226.8 46.2 45.4 5354.5 109.3 NA 16744.8 775.4
## [3,] 947.7 185.6 124.3 80.0 129.5 40.9 79.4 1230.8 382.8 NA 12939.2 464.5
## [4,] 60.5 14.7 28.8 80.1 67.0 11.0 34.8 1679.3 9.7 38.6 4562.6 112.2
## [5,] 327.2 23.3 87.3 84.7 116.2 40.7 38.4 2035.5 278.7 99.2 12562.3 390.7
## [6,] 362.5 52.9 100.6 NA 110.9 19.3 9.2 2578.0 7.0 223.6 8484.2 107.0
## M50 M51 M52 M53 M54 M55 M56 M57 M58 M59 M60
## [1,] 98.1 372.1 148.2 562.4 0.3 102.6 74.1 200.4 195.6 474.5 170.9
## [2,] 563.5 520.6 306.7 1292.2 4.6 604.3 140.3 1158.9 1631.4 590.9 798.6
## [3,] 512.4 NA 197.6 6413.9 26.7 19.7 145.8 9435.5 1155.3 6537.7 2813.2
## [4,] 67.6 263.2 134.8 130.6 1.0 36.2 44.7 141.6 159.8 74.6 38.7
## [5,] 197.8 575.6 190.7 759.9 2.3 70.4 148.6 612.1 490.4 619.4 390.7
## [6,] 128.8 229.6 90.3 689.4 0.4 12202.2 116.8 864.8 1120.2 513.3 25.0
## M61 M62 M63 M64 M65 M66 M67 M68 M69 M70 M71
## [1,] 564.9 232.0 253.1 115.9 262.7 3104.5 94.5 128.9 0.6 13.8 23.8
## [2,] 1215.6 785.6 2965.9 490.2 1416.5 3168.2 601.0 257.4 288.0 68.0 232.6
## [3,] 3118.4 NA 12076.8 612.3 1798.1 689.4 531.3 125.0 112.7 194.8 51.5
## [4,] 264.4 195.5 511.6 309.8 156.9 632.1 55.2 264.9 29.9 14.0 16.2
## [5,] 1036.3 442.1 824.3 580.5 662.8 507.3 121.4 232.4 73.3 42.3 32.9
## [6,] 1148.6 512.5 731.5 169.5 1148.2 933.1 163.6 112.7 220.5 47.0 28.1
## M72 M73 M74 M75 M76 M77 M78 M79 M80 M81 M82 M83
## [1,] 169.9 134.3 9.9 75.7 606.9 451.5 0.1 20.2 455.8 314.0 NA NA
## [2,] 427.9 260.0 88.2 408.1 1127.2 799.1 46.0 199.6 205.4 1399.8 121.7 8707.8
## [3,] 243.4 214.0 46.2 395.6 2940.8 1532.2 NA NA 204.9 2942.9 147.8 NA
## [4,] NA 18.6 9.2 100.1 73.0 NA 1.6 NA 141.6 304.2 0.3 198.4
## [5,] 250.4 79.2 20.0 503.2 708.4 774.8 NA NA 251.0 425.9 38.5 213.5
## [6,] 274.3 131.2 1.6 196.3 512.5 308.2 40.7 28.5 2023.8 929.3 133.8 363.7
## M84 M85 M86 M87 M88 M89 M90 M91 M92 M93 M94 M95
## [1,] 8.8 35.2 40.2 16.8 136.3 384.5 28.6 60.0 10.1 69.8 99.3 13.8
## [2,] 108.4 125.5 162.0 28.3 319.6 3712.3 285.6 337.5 84.3 120.4 2383.3 97.2
## [3,] 18.7 85.8 91.4 99.3 396.0 694.1 277.9 61.3 NA 236.4 579.0 NA
## [4,] 67.7 0.7 54.1 19.2 75.2 180.5 26.3 26.2 12.1 50.7 119.6 NA
## [5,] 30.2 5.8 695.7 23.7 216.2 485.6 75.8 65.2 20.4 111.9 569.7 36.8
## [6,] 484.3 33.3 79.0 11.8 208.2 1139.8 56.1 79.8 18.5 38.0 1233.6 NA
## M96 M97 M98 M99 M100 M101 M102 M103 M104 M105 M106 M107
## [1,] NA 19.4 10.2 30.6 108.4 31.0 168.1 182.5 185.3 44.0 30.8 214.2
## [2,] 7.6 NA 42.1 46.1 1348.1 148.7 58.6 1482.8 333.6 193.5 71.0 834.3
## [3,] 11.7 12.9 78.1 75.3 206.9 42.3 189.3 211.5 367.8 147.5 NA 1338.7
## [4,] 6.7 6.5 20.1 17.1 124.9 21.4 53.9 50.3 105.8 31.8 43.1 160.1
## [5,] 2.5 14.4 15.8 51.2 359.8 28.2 164.0 167.1 502.1 419.6 33.9 393.1
## [6,] 12.5 11.9 70.3 40.6 240.0 15.9 213.0 459.2 269.3 142.6 118.8 274.3
## M108 M109 M110 M111 M112 M113 M114 M115 M116 M117 M118 M119
## [1,] 8.4 239.0 156.8 6.6 201.7 84.6 70.2 291.2 32.9 112.3 198.7 128.5
## [2,] 157.5 113.8 69.3 150.6 477.6 3.3 217.9 66.6 131.0 694.5 635.3 209.7
## [3,] 244.7 1045.7 83.2 2664.3 550.5 1319.4 413.9 55.5 42.5 25.7 271.9 88.9
## [4,] 41.9 16.6 31.6 22.4 18.8 90.7 39.6 136.2 11.7 91.1 59.1 16.1
## [5,] 52.8 26.3 47.5 78.2 538.8 133.3 65.1 411.1 48.9 18.8 225.8 91.5
## [6,] 48.1 635.2 124.6 32.4 402.4 NA 230.4 163.7 13.1 890.0 587.1 241.5

```

