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##                                                                                             ##
## Supplementary material to Comments on "Outlier-sums for differential gene expression analysis" ##
##                                                                                             ##
## Sarah C. Emerson, Department of Statistics, Oregon State University, Corvallis, OR 97331,      ##
##     emersosa@stat.oregonstate.edu                                                           ##
## Scott S. Emerson, Department of Biostatistics, University of Washington, Seattle, WA 98195     ##
##                                                                                             ##
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##############
##
## This code is used to compare outlier sum statistics to t tests
##
## The simulation results used in the manuscript tables are from this code
##
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##
## Cases considered
##
##  Results will be stored as caseGGxCC.NNMM where
##      "case" is norm (for normal), tKdf (for a t with KK df), ...
##      GG is the number of over expressed genes equal to 01, 50, 99
##      CC is the number of diseased cases with over expressed genes equal to 02, 04, 08, 15
##      NN is the number of diseased subjects equal to 15
##      MM is the number of healthy subjects equal to 15, 60
##
##############

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##
## Function to display results
##
##############

FastDisplayCase <- function (case, alpha=0.05) {
    cat("Number of simulations: ", dim(case$rsltNull)[2],"\n")
    z <- cbind(
        NullPwr=apply(case$rsltNull < alpha, 1, mean),
        NullMean=apply(case$rsltNull,1,mean),
        NullMdn=apply(case$rsltNull,1,quantile,0.5),
        NullSD=sqrt(apply(case$rsltNull,1,var)),
        AltPwr=apply(case$rsltAlt < alpha, 1, mean),
        AltMean=apply(case$rsltAlt,1,mean),
        AltMdn=apply(case$rsltAlt,1,quantile,0.5),
        AltSD=sqrt(apply(case$rsltAlt,1,var)),
        PVP10=as.vector(apply(case$pvp10,1,mean)[c(1:14,4:14,4:14)]),
        PVP25=as.vector(apply(case$pvp25,1,mean)[c(1:14,4:14,4:14)])
        )
    z
}


##############
##
## fastSumOutlierData (caseGGxCC, altDistn=F, validate=F)
##     caseGGxCC is a list of parameters describing the scenario to be evaluated (see use of argument
 below)
##     altDistn indicates whether any diseased cases are to have overexpressed genes
##     validate indicates whether additional results are to be returned to allow comparisons with standard
##        S-Plus functions
##
```

```
## Generate data to be used in determining the empirical sampling distribution for statistics
## in various scenarios
##
##    We vectorize the process so that we can compute the test statistics for many genes simultaneously
##
##    The following function is called once to generate data under the null, and once to
##    generate data under the alternative hypothesis
##        Under the alternative hypothesis a specified number of diseased cases in each
##        simulation will be "overexpressed" by having some specified shift added to the
##        null distribution of gene expression
##
##    We generate 30 times the number of genes that will eventually be used in a simulation
##        For each gene we calculate:
##           - the three versions of the t statistics
##           - the eight versions of the outlier sum statistic
##
##    When doing a simulation, we then sample randomly from that larger population with replacement
##        All we need sample are the t and outlier sum statistics that would have been computed from
##        a particular simulated gene
##
##############

# A simple function that provides descriptive statistics for columns in a matrix or list
# This function is used when validating the vectorized code in fastSumOutlierData()

descrip <- function(X) {
    if(is.list(X)) {
        tmp <- NULL
        for(i in 1:length(X))
            tmp <- cbind(tmp, X[[i]])
        dimnames(tmp) <- list(NULL, names(X))
        X <- tmp
    }
    X <- as.matrix(X)
    if(!is.numeric(X))
        stop("argument must be numeric")
    rslt <- NULL
    for(i in 1:dim(X)[2]) {
        x <- X[, i]
        u <- is.na(x)
        rsl <- c(length(x), sum(u))
        x <- x[!u]
        if(length(x) == 0) {
            rsl <- c(rsl, rep(NA, 7))
        }
        else rsl <- c(rsl, mean(x), sqrt(var(x)), quantile(x))
        rslt <- rbind(rslt, rsl)
    }
    if(dim(X)[2] == 1)
        rslt <- matrix(rslt, 1)
    dimnames(rslt) <- list(dimnames(X)[[2]], c("n", "msng", "mean", "std dev", "min", "25%-ile", "median",
"75%-ile", "maximum"))
    rslt
}

# The definition of fastSumOutlierData ()

fastSumOutlierData <- function (caseGGxCC, altDistn=F, validate=F) {

    if (validate) timeStamps <- list(proc.time())

    rdata <- caseGGxCC$rdata                                    # a function to generate random data
    Ngenes <- 30 * caseGGxCC$Ngenes                             # the number of genes to be simulated to
use as the "population"
    NHealthy <- caseGGxCC$NHealthy                              # the number of healthy subjects in a
single simulated sample
```

```
    NDisease <- caseGGxCC$NDisease                                  # the number of diseased subjects in a
single simulated sample
    NoverExpressCases <- caseGGxCC$NoverExpressCases                # the number of diseased subjects that
will have overexpressed genes
    NoverExpressGenes <- caseGGxCC$NoverExpressGenes                # the number of genes that will be over
expressed
    overExpress <- caseGGxCC$overExpress                            # the mean expression level in over
expressed genes

    Ncase <- NHealthy + NDisease
    Nobs <- Ngenes * Ncase

    # In order to vectorize the simulations, we calculate the indices of sorted data that would correspond
to the quantiles
    #    In each case, the quantile is a weighted average of rows in a vector of observations
    #    In the validations, this code is compared to the values returned by the S-Plus function quantile
(), mad(), t.test()

    if (Ncase %% 2 == 1) mdnIndx <- Ncase %/% 2 + 1 else mdnIndx <- (Ncase %/% 2) + c(0,1)
    p25Indx <- trunc(0.25 * (Ncase - 1)) + 1:2
    p25Wts <- 1:0  + c(-1,1) * (.25 * Ncase - p25Indx[1] + 0.75)
    p75Indx <- trunc(0.75 * (Ncase - 1)) + 1:2
    p75Wts <- 1:0  + c(-1,1) *(.75 * Ncase - p75Indx[1] + 0.25)
    if (NHealthy %% 2 == 1) mdnIndxH <- NHealthy %/% 2 + 1 else mdnIndxH <- (NHealthy %/% 2) + c(0,1)
    p25IndxH <- trunc(0.25 * (NHealthy - 1)) + 1:2
    p25WtsH <- 1:0  + c(-1,1) * (.25 * NHealthy - p25IndxH[1] + 0.75)
    p75IndxH <- trunc(0.75 * (NHealthy - 1)) + 1:2
    p75WtsH <- 1:0  + c(-1,1) *(.75 * NHealthy - p75IndxH[1] + 0.25)
    mdnIndxH <- mdnIndxH + NDisease
    p25IndxH <- p25IndxH + NDisease
    p75IndxH <- p75IndxH + NDisease

    # We perform vectorized simulations using matrices in which the columns correspond to a single
"experiment"
    # and the rows correspond to cases within an experiment.
    #     The first NDisease rows correspond to diseased subjects, the last NHealthy rows are healthy
subjects
    #     Any diseased subjects with overexpressed genes will be the first NoverExpressCases rows

    # Initialization of matrices used to store gene expression data
    #    matrix Y will contain the gene expression levels for each case for each gene
    #    matrix Yord will have the data in Y sorted within each column
    #    matrix Yctr will have the data centered by the appropriate median value

    Y <- Yord <- Yctr <- matrix(0,Ncase,Ngenes)

    # Initialization of vectors used to compute the outlier sum statistics
    # Nomenclature follows the notation in the paper, where for YmdnA, YmadA, YmdnH, YmadH
    #    "mdn" denotes medians
    #    "mad" denotes median absolute deviations
    #    "A" denotes the median or mad computed using all (both healthy and diseased)
    #    "H" denotes the median or mad computed using only the healthy cases
    #
    # for Yp25AAA, Yp75AAA, YiqrAAA, Yp25AAH, ..., YiqrHHH
    #    "p25" denotes the 25th percentile of the standardized gene expression
    #    "p75" denotes the 75th percentile of the standardized gene expression
    #    "iqr" denotes the interquartile range of the standardized gene expression
    #    "A" denotes the use of all cases and "H" denotes the use of only healthy cases
    #       "A**" denotes the standardization centering on the median of all cases
    #       "H**" denotes the standardization centering on the median of healthy cases
    #       "*A*" denotes the standardization scaling on the mad of all cases
    #       "*H*" denotes the standardization scaling on the mad of healthy cases
    #       "**A" denotes computing quantiles of the scaled observations using all cases
    #       "**H" denotes computing quantiles of the scaled observations using healthy cases

    YmdnA <- YmadA <- YmdnH <- YmadH <-
```

```
Yp25AAA <- Yp75AAA <- YiqrAAA <-
Yp25AAH <- Yp75AAH <- YiqrAAH <-
Yp25AHA <- Yp75AHA <- YiqrAHA <-
Yp25AHH <- Yp75AHH <- YiqrAHH <-
Yp25HAA <- Yp75HAA <- YiqrHAA <-
Yp25HAH <- Yp75HAH <- YiqrHAH <-
Yp25HHA <- Yp75HHA <- YiqrHHA <-
Yp25HHH <- Yp75HHH <- YiqrHHH <-
rep(0,Ngenes)

# Initialization of vectors used to compute the t statistics
#    "m" denotes means
#    "v" denotes variances
#    "se" denotes standard errors
#    "df" denotes degrees freedom computed using Satterthwaite approximation
#    "Healthy" denotes statistics computed for the healthy cases
#    "Disease" denotes statistics computed for the healthy cases
#    "Pool" is used for std errors using pooled estimates of variance
#    "Uneq" denotes a std error computation that allows for possible unequal variance

mHealth <- vHealth <- mDisease <- vDisease <-
sePool <- seUneq <- dfUneq <- seHealth <-
rep(0,Ngenes)

# Initialization of vectors used to store the t and outlier sum statistics
#    "t" denotes t statistics
#    "p" denotes p values
#    "sout" denotes outlier sum statistics
#    "Eq" denotes presumption of equal variances
#    "Uneq" denotes allowing for the possibility of unequal variances
#    "Health" denotes using variance estimated from only the healthy cases
#    "AAA", "AHA", etc. follows nomenclature described above and in the paper

tEq <- pEq <-
tUneq <- pUneq <-
tHealth <- pHealth <-
soutAAA <- soutAAH <-
soutAHA <- soutAHH <-
soutHAA <- soutHAH <-
soutHHA <- soutHHH <-
rep(0,Ngenes)

# Generation of the gene expression data

if (validate) timeStamps <- c(timeStamps,list(proc.time()))

Y[1:Nobs] <- rdata(Nobs)
if (altDistn) Y[1:NoverExpressCases,] <- Y[1:NoverExpressCases,] + overExpress

if (validate) timeStamps <- c(timeStamps,list(proc.time()))

# Computation of the summary statistics needed for t statistics using apply

mHealth[1:Ngenes] <- apply(Y[-(1:NDisease),],2,mean)
vHealth[1:Ngenes] <- apply(Y[-(1:NDisease),]^2,2,mean) - mHealth^2
mDisease[1:Ngenes] <- apply(Y[1:NDisease,],2,mean)
vDisease[1:Ngenes] <- apply(Y[1:NDisease,]^2,2,mean) - mDisease^2
sePool[1:Ngenes] <- sqrt((NHealthy * vHealth + NDisease * vDisease) / (Ncase - 2) *
    (1/NHealthy + 1/NDisease))
seUneq[1:Ngenes] <- sqrt(vHealth / (NHealthy - 1) + vDisease / (NDisease - 1))
dfUneq[1:Ngenes] <- (vHealth / (NHealthy - 1) + vDisease / (NDisease - 1))^2 /
    (vHealth^2 / (NHealthy - 1)^3 + vDisease^2 / (NDisease - 1)^3)
seHealth[1:Ngenes] <- sqrt(vHealth / (NHealthy - 1) * (1 + NHealthy / NDisease))

# Vectorized computation of t statistics and their p values
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```
    tEq[1:Ngenes] <- (mDisease - mHealth) / sePool
    pEq[1:Ngenes] <- 1 - pt(tEq,Ncase-2)
    tUneq[1:Ngenes] <- (mDisease - mHealth) / seUneq
    pUneq[1:Ngenes] <- 1 - pt(tUneq,dfUneq)
    tHealth[1:Ngenes] <- (mDisease - mHealth) / seHealth
    pHealth[1:Ngenes] <- 1 - pt(tHealth,NHealthy-1)

    # Vectorized computation of medians based on all cases

    Yord[1:Nobs] <- Y[order(rep(1:Ngenes,each=Ncase),Y)]
    if (length(mdnIndx)==1) {
        YmdnA[1:Ngenes] <- Yord[mdnIndx,]
    } else YmdnA[1:Ngenes] <- c(1/2, 1/2) %*% Yord[mdnIndx,]

    # Vectorized centering of observations using YmdnA and then computing YmadA

    Yord[1:Nobs] <- Yord - rep(YmdnA,each=Ncase)
    Yord[1:Nobs] <- Yord[order(rep(1:Ngenes,each=Ncase),abs(Yord))]
    if (length(mdnIndx)==1) {
        YmadA[1:Ngenes] <- abs(Yord[mdnIndx,])
    } else YmadA[1:Ngenes] <- c(1/2, 1/2) %*% abs(Yord[mdnIndx,])

    # Vectorized scaling of observaions uning YmdnA and YmadA, then computing
    # quantiles using all cases, and computing soutAAA

    Yctr[1:Nobs] <- (Y - rep(YmdnA,each=Ncase)) / rep(YmadA,each=Ncase)
    Yord[1:Nobs] <- Yctr[order(rep(1:Ngenes,each=Ncase),Yctr)]
    Yp25AAA[1:Ngenes] <- p25Wts %*% Yord[p25Indx,]
    Yp75AAA[1:Ngenes] <- p75Wts %*% Yord[p75Indx,]
    YiqrAAA[1:Ngenes] <- Yp75AAA - Yp25AAA
    soutAAA[1:Ngenes] <- rep(c(1,0),c(NDisease,NHealthy)) %*% (Yctr * (Yctr > rep(YiqrAAA +
Yp75AAA,each=Ncase)))

    # Keeping the same AA scaling, but computing quantiles using only
    # healthy cases to compute soutAAH in a vectorized manner

    Yord[1:Nobs] <- Yctr[order(rep(1:Ngenes,each=Ncase),rep(rep(1:2,c(NDisease,NHealthy)),Ngenes),Yctr)]
    Yp25AAH[1:Ngenes] <- p25WtsH %*% Yord[p25IndxH,]
    Yp75AAH[1:Ngenes] <- p75WtsH %*% Yord[p75IndxH,]
    YiqrAAH[1:Ngenes] <- Yp75AAH - Yp25AAH
    soutAAH[1:Ngenes] <- rep(c(1,0),c(NDisease,NHealthy)) %*% (Yctr * (Yctr > rep(YiqrAAH +
Yp75AAH,each=Ncase)))

    # Vectorized computation of medians based on healthy cases

    Yord[1:Nobs] <- Y[order(rep(1:Ngenes,each=Ncase),rep(rep(1:2,c(NDisease,NHealthy)),Ngenes),Y)]
    if (length(mdnIndxH)==1) {
        YmdnH[1:Ngenes] <- Yord[mdnIndxH,]
    } else YmdnH[1:Ngenes] <- c(1/2, 1/2) %*% Yord[mdnIndxH,]

    # Vectorized centering of observations using YmdnH and then computing YmadH

    Yord[1:Nobs] <- Yord - rep(YmdnH,each=Ncase)
    Yord[1:Nobs] <- Yord[order(rep(1:Ngenes,each=Ncase),rep(rep(1:2,c(NDisease,NHealthy)),Ngenes),abs
(Yord))]
    if (length(mdnIndxH)==1) {
        YmadH[1:Ngenes] <- abs(Yord[mdnIndxH,])
    } else YmadH[1:Ngenes] <- c(1/2, 1/2) %*% abs(Yord[mdnIndxH,])

    # Vectorized scaling of observaions uning YmdnH and YmadH, then computing
    # quantiles using all cases, and computing soutHHA

    Yctr[1:Nobs] <- (Y - rep(YmdnH,each=Ncase)) / rep(YmadH,each=Ncase)
    Yord[1:Nobs] <- Yctr[order(rep(1:Ngenes,each=Ncase),Yctr)]
    Yp25HHA[1:Ngenes] <- p25Wts %*% Yord[p25Indx,]
    Yp75HHA[1:Ngenes] <- p75Wts %*% Yord[p75Indx,]
```

```
    YiqrHHA[1:Ngenes] <- Yp75HHA - Yp25HHA
    southHA[1:Ngenes] <- rep(c(1,0),c(NDisease,NHealthy)) %*% (Yctr * (Yctr > rep(YiqrHHA +
Yp75HHA,each=Ncase)))

    # Keeping the same HH scaling, but computing quantiles using only
    # healthy cases to compute southHHH in a vectorized manner

    Yord[1:Nobs] <- Yctr[order(rep(1:Ngenes,each=Ncase),rep(rep(1:2,c(NDisease,NHealthy)),Ngenes),Yctr)]
    Yp25HHH[1:Ngenes] <- p25WtsH %*% Yord[p25IndxH,]
    Yp75HHH[1:Ngenes] <- p75WtsH %*% Yord[p75IndxH,]
    YiqrHHH[1:Ngenes] <- Yp75HHH - Yp25HHH
    southHHH[1:Ngenes] <- rep(c(1,0),c(NDisease,NHealthy)) %*% (Yctr * (Yctr > rep(YiqrHHH +
Yp75HHH,each=Ncase)))

    # Vectorized scaling of observaions uning YmdnA and YmadH, then computing
    # quantiles using all cases, and computing soutAHA

    Yctr[1:Nobs] <- (Y - rep(YmdnA,each=Ncase)) / rep(YmadH,each=Ncase)
    Yord[1:Nobs] <- Yctr[order(rep(1:Ngenes,each=Ncase),Yctr)]
    Yp25AHA[1:Ngenes] <- p25Wts %*% Yord[p25Indx,]
    Yp75AHA[1:Ngenes] <- p75Wts %*% Yord[p75Indx,]
    YiqrAHA[1:Ngenes] <- Yp75AHA - Yp25AHA
    soutAHA[1:Ngenes] <- rep(c(1,0),c(NDisease,NHealthy)) %*% (Yctr * (Yctr > rep(YiqrAHA +
Yp75AHA,each=Ncase)))

    # Keeping the same AH scaling, but computing quantiles using only
    # healthy cases to compute soutAHH in a vectorized manner