```
##      M120 M121 M122 M123 M124 M125 M126 M127 M128 M129 M130 M131
## [1,] 109.4  3.7 18.5 266.1 431.2 145.1  35.7   NA  48.9 2445.7  37.9 1258.4
## [2,] 237.9 47.4 41.8 188.3 673.1 283.1  61.7 367.0 225.9  961.8 100.1 1636.7
## [3,] 105.4 40.4 39.0  67.6 997.8 180.6  76.2 145.4 494.4  673.4  42.8 1954.2
## [4,]   NA   NA 12.3  50.1 184.1 102.1  31.1   0.7 649.8  651.7  31.3  799.8
## [5,]  42.9 40.3  3.9 235.0 585.5 624.2 122.4   0.1 726.1 2048.9   NA 2380.8
## [6,]  69.1  0.6 14.3  36.3 848.7 135.0  38.9 375.8 1392.6  850.6  75.9  964.9
##      M132 M133 M134 M135 M136 M137 M138 M139 M140 M141 M142
## [1,] 168.5  32.7 706.9 1106.9 107.6 2807.8 481.0  68.4 115.1  64.8 25.5
## [2,] 206.6 148.5 6674.1 9079.2   NA  938.9 6084.5  75.3  84.2 357.1 16.1
## [3,] 193.6 129.8 787.2 1404.5 1564.3 1163.2 246.0 2460.4 993.5 1698.5 32.9
## [4,]  34.0  22.1 392.4  550.0  43.4  370.6 109.3  68.7  58.1  83.5 60.5
## [5,] 168.9  58.5 973.9 1494.7  85.8  984.0 1037.4  66.4  44.5  47.6 45.6
## [6,] 102.5  76.5   NA 19079.6 741.4 2916.5 1732.1 381.9 143.8 157.2 10.4
##      M143 M144 M145 M146 M147 M148 M149
## [1,] 473.9 26.5   NA  6.8 118.6 710.6 203.6
## [2,] 455.5 29.5  28.1  35.8 316.1 390.7 199.0
## [3,]  75.9 33.2 802.8 967.6 154.4  31.6 195.2
## [4,] 136.9 17.0  10.2  24.7  64.1  91.4  91.6
## [5,] 1441.7 35.2   0.1  22.8 135.0 322.3 254.3
## [6,] 182.1 32.6 435.1 325.3 162.4 129.7 207.2
```

```
datosexpr_GastricCancer <- t(datosexpr_GastricCancer)
```

```
row_data <- data.frame(Metabolitos = rownames(datosexpr_GastricCancer))
contenedorGastricCancer <- SummarizedExperiment(assays = list(counts = datosexpr_GastricCancer), colData = row_data)
contenedorGastricCancer
```

```
## class: SummarizedExperiment
## dim: 149 140
## metadata(0):
## assays(1): counts
## rownames(149): M1 M2 ... M148 M149
## rowData names(1): Metabolitos
## colnames: NULL
## colData names(4): Idx SampleID SampleType Class
```