    Yord[1:Nobs] <- Yctr[order(rep(1:Ngenes,each=Ncase),rep(rep(1:2,c(NDisease,NHealthy)),Ngenes),Yctr)]
    Yp25AHH[1:Ngenes] <- p25WtsH %*% Yord[p25IndxH,]
    Yp75AHH[1:Ngenes] <- p75WtsH %*% Yord[p75IndxH,]
    YiqrAHH[1:Ngenes] <- Yp75AHH - Yp25AHH
    soutAHH[1:Ngenes] <- rep(c(1,0),c(NDisease,NHealthy)) %*% (Yctr * (Yctr > rep(YiqrAHH +
Yp75AHH,each=Ncase)))

    # Vectorized scaling of observaions uning YmdnH and YmadA, then computing
    # quantiles using all cases, and computing soutHAA

    Yctr[1:Nobs] <- (Y - rep(YmdnH,each=Ncase)) / rep(YmadA,each=Ncase)
    Yord[1:Nobs] <- Yctr[order(rep(1:Ngenes,each=Ncase),Yctr)]
    Yp25HAA[1:Ngenes] <- p25Wts %*% Yord[p25Indx,]
    Yp75HAA[1:Ngenes] <- p75Wts %*% Yord[p75Indx,]
    YiqrHAA[1:Ngenes] <- Yp75HAA - Yp25HAA
    southAA[1:Ngenes] <- rep(c(1,0),c(NDisease,NHealthy)) %*% (Yctr * (Yctr > rep(YiqrHAA +
Yp75HAA,each=Ncase)))

    # Keeping the same HA scaling, but computing quantiles using only
    # healthy cases to compute southHAH in a vectorized manner

    Yord[1:Nobs] <- Yctr[order(rep(1:Ngenes,each=Ncase),rep(rep(1:2,c(NDisease,NHealthy)),Ngenes),Yctr)]
    Yp25HAH[1:Ngenes] <- p25WtsH %*% Yord[p25IndxH,]
    Yp75HAH[1:Ngenes] <- p75WtsH %*% Yord[p75IndxH,]
    YiqrHAH[1:Ngenes] <- Yp75HAH - Yp25HAH
    southAH[1:Ngenes] <- rep(c(1,0),c(NDisease,NHealthy)) %*% (Yctr * (Yctr > rep(YiqrHAH +
Yp75HAH,each=Ncase)))

    # The following code is used to validate the vectorized code against more transparent use of the apply
functions

    if (validate) {

        timeStamps <- c(timeStamps,list(proc.time()))

        # Validation of summary statistics used in computing t statistics

        mH <- apply(Y[-(1:NDisease),],2,mean)
```

```
        vH <- apply(Y[-(1:NDisease),],2,var,unbiased=F)
        mD <- apply(Y[(1:NDisease),],2,mean)
        vD <- apply(Y[(1:NDisease),],2,var,unbiased=F)
        seP <- sqrt((NDisease * vD + NHealthy * vH) / (Ncase - 2) * (1 / NHealthy + 1 / NDisease))
        seU <- sqrt(vD / (NDisease - 1) + vH / (NHealthy - 1))
        seH <- sqrt( NHealthy * vH / (NHealthy - 1) * (1 / NHealthy + 1 / NDisease))
        timeStamps <- c(timeStamps,list(proc.time()))
        cat("\nGroup descriptive statistics: difference between code and independent coding\n")
        print(round(descrip(cbind(mHealth=mH-mHealth,vHealth=vH-vHealth,mDisease=mD-mDisease,vDisease=vD-
vDisease,
            sePool=seP-sePool,seUneq=seU-seUneq,seHealth=seH-seHealth)),14))

        # Validation of t statistics that presume equal variances

        timeStamps <- c(timeStamps,list(proc.time()))
        zStat <- zPval <- rep(0,Ngenes)
        for (i in 1:Ngenes) {
            z <- t.test(Y[1:NDisease,i],Y[-(1:NDisease),i],alternative="greater")
            zStat[i] <- z$statistic
            zPval[i] <- z$p.value
        }
        timeStamps <- c(timeStamps,list(proc.time()))
        cat("\nT test presuming equal variances: difference between tEq and loop using t.test\n")
        print(round(descrip(cbind(Stat=zStat-tEq,Pval=zPval-pEq)),14))

        # Validation of t statistics that allow for the possibility of unequal variances

        timeStamps <- c(timeStamps,list(proc.time()))
        zStat <- zPval <- zDF <- rep(0,Ngenes)
        for (i in 1:Ngenes) {
            z <- t.test(Y[1:NDisease,i],Y[-(1:NDisease),i],var.equal=F,alternative="greater")
            zStat[i] <- z$statistic
            zPval[i] <- z$p.value
            zDF[i] <- z$parameters
        }
        timeStamps <- c(timeStamps,list(proc.time()))
        cat("\nT test allowing unequal variances: difference between tUneq and loop using t.test\n")
        print(round(descrip(cbind(Stat=zStat-tUneq,DF=zDF-dfUneq,Pval=zPval-pUneq)),14))

        # Validation of t statistics using standard error based on healthy cases' variance

        timeStamps <- c(timeStamps,list(proc.time()))
        zStat <- (mD - mH) / seH
        zPval <- 1 - pt(zStat,NHealthy-1)
        timeStamps <- c(timeStamps,list(proc.time()))
        cat("\nT test using Healthy: difference between tHealth and independent code\n")
        print(round(descrip(cbind(Stat=zStat-tHealth,Pval=zPval-pHealth)),14))

        # Validation of summary statistics (median, mad) used in computing outlier sum statistics

        timeStamps <- c(timeStamps,list(proc.time()))
        mdnH <- apply(Y[-(1:NDisease),],2,quantile,prob=0.5)
        madH <- apply(Y[-(1:NDisease),],2,mad,constant=1)
        mdnA <- apply(Y,2,quantile,prob=0.5)
        madA <- apply(Y,2,mad,constant=1)
        timeStamps <- c(timeStamps,list(proc.time()))
        cat("\nMedians and median absolute deviation: difference between code and apply()\n")
        print(round(descrip(cbind(YmdnA=mdnA-YmdnA,YmadA=madA-YmadA,YmdnH=mdnH-YmdnH,YmadH=madH-YmadH)),
14))

        # Validation of quantiles used in computing outlier sum statistics

        timeStamps <- c(timeStamps,list(proc.time()))
        p25AAA <- apply(((Y - rep(mdnA,each=Ncase)) / rep(madA,each=Ncase)),2,quantile,prob=0.25)
        p75AAA <- apply(((Y - rep(mdnA,each=Ncase)) / rep(madA,each=Ncase)),2,quantile,prob=0.75)
        p25HAA <- apply(((Y - rep(mdnH,each=Ncase)) / rep(madA,each=Ncase)),2,quantile,prob=0.25)
```

```
        p75HAA <- apply(((Y - rep(mdnH,each=Ncase)) / rep(madA,each=Ncase)),2,quantile,prob=0.75)
        p25AHA <- apply(((Y - rep(mdnA,each=Ncase)) / rep(madH,each=Ncase)),2,quantile,prob=0.25)
        p75AHA <- apply(((Y - rep(mdnA,each=Ncase)) / rep(madH,each=Ncase)),2,quantile,prob=0.75)
        p25HHA <- apply(((Y - rep(mdnH,each=Ncase)) / rep(madH,each=Ncase)),2,quantile,prob=0.25)
        p75HHA <- apply(((Y - rep(mdnH,each=Ncase)) / rep(madH,each=Ncase)),2,quantile,prob=0.75)
        p25AAH <- apply(((Y - rep(mdnA,each=Ncase)) / rep(madA,each=Ncase))[-(1:NDisease),],
2,quantile,prob=0.25)
        p75AAH <- apply(((Y - rep(mdnA,each=Ncase)) / rep(madA,each=Ncase))[-(1:NDisease),],
2,quantile,prob=0.75)
        p25HAH <- apply(((Y - rep(mdnH,each=Ncase)) / rep(madA,each=Ncase))[-(1:NDisease),],
2,quantile,prob=0.25)
        p75HAH <- apply(((Y - rep(mdnH,each=Ncase)) / rep(madA,each=Ncase))[-(1:NDisease),],
2,quantile,prob=0.75)
        p25AHH <- apply(((Y - rep(mdnA,each=Ncase)) / rep(madH,each=Ncase))[-(1:NDisease),],
2,quantile,prob=0.25)
        p75AHH <- apply(((Y - rep(mdnA,each=Ncase)) / rep(madH,each=Ncase))[-(1:NDisease),],
2,quantile,prob=0.75)
        p25HHH <- apply(((Y - rep(mdnH,each=Ncase)) / rep(madH,each=Ncase))[-(1:NDisease),],
2,quantile,prob=0.25)
        p75HHH <- apply(((Y - rep(mdnH,each=Ncase)) / rep(madH,each=Ncase))[-(1:NDisease),],
2,quantile,prob=0.75)
        timeStamps <- c(timeStamps,list(proc.time()))
        cat("\nQuartiles: difference between code and apply()\n")
        print(round(descrip(cbind(Yp25AAA=p25AAA-Yp25AAA,Yp75AAA=p75AAA-Yp75AAA,
            Yp25AHA=p25AHA-Yp25AHA,Yp75AHA=p75AHA-Yp75AHA,
            Yp25HAA=p25HAA-Yp25HAA,Yp75HAA=p75HAA-Yp75HAA,
            Yp25HHA=p25HHA-Yp25HHA,Yp75HHA=p75HHA-Yp75HHA,
            Yp25AAH=p25AAH-Yp25AAH,Yp75AAH=p75AAH-Yp75AAH,
            Yp25AHH=p25AHH-Yp25AHH,Yp75AHH=p75AHH-Yp75AHH,
            Yp25HAH=p25HAH-Yp25HAH,Yp75HAH=p75HAH-Yp75HAH,
            Yp25HHH=p25HHH-Yp25HHH,Yp75HHH=p75HHH-Yp75HHH)),14))

        # Validation of outlier sum statistics

        timeStamps <- c(timeStamps,list(proc.time()))
        tY <- ((Y - rep(mdnA,each=Ncase)) / rep(madA,each=Ncase))[1:NDisease,]
        outAAA <- apply(tY * (tY >= rep(2 * p75AAA - p25AAA,each=NDisease)),2,sum)
        tY <- ((Y - rep(mdnH,each=Ncase)) / rep(madA,each=Ncase))[1:NDisease,]
        outHAA <- apply(tY * (tY >= rep(2 * p75HAA - p25HAA,each=NDisease)),2,sum)
        tY <- ((Y - rep(mdnA,each=Ncase)) / rep(madH,each=Ncase))[1:NDisease,]
        outAHA <- apply(tY * (tY >= rep(2 * p75AHA - p25AHA,each=NDisease)),2,sum)
        tY <- ((Y - rep(mdnH,each=Ncase)) / rep(madH,each=Ncase))[1:NDisease,]
        outHHA <- apply(tY * (tY >= rep(2 * p75HHA - p25HHA,each=NDisease)),2,sum)
        tY <- ((Y - rep(mdnA,each=Ncase)) / rep(madA,each=Ncase))[1:NDisease,]
        outAAH <- apply(tY * (tY >= rep(2 * p75AAH - p25AAH,each=NDisease)),2,sum)
        tY <- ((Y - rep(mdnH,each=Ncase)) / rep(madA,each=Ncase))[1:NDisease,]
        outHAH <- apply(tY * (tY >= rep(2 * p75HAH - p25HAH,each=NDisease)),2,sum)
        tY <- ((Y - rep(mdnA,each=Ncase)) / rep(madH,each=Ncase))[1:NDisease,]
        outAHH <- apply(tY * (tY >= rep(2 * p75AHH - p25AHH,each=NDisease)),2,sum)
        tY <- ((Y - rep(mdnH,each=Ncase)) / rep(madH,each=Ncase))[1:NDisease,]
        outHHH <- apply(tY * (tY >= rep(2 * p75HHH - p25HHH,each=NDisease)),2,sum)
        timeStamps <- c(timeStamps,list(proc.time()))
        cat("\nOutlier Sum Statistics: difference between code and apply()\n")
        print(round(descrip(cbind(soutAAA=outAAA-soutAAA,
            soutHAA=outHAA-soutHAA,
            soutAHA=outAHA-soutAHA,
            soutHHA=outHHA-soutHHA,
            soutAAH=outAAH-soutAAH,
            soutHAH=outHAH-soutHAH,
            soutAHH=outAHH-soutAHH,
            soutHHH=outHHH-soutHHH)),14))
        timeStamps <- c(timeStamps,list(proc.time()))

        rslt <- NULL
        for (i in 1:17) rslt <- rbind(rslt,timeStamps[[i+1]] - timeStamps[[i]])
        rslt <- rslt[,1:3]
```

```
        dimnames(rslt) <- list(c("Initializing memory","Generating data","Computing vectorized
statistics","Computing summary statistics for t tests",
                "Comparing and printing","Computing statistics for t test equal variances","Comparing and
printing",
                "Computing statistics for t test unequal variances","Comparing and printing","Computing
summary for t test healthy variance",
                "Comparing and printing","Computing median, mad statistics for outlier sum","Comparing and
printing",
                "Computing quantile statistics for outlier sum","Comparing and printing","Computing
outlier sum statistics",
                "Comparing and printing"),c("User","System","Elapsed"))
        cat("\nElapsed time:\n")
        print(rslt)
    }

    cbind
(tEq=tEq,pEq=pEq,tUneq=tUneq,pUneq=pUneq,tHlth=tHealth,pHlth=pHealth,soutAAA=soutAAA,soutAAH=soutAAH,
        soutAHA=soutAHA,soutAHH=soutAHH,soutHAA=soutHAA,soutHAH=soutHAH,soutHHA=soutHHA,soutHHH=soutHHH)

}

# Definition of an alternatve function that is written more transparently, but which is approximately 10
 times slower,
# because it is not vectorized code.

slowSumOutlierData <- function (caseGGxCC, altDistn=F, validate=F) {

    if (validate) timeStamps <- list(proc.time())

    rdata <- caseGGxCC$rdata                                    # a function to generate random data
    Ngenes <- 30 * caseGGxCC$Ngenes                             # the number of genes to be simulated to
use as the "population"
    NHealthy <- caseGGxCC$NHealthy                              # the number of healthy subjects in a
single simulated sample
    NDisease <- caseGGxCC$NDisease                              # the number of diseased subjects in a
single simulated sample
    NoverExpressCases <- caseGGxCC$NoverExpressCases            # the number of diseased subjects that
will have overexpressed genes
    NoverExpressGenes <- caseGGxCC$NoverExpressGenes            # the number of genes that will be over
expressed
    overExpress <- caseGGxCC$overExpress                        # the mean expression level in over
expressed genes

    Ncase <- NHealthy + NDisease
    Nobs <- Ngenes * Ncase

    # Initialization of vectors used to store the t and outlier sum statistics
    #    "t" denotes t statistics
    #    "p" denotes p values
    #    "sout" denotes outlier sum statistics
    #    "Eq" denotes presumption of equal variances
    #    "Uneq" denotes allowing for the possibility of unequal variances
    #    "Health" denotes using variance estimated from only the healthy cases
    #    "AAA", "AHA", etc. follows nomenclature described above and in the paper

    tEq <- pEq <-
    tUneq <- pUneq <-
    tHealth <- pHealth <-
    soutAAA <- soutAAH <-
    soutAHA <- soutAHH <-
    soutHAA <- soutHAH <-
    soutHHA <- soutHHH <-
    rep(0,Ngenes)

    for (i in 1:Ngenes) {
        Y <- rdata(Ncase)
```

```
        if (altDistn) Y[1:NoverExpressCases] <- Y[1:NoverExpressCases] + overExpress

        vH <- var(Y[-(1:NDisease)])
        mH <- mean(Y[-(1:NDisease)])
        mD <- mean(Y[(1:NDisease)])
        seH <- sqrt( vH * (1 / NHealthy + 1 / NDisease))

        z <- t.test(Y[1:NDisease],Y[-(1:NDisease)],alternative="greater")
        tEq[i] <- z$statistic
        pEq[i] <- z$p.value
        z <- t.test(Y[1:NDisease],Y[-(1:NDisease)],alternative="greater",var.equal=F)
        tUneq[i] <- z$statistic
        pUneq[i] <- z$p.value
        tHealth[i] <- (mD - mH) / seH
        pHealth[i] <- 1 - pt(tHealth[i],NHealthy-1)

        mdnH <- quantile(Y[-(1:NDisease)],prob=0.5)
        madH <- mad(Y[-(1:NDisease)],constant=1)
        mdnA <- quantile(Y,prob=0.5)
        madA <- mad(Y,constant=1)

        YAA <- (Y - mdnA) / madA
        YAH <- (Y - mdnA) / madH
        YHA <- (Y - mdnH) / madA
        YHH <- (Y - mdnH) / madH

        pAAA <- quantile(YAA,prob=c(0.25,0.75))
        pAHA <- quantile(YAH,prob=c(0.25,0.75))
        pHAA <- quantile(YHA,prob=c(0.25,0.75))
        pHHA <- quantile(YHH,prob=c(0.25,0.75))
        pAAH <- quantile(YAA[-(1:NDisease)],prob=c(0.25,0.75))
        pAHH <- quantile(YAH[-(1:NDisease)],prob=c(0.25,0.75))
        pHAH <- quantile(YHA[-(1:NDisease)],prob=c(0.25,0.75))
        pHHH <- quantile(YHH[-(1:NDisease)],prob=c(0.25,0.75))

        soutAAA[i] <- sum((YAA * (YAA >= 2 * pAAA[2] - pAAA[1]))[1:NDisease])
        soutAAH[i] <- sum((YAA * (YAA >= 2 * pAAH[2] - pAAH[1]))[1:NDisease])
        soutAHA[i] <- sum((YAH * (YAH >= 2 * pAHA[2] - pAHA[1]))[1:NDisease])
        soutAHH[i] <- sum((YAH * (YAH >= 2 * pAHH[2] - pAHH[1]))[1:NDisease])
        soutHAA[i] <- sum((YHA * (YHA >= 2 * pHAA[2] - pHAA[1]))[1:NDisease])
        soutHAH[i] <- sum((YHA * (YHA >= 2 * pHAH[2] - pHAH[1]))[1:NDisease])
        soutHHA[i] <- sum((YHH * (YHH >= 2 * pHHA[2] - pHHA[1]))[1:NDisease])
        soutHHH[i] <- sum((YHH * (YHH >= 2 * pHHH[2] - pHHH[1]))[1:NDisease])

    }

    if (validate) print(proc.time() - timeStamps[[1]])

    cbind
 (tEq=tEq,pEq=pEq,tUneq=tUneq,pUneq=pUneq,tHlth=tHealth,pHlth=pHealth,soutAAA=soutAAA,soutAAH=soutAAH,
        soutAHA=soutAHA,soutAHH=soutAHH,soutHAA=soutHAA,soutHAH=soutHAH,soutHHA=soutHHA,soutHHH=soutHHH)

}

##############
##
## Validation of statistics
##
##############

caseGGxCC <- list(
    Ngenes=           100,
    rdata =         rnorm,
    NoverExpressGenes= 01,
    NoverExpressCases= 02,
    NDisease=          15,
```

```
    NHealthy=          60,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp05=NULL,pvp10=NULL,pvp15=NULL,pvp20=NULL,pvp25=NULL)

set.seed(1)
validateSlow <- slowSumOutlierData (caseGGxCC, altDist=T, validate=T)
[1] 25.484 44.250 76.047  0.000  0.000

set.seed(1)
start <- proc.time()
validateFast <- fastSumOutlierData (caseGGxCC, altDistn=T, validate=F)
print(proc.time() - start)
[1] 5.828 0.875 7.907 0.000 0.000

set.seed(1)
validateFast <- fastSumOutlierData (caseGGxCC, altDistn=T, validate=T)

Group descriptive statistics: difference between code and independent coding
            n msng mean std dev min 25%-ile median 75%-ile maximum
 mHealth 3000    0    0       0   0       0      0       0       0
 vHealth 3000    0    0       0   0       0      0       0       0
mDisease 3000    0    0       0   0       0      0       0       0
vDisease 3000    0    0       0   0       0      0       0       0
  sePool 3000    0    0       0   0       0      0       0       0
  seUneq 3000    0    0       0   0       0      0       0       0
seHealth 3000    0    0       0   0       0      0       0       0

T test presuming equal variances: difference between tEq and loop using t.test
        n msng mean std dev min 25%-ile median 75%-ile maximum
Stat 3000    0    0       0   0       0      0       0       0
Pval 3000    0    0       0   0       0      0       0       0

T test allowing unequal variances: difference between tUneq and loop using t.test
        n msng mean std dev     min 25%-ile median 75%-ile maximum
Stat 3000    0    0  0e+000  0e+000       0      0       0  0e+000
  DF 3000    0    0  1e-014 -4e-014       0      0       0  3e-014
Pval 3000    0    0  0e+000  0e+000       0      0       0  0e+000

T test using Healthy: difference between tHealth and independent code
        n msng mean std dev min 25%-ile median 75%-ile maximum
Stat 3000    0    0       0   0       0      0       0       0
Pval 3000    0    0       0   0       0      0       0       0

Medians and median absolute deviation: difference between code and apply()
         n msng mean std dev min 25%-ile median 75%-ile maximum
YmdnA 3000    0    0       0   0       0      0       0       0
YmadA 3000    0    0       0   0       0      0       0       0
YmdnH 3000    0    0       0   0       0      0       0       0
YmadH 3000    0    0       0   0       0      0       0       0

Quartiles: difference between code and apply()
           n msng mean std dev min 25%-ile median 75%-ile maximum
Yp25AAA 3000    0    0       0   0       0      0       0       0
Yp75AAA 3000    0    0       0   0       0      0       0       0
Yp25AHA 3000    0    0       0   0       0      0       0       0
Yp75AHA 3000    0    0       0   0       0      0       0       0
Yp25HAA 3000    0    0       0   0       0      0       0       0
Yp75HAA 3000    0    0       0   0       0      0       0       0
Yp25HHA 3000    0    0       0   0       0      0       0       0
Yp75HHA 3000    0    0       0   0       0      0       0       0
Yp25AAH 3000    0    0       0   0       0      0       0       0
Yp75AAH 3000    0    0       0   0       0      0       0       0
Yp25AHH 3000    0    0       0   0       0      0       0       0
Yp75AHH 3000    0    0       0   0       0      0       0       0
Yp25HAH 3000    0    0       0   0       0      0       0       0
Yp75HAH 3000    0    0       0   0       0      0       0       0
```

```
Yp25HHH 3000    0    0       0   0       0      0       0       0
Yp75HHH 3000    0    0       0   0       0      0       0       0

Outlier Sum Statistics: difference between code and apply()
          n msng mean std dev min 25%-ile median 75%-ile maximum
soutAAA 3000    0    0       0   0       0      0       0       0
soutHAA 3000    0    0       0   0       0      0       0       0
soutAHA 3000    0    0       0   0       0      0       0       0
soutHHA 3000    0    0       0   0       0      0       0       0
soutAAH 3000    0    0       0   0       0      0       0       0
soutHAH 3000    0    0       0   0       0      0       0       0
soutAHH 3000    0    0       0   0       0      0       0       0
soutHHH 3000    0    0       0   0       0      0       0       0

Elapsed time:
                                              User System Elapsed
                            Initializing memory  0.031  0.000   0.031
                                Generating data  0.047  0.000   0.047
                Computing vectorized statistics  5.765  0.968   6.750
        Computing summary statistics for t tests  2.657  4.110   7.375
                           Comparing and printing  0.000  0.015   0.078
  Computing statistics for t test equal variances  3.687  4.532  13.219
                           Comparing and printing  0.000  0.015   0.015
Computing statistics for t test unequal variances  5.578  8.641  14.516
                           Comparing and printing  0.016  0.000   0.015
    Computing summary for t test healthy variance  0.015  0.000   0.016
                           Comparing and printing  0.016  0.000   0.016
 Computing median, mad statistics for outlier sum  2.500  4.078   7.062
                           Comparing and printing  0.016  0.000   0.016
    Computing quantile statistics for outlier sum 18.547 29.734  51.640
                           Comparing and printing  0.046  0.016   0.063
                Computing outlier sum statistics  1.391  0.703   2.500
                           Comparing and printing  0.000  0.031   0.031

descrip(validateSlow-validateFast)
          n msng           mean       std dev             min        25%-ile median       75%-ile
maximum
    tEq 3000    0  2.263091e-019 2.063219e-016 -1.332268e-015  0.000000e+000      0 1.084202e-018
8.881784e-016
    pEq 3000    0  3.441691e-018 1.891839e-016 -1.998401e-015  0.000000e+000      0 0.000000e+000
1.887379e-015
  tUneq 3000    0 -1.220396e-018 1.840729e-016 -1.776357e-015  0.000000e+000      0 0.000000e+000
1.332268e-015
  pUneq 3000    0 -4.292862e-018 5.687975e-016 -3.441691e-015 -1.110223e-016      0 1.110223e-016
3.552714e-015
  tHlth 3000    0  3.096406e-017 2.576142e-016 -1.776357e-015  0.000000e+000      0 1.110223e-016
1.332268e-015
  pHlth 3000    0  3.848773e-018 2.041500e-016 -1.443290e-015  0.000000e+000      0 0.000000e+000
1.554312e-015
soutAAA 3000    0 -1.184238e-018 2.470307e-016 -3.552714e-015  0.000000e+000      0 0.000000e+000
3.552714e-015
soutAAH 3000    0  5.329071e-018 3.235151e-016 -3.552714e-015  0.000000e+000      0 0.000000e+000
3.552714e-015
soutAHA 3000    0 -5.329071e-018 2.448367e-016 -3.552714e-015  0.000000e+000      0 0.000000e+000
3.552714e-015
soutAHH 3000    0 -4.736952e-018 3.401702e-016 -3.552714e-015  0.000000e+000      0 0.000000e+000
3.552714e-015
soutHAA 3000    0  1.776357e-018 2.615102e-016 -3.552714e-015  0.000000e+000      0 0.000000e+000
3.552714e-015
soutHAH 3000    0 -1.776357e-018 3.478446e-016 -3.552714e-015  0.000000e+000      0 0.000000e+000
3.552714e-015
soutHHA 3000    0  3.552714e-018 3.177975e-016 -3.552714e-015  0.000000e+000      0 0.000000e+000
3.552714e-015
soutHHH 3000    0  8.881784e-018 4.063386e-016 -3.552714e-015  0.000000e+000      0 0.000000e+000
3.552714e-015
```

```
##############
##
## One simulation
##
##    This function will sample appropriate numbers of gene results (t statistics and outlier sum
 statistics) from
##    data generated by fastSumOutlierData()
##
##    Each simulation samples
##        NoverExpressGenes from the alternative distribution
##        Ngenes - NoverExpressGenes from the alternative distribution
##
##    Those sampled results are then used to define the empirical distributions for the outlier sum
 statistics and
##    to judge the ordering of the statistics.
##
##    When computing the null distribution, the Ngene-th gene is used as the target gene, and genes 1 -
 (Ngenes - 1)
##        are used to compute the p value
##    When computing the alternative distribution, the first gene is used as the target gene, and genes 2
 - Ngenes
##        are used to compute the p value
##
##    p values are computed three ways:
##        Proportion of genes that exceed the observed value of the target gene
##        Proportion of genes that exceed the observed value of the target gene plus one-half the
 proportion that are equal to the observed value
##        Proportion of genes that meet or exceed the observed value of the target gene
##
##############

fastSumOutlierStats <- function (caseGGxCC) {

    Ngenes <- caseGGxCC$Ngenes
    NoverExpressGenes <- caseGGxCC$NoverExpressGenes

    genes <- rbind(caseGGxCC$altStats[sample(1:(dim(caseGGxCC$altStats)
[1]),NoverExpressGenes,replace=T),,drop=F],
        caseGGxCC$nullStats[sample(1:(dim(caseGGxCC$nullStats)[1]),Ngenes-
NoverExpressGenes,replace=T),,drop=F])

    asymNull <- genes[Ngenes,c(2,4,6)]
    asymAlt <- genes[1,c(2,4,6)]

    asym <- genes[,c(2,4,6)]
    genes <- genes[,-c(2,4,6)]

    pval.null <- genes - rep(genes[Ngenes,],each=Ngenes)
    pval.alt <- genes - rep(genes[1,],each=Ngenes)

    pval2 <- (Ngenes - apply(genes,2,rank)) / (Ngenes - 1)

    asymNull <- c(asymNull,apply(pval.null > 0, 2, sum) / (Ngenes - 1), pval2[Ngenes,], (apply(pval.null
>= 0, 2, sum) - 1) / (Ngenes - 1))
    asymAlt <- c(asymAlt,apply(pval.alt > 0, 2, sum) / (Ngenes - 1), pval2[1,], (apply(pval.alt >= 0, 2,
sum) - 1) / (Ngenes - 1))

    pval2 <- cbind(asym,pval2)
    pval2.sort <- matrix(pval2[order(rep(1:(dim(pval2)[2]),each=Ngenes),pval2)],Ngenes)
    thresh10 <- pval2.sort[10,]
    thresh25 <- pval2.sort[25,]

    list(
        rsltNull= asymNull,
        rsltAlt= asymAlt,
        pvp10= apply(pval2[1:NoverExpressGenes,,drop=F] <= rep(thresh10,each=NoverExpressGenes),2,sum) /
```

```
 apply(pval2 <= rep(thresh10,each=Ngenes),2,sum),
        pvp25= apply(pval2[1:NoverExpressGenes,,drop=F] <= rep(thresh25,each=NoverExpressGenes),2,sum) /
 apply(pval2 <= rep(thresh25,each=Ngenes),2,sum)
     )

}

##########
##
## Fnorm01x02.1515
## Fnorm20x02.1515
##
##########

seed <- 1
set.seed(seed)
Fnorm01x02.1515 <-
caseGGxCC <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 01,
    NoverExpressCases= 02,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
Nsim <- 10000
nullStats <- fastSumOutlierData (caseGGxCC, altDistn=F)
altStats <- fastSumOutlierData (caseGGxCC, altDistn=T)
SnormGGx02.1515 <- list(nullStats=nullStats,altStats=altStats)
caseGGxCC$nullStats <- nullStats
caseGGxCC$altStats <- altStats

rsltNull <- matrix(0,36,Nsim) * NA
dimnames(rsltNull) <- list(c("tEq","tUneq","tHlth",
    "e.tEq.1","e.tUneq.1","e.tHlth.1","soutAAA.1","soutAAH.1",  "soutAHA.1","soutAHH.1","soutHAA.
 1","soutHAH.1","soutHHA.1","soutHHH.1",
    "e.tEq.2","e.tUneq.2","e.tHlth.2","soutAAA.2","soutAAH.2",  "soutAHA.2","soutAHH.2","soutHAA.
 2","soutHAH.2","soutHHA.2","soutHHH.2",
    "e.tEq.3","e.tUneq.3","e.tHlth.3","soutAAA.3","soutAAH.3",  "soutAHA.3","soutAHH.3","soutHAA.
 3","soutHAH.3","soutHHA.3","soutHHH.3"),
    rep("",Nsim))
rsltAlt <- rsltNull
pvp10 <- pvp25  <- rsltNull[c(1:3,15:25),]

set.seed(10*seed+1)
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm01x02.1515$rsltNull <- cbind(Fnorm01x02.1515$rsltNull,rsltNull)
Fnorm01x02.1515$rsltAlt <-  cbind(Fnorm01x02.1515$rsltAlt,rsltAlt)
Fnorm01x02.1515$pvp10 <-    cbind(Fnorm01x02.1515$pvp10,pvp10)
Fnorm01x02.1515$pvp25 <-    cbind(Fnorm01x02.1515$pvp25,pvp25)
FastDisplayCase (Fnorm01x02.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr   AltMean    AltMdn     AltSD       PVP10
 PVP25
      tEq  0.0477 0.5001713 0.4974220 0.2883141 0.1316 0.3132578 0.2581983 0.2460597 0.003143636
 0.002710154
    tUneq  0.0474 0.5001692 0.4974221 0.2880964 0.1304 0.3134574 0.2585188 0.2457930 0.003113636
 0.002694154
    tHlth  0.0472 0.5002632 0.4975342 0.2883222 0.1733 0.3042294 0.2358906 0.2591797 0.004972727
```

0.004065846
  e.tEq.1 0.0462 0.5029606 0.5025025 0.2880192 0.1302 0.3159612 0.2622623 0.2468357 0.003143636
0.002710154
e.tUneq.1 0.0462 0.5029606 0.5025025 0.2880192 0.1302 0.3159612 0.2622623 0.2468357 0.003143636
0.002710154
e.tHlth.1 0.0451 0.5030963 0.5035035 0.2883204 0.1705 0.3066896 0.2392392 0.2601214 0.004972727
0.004065846
soutAAA.1 0.0500 0.2873976 0.3373373 0.1021553 0.2356 0.1834897 0.1611612 0.1320326 0.005752727
0.005464000
soutAAH.1 0.0497 0.3453692 0.4264264 0.1402488 0.2072 0.2094448 0.1781782 0.1578833 0.005633636
0.004858308
soutAHA.1 0.0500 0.2866723 0.3373373 0.1027793 0.2274 0.1841282 0.1656657 0.1314300 0.006266364
0.005428615
soutAHH.1 0.0509 0.3444031 0.4264264 0.1407838 0.1765 0.2190446 0.1921922 0.1556383 0.004644545
0.004078308
southAA.1 0.0495 0.2874764 0.3373373 0.1020223 0.2320 0.1819705 0.1581582 0.1318159 0.005930909
0.005508000
southAH.1 0.0475 0.3453251 0.4264264 0.1401022 0.2020 0.2096359 0.1801802 0.1567921 0.005200000
0.004581704
southHA.1 0.0503 0.2867689 0.3373373 0.1026057 0.2288 0.1826501 0.1621622 0.1314047 0.006363636
0.005482000
southHH.1 0.0519 0.3443957 0.4264264 0.1407489 0.1767 0.2182818 0.1911912 0.1548875 0.004444545
0.003946000
  e.tEq.2 0.0462 0.5029745 0.5025025 0.2880182 0.1302 0.3159612 0.2622623 0.2468357 0.003143636
0.002710154
e.tUneq.2 0.0462 0.5029745 0.5025025 0.2880182 0.1302 0.3159612 0.2622623 0.2468357 0.003143636
0.002710154
e.tHlth.2 0.0451 0.5031102 0.5035035 0.2883195 0.1705 0.3066896 0.2392392 0.2601214 0.004972727
0.004065846
soutAAA.2 0.0500 0.5014685 0.6681682 0.2448164 0.2356 0.2789457 0.1611612 0.2657861 0.005752727
0.005464000
soutAAH.2 0.0497 0.4993902 0.7117117 0.2628470 0.2072 0.2628865 0.1781782 0.2489131 0.005633636
0.004858308
soutAHA.2 0.0500 0.5007431 0.6681682 0.2457102 0.2274 0.2795842 0.1656657 0.2652575 0.006266364
0.005428615
soutAHH.2 0.0509 0.4984242 0.7117117 0.2636978 0.1765 0.2724863 0.1921922 0.2454134 0.004644545
0.004078308
southAA.2 0.0495 0.5015472 0.6681682 0.2446919 0.2320 0.2774265 0.1581582 0.2662238 0.005930909
0.005508000
southAH.2 0.0475 0.4993462 0.7117117 0.2627945 0.2020 0.2630776 0.1801802 0.2481812 0.005200000
0.004581704
southHA.2 0.0503 0.5008397 0.6681682 0.2455534 0.2288 0.2781061 0.1621622 0.2657765 0.006363636
0.005482000
southHH.2 0.0519 0.4984168 0.7117117 0.2636834 0.1767 0.2717234 0.1911912 0.2451043 0.004444545
0.003946000
  e.tEq.3 0.0462 0.5029884 0.5025025 0.2880172 0.1302 0.3159612 0.2622623 0.2468357 0.003143636
0.002710154
e.tUneq.3 0.0462 0.5029884 0.5025025 0.2880172 0.1302 0.3159612 0.2622623 0.2468357 0.003143636
0.002710154
e.tHlth.3 0.0451 0.5031241 0.5035035 0.2883187 0.1705 0.3066896 0.2392392 0.2601214 0.004972727
0.004065846
soutAAA.3 0.0500 0.7155393 1.0000000 0.3970270 0.2356 0.3744017 0.1611612 0.4098897 0.005752727
0.005464000
soutAAH.3 0.0497 0.6534113 1.0000000 0.3959013 0.2072 0.3163281 0.1781782 0.3507443 0.005633636
0.004858308
soutAHA.3 0.0499 0.7148140 1.0000000 0.3979692 0.2274 0.3750402 0.1656657 0.4093983 0.006266364
0.005428615
soutAHH.3 0.0508 0.6524452 1.0000000 0.3968419 0.1765 0.3259279 0.1921922 0.3467930 0.004644545
0.004078308
southAA.3 0.0495 0.7156181 1.0000000 0.3969077 0.2320 0.3728825 0.1581582 0.4105271 0.005930909
0.005508000
southAH.3 0.0474 0.6533673 1.0000000 0.3958836 0.2020 0.3165192 0.1801802 0.3501961 0.005200000
0.004581704
southHA.3 0.0502 0.7149106 1.0000000 0.3978204 0.2288 0.3735621 0.1621622 0.4100790 0.006363636
0.005482000
southHH.3 0.0518 0.6524378 1.0000000 0.3968352 0.1767 0.3251651 0.1911912 0.3466919 0.004444545