```
summary(GastricCancer_NMR)
```

```
##      Idx      SampleID      SampleType      Class
## Min.   : 1.00   Length:140   Length:140   Length:140
## 1st Qu.: 35.75  Class :character  Class :character  Class :character
## Median : 70.50  Mode  :character  Mode  :character  Mode  :character
## Mean   : 70.50
## 3rd Qu.:105.25
## Max.   :140.00
##
##      M1      M2      M3      M4
## Min.   : 0.40   Min.   :  3.1   Min.   : 0.1   Min.   : 0.10
## 1st Qu.: 29.82   1st Qu.: 140.9   1st Qu.: 53.6   1st Qu.: 18.77
## Median : 60.35   Median : 270.2   Median :105.1   Median : 35.70
## Mean   :101.07   Mean   : 642.0   Mean   :146.4   Mean   : 43.83
```

##	3rd Qu.:133.38	3rd Qu.: 480.9	3rd Qu.:198.8	3rd Qu.: 51.33
##	Max. :909.90	Max. :26195.8	Max. :862.5	Max. :242.50
##	NA's :16	NA's :1	NA's :7	NA's :12
##	M5	M6	M7	M8
##	Min. : 1.3	Min. : 0.20	Min. : 4.60	Min. : 9.30
##	1st Qu.: 67.0	1st Qu.: 15.50	1st Qu.: 19.65	1st Qu.: 37.17
##	Median : 160.3	Median : 25.90	Median : 40.25	Median : 51.00
##	Mean : 231.1	Mean : 41.63	Mean : 74.12	Mean : 67.81
##	3rd Qu.: 253.1	3rd Qu.: 48.60	3rd Qu.: 65.55	3rd Qu.: 77.83
##	Max. :2503.0	Max. :339.40	Max. :492.60	Max. :525.00
##	NA's :2	NA's :7	NA's :4	
##	M9	M10	M11	M12
##	Min. : 0.7	Min. : 0.1	Min. : 0.3	Min. : 1.70
##	1st Qu.: 20.1	1st Qu.: 38.4	1st Qu.: 47.0	1st Qu.: 31.85
##	Median : 42.2	Median : 80.8	Median : 82.9	Median : 50.55
##	Mean : 64.1	Mean : 124.8	Mean : 192.5	Mean : 69.13
##	3rd Qu.: 75.3	3rd Qu.: 148.0	3rd Qu.: 164.7	3rd Qu.: 83.70
##	Max. :612.1	Max. :2026.8	Max. :2676.3	Max. :576.20
##	NA's :27	NA's :11	NA's :7	
##	M13	M14	M15	M16
##	Min. : 17.20	Min. : 0.20	Min. : 7.90	Min. : 3.70
##	1st Qu.: 79.28	1st Qu.: 30.40	1st Qu.: 28.80	1st Qu.: 43.95
##	Median : 108.85	Median : 50.40	Median : 44.10	Median : 90.60
##	Mean : 376.10	Mean : 68.75	Mean : 57.16	Mean :125.03
##	3rd Qu.: 223.62	3rd Qu.: 83.70	3rd Qu.: 71.08	3rd Qu.:171.68
##	Max. :10712.70	Max. :437.60	Max. :212.30	Max. :665.90
##		NA's :3		NA's :10
##	M17	M18	M19	M20
##	Min. : 0.40	Min. : 2.60	Min. : 0.40	Min. : 0.50
##	1st Qu.: 7.60	1st Qu.: 83.05	1st Qu.: 27.68	1st Qu.: 24.60
##	Median : 20.00	Median : 139.35	Median : 56.05	Median : 45.80
##	Mean : 39.16	Mean : 210.99	Mean : 65.75	Mean : 62.47
##	3rd Qu.: 63.02	3rd Qu.: 277.65	3rd Qu.: 85.55	3rd Qu.: 73.10
##	Max. :187.60	Max. :1236.50	Max. :217.70	Max. :341.90
##	NA's :38	NA's :2	NA's :12	NA's :7
##	M21	M22	M23	M24
##	Min. : 0.10	Min. : 0.30	Min. : 65.8	Min. : 0.3
##	1st Qu.: 12.38	1st Qu.: 18.10	1st Qu.: 233.7	1st Qu.: 34.2
##	Median : 30.85	Median : 37.35	Median : 395.3	Median : 95.3
##	Mean : 66.41	Mean : 58.26	Mean : 487.5	Mean :113.3
##	3rd Qu.: 70.15	3rd Qu.: 70.03	3rd Qu.: 617.4	3rd Qu.:155.2
##	Max. :997.20	Max. :713.50	Max. :2499.1	Max. :446.4
##	NA's :44	NA's :28	NA's :1	NA's :15
##	M25	M26	M27	M28
##	Min. : 0.40	Min. : 2.00	Min. : 0.40	Min. : 0.10
##	1st Qu.: 12.20	1st Qu.: 13.80	1st Qu.: 14.75	1st Qu.: 11.75
##	Median : 18.25	Median : 20.90	Median : 34.60	Median : 19.50
##	Mean : 24.23	Mean : 28.31	Mean : 63.19	Mean : 217.14
##	3rd Qu.: 28.50	3rd Qu.: 30.80	3rd Qu.: 65.30	3rd Qu.: 34.70
##	Max. :171.80	Max. :374.60	Max. :1062.50	Max. :14787.10
##		NA's :8	NA's :17	NA's :21
##	M29	M30	M31	M32
##	Min. : 4.8	Min. : 2.20	Min. : 0.20	Min. : 0.60
##	1st Qu.: 43.4	1st Qu.: 19.77	1st Qu.: 13.60	1st Qu.: 84.25

## Median :	84.8	Median :	33.60	Median :	24.10	Median :	115.95
## Mean :	269.0	Mean :	92.89	Mean :	70.59	Mean :	174.49
## 3rd Qu.:	184.4	3rd Qu.:	73.78	3rd Qu.:	61.55	3rd Qu.:	218.12
## Max. :	4719.0	Max. :	1156.80	Max. :	1336.60	Max. :	874.20
## NA's :	3	NA's :	2	NA's :	1		
##	M33		M34		M35		M36
## Min. :	26.8	Min. :	0.10	Min. :	0.1	Min. :	0.10
## 1st Qu.:	213.6	1st Qu.:	36.88	1st Qu.:	52.1	1st Qu.:	13.10
## Median :	308.4	Median :	83.55	Median :	131.8	Median :	17.40
## Mean :	351.8	Mean :	147.76	Mean :	497.6	Mean :	45.00
## 3rd Qu.:	424.4	3rd Qu.:	177.72	3rd Qu.:	333.7	3rd Qu.:	59.75
## Max. :	1127.6	Max. :	1605.40	Max. :	6596.8	Max. :	305.90
##		NA's :	20	NA's :	21	NA's :	13
##	M37		M38		M39		M40
## Min. :	4.30	Min. :	9.8	Min. :	0.50	Min. :	0.80
## 1st Qu.:	31.38	1st Qu.:	81.3	1st Qu.:	21.90	1st Qu.:	26.95
## Median :	49.05	Median :	161.6	Median :	36.10	Median :	39.20
## Mean :	85.50	Mean :	261.8	Mean :	60.21	Mean :	50.87
## 3rd Qu.:	105.65	3rd Qu.:	311.3	3rd Qu.:	70.50	3rd Qu.:	65.35
## Max. :	1026.50	Max. :	1632.5	Max. :	913.90	Max. :	204.30
##		NA's :	5	NA's :	1	NA's :	2
##	M41		M42		M43		M44
## Min. :	0.10	Min. :	12.5	Min. :	4.1	Min. :	0.30
## 1st Qu.:	15.60	1st Qu.:	66.8	1st Qu.:	8.3	1st Qu.:	23.35
## Median :	49.60	Median :	127.2	Median :	13.2	Median :	45.45
## Mean :	84.33	Mean :	150.8	Mean :	18.5	Mean :	67.31
## 3rd Qu.:	94.20	3rd Qu.:	196.2	3rd Qu.:	20.7	3rd Qu.:	97.20
## Max. :	746.00	Max. :	810.1	Max. :	191.7	Max. :	454.10
## NA's :	22	NA's :	5	NA's :	3	NA's :	4
##	M45		M46		M47		M48
## Min. :	49.9	Min. :	1.5	Min. :	0.10	Min. :	988
## 1st Qu.:	822.5	1st Qu.:	94.8	1st Qu.:	97.62	1st Qu.:	5792
## Median :	1917.1	Median :	185.5	Median :	193.60	Median :	7964
## Mean :	2927.8	Mean :	310.2	Mean :	324.73	Mean :	9989
## 3rd Qu.:	3769.2	3rd Qu.:	365.2	3rd Qu.:	454.95	3rd Qu.:	12398
## Max. :	16673.9	Max. :	3749.4	Max. :	1771.30	Max. :	33767
##		NA's :	8	NA's :	14		
##	M49		M50		M51		M52
## Min. :	9.6	Min. :	0.20	Min. :	2.1	Min. :	9.60
## 1st Qu.:	175.0	1st Qu.:	98.03	1st Qu.:	202.1	1st Qu.:	89.92
## Median :	260.9	Median :	150.45	Median :	387.6	Median :	133.30
## Mean :	322.1	Mean :	353.63	Mean :	466.4	Mean :	184.89
## 3rd Qu.:	430.6	3rd Qu.:	267.12	3rd Qu.:	516.3	3rd Qu.:	203.00
## Max. :	1547.1	Max. :	17082.20	Max. :	5732.7	Max. :	3337.30
##		NA's :	2	NA's :	10		
##	M53		M54		M55		M56
## Min. :	40.2	Min. :	0.200	Min. :	0.40	Min. :	2.9
## 1st Qu.:	382.8	1st Qu.:	1.775	1st Qu.:	51.45	1st Qu.:	49.0
## Median :	577.7	Median :	5.050	Median :	113.50	Median :	88.0
## Mean :	796.8	Mean :	9.920	Mean :	507.69	Mean :	103.5
## 3rd Qu.:	824.2	3rd Qu.:	11.725	3rd Qu.:	197.35	3rd Qu.:	137.3
## Max. :	6413.9	Max. :	82.900	Max. :	19704.10	Max. :	367.9
##		NA's :	28	NA's :	5	NA's :	9
##	M57		M58		M59		M60

##	Min. :	0.1	Min. :	15.6	Min. :	32.8	Min. :	0.2
##	1st Qu.:	217.2	1st Qu.:	208.1	1st Qu.:	201.9	1st Qu.:	105.7
##	Median :	372.4	Median :	359.5	Median :	347.2	Median :	209.3
##	Mean :	680.4	Mean :	579.3	Mean :	523.9	Mean :	1910.0
##	3rd Qu.:	611.8	3rd Qu.:	638.1	3rd Qu.:	519.1	3rd Qu.:	473.5
##	Max. :	16077.3	Max. :	6371.7	Max. :	10448.2	Max. :	160844.7
##	NA's :	2	NA's :	1	NA's :	6	NA's :	11
##	M61		M62		M63		M64	
##	Min. :	1.7	Min. :	0.3	Min. :	3.7	Min. :	0.1
##	1st Qu.:	269.5	1st Qu.:	199.5	1st Qu.:	275.0	1st Qu.:	128.0
##	Median :	542.0	Median :	338.5	Median :	441.1	Median :	196.2
##	Mean :	727.6	Mean :	420.4	Mean :	867.9	Mean :	294.5
##	3rd Qu.:	851.8	3rd Qu.:	507.2	3rd Qu.:	824.8	3rd Qu.:	342.6
##	Max. :	4920.9	Max. :	1897.9	Max. :	15297.4	Max. :	5168.5
##	NA's :	1	NA's :	6	NA's :	4	NA's :	8
##	M65		M66		M67		M68	
##	Min. :	25.6	Min. :	34.6	Min. :	2.5	Min. :	0.10
##	1st Qu.:	224.8	1st Qu.:	462.8	1st Qu.:	71.2	1st Qu.:	90.17
##	Median :	348.6	Median :	1112.0	Median :	112.7	Median :	158.65
##	Mean :	533.4	Mean :	1745.7	Mean :	163.2	Mean :	211.01
##	3rd Qu.:	702.4	3rd Qu.:	2380.1	3rd Qu.:	196.2	3rd Qu.:	252.95
##	Max. :	2432.1	Max. :	16544.5	Max. :	686.9	Max. :	1639.00
##					NA's :	5	NA's :	4
##	M69		M70		M71		M72	
##	Min. :	0.10	Min. :	1.70	Min. :	4.40	Min. :	0.30
##	1st Qu.:	30.05	1st Qu.:	18.15	1st Qu.:	23.00	1st Qu.:	48.85
##	Median :	48.45	Median :	42.25	Median :	31.35	Median :	100.45
##	Mean :	72.98	Mean :	80.41	Mean :	47.87	Mean :	139.66
##	3rd Qu.:	95.75	3rd Qu.:	97.33	3rd Qu.:	56.40	3rd Qu.:	174.53
##	Max. :	546.50	Max. :	598.30	Max. :	490.40	Max. :	629.00
##	NA's :	4	NA's :	2			NA's :	8
##	M73		M74		M75		M76	
##	Min. :	10.10	Min. :	0.10	Min. :	21.6	Min. :	0.1
##	1st Qu.:	46.20	1st Qu.:	10.30	1st Qu.:	78.4	1st Qu.:	209.6
##	Median :	90.75	Median :	16.20	Median :	105.7	Median :	342.5
##	Mean :	98.43	Mean :	28.17	Mean :	165.5	Mean :	491.1
##	3rd Qu.:	133.05	3rd Qu.:	34.40	3rd Qu.:	193.2	3rd Qu.:	610.0
##	Max. :	366.30	Max. :	171.00	Max. :	1225.3	Max. :	3230.2
##			NA's :	7			NA's :	3
##	M77		M78		M79		M80	
##	Min. :	0.1	Min. :	0.10	Min. :	0.40	Min. :	0.4
##	1st Qu.:	198.4	1st Qu.:	6.60	1st Qu.:	12.90	1st Qu.:	133.2
##	Median :	316.0	Median :	15.60	Median :	32.40	Median :	267.1
##	Mean :	374.4	Mean :	25.32	Mean :	120.47	Mean :	676.3
##	3rd Qu.:	457.6	3rd Qu.:	33.90	3rd Qu.:	71.45	3rd Qu.:	464.7
##	Max. :	1751.5	Max. :	241.60	Max. :	3504.40	Max. :	27945.1
##	NA's :	5	NA's :	19	NA's :	41	NA's :	1
##	M81		M82		M83		M84	
##	Min. :	1.2	Min. :	0.100	Min. :	0.1	Min. :	0.10
##	1st Qu.:	303.4	1st Qu.:	7.425	1st Qu.:	131.4	1st Qu.:	29.05
##	Median :	491.4	Median :	17.650	Median :	225.0	Median :	67.00
##	Mean :	684.4	Mean :	60.815	Mean :	601.9	Mean :	110.00
##	3rd Qu.:	750.5	3rd Qu.:	52.625	3rd Qu.:	616.2	3rd Qu.:	133.70
##	Max. :	3849.4	Max. :	1249.700	Max. :	8918.0	Max. :	813.00

##		NA's :32	NA's :2	NA's :5
##	M85	M86	M87	M88
##	Min. : 0.10	Min. : 4.70	Min. : 2.50	Min. : 0.5
##	1st Qu.: 19.93	1st Qu.: 42.38	1st Qu.: 16.40	1st Qu.:103.5
##	Median : 35.75	Median : 63.15	Median : 28.40	Median :149.6
##	Mean : 49.27	Mean : 94.95	Mean : 38.30	Mean :187.6
##	3rd Qu.: 60.80	3rd Qu.:114.72	3rd Qu.: 47.05	3rd Qu.:224.5
##	Max. :376.00	Max. :959.30	Max. :213.70	Max. :798.8
##	NA's :4		NA's :1	NA's :1
##	M89	M90	M91	M92
##	Min. : 47.4	Min. : 2.80	Min. : 4.6	Min. : 0.10
##	1st Qu.: 276.3	1st Qu.: 32.75	1st Qu.: 38.4	1st Qu.: 7.40
##	Median : 425.3	Median : 56.00	Median : 49.5	Median : 15.40
##	Mean : 710.1	Mean :108.09	Mean : 71.0	Mean : 24.99
##	3rd Qu.: 891.9	3rd Qu.:140.72	3rd Qu.: 91.6	3rd Qu.: 31.00
##	Max. :6317.1	Max. :748.70	Max. :337.5	Max. :169.40
##			NA's :1	NA's :23
##	M93	M94	M95	M96
##	Min. : 5.60	Min. : 12.9	Min. : 0.70	Min. : 0.100
##	1st Qu.: 39.20	1st Qu.: 124.8	1st Qu.: 18.60	1st Qu.: 8.175
##	Median : 65.15	Median : 241.7	Median : 44.30	Median : 9.400
##	Mean : 80.09	Mean : 431.7	Mean : 57.43	Mean :10.374
##	3rd Qu.: 97.12	3rd Qu.: 521.1	3rd Qu.: 77.97	3rd Qu.:11.300
##	Max. :505.60	Max. :2624.2	Max. :305.50	Max. :32.600
##		NA's :1	NA's :36	NA's :20
##	M97	M98	M99	M100
##	Min. : 0.7	Min. : 0.60	Min. : 0.80	Min. : 0.1
##	1st Qu.: 8.6	1st Qu.: 22.20	1st Qu.: 23.07	1st Qu.: 63.0
##	Median :11.3	Median : 42.60	Median : 49.65	Median : 132.3
##	Mean :13.3	Mean : 76.03	Mean : 73.64	Mean : 372.5
##	3rd Qu.:15.4	3rd Qu.: 81.90	3rd Qu.: 76.00	3rd Qu.: 284.8
##	Max. :82.0	Max. :1257.30	Max. :737.20	Max. :5188.2
##	NA's :15	NA's :3	NA's :4	NA's :12
##	M101	M102	M103	M104
##	Min. : 0.10	Min. : 0.10	Min. : 2.60	Min. : 0.2
##	1st Qu.: 18.55	1st Qu.: 50.38	1st Qu.: 80.42	1st Qu.: 185.8
##	Median : 29.30	Median :123.15	Median : 165.05	Median : 247.8
##	Mean : 43.21	Mean :144.63	Mean : 249.86	Mean : 322.7
##	3rd Qu.: 42.52	3rd Qu.:210.22	3rd Qu.: 317.77	3rd Qu.: 384.2
##	Max. :428.80	Max. :636.20	Max. :1482.80	Max. :1579.2
##	NA's :2	NA's :14	NA's :6	NA's :1
##	M105	M106	M107	M108
##	Min. : 0.10	Min. : 5.30	Min. : 0.4	Min. : 0.50
##	1st Qu.: 39.60	1st Qu.: 31.60	1st Qu.: 184.6	1st Qu.: 19.50
##	Median : 65.35	Median : 50.30	Median : 254.2	Median : 30.70
##	Mean : 173.64	Mean : 72.78	Mean : 356.1	Mean : 56.53
##	3rd Qu.: 177.62	3rd Qu.: 87.70	3rd Qu.: 441.6	3rd Qu.: 59.20
##	Max. :2182.20	Max. :598.70	Max. :2073.8	Max. :1397.20
##	NA's :4	NA's :1		NA's :2
##	M109	M110	M111	M112
##	Min. : 0.10	Min. : 2.30	Min. : 0.20	Min. : 18.8
##	1st Qu.: 27.65	1st Qu.: 38.45	1st Qu.: 12.38	1st Qu.: 95.2
##	Median : 40.90	Median : 68.80	Median : 30.95	Median : 179.2
##	Mean : 121.05	Mean : 81.15	Mean : 126.86	Mean : 253.0

##	3rd Qu.: 118.90	3rd Qu.:118.40	3rd Qu.: 66.35	3rd Qu.: 356.6
##	Max. :1045.70	Max. :359.10	Max. :6373.70	Max. :1579.1
##	NA's :1	NA's :9	NA's :6	
##	M113	M114	M115	M116
##	Min. : 0.2	Min. : 1.00	Min. : 5.8	Min. : 0.50
##	1st Qu.: 57.2	1st Qu.: 66.97	1st Qu.: 43.4	1st Qu.: 13.25
##	Median : 133.3	Median : 110.40	Median : 108.1	Median : 26.60
##	Mean : 285.8	Mean : 170.49	Mean : 199.2	Mean : 36.18
##	3rd Qu.: 349.4	3rd Qu.: 207.90	3rd Qu.: 286.3	3rd Qu.: 38.85
##	Max. :2078.8	Max. :1143.40	Max. :2134.5	Max. :318.70
##	NA's :31		NA's :3	NA's :1
##	M117	M118	M119	M120
##	Min. : 7.90	Min. : 4.6	Min. : 10.30	Min. : 0.20
##	1st Qu.: 66.47	1st Qu.: 73.8	1st Qu.: 44.33	1st Qu.: 39.65
##	Median : 150.30	Median : 180.3	Median : 93.70	Median : 77.80
##	Mean : 283.70	Mean : 249.6	Mean :101.50	Mean : 94.75
##	3rd Qu.: 343.20	3rd Qu.: 270.5	3rd Qu.:130.12	3rd Qu.:116.70
##	Max. :1613.10	Max. :1434.2	Max. :526.80	Max. :934.90
##	NA's :2	NA's :1		NA's :5
##	M121	M122	M123	M124
##	Min. : 0.5	Min. : 1.00	Min. : 4.8	Min. : 3.3
##	1st Qu.: 5.7	1st Qu.: 13.30	1st Qu.: 61.7	1st Qu.: 216.4
##	Median : 10.3	Median : 19.30	Median : 145.6	Median : 420.0
##	Mean : 18.9	Mean : 26.61	Mean : 204.2	Mean : 539.3
##	3rd Qu.: 19.6	3rd Qu.: 33.10	3rd Qu.: 275.3	3rd Qu.: 675.1
##	Max. :217.2	Max. :202.20	Max. :1418.2	Max. :3789.7
##	NA's :27	NA's :3	NA's :7	NA's :5
##	M125	M126	M127	M128
##	Min. : 12.4	Min. : 1.90	Min. : 0.10	Min. : 0.10
##	1st Qu.: 114.3	1st Qu.: 22.48	1st Qu.: 22.32	1st Qu.: 82.85
##	Median : 190.1	Median : 37.00	Median : 49.30	Median : 257.20
##	Mean : 263.2	Mean : 48.96	Mean :118.89	Mean : 511.05
##	3rd Qu.: 321.1	3rd Qu.: 55.83	3rd Qu.:139.18	3rd Qu.: 617.12
##	Max. :1619.1	Max. :609.40	Max. :786.20	Max. :5959.60
##		NA's :4	NA's :30	NA's :12
##	M129	M130	M131	M132
##	Min. : 133.3	Min. : 0.20	Min. : 76.6	Min. : 21.4
##	1st Qu.: 922.1	1st Qu.: 17.25	1st Qu.: 849.3	1st Qu.: 79.8
##	Median :1770.3	Median : 38.00	Median :1441.5	Median : 107.3
##	Mean :1825.7	Mean : 63.73	Mean :1952.4	Mean : 165.7
##	3rd Qu.:2384.1	3rd Qu.: 58.05	3rd Qu.:2444.7	3rd Qu.: 169.4
##	Max. :8038.2	Max. :1188.70	Max. :8348.6	Max. :3155.4
##		NA's :10		
##	M133	M134	M135	M136
##	Min. : 4.10	Min. : 64.6	Min. : 0.9	Min. : 0.10
##	1st Qu.: 33.45	1st Qu.: 445.8	1st Qu.: 798.1	1st Qu.: 10.93
##	Median : 53.15	Median : 746.4	Median : 1309.5	Median : 95.05
##	Mean : 104.90	Mean :1254.8	Mean : 3076.5	Mean : 239.51
##	3rd Qu.: 90.70	3rd Qu.:1329.7	3rd Qu.: 2422.4	3rd Qu.: 129.03
##	Max. :1894.50	Max. :8567.8	Max. :53432.0	Max. :5014.90
##		NA's :2		NA's :32
##	M137	M138	M139	M140
##	Min. : 0.4	Min. : 2.1	Min. : 0.10	Min. : 0.10
##	1st Qu.: 271.1	1st Qu.: 149.1	1st Qu.: 29.62	1st Qu.: 42.65