```
 0.003946000

set.seed(10*seed+2)
Fnorm20x02.1515 <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 20,
    NoverExpressCases= 02,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 20
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm20x02.1515$rsltNull <- cbind(Fnorm20x02.1515$rsltNull,rsltNull)
Fnorm20x02.1515$rsltAlt <-  cbind(Fnorm20x02.1515$rsltAlt,rsltAlt)
Fnorm20x02.1515$pvp10 <-    cbind(Fnorm20x02.1515$pvp10,pvp10)
Fnorm20x02.1515$pvp25 <-    cbind(Fnorm20x02.1515$pvp25,pvp25)
FastDisplayCase (Fnorm20x02.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr   AltMean    AltMdn     AltSD      PVP10      PVP25
      tEq  0.0498 0.5004436 0.5014623 0.2904446 0.1286 0.3084258 0.2523257 0.2427407 0.05935773 0.05420880
    tUneq  0.0492 0.5004412 0.5014613 0.2902181 0.1273 0.3086308 0.2524262 0.2424869 0.05897848 0.05407942
    tHlth  0.0506 0.5004962 0.5014615 0.2907101 0.1734 0.2987272 0.2287079 0.2555152 0.08982758 0.07653726
  e.tEq.1  0.0476 0.5066672 0.5115115 0.2902070 0.1215 0.3146468 0.2612613 0.2442742 0.05935773 0.05420880
e.tUneq.1  0.0476 0.5066672 0.5115115 0.2902070 0.1215 0.3146468 0.2612613 0.2442742 0.05935773 0.05420880
e.tHlth.1  0.0487 0.5068804 0.5110110 0.2903303 0.1660 0.3048438 0.2342342 0.2570675 0.08982758 0.07653726
soutAAA.1  0.0479 0.2925944 0.3443443 0.1040860 0.2347 0.1875449 0.1656657 0.1352884 0.11555500 0.10774198
soutAAH.1  0.0442 0.3528382 0.4344344 0.1406881 0.2041 0.2128569 0.1796797 0.1605428 0.10700591 0.09336477
soutAHA.1  0.0493 0.2928249 0.3443443 0.1037271 0.2211 0.1874040 0.1651652 0.1337154 0.11758727 0.10171142
soutAHH.1  0.0467 0.3524936 0.4344344 0.1414499 0.1707 0.2222784 0.1941942 0.1573050 0.08268288 0.07743711
soutHAA.1  0.0458 0.2929966 0.3443443 0.1038074 0.2334 0.1853574 0.1631632 0.1347881 0.11685470 0.10913814
soutHAH.1  0.0454 0.3531823 0.4344344 0.1407155 0.1938 0.2125945 0.1801802 0.1591196 0.09658273 0.08924174
soutHHA.1  0.0479 0.2930808 0.3443443 0.1035457 0.2250 0.1856699 0.1611612 0.1336940 0.11907182 0.10274662
soutHHH.1  0.0488 0.3528396 0.4344344 0.1413000 0.1683 0.2212315 0.1941942 0.1563216 0.07963379 0.07322235
  e.tEq.2  0.0476 0.5066834 0.5115115 0.2902060 0.1215 0.3146472 0.2612613 0.2442741 0.05935773 0.05420880
e.tUneq.2  0.0476 0.5066834 0.5115115 0.2902060 0.1215 0.3146472 0.2612613 0.2442741 0.05935773 0.05420880
e.tHlth.2  0.0487 0.5068966 0.5110110 0.2903292 0.1660 0.3048442 0.2342342 0.2570675 0.08982758 0.07653726
soutAAA.2  0.0479 0.5031486 0.6716717 0.2453780 0.2347 0.2816308 0.1656657 0.2666265 0.11555500 0.10774198
soutAAH.2  0.0442 0.5067201 0.7162162 0.2616690 0.2041 0.2638307 0.1796797 0.2477780 0.10700591 0.09336477
soutAHA.2  0.0493 0.5033792 0.6716717 0.2450279 0.2211 0.2814899 0.1651652 0.2658817 0.11758727 0.10171142
soutAHH.2  0.0467 0.5063755 0.7162162 0.2622818 0.1707 0.2732523 0.1941942 0.2437298 0.08268288 0.07743711
soutHAA.2  0.0458 0.5035509 0.6716717 0.2449143 0.2334 0.2794432 0.1631632 0.2671447 0.11685470 0.10913814
soutHAH.2  0.0454 0.5070642 0.7162162 0.2614813 0.1938 0.2635684 0.1801802 0.2469124 0.09658273 0.08924174
soutHHA.2  0.0479 0.5036350 0.6716717 0.2447311 0.2250 0.2797558 0.1611612 0.2664840 0.11907182 0.10274662
soutHHH.2  0.0488 0.5067215 0.7162162 0.2619978 0.1683 0.2722054 0.1941942 0.2433157 0.07963379 0.07322235
  e.tEq.3  0.0476 0.5066996 0.5115115 0.2902050 0.1215 0.3146475 0.2612613 0.2442741 0.05935773 0.05420880
e.tUneq.3  0.0476 0.5066996 0.5115115 0.2902050 0.1215 0.3146475 0.2612613 0.2442741 0.05935773 0.05420880
e.tHlth.3  0.0487 0.5069128 0.5110110 0.2903281 0.1660 0.3048445 0.2342342 0.2570674 0.08982758 0.07653726
soutAAA.3  0.0479 0.7137029 1.0000000 0.3962893 0.2347 0.3757167 0.1656657 0.4086658 0.11555500 0.10774198
soutAAH.3  0.0442 0.6606020 1.0000000 0.3928516 0.2041 0.3148046 0.1796797 0.3461804 0.10700591 0.09336477
soutAHA.3  0.0493 0.7139334 1.0000000 0.3959500 0.2211 0.3755758 0.1651652 0.4082128 0.11758727 0.10171142
soutAHH.3  0.0466 0.6602574 1.0000000 0.3933950 0.1707 0.3242261 0.1941942 0.3418927 0.08268288 0.07743711
soutHAA.3  0.0457 0.7141051 1.0000000 0.3957884 0.2334 0.3735291 0.1631632 0.4095070 0.11685470 0.10913814
soutHAH.3  0.0454 0.6609460 1.0000000 0.3925917 0.1938 0.3145422 0.1801802 0.3456001 0.09658273 0.08924174
soutHHA.3  0.0479 0.7141893 1.0000000 0.3956303 0.2250 0.3738416 0.1611612 0.4090044 0.11907182 0.10274662
soutHHH.3  0.0488 0.6606034 1.0000000 0.3930702 0.1683 0.3231793 0.1941942 0.3417538 0.07963379 0.07322235

##########
##
```

```
## Fnorm01x04.1515
## Fnorm02x04.1515
## Fnorm04x04.1515
## Fnorm08x04.1515
## Fnorm20x04.1515
##
##########

seed <- 2
set.seed(seed)
Fnorm01x04.1515 <-
caseGGxCC <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 01,
    NoverExpressCases= 04,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
Nsim <- 10000
#nullStats <- fastSumOutlierData (caseGGxCC, altDistn=F)
#altStats <- fastSumOutlierData (caseGGxCC, altDistn=T)
#SnormGGx04.1515 <- list(nullStats=nullStats,altStats=altStats)
caseGGxCC$nullStats <- SnormGGx04.1515$nullStats
caseGGxCC$altStats <- SnormGGx04.1515$altStats

rsltNull <- matrix(0,36,Nsim) * NA
dimnames(rsltNull) <- list(c("tEq","tUneq","tHlth",
    "e.tEq.1","e.tUneq.1","e.tHlth.1","soutAAA.1","soutAAH.1",  "soutAHA.1","soutAHH.1","soutHAA.
1","soutHAH.1","soutHHA.1","soutHHH.1",
    "e.tEq.2","e.tUneq.2","e.tHlth.2","soutAAA.2","soutAAH.2",  "soutAHA.2","soutAHH.2","soutHAA.
2","soutHAH.2","soutHHA.2","soutHHH.2",
    "e.tEq.3","e.tUneq.3","e.tHlth.3","soutAAA.3","soutAAH.3",  "soutAHA.3","soutAHH.3","soutHAA.
3","soutHAH.3","soutHHA.3","soutHHH.3"),
    rep("",Nsim))
rsltAlt <- rsltNull
pvp10 <- pvp25  <- rsltNull[c(1:3,15:25),]

set.seed(10*seed+1)
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm01x04.1515$rsltNull <- cbind(Fnorm01x04.1515$rsltNull,rsltNull)
Fnorm01x04.1515$rsltAlt <-  cbind(Fnorm01x04.1515$rsltAlt,rsltAlt)
Fnorm01x04.1515$pvp10 <-    cbind(Fnorm01x04.1515$pvp10,pvp10)
Fnorm01x04.1515$pvp25 <-    cbind(Fnorm01x04.1515$pvp25,pvp25)
FastDisplayCase (Fnorm01x04.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr   AltMean     AltMdn     AltSD       PVP10
 PVP25
      tEq  0.0488 0.4970339 0.4956140 0.2876030 0.2966 0.1742385 0.11412046 0.1789339 0.008631970
 0.006931704
    tUneq  0.0485 0.4970413 0.4956158 0.2873792 0.2936 0.1746967 0.11507450 0.1787100 0.008514697
 0.006867550
    tHlth  0.0462 0.4971666 0.4958274 0.2872342 0.3988 0.1538265 0.07887321 0.1865103 0.014809091
 0.010708023
  e.tEq.1  0.0457 0.4993892 0.4954955 0.2873386 0.2871 0.1762447 0.11511512 0.1797481 0.008631970
 0.006931704
e.tUneq.1  0.0457 0.4993892 0.4954955 0.2873386 0.2871 0.1762447 0.11511512 0.1797481 0.008631970
 0.006931704
e.tHlth.1  0.0473 0.4993907 0.4954955 0.2872058 0.3955 0.1552212 0.08008008 0.1875023 0.014809091
```

```
 0.010708023
soutAAA.1  0.0482 0.2891075 0.3393393 0.1022931 0.3519 0.1579400 0.11411411 0.1375766 0.014178333
 0.009754462
soutAAH.1  0.0477 0.3452645 0.4244244 0.1377467 0.4122 0.1359996 0.07407407 0.1460295 0.015680000
 0.011404165
soutAHA.1  0.0483 0.2891590 0.3393393 0.1022574 0.3622 0.1497127 0.09909910 0.1357256 0.014201818
 0.009977077
soutAHH.1  0.0471 0.3447220 0.4244244 0.1381589 0.3592 0.1435582 0.08608609 0.1443402 0.011826364
 0.009179100
soutHAA.1  0.0477 0.2893274 0.3393393 0.1021145 0.3640 0.1515216 0.10810811 0.1358704 0.014946364
 0.010336934
soutHAH.1  0.0468 0.3452660 0.4244244 0.1377022 0.4157 0.1325697 0.07007007 0.1435755 0.015301818
 0.011273692
soutHHA.1  0.0494 0.2892031 0.3393393 0.1021636 0.3773 0.1451745 0.09209209 0.1354096 0.014926364
 0.010514308
soutHHH.1  0.0461 0.3448057 0.4244244 0.1381218 0.3712 0.1396850 0.08208208 0.1422056 0.011726515
 0.009279846
  e.tEq.2  0.0457 0.4994053 0.4954955 0.2873394 0.2871 0.1762447 0.11511512 0.1797481 0.008631970
 0.006931704
e.tUneq.2  0.0457 0.4994053 0.4954955 0.2873394 0.2871 0.1762447 0.11511512 0.1797481 0.008631970
 0.006931704
e.tHlth.2  0.0473 0.4994068 0.4954955 0.2872066 0.3955 0.1552212 0.08008008 0.1875023 0.014809091
 0.010708023
soutAAA.2  0.0482 0.5015969 0.6691692 0.2446592 0.3519 0.2363980 0.11411411 0.2611727 0.014178333
 0.009754462
soutAAH.2  0.0477 0.5021507 0.7107107 0.2611014 0.4122 0.1617012 0.07407407 0.2086183 0.015680000
 0.011404165
soutAHA.2  0.0483 0.5016484 0.6691692 0.2445996 0.3622 0.2281707 0.09909910 0.2626717 0.014201818
 0.009977077
soutAHH.2  0.0471 0.5016083 0.7107107 0.2616447 0.3592 0.1692598 0.08608609 0.2065006 0.011826364
 0.009179100
soutHAA.2  0.0477 0.5018169 0.6691692 0.2443935 0.3640 0.2299796 0.10810811 0.2622058 0.014946364
 0.010336934
soutHAH.2  0.0468 0.5021522 0.7107107 0.2610771 0.4157 0.1582713 0.07007007 0.2073336 0.015301818
 0.011273692
soutHHA.2  0.0494 0.5016925 0.6691692 0.2445221 0.3773 0.2236325 0.09209209 0.2638616 0.014926364
 0.010514308
soutHHH.2  0.0461 0.5016919 0.7107107 0.2615750 0.3712 0.1653866 0.08208208 0.2054992 0.011726515
 0.009279846
  e.tEq.3  0.0457 0.4994213 0.4954955 0.2873403 0.2871 0.1762447 0.11511512 0.1797481 0.008631970
 0.006931704
e.tUneq.3  0.0457 0.4994213 0.4954955 0.2873403 0.2871 0.1762447 0.11511512 0.1797481 0.008631970
 0.006931704
e.tHlth.3  0.0473 0.4994228 0.4954955 0.2872075 0.3955 0.1552212 0.08008008 0.1875023 0.014809091
 0.010708023
soutAAA.3  0.0480 0.7140864 1.0000000 0.3966479 0.3519 0.3148561 0.11411411 0.3953728 0.014178333
 0.009754462
soutAAH.3  0.0476 0.6590369 1.0000000 0.3948374 0.4122 0.1874028 0.07407407 0.2806601 0.015680000
 0.011404165
soutAHA.3  0.0483 0.7141378 1.0000000 0.3965835 0.3622 0.3066287 0.09909910 0.3979900 0.014201818
 0.009977077
soutAHH.3  0.0471 0.6584945 1.0000000 0.3954123 0.3592 0.1949614 0.08608609 0.2783926 0.011826364
 0.009179100
soutHAA.3  0.0476 0.7143063 1.0000000 0.3963661 0.3640 0.3084376 0.10810811 0.3973256 0.014946364
 0.010336934
soutHAH.3  0.0467 0.6590384 1.0000000 0.3948208 0.4157 0.1839729 0.07007007 0.2800216 0.015301818
 0.011273692
soutHHA.3  0.0492 0.7141820 1.0000000 0.3965121 0.3773 0.3020905 0.09209209 0.3996683 0.014926364
 0.010514308
soutHHH.3  0.0461 0.6585782 1.0000000 0.3953330 0.3712 0.1910882 0.08208208 0.2780090 0.011726515
 0.009279846

set.seed(10*seed+2)
Fnorm02x04.1515 <- list(
    Ngenes=          1000,
    rdata =         rnorm,
```

```
    NoverExpressGenes= 02,
    NoverExpressCases= 04,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 02
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm02x04.1515$rsltNull <- cbind(Fnorm02x04.1515$rsltNull,rsltNull)
Fnorm02x04.1515$rsltAlt <-  cbind(Fnorm02x04.1515$rsltAlt,rsltAlt)
Fnorm02x04.1515$pvp10 <-    cbind(Fnorm02x04.1515$pvp10,pvp10)
Fnorm02x04.1515$pvp25 <-    cbind(Fnorm02x04.1515$pvp25,pvp25)
FastDisplayCase (Fnorm02x04.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr   AltMean     AltMdn     AltSD      PVP10
PVP25
      tEq  0.0512 0.4985940 0.5006123 0.2893566 0.2932 0.1763003 0.11517585 0.1797340 0.01642545
0.01386200
    tUneq  0.0509 0.4985957 0.5006118 0.2891336 0.2907 0.1767662 0.11600939 0.1794999 0.01629636
0.01372415
    tHlth  0.0482 0.4991761 0.5005978 0.2891892 0.3981 0.1557512 0.07976464 0.1875369 0.03008742
0.02149878
  e.tEq.1  0.0496 0.5012772 0.5015015 0.2890091 0.2847 0.1785499 0.11711712 0.1804391 0.01642545
0.01386200
e.tUneq.1  0.0496 0.5012772 0.5015015 0.2890091 0.2847 0.1785499 0.11711712 0.1804391 0.01642545
0.01386200
e.tHlth.1  0.0481 0.5017065 0.5025025 0.2891351 0.3975 0.1573524 0.08208208 0.1884103 0.03008742
0.02149878
soutAAA.1  0.0475 0.2890110 0.3393393 0.1024479 0.3414 0.1593340 0.11761762 0.1375551 0.02823091
0.01896878
soutAAH.1  0.0474 0.3449538 0.4244244 0.1379644 0.4062 0.1367499 0.07607608 0.1456050 0.03087833
0.02234125
soutAHA.1  0.0484 0.2883385 0.3393393 0.1027225 0.3547 0.1519523 0.10310310 0.1363259 0.02857091
0.01973111
soutAHH.1  0.0469 0.3446487 0.4244244 0.1385011 0.3623 0.1440965 0.08908909 0.1442165 0.02368000
0.01812493
soutHAA.1  0.0483 0.2885441 0.3393393 0.1027141 0.3565 0.1529458 0.11111111 0.1361327 0.02976273
0.02003864
soutHAH.1  0.0471 0.3447768 0.4244244 0.1382066 0.4101 0.1332486 0.07207207 0.1432092 0.03095288
0.02206356
soutHHA.1  0.0488 0.2881630 0.3393393 0.1028884 0.3724 0.1473593 0.09609610 0.1361715 0.02989273
0.02068311
soutHHH.1  0.0466 0.3445809 0.4244244 0.1386338 0.3683 0.1401495 0.08508509 0.1420555 0.02388909
0.01841248
  e.tEq.2  0.0496 0.5012958 0.5015015 0.2890094 0.2847 0.1785501 0.11711712 0.1804390 0.01642545
0.01386200
e.tUneq.2  0.0496 0.5012958 0.5015015 0.2890094 0.2847 0.1785501 0.11711712 0.1804390 0.01642545
0.01386200
e.tHlth.2  0.0481 0.5017252 0.5025025 0.2891353 0.3975 0.1573525 0.08208208 0.1884103 0.03008742
0.02149878
soutAAA.2  0.0475 0.4991081 0.6691692 0.2449212 0.3414 0.2391967 0.11761762 0.2623807 0.02823091
0.01896878
soutAAH.2  0.0474 0.5004304 0.7107107 0.2612173 0.4062 0.1620761 0.07607608 0.2075559 0.03087833
0.02234125
soutAHA.2  0.0484 0.4984356 0.6691692 0.2456118 0.3547 0.2318149 0.10310310 0.2639813 0.02857091
0.01973111
soutAHH.2  0.0469 0.5001254 0.7107107 0.2616825 0.3623 0.1694226 0.08908909 0.2056815 0.02368000
0.01812493
soutHAA.2  0.0483 0.4986412 0.6691692 0.2454326 0.3565 0.2328085 0.11111111 0.2635807 0.02976273
0.02003864
```

```
soutHAH.2  0.0471 0.5002534 0.7107107 0.2614506 0.4101 0.1585748 0.07207207 0.2063126 0.03095288
 0.02206356
soutHHA.2  0.0488 0.4982600 0.6691692 0.2458313 0.3724 0.2272219 0.09609610 0.2652881 0.02989273
 0.02068311
soutHHH.2  0.0466 0.5000575 0.7107107 0.2617930 0.3683 0.1654757 0.08508509 0.2046612 0.02388909
 0.01841248
  e.tEq.3  0.0495 0.5013145 0.5015015 0.2890098 0.2847 0.1785502 0.11711712 0.1804390 0.01642545
 0.01386200
e.tUneq.3  0.0495 0.5013145 0.5015015 0.2890098 0.2847 0.1785502 0.11711712 0.1804390 0.01642545
 0.01386200
e.tHlth.3  0.0481 0.5017438 0.5025025 0.2891356 0.3975 0.1573526 0.08208208 0.1884102 0.03008742
 0.02149878
soutAAA.3  0.0475 0.7092051 1.0000000 0.3974221 0.3414 0.3190594 0.11761762 0.3974927 0.02823091
 0.01896878
soutAAH.3  0.0474 0.6559070 1.0000000 0.3949233 0.4062 0.1874022 0.07607608 0.2789532 0.03087833
 0.02234125
soutAHA.3  0.0484 0.7085326 1.0000000 0.3982029 0.3547 0.3116776 0.10310310 0.4000277 0.02857091
 0.01973111
soutAHH.3  0.0468 0.6556020 1.0000000 0.3953512 0.3623 0.1947487 0.08908909 0.2768902 0.02368000
 0.01812493
soutHAA.3  0.0483 0.7087382 1.0000000 0.3979840 0.3565 0.3126712 0.11111111 0.3995648 0.02976273
 0.02003864
soutHAH.3  0.0471 0.6557300 1.0000000 0.3951473 0.4101 0.1839009 0.07207207 0.2783482 0.03095288
 0.02206356
soutHHA.3  0.0488 0.7083571 1.0000000 0.3984309 0.3724 0.3070846 0.09609610 0.4018052 0.02989273
 0.02068311
soutHHH.3  0.0466 0.6555341 1.0000000 0.3954510 0.3683 0.1908018 0.08508509 0.2764949 0.02388909
 0.01841248

set.seed(10*seed+3)
Fnorm04x04.1515 <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 04,
    NoverExpressCases= 04,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 04
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm04x04.1515$rsltNull <- cbind(Fnorm04x04.1515$rsltNull,rsltNull)
Fnorm04x04.1515$rsltAlt <-  cbind(Fnorm04x04.1515$rsltAlt,rsltAlt)
Fnorm04x04.1515$pvp10 <-    cbind(Fnorm04x04.1515$pvp10,pvp10)
Fnorm04x04.1515$pvp25 <-    cbind(Fnorm04x04.1515$pvp25,pvp25)
FastDisplayCase (Fnorm04x04.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr   AltMean     AltMdn     AltSD      PVP10
 PVP25
      tEq  0.0531 0.4920047 0.4921725 0.2894669 0.2965 0.1773091 0.11626790 0.1812789 0.03424742
 0.02795125
    tUneq  0.0528 0.4920136 0.4921762 0.2892441 0.2938 0.1777683 0.11701554 0.1810465 0.03365576
 0.02777833
    tHlth  0.0513 0.4920403 0.4923355 0.2893163 0.3977 0.1569549 0.08038132 0.1888193 0.06041190
 0.04314728
  e.tEq.1  0.0493 0.4953266 0.4944945 0.2888862 0.2874 0.1802016 0.11911912 0.1820486 0.03424742
 0.02795125
e.tUneq.1  0.0493 0.4953266 0.4944945 0.2888862 0.2874 0.1802016 0.11911912 0.1820486 0.03424742
 0.02795125
e.tHlth.1  0.0498 0.4952766 0.4944945 0.2889045 0.3913 0.1592805 0.08408408 0.1897856 0.06041190
```

```
 0.04314728
soutAAA.1  0.0552 0.2874116 0.3403403 0.1054002 0.3491 0.1575804 0.11411411 0.1373640 0.05599000
 0.03831108
soutAAH.1  0.0534 0.3443976 0.4254254 0.1407312 0.4151 0.1371252 0.07407407 0.1465235 0.06228727
 0.04464277
soutAHA.1  0.0537 0.2871754 0.3403403 0.1053405 0.3594 0.1504866 0.10110110 0.1357804 0.05628000
 0.03963492
soutAHH.1  0.0504 0.3443588 0.4254254 0.1405601 0.3657 0.1450905 0.08808809 0.1451873 0.04575924
 0.03656447
soutHAA.1  0.0551 0.2872851 0.3403403 0.1054169 0.3632 0.1515961 0.10810811 0.1359999 0.05845924
 0.04059615
soutHAH.1  0.0523 0.3442926 0.4254254 0.1405518 0.4124 0.1339518 0.07207207 0.1439560 0.06188470
 0.04422279
soutHHA.1  0.0533 0.2870552 0.3403403 0.1054608 0.3734 0.1461797 0.09509510 0.1354926 0.05938136
 0.04176693
soutHHH.1  0.0519 0.3442455 0.4254254 0.1405662 0.3704 0.1414594 0.08408408 0.1429416 0.04631545
 0.03727203
  e.tEq.2  0.0493 0.4953420 0.4944945 0.2888853 0.2874 0.1802018 0.11911912 0.1820485 0.03424742
 0.02795125
e.tUneq.2  0.0493 0.4953420 0.4944945 0.2888853 0.2874 0.1802018 0.11911912 0.1820485 0.03424742
 0.02795125
e.tHlth.2  0.0498 0.4952920 0.4944945 0.2889036 0.3913 0.1592806 0.08408408 0.1897855 0.06041190
 0.04314728
soutAAA.2  0.0552 0.4973249 0.6696697 0.2481369 0.3491 0.2351619 0.11411411 0.2605976 0.05599000
 0.03831108
soutAAH.2  0.0534 0.5004650 0.7112112 0.2636324 0.4151 0.1631085 0.07407407 0.2094901 0.06228727
 0.04464277
soutAHA.2  0.0537 0.4970887 0.6696697 0.2483113 0.3594 0.2280681 0.10110110 0.2618767 0.05628000
 0.03963492
soutAHH.2  0.0504 0.5004262 0.7112112 0.2635642 0.3657 0.1710738 0.08808809 0.2075629 0.04575924
 0.03656447
soutHAA.2  0.0551 0.4971984 0.6696697 0.2482510 0.3632 0.2291776 0.10810811 0.2616617 0.05845924
 0.04059615
soutHAH.2  0.0523 0.5003600 0.7112112 0.2635988 0.4124 0.1599350 0.07207207 0.2080991 0.06188470
 0.04422279
soutHHA.2  0.0533 0.4969685 0.6696697 0.2484639 0.3734 0.2237612 0.09509510 0.2630012 0.05938136
 0.04176693
soutHHH.2  0.0519 0.5003130 0.7112112 0.2636345 0.3704 0.1674426 0.08408408 0.2064559 0.04631545
 0.03727203
  e.tEq.3  0.0492 0.4953575 0.4944945 0.2888844 0.2874 0.1802019 0.11911912 0.1820484 0.03424742
 0.02795125
e.tUneq.3  0.0492 0.4953575 0.4944945 0.2888844 0.2874 0.1802019 0.11911912 0.1820484 0.03424742
 0.02795125
e.tHlth.3  0.0498 0.4953074 0.4944945 0.2889028 0.3913 0.1592808 0.08408408 0.1897854 0.06041190
 0.04314728
soutAAA.3  0.0552 0.7072382 1.0000000 0.4004188 0.3491 0.3127433 0.11411411 0.3941531 0.05599000
 0.03831108
soutAAH.3  0.0534 0.6565324 1.0000000 0.3969132 0.4151 0.1890918 0.07407407 0.2818767 0.06228727
 0.04464277
soutAHA.3  0.0537 0.7070020 1.0000000 0.4006507 0.3594 0.3056495 0.10110110 0.3963909 0.05628000
 0.03963492
soutAHH.3  0.0504 0.6564936 1.0000000 0.3968833 0.3657 0.1970571 0.08808809 0.2797084 0.04575924
 0.03656447
soutHAA.3  0.0551 0.7071117 1.0000000 0.4005558 0.3632 0.3067591 0.10810811 0.3960316 0.05845924
 0.04059615
soutHAH.3  0.0523 0.6564274 1.0000000 0.3969322 0.4124 0.1859183 0.07207207 0.2811379 0.06188470
 0.04422279
soutHHA.3  0.0533 0.7068818 1.0000000 0.4008082 0.3734 0.3013426 0.09509510 0.3979753 0.05938136
 0.04176693
soutHHH.3  0.0519 0.6563804 1.0000000 0.3969744 0.3704 0.1934259 0.08408408 0.2792260 0.04631545
 0.03727203

set.seed(10*seed+4)
Fnorm08x04.1515 <- list(
    Ngenes=          1000,
    rdata =         rnorm,
```

```
    NoverExpressGenes= 08,
    NoverExpressCases= 04,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 08
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm08x04.1515$rsltNull <- cbind(Fnorm08x04.1515$rsltNull,rsltNull)
Fnorm08x04.1515$rsltAlt <-  cbind(Fnorm08x04.1515$rsltAlt,rsltAlt)
Fnorm08x04.1515$pvp10 <-    cbind(Fnorm08x04.1515$pvp10,pvp10)
Fnorm08x04.1515$pvp25 <-    cbind(Fnorm08x04.1515$pvp25,pvp25)
FastDisplayCase (Fnorm08x04.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr   AltMean     AltMdn     AltSD      PVP10
PVP25
      tEq  0.0502 0.5003256 0.5020237 0.2908297 0.2940 0.1755362 0.11383394 0.1787962 0.06588455
0.05495375
    tUneq  0.0499 0.5003281 0.5020223 0.2906090 0.2917 0.1759947 0.11446071 0.1785654 0.06482000
0.05440729
    tHlth  0.0482 0.5001891 0.5018141 0.2906506 0.3966 0.1553797 0.08134323 0.1863954 0.11406970
0.08345681
  e.tEq.1  0.0463 0.5047668 0.5045045 0.2898252 0.2787 0.1797119 0.11911912 0.1800250 0.06588455
0.05495375
e.tUneq.1  0.0463 0.5047668 0.5045045 0.2898252 0.2787 0.1797119 0.11911912 0.1800250 0.06588455
0.05495375
e.tHlth.1  0.0459 0.5046363 0.5045045 0.2897624 0.3876 0.1590096 0.08608609 0.1876991 0.11406970
0.08345681
soutAAA.1  0.0489 0.2908490 0.3423423 0.1040904 0.3398 0.1605532 0.11811812 0.1378817 0.10721030
0.07393263
soutAAH.1  0.0463 0.3477247 0.4274274 0.1395409 0.4012 0.1368998 0.07607608 0.1452781 0.11825848
0.08618885
soutAHA.1  0.0518 0.2911562 0.3423423 0.1039218 0.3537 0.1533822 0.10310310 0.1369011 0.10636455
0.07637111
soutAHH.1  0.0481 0.3478390 0.4274274 0.1396634 0.3576 0.1443948 0.08808809 0.1437771 0.08843303
0.07025385
soutHAA.1  0.0487 0.2911764 0.3423423 0.1038070 0.3548 0.1545600 0.11211211 0.1366154 0.11205409
0.07810692
soutHAH.1  0.0460 0.3477933 0.4274274 0.1392394 0.4012 0.1336682 0.07307307 0.1427762 0.11760545
0.08557672
soutHHA.1  0.0502 0.2912038 0.3423423 0.1038384 0.3661 0.1490729 0.09659660 0.1366482 0.11173333
0.08046524
soutHHH.1  0.0474 0.3477554 0.4284284 0.1395075 0.3622 0.1406155 0.08508509 0.1414498 0.08888258
0.07116803
  e.tEq.2  0.0463 0.5047828 0.5045045 0.2898260 0.2787 0.1797121 0.11911912 0.1800250 0.06588455
0.05495375
e.tUneq.2  0.0463 0.5047828 0.5045045 0.2898260 0.2787 0.1797121 0.11911912 0.1800250 0.06588455
0.05495375
e.tHlth.2  0.0459 0.5046524 0.5045045 0.2897633 0.3876 0.1590098 0.08608609 0.1876991 0.11406970
0.08345681
soutAAA.2  0.0489 0.5024075 0.6706707 0.2458989 0.3398 0.2407734 0.11811812 0.2629682 0.10721030
0.07393263
soutAAH.2  0.0463 0.5034188 0.7127127 0.2618601 0.4012 0.1620573 0.07607608 0.2071329 0.11825848
0.08618885
soutAHA.2  0.0518 0.5027146 0.6706707 0.2455631 0.3537 0.2336024 0.10310310 0.2646384 0.10636455
0.07637111
soutAHH.2  0.0481 0.5035331 0.7127127 0.2618574 0.3576 0.1695523 0.08808809 0.2051659 0.08843303
0.07025385
soutHAA.2  0.0487 0.5027348 0.6706707 0.2454972 0.3548 0.2347802 0.11211211 0.2641332 0.11205409
0.07810692
```

```
soutHAH.2  0.0460 0.5034874 0.7127127 0.2616587 0.4012 0.1588256 0.07307307 0.2057814 0.11760545
 0.08557672
soutHHA.2  0.0502 0.5027623 0.6706707 0.2454868 0.3661 0.2292931 0.09659660 0.2658115 0.11173333
 0.08046524
soutHHH.2  0.0474 0.5034494 0.7127127 0.2618240 0.3622 0.1657730 0.08508509 0.2040084 0.08888258
 0.07116803
  e.tEq.3  0.0462 0.5047988 0.5045045 0.2898269 0.2787 0.1797122 0.11911912 0.1800249 0.06588455
 0.05495375
e.tUneq.3  0.0462 0.5047988 0.5045045 0.2898269 0.2787 0.1797122 0.11911912 0.1800249 0.06588455
 0.05495375
e.tHlth.3  0.0459 0.5046684 0.5045045 0.2897642 0.3876 0.1590099 0.08608609 0.1876991 0.11406970
 0.08345681
soutAAA.3  0.0489 0.7139660 1.0000000 0.3971097 0.3398 0.3209936 0.11811812 0.3981203 0.10721030
 0.07393263
soutAAH.3  0.0463 0.6591129 1.0000000 0.3945927 0.4012 0.1872147 0.07607608 0.2782736 0.11825848
 0.08618885
soutAHA.3  0.0518 0.7142731 1.0000000 0.3967381 0.3537 0.3138226 0.10310310 0.4006640 0.10636455
 0.07637111
soutAHH.3  0.0481 0.6592272 1.0000000 0.3945458 0.3576 0.1947097 0.08808809 0.2761305 0.08843303
 0.07025385
soutHAA.3  0.0486 0.7142933 1.0000000 0.3966866 0.3548 0.3150004 0.11211211 0.4000943 0.11205409
 0.07810692
soutHAH.3  0.0460 0.6591815 1.0000000 0.3944320 0.4012 0.1839831 0.07307307 0.2775621 0.11760545
 0.08557672
soutHHA.3  0.0502 0.7143207 1.0000000 0.3966656 0.3661 0.3095133 0.09659660 0.4023001 0.11173333
 0.08046524
soutHHH.3  0.0474 0.6591435 1.0000000 0.3945567 0.3622 0.1909304 0.08508509 0.2756167 0.08888258
 0.07116803

set.seed(10*seed+5)
Fnorm20x04.1515 <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 20,
    NoverExpressCases= 04,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 20
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm20x04.1515$rsltNull <- cbind(Fnorm20x04.1515$rsltNull,rsltNull)
Fnorm20x04.1515$rsltAlt <-  cbind(Fnorm20x04.1515$rsltAlt,rsltAlt)
Fnorm20x04.1515$pvp10 <-    cbind(Fnorm20x04.1515$pvp10,pvp10)
Fnorm20x04.1515$pvp25 <-    cbind(Fnorm20x04.1515$pvp25,pvp25)
FastDisplayCase (Fnorm20x04.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr   AltMean     AltMdn     AltSD     PVP10     PVP25
      tEq  0.0487 0.4986727 0.5002416 0.2873814 0.2906 0.1772273 0.11436756 0.1818365 0.1537065 0.1293860
    tUneq  0.0483 0.4986733 0.5002415 0.2871648 0.2892 0.1776949 0.11497246 0.1815977 0.1513786 0.1282516
    tHlth  0.0472 0.4987728 0.5002829 0.2865838 0.3975 0.1568643 0.07902695 0.1901921 0.2598277 0.1957225
  e.tEq.1  0.0421 0.5070630 0.5085085 0.2854547 0.2672 0.1852568 0.12312312 0.1838758 0.1537065 0.1293860
e.tUneq.1  0.0421 0.5070630 0.5085085 0.2854547 0.2672 0.1852568 0.12312312 0.1838758 0.1537065 0.1293860
e.tHlth.1  0.0409 0.5073895 0.5085085 0.2844127 0.3693 0.1646680 0.08908909 0.1920886 0.2598277 0.1957225
soutAAA.1  0.0481 0.2936556 0.3463463 0.1058030 0.3273 0.1639195 0.12112112 0.1391401 0.2464952 0.1767088
soutAAH.1  0.0445 0.3516871 0.4324324 0.1395734 0.3804 0.1444673 0.08408408 0.1483253 0.2638318 0.2018390
soutAHA.1  0.0444 0.2948190 0.3463463 0.1045861 0.3425 0.1561483 0.10810811 0.1376104 0.2441758 0.1816675
soutAHH.1  0.0440 0.3527287 0.4324324 0.1390362 0.3321 0.1510931 0.09409409 0.1463013 0.2044318 0.1660788
soutHAA.1  0.0467 0.2939003 0.3463463 0.1054987 0.3395 0.1577178 0.11611612 0.1375351 0.2557739 0.1851199
soutHAH.1  0.0419 0.3517312 0.4324324 0.1392016 0.3842 0.1410930 0.08008008 0.1459390 0.2625971 0.2013417
```