```
## Median : 654.1 Median : 464.3 Median : 71.30 Median : 83.00
## Mean : 1308.5 Mean : 955.7 Mean : 292.31 Mean : 248.69
## 3rd Qu.: 1687.0 3rd Qu.:1342.0 3rd Qu.: 146.97 3rd Qu.: 137.50
## Max. :12900.8 Max. :6344.9 Max. :5569.50 Max. :6960.30
## NA's :4 NA's :1 NA's :14 NA's :5
## M141 M142 M143 M144
## Min. : 3.00 Min. : 0.10 Min. : 0.2 Min. : 17.00
## 1st Qu.: 73.45 1st Qu.: 4.55 1st Qu.: 101.5 1st Qu.: 25.50
## Median : 124.40 Median : 10.60 Median : 254.3 Median : 27.60
## Mean : 239.77 Mean : 22.08 Mean : 737.9 Mean : 41.97
## 3rd Qu.: 193.32 3rd Qu.: 23.80 3rd Qu.: 532.5 3rd Qu.: 29.80
## Max. :6173.90 Max. :282.90 Max. :8413.2 Max. :1251.40
## NA's :2 NA's :1 NA's :2
## M145 M146 M147 M148
## Min. : 0.10 Min. : 0.1 Min. : 12.00 Min. : 1.00
## 1st Qu.: 1.95 1st Qu.: 6.3 1st Qu.: 88.67 1st Qu.: 81.25
## Median : 6.00 Median : 11.1 Median :136.10 Median : 198.85
## Mean : 195.79 Mean : 116.4 Mean :178.90 Mean : 329.83
## 3rd Qu.: 23.90 3rd Qu.: 35.6 3rd Qu.:227.50 3rd Qu.: 540.75
## Max. :5479.20 Max. :4791.5 Max. :840.20 Max. :2560.30
## NA's :33 NA's :6 NA's :2 NA's :2
## M149
## Min. : 22.1
## 1st Qu.:109.6
## Median :175.3
## Mean :179.7
## 3rd Qu.:223.9
## Max. :502.5
##
```