```
southHHA.1  0.0443 0.2948918 0.3463463 0.1044540 0.3568 0.1517014 0.10110110 0.1372200 0.2549459 0.1899328
southHHH.1  0.0421 0.3527185 0.4324324 0.1387934 0.3387 0.1472681 0.09109109 0.1441414 0.2044536 0.1689687
  e.tEq.2   0.0421 0.5070791 0.5085085 0.2854544 0.2672 0.1852570 0.12312312 0.1838757 0.1537065 0.1293860
e.tUneq.2   0.0421 0.5070791 0.5085085 0.2854544 0.2672 0.1852570 0.12312312 0.1838757 0.1537065 0.1293860
e.tHlth.2   0.0409 0.5074056 0.5085085 0.2844125 0.3693 0.1646682 0.08908909 0.1920885 0.2598277 0.1957225
soutAAA.2   0.0481 0.5002809 0.6726727 0.2470629 0.3273 0.2416267 0.12112112 0.2611760 0.2464952 0.1767088
soutAAH.2   0.0445 0.5042366 0.7147147 0.2607857 0.3804 0.1695456 0.08408408 0.2087572 0.2638318 0.2018390
soutAHA.2   0.0444 0.5014444 0.6726727 0.2455670 0.3425 0.2338556 0.10810811 0.2626736 0.2441758 0.1816675
soutAHH.2   0.0440 0.5052783 0.7147147 0.2598879 0.3321 0.1761714 0.09409409 0.2065210 0.2044318 0.1660788
soutHAA.2   0.0467 0.5005257 0.6726727 0.2467278 0.3395 0.2354250 0.11611612 0.2621693 0.2557739 0.1851199
soutHAH.2   0.0419 0.5042808 0.7147147 0.2605612 0.3842 0.1661713 0.08008008 0.2074768 0.2625971 0.2013417
soutHHA.2   0.0443 0.5015172 0.6726727 0.2454495 0.3568 0.2294086 0.10110110 0.2637827 0.2549459 0.1899328
soutHHH.2   0.0421 0.5052681 0.7147147 0.2597641 0.3387 0.1723464 0.09109109 0.2054639 0.2044536 0.1689687
  e.tEq.3   0.0420 0.5070952 0.5085085 0.2854541 0.2672 0.1852572 0.12312312 0.1838756 0.1537065 0.1293860
e.tUneq.3   0.0420 0.5070952 0.5085085 0.2854541 0.2672 0.1852572 0.12312312 0.1838756 0.1537065 0.1293860
e.tHlth.3   0.0409 0.5074217 0.5085085 0.2844124 0.3693 0.1646684 0.08908909 0.1920884 0.2598277 0.1957225
soutAAA.3   0.0481 0.7069063 1.0000000 0.3980007 0.3273 0.3193339 0.12112112 0.3937355 0.2464952 0.1767088
soutAAH.3   0.0445 0.6567862 1.0000000 0.3924212 0.3804 0.1946239 0.08408408 0.2787564 0.2638318 0.2018390
soutAHA.3   0.0444 0.7080698 1.0000000 0.3964678 0.3425 0.3115628 0.10810811 0.3962575 0.2441758 0.1816675
soutAHH.3   0.0440 0.6578278 1.0000000 0.3914194 0.3321 0.2012497 0.09409409 0.2764852 0.2044318 0.1660788
soutHAA.3   0.0467 0.7071511 1.0000000 0.3976656 0.3395 0.3131322 0.11611612 0.3956152 0.2557739 0.1851199
soutHAH.3   0.0419 0.6568303 1.0000000 0.3922549 0.3842 0.1912496 0.08008008 0.2781032 0.2625971 0.2013417
soutHHA.3   0.0443 0.7081425 1.0000000 0.3963571 0.3568 0.3071158 0.10110110 0.3978631 0.2549459 0.1899328
soutHHH.3   0.0421 0.6578176 1.0000000 0.3913411 0.3387 0.1974247 0.09109109 0.2760443 0.2044536 0.1689687

##########
##
## Fnorm01x08.1515
## Fnorm20x08.1515
##
##########

seed <- 3
set.seed(seed)
Fnorm01x08.1515 <-
caseGGxCC <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 01,
    NoverExpressCases= 08,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
Nsim <- 10000
#nullStats <- fastSumOutlierData (caseGGxCC, altDistn=F)
#altStats <- fastSumOutlierData (caseGGxCC, altDistn=T)
#SnormGGx08.1515 <- list(nullStats=nullStats,altStats=altStats)
caseGGxCC$nullStats <- SnormGGx08.1515$nullStats
caseGGxCC$altStats <- SnormGGx08.1515$altStats

rsltNull <- matrix(0,36,Nsim) * NA
dimnames(rsltNull) <- list(c("tEq","tUneq","tHlth",
    "e.tEq.1","e.tUneq.1","e.tHlth.1","soutAAA.1","soutAAH.1",  "soutAHA.1","soutAHH.1","soutHAA.
1","soutHAH.1","soutHHA.1","soutHHH.1",
    "e.tEq.2","e.tUneq.2","e.tHlth.2","soutAAA.2","soutAAH.2",  "soutAHA.2","soutAHH.2","soutHAA.
2","soutHAH.2","soutHHA.2","soutHHH.2",
    "e.tEq.3","e.tUneq.3","e.tHlth.3","soutAAA.3","soutAAH.3",  "soutAHA.3","soutAHH.3","soutHAA.
3","soutHAH.3","soutHHA.3","soutHHH.3"),
    rep("",Nsim))
rsltAlt <- rsltNull
pvp10 <- pvp25  <- rsltNull[c(1:3,15:25),]

set.seed(10*seed+1)
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
```

```
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm01x08.1515$rsltNull <- cbind(Fnorm01x08.1515$rsltNull,rsltNull)
Fnorm01x08.1515$rsltAlt <-  cbind(Fnorm01x08.1515$rsltAlt,rsltAlt)
Fnorm01x08.1515$pvp10 <-    cbind(Fnorm01x08.1515$pvp10,pvp10)
Fnorm01x08.1515$pvp25 <-    cbind(Fnorm01x08.1515$pvp25,pvp25)
FastDisplayCase (Fnorm01x08.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr    AltMean      AltMdn      AltSD       PVP10
PVP25
      tEq  0.0475 0.4981314 0.4923681 0.2856126 0.7883 0.03721865 0.012495991 0.06513858 0.044136515
0.025745396
    tUneq  0.0473 0.4981317 0.4923728 0.2854002 0.7850 0.03776215 0.013207783 0.06520793 0.043517424
0.025559561
    tHlth  0.0467 0.4980051 0.4925133 0.2853900 0.8667 0.02511500 0.005058338 0.05807448 0.061096515
0.031038781
  e.tEq.1  0.0487 0.4985815 0.4934935 0.2865456 0.7937 0.03677708 0.013013013 0.06478994 0.044136515
0.025745396
e.tUneq.1  0.0487 0.4985815 0.4934935 0.2865456 0.7937 0.03677708 0.013013013 0.06478994 0.044136515
0.025745396
e.tHlth.1  0.0488 0.4985395 0.4929930 0.2863251 0.8710 0.02489830 0.005005005 0.05788085 0.061096515
0.031038781
soutAAA.1  0.0482 0.2917355 0.3463463 0.1063526 0.2335 0.20707217 0.227227227 0.14273277 0.009508182
0.006556769
soutAAH.1  0.0485 0.3467954 0.4284284 0.1400256 0.6433 0.07702342 0.026026026 0.11655144 0.031064545
0.019592462
soutAHA.1  0.0492 0.2923496 0.3463463 0.1058085 0.2989 0.18537117 0.152152152 0.14788506 0.012200909
0.008258923
soutAHH.1  0.0511 0.3473163 0.4284284 0.1400405 0.6107 0.07896767 0.031031031 0.11507974 0.029147273
0.018193242
soutHAA.1  0.0488 0.2918087 0.3458458 0.1063452 0.2759 0.19191752 0.174174174 0.14412448 0.011755455
0.007607846
soutHAH.1  0.0496 0.3470338 0.4284284 0.1398362 0.7013 0.06545135 0.018018018 0.10908544 0.038767424
0.022465077
soutHHA.1  0.0493 0.2923173 0.3463463 0.1058457 0.3313 0.17647558 0.127127127 0.15030002 0.014631818
0.009501550
soutHHH.1  0.0507 0.3474624 0.4284284 0.1399823 0.6707 0.06872513 0.023023023 0.10788181 0.033783788
0.020366627
  e.tEq.2  0.0487 0.4985983 0.4934935 0.2865475 0.7937 0.03677708 0.013013013 0.06478994 0.044136515
0.025745396
e.tUneq.2  0.0487 0.4985983 0.4934935 0.2865475 0.7937 0.03677708 0.013013013 0.06478994 0.044136515
0.025745396
e.tHlth.2  0.0488 0.4985564 0.4929930 0.2863268 0.8710 0.02489830 0.005005005 0.05788085 0.061096515
0.031038781
soutAAA.2  0.0482 0.4960560 0.6726727 0.2483795 0.2335 0.32760631 0.227227227 0.28387449 0.009508182
0.006556769
soutAAH.2  0.0485 0.4997256 0.7127127 0.2623524 0.6433 0.08563804 0.026026026 0.14915877 0.031064545
0.019592462
soutAHA.2  0.0492 0.4966701 0.6726727 0.2476411 0.2989 0.30590531 0.152152152 0.29548945 0.012200909
0.008258923
soutAHH.2  0.0511 0.5002465 0.7127127 0.2620568 0.6107 0.08758228 0.031031031 0.14789843 0.029147273
0.018193242
soutHAA.2  0.0488 0.4961291 0.6726727 0.2483162 0.2759 0.31245165 0.174174174 0.29092545 0.011755455
0.007607846
soutHAH.2  0.0496 0.4999640 0.7127127 0.2621123 0.7013 0.07406597 0.018018018 0.14409417 0.038767424
0.022465077
soutHHA.2  0.0493 0.4966377 0.6726727 0.2476836 0.3313 0.29700971 0.127127127 0.30029782 0.014631818
0.009501550
soutHHH.2  0.0507 0.5003925 0.7127127 0.2619405 0.6707 0.07733974 0.023023023 0.14298802 0.033783788
0.020366627
  e.tEq.3  0.0487 0.4986152 0.4934935 0.2865493 0.7937 0.03677708 0.013013013 0.06478994 0.044136515
0.025745396
e.tUneq.3  0.0487 0.4986152 0.4934935 0.2865493 0.7937 0.03677708 0.013013013 0.06478994 0.044136515
```

```
 0.025745396
e.tHlth.3  0.0488 0.4985733 0.4929930 0.2863286 0.8710 0.02489830 0.005005005 0.05788085 0.061096515
 0.031038781
soutAAA.3  0.0481 0.7003764 1.0000000 0.4001412 0.2335 0.44814044 0.227227227 0.43514921 0.009508182
 0.006556769
soutAAH.3  0.0485 0.6526558 1.0000000 0.3950462 0.6433 0.09425265 0.026026026 0.18852312 0.031064545
 0.019592462
soutAHA.3  0.0492 0.7009905 1.0000000 0.3993693 0.2989 0.42643944 0.152152152 0.44868260 0.012200909
 0.008258923
soutAHH.3  0.0511 0.6531767 1.0000000 0.3946483 0.6107 0.09619690 0.031031031 0.18743818 0.029147273
 0.018193242
soutHAA.3  0.0487 0.7004495 1.0000000 0.4000646 0.2759 0.43298579 0.174174174 0.44391599 0.011755455
 0.007607846
soutHAH.3  0.0496 0.6528942 1.0000000 0.3947944 0.7013 0.08268058 0.018018018 0.18508148 0.038767424
 0.022465077
soutHHA.3  0.0493 0.7009582 1.0000000 0.3994123 0.3313 0.41754384 0.127127127 0.45423067 0.014631818
 0.009501550
soutHHH.3  0.0507 0.6533227 1.0000000 0.3945145 0.6707 0.08595435 0.023023023 0.18406843 0.033783788
 0.020366627

set.seed(10*seed+2)
Fnorm20x08.1515 <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 20,
    NoverExpressCases= 08,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 20
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm20x08.1515$rsltNull <- cbind(Fnorm20x08.1515$rsltNull,rsltNull)
Fnorm20x08.1515$rsltAlt <-  cbind(Fnorm20x08.1515$rsltAlt,rsltAlt)
Fnorm20x08.1515$pvp10 <-    cbind(Fnorm20x08.1515$pvp10,pvp10)
Fnorm20x08.1515$pvp25 <-    cbind(Fnorm20x08.1515$pvp25,pvp25)
FastDisplayCase (Fnorm20x08.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr    AltMean      AltMdn      AltSD     PVP10
 PVP25
      tEq  0.0468 0.5019397 0.5051001 0.2880071 0.7875 0.03664598 0.012455594 0.06376987 0.5767591
 0.4270334
    tUneq  0.0466 0.5019395 0.5051001 0.2877908 0.7844 0.03719907 0.013112994 0.06384242 0.5680418
 0.4239175
    tHlth  0.0473 0.5019424 0.5050562 0.2881022 0.8726 0.02453275 0.004979274 0.05605124 0.7496911
 0.5250812
  e.tEq.1  0.0356 0.5111536 0.5175175 0.2845004 0.7344 0.04497427 0.022022022 0.06606475 0.5767591
 0.4270334
e.tUneq.1  0.0356 0.5111536 0.5175175 0.2845004 0.7344 0.04497427 0.022022022 0.06606475 0.5767591
 0.4270334
e.tHlth.1  0.0327 0.5114059 0.5175175 0.2841947 0.8285 0.03326787 0.015015015 0.05807291 0.7496911
 0.5250812
soutAAA.1  0.0464 0.2968225 0.3513514 0.1076415 0.2258 0.21054665 0.227727728 0.14421592 0.1772130
 0.1288063
soutAAH.1  0.0400 0.3568771 0.4384384 0.1405288 0.5923 0.08556667 0.034034034 0.11886902 0.4653264
 0.3354210
soutAHA.1  0.0468 0.2970631 0.3513514 0.1069430 0.2842 0.18917578 0.155155155 0.14890615 0.2286653
 0.1574172
soutAHH.1  0.0393 0.3564790 0.4384384 0.1407004 0.5625 0.08780240 0.039039039 0.11788780 0.4356838
 0.3146824
```

```
soutHAA.1  0.0468 0.2970517 0.3513514 0.1072858 0.2679 0.19598919 0.176676677 0.14546369 0.2135379
 0.1472678
soutHAH.1  0.0396 0.3570364 0.4384384 0.1402402 0.6470 0.07389820 0.027027027 0.11097220 0.5414888
 0.3830964
soutHHA.1  0.0461 0.2972214 0.3508509 0.1066558 0.3165 0.18059700 0.131131131 0.15118924 0.2652742
 0.1794823
soutHHH.1  0.0378 0.3565945 0.4384384 0.1404664 0.6055 0.07754174 0.032032032 0.11049119 0.4919564
 0.3499595
  e.tEq.2  0.0356 0.5111678 0.5175175 0.2845005 0.7344 0.04497462 0.022022022 0.06606462 0.5767591
 0.4270334
e.tUneq.2  0.0356 0.5111678 0.5175175 0.2845005 0.7344 0.04497462 0.022022022 0.06606462 0.5767591
 0.4270334
e.tHlth.2  0.0327 0.5114202 0.5175175 0.2841948 0.8285 0.03326822 0.015015015 0.05807280 0.7496911
 0.5250812
soutAAA.2  0.0464 0.4998792 0.6751752 0.2478953 0.2258 0.32994419 0.227727728 0.28399271 0.1772130
 0.1288063
soutAAH.2  0.0400 0.5072517 0.7177177 0.2601859 0.5923 0.09432307 0.034034034 0.15131816 0.4653264
 0.3354210
soutAHA.2  0.0468 0.5001197 0.6751752 0.2473956 0.2842 0.30857332 0.155155155 0.29517861 0.2286653
 0.1574172
soutAHH.2  0.0393 0.5068536 0.7177177 0.2605086 0.5625 0.09655881 0.039039039 0.15041850 0.4356838
 0.3146824
soutHAA.2  0.0468 0.5001083 0.6751752 0.2475532 0.2679 0.31538674 0.176676677 0.29067147 0.2135379
 0.1472678
soutHAH.2  0.0396 0.5074110 0.7177177 0.2599380 0.6470 0.08265460 0.027027027 0.14589906 0.5414888
 0.3830964
soutHHA.2  0.0461 0.5002781 0.6751752 0.2471415 0.3165 0.29999454 0.131131131 0.29977380 0.2652742
 0.1794823
soutHHH.2  0.0378 0.5069691 0.7177177 0.2603157 0.6055 0.08629815 0.032032032 0.14531415 0.4919564
 0.3499595
  e.tEq.3  0.0356 0.5111821 0.5175175 0.2845007 0.7344 0.04497497 0.022022022 0.06606451 0.5767591
 0.4270334
e.tUneq.3  0.0356 0.5111821 0.5175175 0.2845007 0.7344 0.04497497 0.022022022 0.06606451 0.5767591
 0.4270334
e.tHlth.3  0.0327 0.5114344 0.5175175 0.2841948 0.8285 0.03326857 0.015015015 0.05807270 0.7496911
 0.5250812
soutAAA.3  0.0464 0.7029358 1.0000000 0.3981255 0.2258 0.44934174 0.227727728 0.43390607 0.1772130
 0.1288063
soutAAH.3  0.0399 0.6576262 1.0000000 0.3902895 0.5923 0.10307948 0.034034034 0.19050464 0.4653264
 0.3354210
soutAHA.3  0.0467 0.7031764 1.0000000 0.3976918 0.2842 0.42797087 0.155155155 0.44705343 0.2286653
 0.1574172
soutAHH.3  0.0393 0.6572281 1.0000000 0.3906580 0.5625 0.10531522 0.039039039 0.18968765 0.4356838
 0.3146824
soutHAA.3  0.0467 0.7031650 1.0000000 0.3977957 0.2679 0.43478428 0.176676677 0.44225457 0.2135379
 0.1472678
soutHAH.3  0.0395 0.6577856 1.0000000 0.3900628 0.6470 0.09141101 0.027027027 0.18677724 0.5414888
 0.3830964
soutHHA.3  0.0461 0.7033347 1.0000000 0.3974530 0.3165 0.41939209 0.131131131 0.45237093 0.2652742
 0.1794823
soutHHH.3  0.0378 0.6573436 1.0000000 0.3904848 0.6055 0.09505455 0.032032032 0.18614938 0.4919564
 0.3499595


##########
##
## Fnorm01x15.1515
## Fnorm20x15.1515
##
##########

seed <- 4
set.seed(seed)
Fnorm01x15.1515 <-
caseGGxCC <- list(
    Ngenes=          1000,
```

```
    rdata =         rnorm,
    NoverExpressGenes= 01,
    NoverExpressCases= 15,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
Nsim <- 10000
#nullStats <- fastSumOutlierData (caseGGxCC, altDistn=F)
#altStats <- fastSumOutlierData (caseGGxCC, altDistn=T)
#SnormGGx15.1515 <- list(nullStats=nullStats,altStats=altStats)
caseGGxCC$nullStats <- SnormGGx15.1515$nullStats
caseGGxCC$altStats <- SnormGGx15.1515$altStats

rsltNull <- matrix(0,36,Nsim) * NA
dimnames(rsltNull) <- list(c("tEq","tUneq","tHlth",
    "e.tEq.1","e.tUneq.1","e.tHlth.1","soutAAA.1","soutAAH.1",  "soutAHA.1","soutAHH.1","soutHAA.
1","soutHAH.1","soutHHA.1","soutHHH.1",
    "e.tEq.2","e.tUneq.2","e.tHlth.2","soutAAA.2","soutAAH.2",  "soutAHA.2","soutAHH.2","soutHAA.
2","soutHAH.2","soutHHA.2","soutHHH.2",
    "e.tEq.3","e.tUneq.3","e.tHlth.3","soutAAA.3","soutAAH.3",  "soutAHA.3","soutAHH.3","soutHAA.
3","soutHAH.3","soutHHA.3","soutHHH.3"),
    rep("",Nsim))
rsltAlt <- rsltNull
pvp10 <- pvp25  <- rsltNull[c(1:3,15:25),]

set.seed(10*seed+1)
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm01x15.1515$rsltNull <- cbind(Fnorm01x15.1515$rsltNull,rsltNull)
Fnorm01x15.1515$rsltAlt <-  cbind(Fnorm01x15.1515$rsltAlt,rsltAlt)
Fnorm01x15.1515$pvp10 <-    cbind(Fnorm01x15.1515$pvp10,pvp10)
Fnorm01x15.1515$pvp25 <-    cbind(Fnorm01x15.1515$pvp25,pvp25)
FastDisplayCase (Fnorm01x15.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr      AltMean        AltMdn       AltSD       PVP10
 PVP25
      tEq  0.0521 0.4981813 0.4929391 0.2892392 0.9999 0.0001530872 3.478409e-006 0.001262632 0.099580455
 0.039940946
    tUneq  0.0520 0.4981844 0.4929420 0.2890280 0.9999 0.0001618124 4.370713e-006 0.001289378 0.099573182
 0.039939880
    tHlth  0.0509 0.4982017 0.4931194 0.2893259 0.9997 0.0004047591 3.455985e-005 0.002227169 0.099294091
 0.039914199
  e.tEq.1  0.0524 0.4996278 0.4964965 0.2896646 0.9997 0.0001663664 0.000000e+000 0.001498496 0.099580455
 0.039940946
e.tUneq.1  0.0524 0.4996278 0.4964965 0.2896646 0.9997 0.0001663664 0.000000e+000 0.001498496 0.099580455
 0.039940946
e.tHlth.1  0.0501 0.4996343 0.4964965 0.2896074 0.9992 0.0004136136 0.000000e+000 0.002454161 0.099294091
 0.039914199
soutAAA.1  0.0507 0.2917564 0.3443443 0.1061064 0.0519 0.2997808809 3.463463e-001 0.103131848 0.001488182
 0.001183385
soutAAH.1  0.0497 0.3463631 0.4284284 0.1418257 0.7643 0.0466416416 1.701702e-002 0.081907923 0.035834545
 0.023957538
soutAHA.1  0.0487 0.2915159 0.3443443 0.1059203 0.0988 0.2763311311 3.463463e-001 0.125544772 0.002645455
 0.002390923
soutAHH.1  0.0490 0.3467740 0.4294294 0.1415327 0.7599 0.0468260260 1.101101e-002 0.087345387 0.046496364
 0.025853088
soutHAA.1  0.0514 0.2917502 0.3443443 0.1062462 0.0943 0.2760174174 3.453453e-001 0.121989940 0.002596364
 0.002043385
soutHAH.1  0.0500 0.3463027 0.4284284 0.1418864 0.8973 0.0218998999 1.001001e-003 0.064801385 0.075401364
 0.033833100
```

```
soutHHA.1  0.0475 0.2915277 0.3443443 0.1060243 0.1441 0.2640413413 3.453453e-001 0.137628420 0.004914545
 0.003697538
soutHHH.1  0.0485 0.3466055 0.4294294 0.1416049 0.8657 0.0278305305 3.003003e-003 0.070840679 0.066978182
 0.031829726
  e.tEq.2  0.0524 0.4996438 0.4964965 0.2896643 0.9997 0.0001663664 0.000000e+000 0.001498496 0.099580455
 0.039940946
e.tUneq.2  0.0524 0.4996438 0.4964965 0.2896643 0.9997 0.0001663664 0.000000e+000 0.001498496 0.099580455
 0.039940946
e.tHlth.2  0.0501 0.4996503 0.4964965 0.2896073 0.9992 0.0004136136 0.000000e+000 0.002454161 0.099294091
 0.039914199
soutAAA.2  0.0507 0.4993703 0.6716717 0.2477308 0.0519 0.5179830330 6.726727e-001 0.239938436 0.001488182
 0.001183385
soutAAH.2  0.0497 0.4983563 0.7132132 0.2638228 0.7643 0.0494091592 1.701702e-002 0.098383237 0.035834545
 0.023957538
soutAHA.2  0.0487 0.4991299 0.6716717 0.2478527 0.0988 0.4945332833 6.726727e-001 0.270056216 0.002645455
 0.002390923
soutAHH.2  0.0490 0.4987672 0.7132132 0.2634286 0.7599 0.0495935435 1.101101e-002 0.102949257 0.046496364
 0.025853088
soutHAA.2  0.0514 0.4993641 0.6716717 0.2477959 0.0943 0.4942195696 6.726727e-001 0.268677009 0.002596364
 0.002043385
soutHAH.2  0.0500 0.4982959 0.7132132 0.2638902 0.8973 0.0246674174 1.001001e-003 0.085478261 0.075401364
 0.033833100
soutHHA.2  0.0475 0.4991417 0.6716717 0.2478873 0.1441 0.4822434935 6.726727e-001 0.285437043 0.004914545
 0.003697538
soutHHH.2  0.0485 0.4985987 0.7132132 0.2635646 0.8657 0.0305980480 3.003003e-003 0.089960468 0.066978182
 0.031829726
  e.tEq.3  0.0524 0.4996598 0.4964965 0.2896641 0.9997 0.0001663664 0.000000e+000 0.001498496 0.099580455
 0.039940946
e.tUneq.3  0.0524 0.4996598 0.4964965 0.2896641 0.9997 0.0001663664 0.000000e+000 0.001498496 0.099580455
 0.039940946
e.tHlth.3  0.0501 0.4996663 0.4964965 0.2896071 0.9992 0.0004136136 0.000000e+000 0.002454161 0.099294091
 0.039914199
soutAAA.3  0.0507 0.7069843 1.0000000 0.3989842 0.0519 0.7361851852 1.000000e+000 0.387267566 0.001488182
 0.001183385
soutAAH.3  0.0496 0.6503495 1.0000000 0.3961782 0.7643 0.0521766767 1.701702e-002 0.119026128 0.035834545
 0.023957538
soutAHA.3  0.0486 0.7067438 1.0000000 0.3991851 0.0988 0.7127354354 1.000000e+000 0.419011539 0.002645455
 0.002390923
soutAHH.3  0.0490 0.6507605 1.0000000 0.3957580 0.7599 0.0523610611 1.101101e-002 0.122822989 0.046496364
 0.025853088
soutHAA.3  0.0514 0.7069781 1.0000000 0.3990279 0.0943 0.7124217217 1.000000e+000 0.418287658 0.002596364
 0.002043385
soutHAH.3  0.0499 0.6502892 1.0000000 0.3962462 0.8973 0.0274349349 1.001001e-003 0.109231181 0.075401364
 0.033833100
soutHHA.3  0.0475 0.7067557 1.0000000 0.3992005 0.1441 0.7004456456 1.000000e+000 0.435291247 0.004914545
 0.003697538
soutHHH.3  0.0484 0.6505920 1.0000000 0.3959132 0.8657 0.0333655656 3.003003e-003 0.112627591 0.066978182
 0.031829726
```

```
set.seed(10*seed+2)
Fnorm20x15.1515 <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 20,
    NoverExpressCases= 15,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 20
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
```

```
}
Fnorm20x15.1515$rsltNull <- cbind(Fnorm20x15.1515$rsltNull,rsltNull)
Fnorm20x15.1515$rsltAlt <-  cbind(Fnorm20x15.1515$rsltAlt,rsltAlt)
Fnorm20x15.1515$pvp10 <-    cbind(Fnorm20x15.1515$pvp10,pvp10)
Fnorm20x15.1515$pvp25 <-    cbind(Fnorm20x15.1515$pvp25,pvp25)
FastDisplayCase (Fnorm20x15.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr      AltMean        AltMdn        AltSD      PVP10
PVP25
      tEq  0.0477 0.5014045 0.5007511 0.2860257 1.0000 0.0001208782 3.502380e-006 0.0006923003 0.99999000
0.79538700
    tUneq  0.0471 0.5014049 0.5007508 0.2858162 1.0000 0.0001286748 4.310671e-006 0.0007116013 1.00000000
0.79529038
    tHlth  0.0468 0.5015130 0.5007024 0.2862146 1.0000 0.0003563822 3.429789e-005 0.0014309849 0.99614545
0.78939407
  e.tEq.1  0.0290 0.5121063 0.5135135 0.2808431 1.0000 0.0095935936 9.009009e-003 0.0059893767 0.99999000
0.79538700
e.tUneq.1  0.0290 0.5121063 0.5135135 0.2808431 1.0000 0.0095935936 9.009009e-003 0.0059893767 0.99999000
0.79538700
e.tHlth.1  0.0280 0.5121912 0.5135135 0.2808974 0.9997 0.0098163163 1.001001e-002 0.0064147503 0.99614545
0.78939407
soutAAA.1  0.0507 0.2917946 0.3443443 0.1052209 0.0545 0.2978379379 3.463463e-001 0.1045951834 0.03125364
0.02585324
soutAAH.1  0.0331 0.3602569 0.4394394 0.1387308 0.7111 0.0546659660 2.502503e-002 0.0856049710 0.47787000
0.38496933
soutAHA.1  0.0484 0.2929391 0.3443443 0.1038381 0.0997 0.2763514515 3.453453e-001 0.1251481754 0.05889727
0.04760744
soutAHH.1  0.0337 0.3600391 0.4394394 0.1385376 0.7243 0.0546447447 2.102102e-002 0.0901845461 0.60873030
0.43602948
soutHAA.1  0.0502 0.2927315 0.3443443 0.1045828 0.0978 0.2753417417 3.453453e-001 0.1225163136 0.05705636
0.04195248
soutHAH.1  0.0321 0.3605887 0.4394394 0.1376843 0.8760 0.0311482482 1.101101e-002 0.0683875015 0.89183182
0.61081513
soutHHA.1  0.0468 0.2933751 0.3443443 0.1035234 0.1418 0.2646822823 3.453453e-001 0.1366089962 0.09634848
0.07203388
soutHHH.1  0.0325 0.3603055 0.4394394 0.1378014 0.8339 0.0365907908 1.201201e-002 0.0735638404 0.83415530
0.55806663
  e.tEq.2  0.0290 0.5121238 0.5135135 0.2808425 1.0000 0.0095937437 9.009009e-003 0.0059894687 0.99999000
0.79538700
e.tUneq.2  0.0290 0.5121238 0.5135135 0.2808425 1.0000 0.0095937437 9.009009e-003 0.0059894687 0.99999000
0.79538700
e.tHlth.2  0.0280 0.5122087 0.5135135 0.2808971 0.9997 0.0098164665 1.001001e-002 0.0064148232 0.99614545
0.78939407
soutAAA.2  0.0507 0.4999135 0.6716717 0.2468733 0.0545 0.5172824324 6.726727e-001 0.2417069382 0.03125364
0.02585324
soutAAH.2  0.0331 0.5099088 0.7182182 0.2576125 0.7111 0.0575548048 2.502503e-002 0.1020699002 0.47787000
0.38496933
soutAHA.2  0.0484 0.5010580 0.6716717 0.2453179 0.0997 0.4957959459 6.726727e-001 0.2693980183 0.05889727
0.04760744
soutAHH.2  0.0337 0.5096911 0.7182182 0.2576351 0.7243 0.0575335836 2.102102e-002 0.1059407332 0.60873030
0.43602948
soutHAA.2  0.0502 0.5008504 0.6716717 0.2458100 0.0978 0.4947862362 6.726727e-001 0.2690104922 0.05705636
0.04195248
soutHAH.2  0.0321 0.5102406 0.7182182 0.2568571 0.8760 0.0340370871 1.101101e-002 0.0888976321 0.89183182
0.61081513
soutHHA.2  0.0468 0.5014939 0.6716717 0.2448145 0.1418 0.4841267768 6.726727e-001 0.2840725500 0.09634848
0.07203388
soutHHH.2  0.0325 0.5099575 0.7182182 0.2570848 0.8339 0.0394796296 1.201201e-002 0.0927692689 0.83415530
0.55806663
  e.tEq.3  0.0290 0.5121412 0.5135135 0.2808421 1.0000 0.0095938939 9.009009e-003 0.0059895733 0.99999000
0.79538700
e.tUneq.3  0.0290 0.5121412 0.5135135 0.2808421 1.0000 0.0095938939 9.009009e-003 0.0059895733 0.99999000
0.79538700
e.tHlth.3  0.0279 0.5122261 0.5135135 0.2808967 0.9997 0.0098166166 1.001001e-002 0.0064149078 0.99614545
0.78939407
soutAAA.3  0.0507 0.7080323 1.0000000 0.3982356 0.0545 0.7367269269 1.000000e+000 0.3889588307 0.03125364
```

```
 0.02585324
soutAAH.3  0.0331 0.6595608 1.0000000 0.3872970 0.7110 0.0604436436 2.502503e-002 0.1227494574 0.47787000
 0.38496933
soutAHA.3  0.0483 0.7091769 1.0000000 0.3966730 0.0997 0.7152404404 1.000000e+000 0.4181783772 0.05889727
 0.04760744
soutAHH.3  0.0337 0.6593430 1.0000000 0.3873962 0.7243 0.0604224224 2.102102e-002 0.1259870504 0.60873030
 0.43602948
soutHAA.3  0.0502 0.7089693 1.0000000 0.3970866 0.0978 0.7142307307 1.000000e+000 0.4184586947 0.05705636
 0.04195248
soutHAH.3  0.0321 0.6598926 1.0000000 0.3866665 0.8760 0.0369259259 1.101101e-002 0.1126403077 0.89183182
 0.61081513
soutHHA.3  0.0468 0.7096128 1.0000000 0.3961330 0.1418 0.7035712713 1.000000e+000 0.4337246199 0.09634848
 0.07203388
soutHHH.3  0.0325 0.6596094 1.0000000 0.3869274 0.8339 0.0423684685 1.201201e-002 0.1155843726 0.83415530
 0.55806663


##########
##
## Ft5df01x02.1515
## Ft5df20x02.1515
##
##########

seed <- 5
set.seed(seed)
Ft5df01x02.1515 <-
caseGGxCC <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 01,
    NoverExpressCases= 02,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
Nsim <- 10000
#nullStats <- fastSumOutlierData (caseGGxCC, altDistn=F)
#altStats <- fastSumOutlierData (caseGGxCC, altDistn=T)
#St5dfGGx02.1515 <- list(nullStats=nullStats,altStats=altStats)
caseGGxCC$nullStats <- St5dfGGx02.1515$nullStats
caseGGxCC$altStats <- St5dfGGx02.1515$altStats

rsltNull <- matrix(0,36,Nsim) * NA
dimnames(rsltNull) <- list(c("tEq","tUneq","tHlth",
    "e.tEq.1","e.tUneq.1","e.tHlth.1","soutAAA.1","soutAAH.1",  "soutAHA.1","soutAHH.1","soutHAA.
 1","soutHAH.1","soutHHA.1","soutHHH.1",
    "e.tEq.2","e.tUneq.2","e.tHlth.2","soutAAA.2","soutAAH.2",  "soutAHA.2","soutAHH.2","soutHAA.
 2","soutHAH.2","soutHHA.2","soutHHH.2",
    "e.tEq.3","e.tUneq.3","e.tHlth.3","soutAAA.3","soutAAH.3",  "soutAHA.3","soutAHH.3","soutHAA.
 3","soutHAH.3","soutHHA.3","soutHHH.3"),
    rep("",Nsim))
rsltAlt <- rsltNull
pvp10 <- pvp25  <- rsltNull[c(1:3,15:25),]

set.seed(10*seed+1)
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df01x02.1515$rsltNull <- cbind(Ft5df01x02.1515$rsltNull,rsltNull)
Ft5df01x02.1515$rsltAlt <-  cbind(Ft5df01x02.1515$rsltAlt,rsltAlt)
Ft5df01x02.1515$pvp10 <-    cbind(Ft5df01x02.1515$pvp10,pvp10)
```