```
#Instalamos y cargamos el paquete POMA
#BiocManager::install("POMA")
library(POMA)
```

```
## Welcome to POMA!
## Version 1.16.0
## POMAShiny app: https://github.com/pcastellanoescuder/POMAShiny
```

```
#install.packages("ggtext")
library(ggtext)
library(magrittr)
```

```
##
## Adjuntando el paquete: 'magrittr'

## The following object is masked from 'package:GenomicRanges':
##
## subtract
```

```
#Realizamos la imputación de los valores faltantes por valores estimados.
imputed <- contenedorGastricCancer %>%
  PomaImpute(method = "knn", zeros_as_na = TRUE, remove_na = TRUE, cutoff = 20)
```

```
## 9 features removed.
```

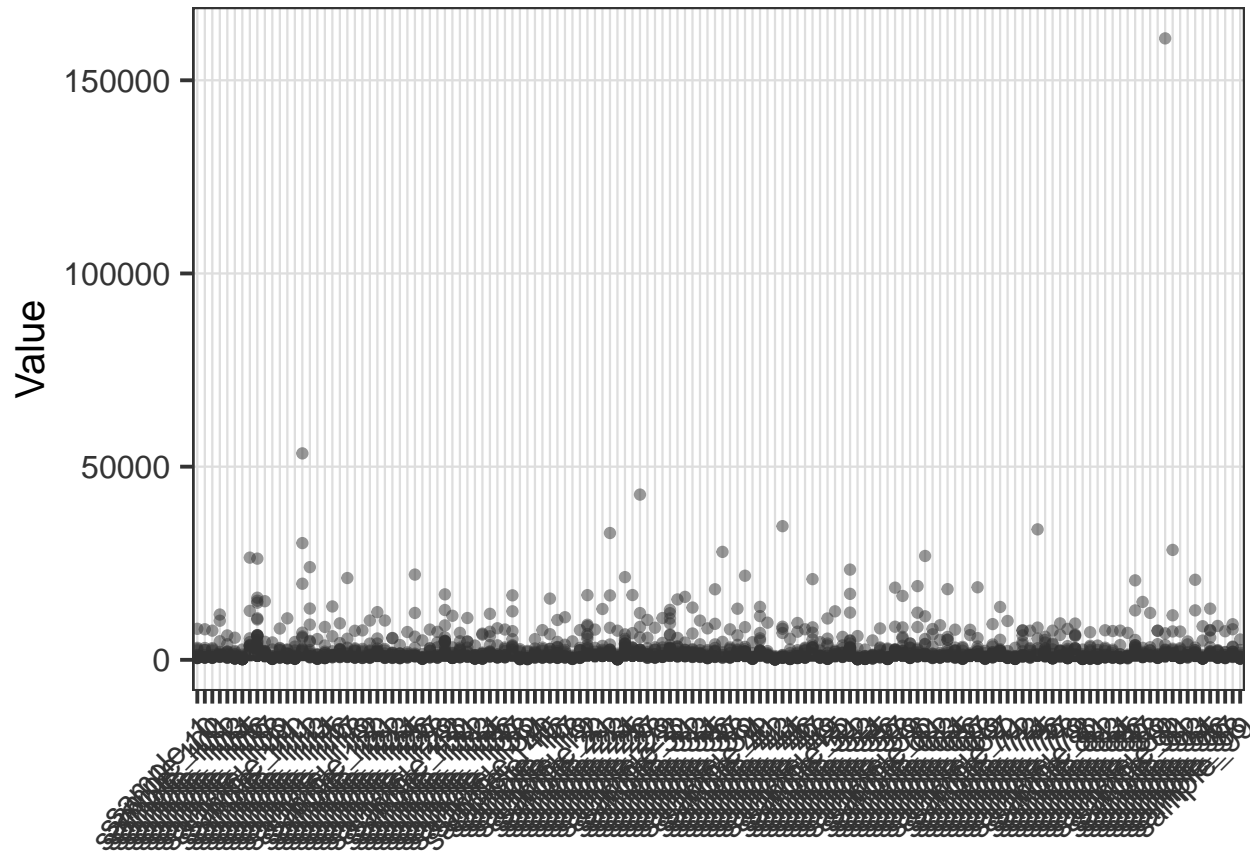
```
imputed
```

```
## class: SummarizedExperiment
## dim: 140 140
## metadata(0):
## assays(1): ''
## rownames(140): M1 M2 ... M148 M149
## rowData names(0):
## colnames: NULL
## colData names(4): Idx SampleID SampleType Class
```

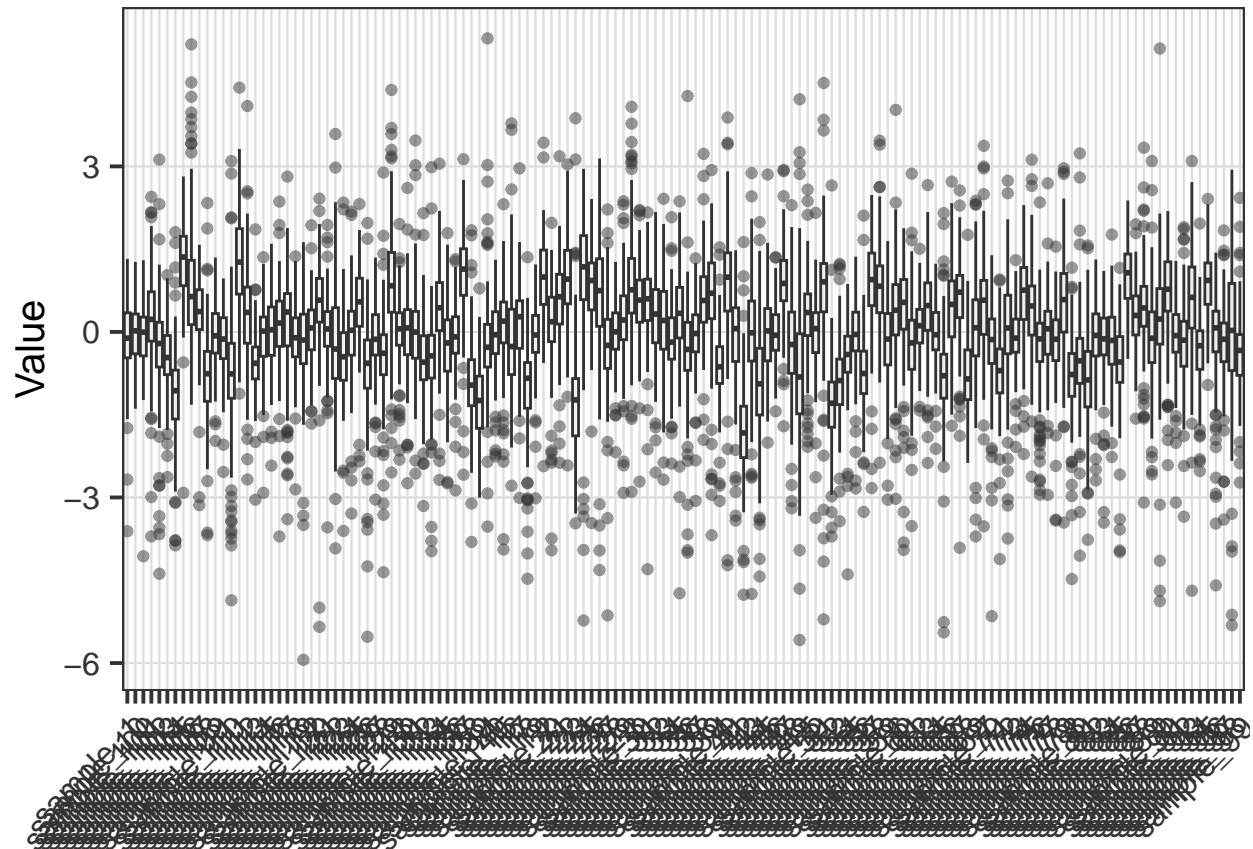
```
normalized <- imputed %>%
  PomaNorm(method = "log_pareto")
normalized
```

```
## class: SummarizedExperiment
## dim: 140 140
## metadata(0):
## assays(1): ''
## rownames(140): M1 M2 ... M148 M149
## rowData names(0):
## colnames: NULL
## colData names(4): Idx SampleID SampleType Class
```

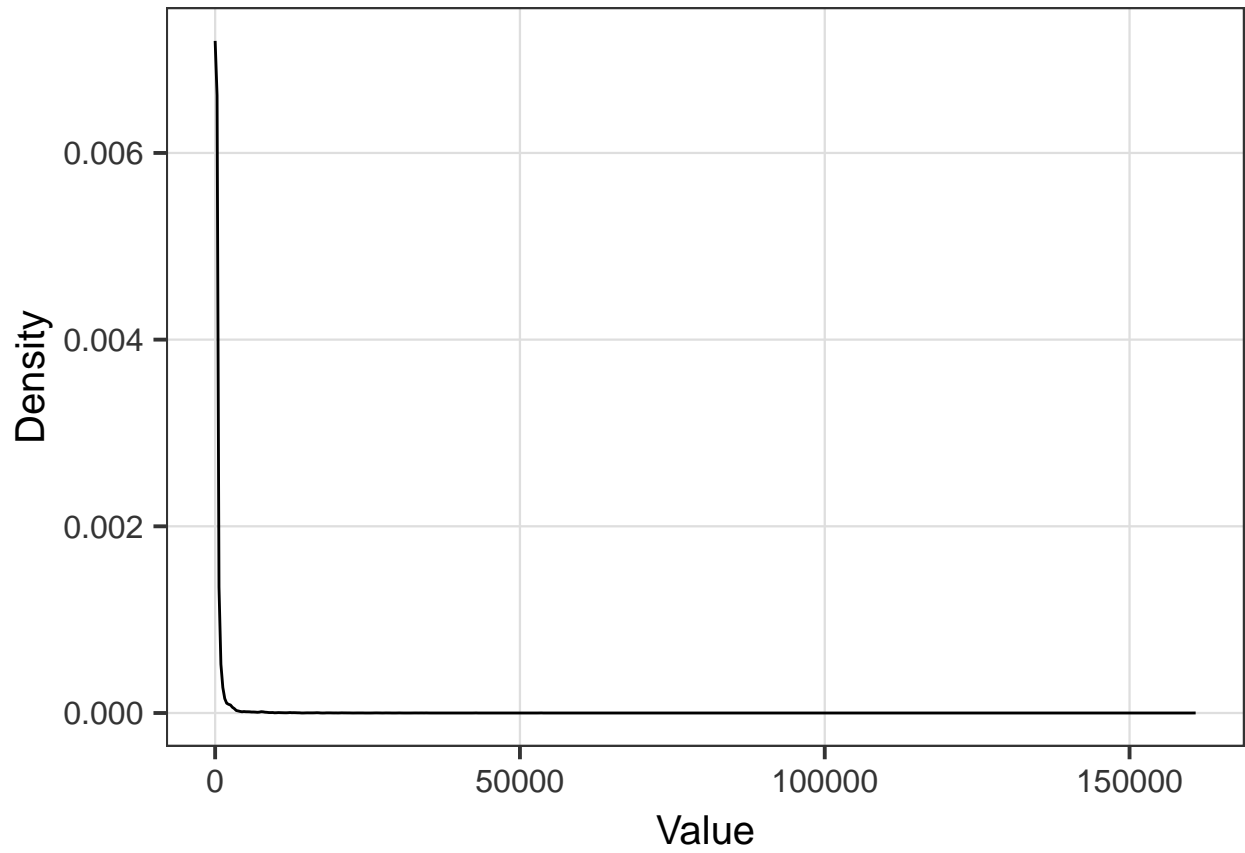
```
#A continuación se muestra el gráfico previo y el gráfico posterior na la normalización de los datos.
PomaBoxplots(imputed, x = "samples")
```



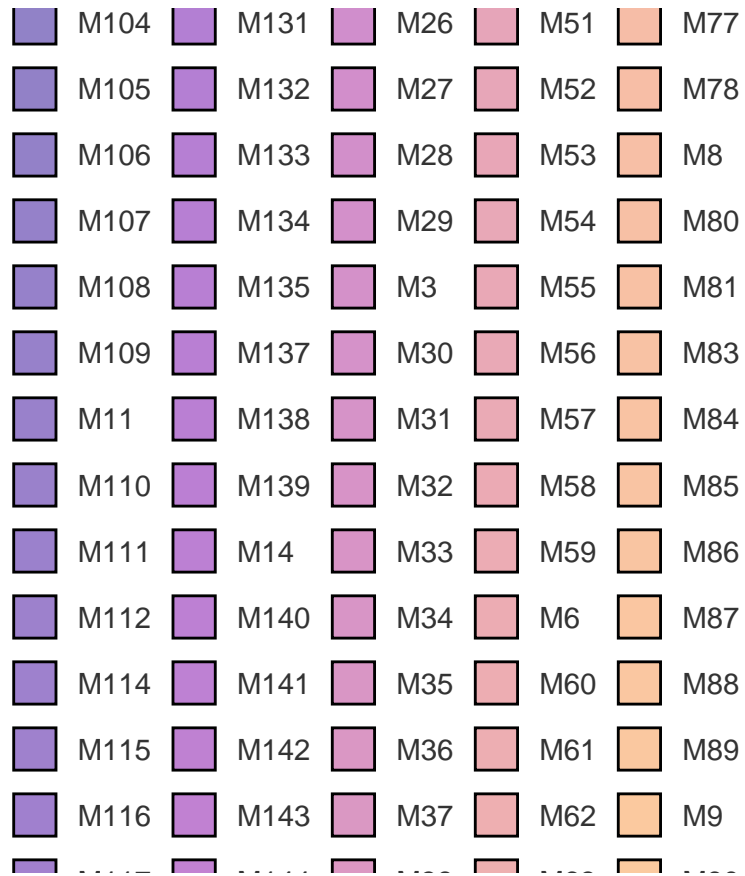
```
PomaBoxplots(normalized, x = "samples")
```



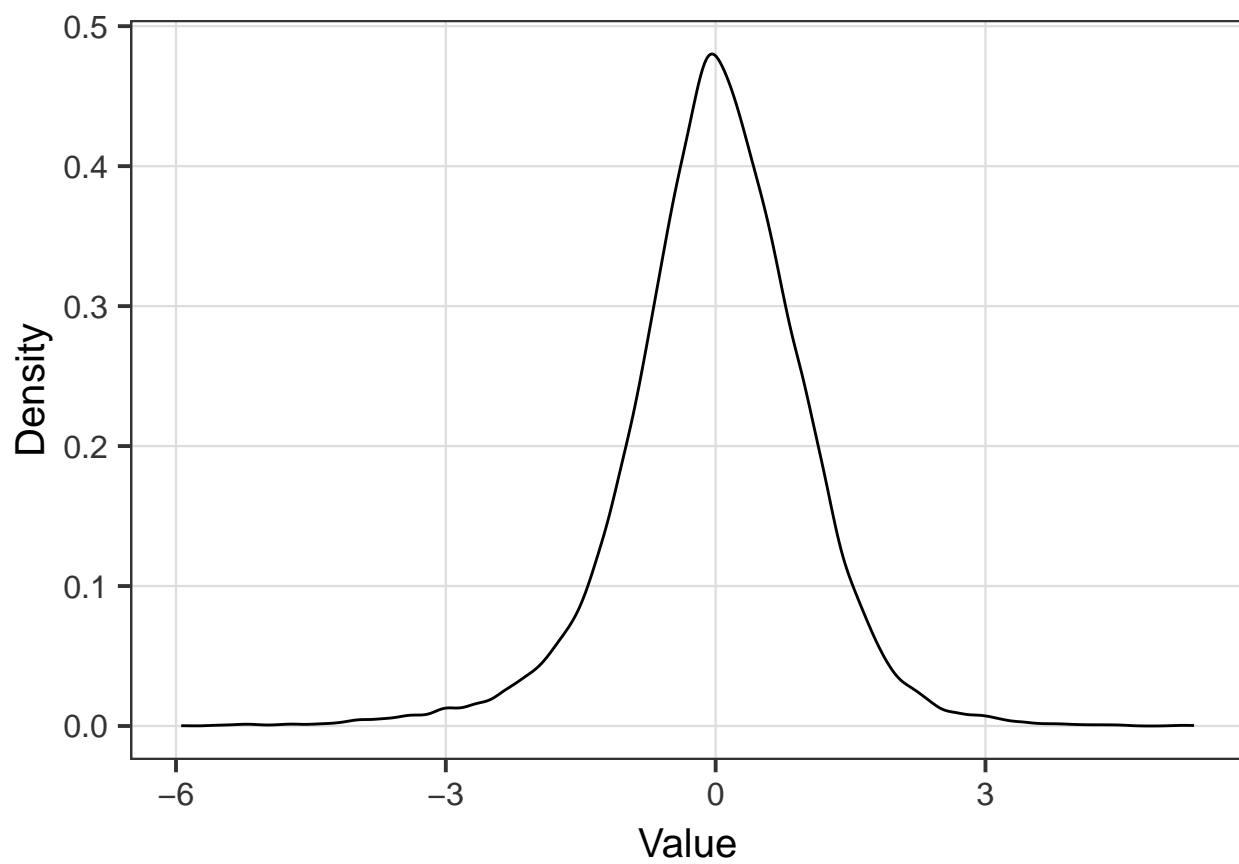
```
PomaDensity(imputed, x = "samples")
```









































































```
PomaDensity(imputed, x = "features")
```



```
PomaDensity(normalized, x = "samples")
```

```
PomaDensity(normalized, x = "features")
```

	M104		M131		M26		M51		M77
	M105		M132		M27		M52		M78
	M106		M133		M28		M53		M8
	M107		M134		M29		M54		M80
	M108		M135		M3		M55		M81
	M109		M137		M30		M56		M83
	M11		M138		M31		M57		M84
	M110		M139		M32		M58		M85
	M111		M14		M33		M59		M86
	M112		M140		M34		M6		M87
	M114		M141		M35		M60		M88
	M115		M142		M36		M61		M89
	M116		M143		M37		M62		M9
				

```
save(contenedorGastricCancer, file="DatosMetadatosFormatoBinario.Rda")
```