```
Ft5df01x02.1515$pvp25 <-    cbind(Ft5df01x02.1515$pvp25,pvp25)
FastDisplayCase (Ft5df01x02.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr   AltMean    AltMdn     AltSD       PVP10
PVP25
      tEq  0.0482 0.4997621 0.4991672 0.2909108 0.1156 0.3493531 0.2941211 0.2631093 0.002931818
0.002530615
    tUneq  0.0478 0.4997706 0.4991676 0.2905371 0.1140 0.3495365 0.2944914 0.2627583 0.002955455
0.002534462
    tHlth  0.0533 0.4997358 0.4992333 0.2936678 0.1444 0.3440274 0.2770869 0.2754291 0.003582727
0.003073538
  e.tEq.1  0.0501 0.5021312 0.5035035 0.2900080 0.1163 0.3517021 0.3003003 0.2633455 0.002931818
0.002530615
e.tUneq.1  0.0501 0.5021312 0.5035035 0.2900080 0.1163 0.3517021 0.3003003 0.2633455 0.002931818
0.002530615
e.tHlth.1  0.0490 0.5020542 0.5035035 0.2901638 0.1365 0.3474858 0.2862863 0.2732187 0.003582727
0.003073538
soutAAA.1  0.0521 0.3776784 0.4784785 0.1636085 0.1295 0.2911671 0.3033033 0.1837225 0.003205606
0.002958462
soutAAH.1  0.0518 0.4039089 0.5055055 0.1844315 0.1440 0.2828979 0.2522523 0.1978452 0.003677273
0.003349385
soutAHA.1  0.0517 0.3782951 0.4784785 0.1635513 0.1305 0.2850292 0.2822823 0.1831652 0.003297273
0.002874615
soutAHH.1  0.0507 0.4043192 0.5055055 0.1841610 0.1305 0.2857241 0.2562563 0.1964888 0.003293636
0.003010000
southAA.1  0.0518 0.3775031 0.4784785 0.1636098 0.1366 0.2877095 0.2972973 0.1835532 0.003264545
0.002986308
southAH.1  0.0514 0.4040027 0.5065065 0.1843361 0.1476 0.2812653 0.2497497 0.1979886 0.003693636
0.003354462
southHA.1  0.0515 0.3781783 0.4784785 0.1636663 0.1329 0.2822495 0.2752753 0.1834437 0.003353636
0.002933858
southHH.1  0.0510 0.4045146 0.5075075 0.1841512 0.1323 0.2836621 0.2512513 0.1965025 0.003416364
0.002950615
  e.tEq.2  0.0501 0.5021473 0.5035035 0.2900084 0.1163 0.3517021 0.3003003 0.2633455 0.002931818
0.002530615
e.tUneq.2  0.0501 0.5021473 0.5035035 0.2900084 0.1163 0.3517021 0.3003003 0.2633455 0.002931818
0.002530615
e.tHlth.2  0.0490 0.5020702 0.5035035 0.2901641 0.1365 0.3474858 0.2862863 0.2732187 0.003582727
0.003073538
soutAAA.2  0.0521 0.5026468 0.7317317 0.2711664 0.1295 0.3607454 0.3033033 0.2750517 0.003205606
0.002958462
soutAAH.2  0.0518 0.5037080 0.5055055 0.2770024 0.1440 0.3264731 0.2522523 0.2660645 0.003677273
0.003349385
soutAHA.2  0.0517 0.5032636 0.7317317 0.2708472 0.1305 0.3546076 0.2822823 0.2762303 0.003297273
0.002874615
soutAHH.2  0.0507 0.5041183 0.5065065 0.2766742 0.1305 0.3292993 0.2562563 0.2645924 0.003293636
0.003010000
southAA.2  0.0518 0.5024716 0.7317317 0.2712478 0.1366 0.3572879 0.2972973 0.2758124 0.003264545
0.002986308
southAH.2  0.0514 0.5038018 0.5065065 0.2769050 0.1476 0.3248404 0.2497497 0.2664384 0.003693636
0.003354462
southHA.2  0.0515 0.5031467 0.7317317 0.2709705 0.1329 0.3518279 0.2752753 0.2771139 0.003353636
0.002933858
southHH.2  0.0510 0.5043137 0.5077578 0.2765971 0.1323 0.3272372 0.2512513 0.2649419 0.003416364
0.002950615
  e.tEq.3  0.0500 0.5021634 0.5035035 0.2900089 0.1163 0.3517021 0.3003003 0.2633455 0.002931818
0.002530615
e.tUneq.3  0.0500 0.5021634 0.5035035 0.2900089 0.1163 0.3517021 0.3003003 0.2633455 0.002931818
0.002530615
e.tHlth.3  0.0490 0.5020863 0.5035035 0.2901644 0.1365 0.3474858 0.2862863 0.2732187 0.003582727
0.003073538
soutAAA.3  0.0521 0.6276153 1.0000000 0.3887999 0.1295 0.4303238 0.3033033 0.3774583 0.003205606
0.002958462
soutAAH.3  0.0518 0.6035070 0.5055055 0.3791116 0.1440 0.3700482 0.2522523 0.3434291 0.003677273
0.003349385
soutAHA.3  0.0516 0.6282320 1.0000000 0.3883788 0.1305 0.4241860 0.2822823 0.3794453 0.003297273
```

```
 0.002874615
soutAHH.3  0.0506 0.6039173 0.5065065 0.3787636 0.1305 0.3728745 0.2562563 0.3419298 0.003293636
 0.003010000
soutHAA.3  0.0518 0.6274400 1.0000000 0.3889130 0.1366 0.4268663 0.2972973 0.3786489 0.003264545
 0.002986308
soutHAH.3  0.0514 0.6036008 0.5065065 0.3790157 0.1476 0.3684156 0.2497497 0.3439257 0.003693636
 0.003354462
soutHHA.3  0.0515 0.6281152 1.0000000 0.3885024 0.1329 0.4214063 0.2752753 0.3805976 0.003353636
 0.002933858
soutHHH.3  0.0510 0.6041127 0.5080080 0.3786558 0.1323 0.3708124 0.2512513 0.3424629 0.003416364
 0.002950615
```

```
set.seed(10*seed+2)
Ft5df20x02.1515 <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 20,
    NoverExpressCases= 02,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 20
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df20x02.1515$rsltNull <- cbind(Ft5df20x02.1515$rsltNull,rsltNull)
Ft5df20x02.1515$rsltAlt <-  cbind(Ft5df20x02.1515$rsltAlt,rsltAlt)
Ft5df20x02.1515$pvp10 <-    cbind(Ft5df20x02.1515$pvp10,pvp10)
Ft5df20x02.1515$pvp25 <-    cbind(Ft5df20x02.1515$pvp25,pvp25)
FastDisplayCase (Ft5df20x02.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr   AltMean    AltMdn     AltSD      PVP10      PVP25
      tEq  0.0490 0.4987372 0.5007048 0.2907205 0.1162 0.3438550 0.2870982 0.2602104 0.06035545 0.05243451
    tUneq  0.0486 0.4987418 0.5007041 0.2903636 0.1146 0.3440513 0.2873493 0.2598726 0.06014727 0.05250671
    tHlth  0.0547 0.4982717 0.5005966 0.2934270 0.1450 0.3383622 0.2667791 0.2720449 0.07488955 0.06310480
  e.tEq.1  0.0490 0.5037059 0.5095095 0.2896151 0.1155 0.3489106 0.2962963 0.2611485 0.06035545 0.05243451
e.tUneq.1  0.0490 0.5037059 0.5095095 0.2896151 0.1155 0.3489106 0.2962963 0.2611485 0.06035545 0.05243451
e.tHlth.1  0.0491 0.5032644 0.5095095 0.2894468 0.1351 0.3447241 0.2792793 0.2702412 0.07488955 0.06310480
soutAAA.1  0.0472 0.3827700 0.4824825 0.1630569 0.1197 0.2961830 0.3103103 0.1840935 0.05802545 0.05648409
soutAAH.1  0.0478 0.4106184 0.5125125 0.1836434 0.1364 0.2877938 0.2602603 0.1989625 0.06388379 0.06197278
soutAHA.1  0.0471 0.3841950 0.4824825 0.1623161 0.1196 0.2909050 0.2912913 0.1833634 0.05919924 0.05395157
soutAHH.1  0.0483 0.4107986 0.5095095 0.1831264 0.1254 0.2912351 0.2632633 0.1978163 0.06062773 0.05508769
soutHAA.1  0.0471 0.3826213 0.4824825 0.1631532 0.1259 0.2925961 0.3023023 0.1841217 0.06036394 0.05718679
soutHAH.1  0.0481 0.4104554 0.5105105 0.1836470 0.1397 0.2856503 0.2542543 0.1989954 0.06500545 0.06311388
soutHHA.1  0.0468 0.3839266 0.4824825 0.1625437 0.1213 0.2879148 0.2837838 0.1839688 0.06175182 0.05613264
soutHHH.1  0.0491 0.4105115 0.5075075 0.1832479 0.1315 0.2888868 0.2592593 0.1978714 0.06118818 0.05614800
  e.tEq.2  0.0490 0.5037211 0.5095095 0.2896167 0.1155 0.3489108 0.2962963 0.2611486 0.06035545 0.05243451
e.tUneq.2  0.0490 0.5037211 0.5095095 0.2896167 0.1155 0.3489108 0.2962963 0.2611486 0.06035545 0.05243451
e.tHlth.2  0.0491 0.5032796 0.5095095 0.2894485 0.1351 0.3447243 0.2792793 0.2702413 0.07488955 0.06310480
soutAAA.2  0.0472 0.5058640 0.7309810 0.2691860 0.1197 0.3656657 0.3103103 0.2748012 0.05802545 0.05648409
soutAAH.2  0.0478 0.5083302 0.5125125 0.2742480 0.1364 0.3309263 0.2602603 0.2661336 0.06388379 0.06197278
soutAHA.2  0.0471 0.5072890 0.7309810 0.2680843 0.1196 0.3603877 0.2912913 0.2756465 0.05919924 0.05395157
soutAHH.2  0.0483 0.5085104 0.5095095 0.2738376 0.1254 0.3343677 0.2632633 0.2647176 0.06062773 0.05508769
soutHAA.2  0.0471 0.5057153 0.7309810 0.2693123 0.1259 0.3620788 0.3023023 0.2757256 0.06036394 0.05718679
soutHAH.2  0.0481 0.5081671 0.5110110 0.2743086 0.1397 0.3287828 0.2542543 0.2665053 0.06500545 0.06311388
soutHHA.2  0.0468 0.5070206 0.7309810 0.2683453 0.1213 0.3573975 0.2837838 0.2768013 0.06175182 0.05613264
soutHHH.2  0.0491 0.5082233 0.5075075 0.2740214 0.1315 0.3320193 0.2592593 0.2651411 0.06118818 0.05614800
  e.tEq.3  0.0488 0.5037363 0.5095095 0.2896182 0.1155 0.3489110 0.2962963 0.2611487 0.06035545 0.05243451
e.tUneq.3  0.0488 0.5037363 0.5095095 0.2896182 0.1155 0.3489110 0.2962963 0.2611487 0.06035545 0.05243451
e.tHlth.3  0.0491 0.5032948 0.5095095 0.2894503 0.1351 0.3447245 0.2792793 0.2702414 0.07488955 0.06310480
soutAAA.3  0.0472 0.6289580 1.0000000 0.3855496 0.1197 0.4351484 0.3103103 0.3764649 0.05802545 0.05648409
```

```
soutAAH.3  0.0477 0.6060419 0.5125125 0.3746522 0.1364 0.3740589 0.2602603 0.3424064 0.06388379 0.06197278
soutAHA.3  0.0471 0.6303830 1.0000000 0.3843250 0.1196 0.4298705 0.2912913 0.3780537 0.05919924 0.05395157
soutAHH.3  0.0483 0.6062221 0.5095095 0.3743047 0.1254 0.3775002 0.2632633 0.3408718 0.06062773 0.05508769
soutHAA.3  0.0471 0.6288093 1.0000000 0.3856853 0.1259 0.4315616 0.3023023 0.3778005 0.06036394 0.05718679
soutHAH.3  0.0481 0.6058789 0.5115115 0.3747391 0.1397 0.3719153 0.2542543 0.3429651 0.06500545 0.06311388
soutHHA.3  0.0467 0.6301146 1.0000000 0.3845931 0.1213 0.4268803 0.2837838 0.3794445 0.06175182 0.05613264
soutHHH.3  0.0491 0.6059350 0.5075075 0.3745141 0.1315 0.3751519 0.2592593 0.3414975 0.06118818 0.05614800

##########
##
## Ft5df01x04.1515
## Ft5df02x04.1515
## Ft5df04x04.1515
## Ft5df08x04.1515
## Ft5df20x04.1515
##
##########

seed <- 6
set.seed(seed)
Ft5df01x04.1515 <-
caseGGxCC <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 01,
    NoverExpressCases= 04,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
Nsim <- 10000
#nullStats <- fastSumOutlierData (caseGGxCC, altDistn=F)
#altStats <- fastSumOutlierData (caseGGxCC, altDistn=T)
#St5dfGGx04.1515 <- list(nullStats=nullStats,altStats=altStats)
caseGGxCC$nullStats <- St5dfGGx04.1515$nullStats
caseGGxCC$altStats <- St5dfGGx04.1515$altStats

rsltNull <- matrix(0,36,Nsim) * NA
dimnames(rsltNull) <- list(c("tEq","tUneq","tHlth",
    "e.tEq.1","e.tUneq.1","e.tHlth.1","soutAAA.1","soutAAH.1",  "soutAHA.1","soutAHH.1","soutHAA.
1","soutHAH.1","soutHHA.1","soutHHH.1",
    "e.tEq.2","e.tUneq.2","e.tHlth.2","soutAAA.2","soutAAH.2",  "soutAHA.2","soutAHH.2","soutHAA.
2","soutHAH.2","soutHHA.2","soutHHH.2",
    "e.tEq.3","e.tUneq.3","e.tHlth.3","soutAAA.3","soutAAH.3",  "soutAHA.3","soutAHH.3","soutHAA.
3","soutHAH.3","soutHHA.3","soutHHH.3"),
    rep("",Nsim))
rsltAlt <- rsltNull
pvp10 <- pvp25  <- rsltNull[c(1:3,15:25),]

set.seed(10*seed+1)
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df01x04.1515$rsltNull <- cbind(Ft5df01x04.1515$rsltNull,rsltNull)
Ft5df01x04.1515$rsltAlt <-  cbind(Ft5df01x04.1515$rsltAlt,rsltAlt)
Ft5df01x04.1515$pvp10 <-    cbind(Ft5df01x04.1515$pvp10,pvp10)
Ft5df01x04.1515$pvp25 <-    cbind(Ft5df01x04.1515$pvp25,pvp25)
FastDisplayCase (Ft5df01x04.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr   AltMean    AltMdn     AltSD       PVP10
 PVP25
      tEq  0.0446 0.4999711 0.5003376 0.2899847 0.2433 0.2229772 0.1577230 0.2113858 0.007497424
```

```
0.006153538
    tUneq  0.0436 0.4999772 0.5003371 0.2896133 0.2415 0.2233687 0.1580028 0.2110965 0.007467273
0.006140923
    tHlth  0.0522 0.4998327 0.5002913 0.2932436 0.3101 0.2091172 0.1270366 0.2219075 0.010780909
0.007874462
  e.tEq.1  0.0455 0.5021635 0.5045045 0.2892524 0.2487 0.2246456 0.1601602 0.2127602 0.007497424
0.006153538
e.tUneq.1  0.0455 0.5021635 0.5045045 0.2892524 0.2487 0.2246456 0.1601602 0.2127602 0.007497424
0.006153538
e.tHlth.1  0.0489 0.5020083 0.5045045 0.2898298 0.2976 0.2127413 0.1331331 0.2215065 0.010780909
0.007874462
soutAAA.1  0.0499 0.3786384 0.4814815 0.1662437 0.1792 0.2684684 0.2532533 0.1913647 0.005112727
0.004132615
soutAAH.1  0.0506 0.4012822 0.5000000 0.1838701 0.2681 0.2114763 0.1391391 0.1935047 0.007936364
0.006556308
soutAHA.1  0.0531 0.3779550 0.4814815 0.1670954 0.2020 0.2529847 0.2192192 0.1913719 0.005762727
0.004771846
soutAHH.1  0.0525 0.4006847 0.4984985 0.1845857 0.2628 0.2110022 0.1421421 0.1908866 0.007479091
0.006095858
soutHAA.1  0.0504 0.3788192 0.4814815 0.1661696 0.1899 0.2598846 0.2422422 0.1904111 0.005534545
0.004381692
soutHAH.1  0.0501 0.4014857 0.4994995 0.1837602 0.2847 0.2049252 0.1331331 0.1916900 0.008698182
0.007096165
soutHHA.1  0.0534 0.3781788 0.4814815 0.1669365 0.2124 0.2465375 0.2072072 0.1915485 0.006270909
0.005193692
soutHHH.1  0.0526 0.4009684 0.5015015 0.1845857 0.2759 0.2047814 0.1356356 0.1890790 0.007848182
0.006473077
  e.tEq.2  0.0455 0.5021790 0.5045045 0.2892516 0.2487 0.2246456 0.1601602 0.2127602 0.007497424
0.006153538
e.tUneq.2  0.0455 0.5021790 0.5045045 0.2892516 0.2487 0.2246456 0.1601602 0.2127602 0.007497424
0.006153538
e.tHlth.2  0.0489 0.5020239 0.5045045 0.2898293 0.2976 0.2127413 0.1331331 0.2215065 0.010780909
0.007874462
soutAAA.2  0.0499 0.4996226 0.5045045 0.2721559 0.1792 0.3305304 0.2532533 0.2788329 0.005112727
0.004132615
soutAAH.2  0.0506 0.4998113 0.5000000 0.2765088 0.2681 0.2360228 0.1391391 0.2432947 0.007936364
0.006556308
soutAHA.2  0.0531 0.4989391 0.5055055 0.2729801 0.2020 0.3150467 0.2192192 0.2822634 0.005762727
0.004771846
soutAHH.2  0.0525 0.4992138 0.4984985 0.2771975 0.2628 0.2355487 0.1421421 0.2412658 0.007479091
0.006095858
soutHAA.2  0.0504 0.4998034 0.5065065 0.2720302 0.1899 0.3219466 0.2422422 0.2800880 0.005534545
0.004381692
soutHAH.2  0.0501 0.5000148 0.4994995 0.2763631 0.2847 0.2294718 0.1331331 0.2425178 0.008698182
0.007096165
soutHHA.2  0.0534 0.4991630 0.5075075 0.2727835 0.2124 0.3085996 0.2072072 0.2837968 0.006270909
0.005193692
soutHHH.2  0.0526 0.4994974 0.5015015 0.2770965 0.2759 0.2293279 0.1356356 0.2404741 0.007848182
0.006473077
  e.tEq.3  0.0454 0.5021946 0.5045045 0.2892508 0.2487 0.2246456 0.1601602 0.2127602 0.007497424
0.006153538
e.tUneq.3  0.0454 0.5021946 0.5045045 0.2892508 0.2487 0.2246456 0.1601602 0.2127602 0.007497424
0.006153538
e.tHlth.3  0.0489 0.5020394 0.5045045 0.2898288 0.2976 0.2127413 0.1331331 0.2215065 0.010780909
0.007874462
soutAAA.3  0.0499 0.6206068 0.5045045 0.3882593 0.1792 0.3925925 0.2532533 0.3764632 0.005112727
0.004132615
soutAAH.3  0.0506 0.5983403 0.5000000 0.3787309 0.2681 0.2605694 0.1391391 0.3010727 0.007936364
0.006556308
soutAHA.3  0.0531 0.6199233 0.5055055 0.3890500 0.2020 0.3771088 0.2192192 0.3815383 0.005762727
0.004771846
soutAHH.3  0.0524 0.5977428 0.4984985 0.3793890 0.2628 0.2600953 0.1421421 0.2994744 0.007479091
0.006095858
soutHAA.3  0.0504 0.6207876 0.5065065 0.3881148 0.1899 0.3840087 0.2422422 0.3788029 0.005534545
0.004381692
soutHAH.3  0.0501 0.5985438 0.4994995 0.3785715 0.2847 0.2540183 0.1331331 0.3009801 0.008698182
```

```
 0.007096165
southHHA.3  0.0531 0.6201471 0.5075075 0.3888424 0.2124 0.3706617 0.2072072 0.3837184 0.006270909
 0.005193692
southHHH.3  0.0526 0.5980265 0.5015015 0.3792415 0.2759 0.2538745 0.1356356 0.2993476 0.007848182
 0.006473077

set.seed(10*seed+2)
Ft5df02x04.1515 <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 02,
    NoverExpressCases= 04,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 02
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df02x04.1515$rsltNull <- cbind(Ft5df02x04.1515$rsltNull,rsltNull)
Ft5df02x04.1515$rsltAlt <-  cbind(Ft5df02x04.1515$rsltAlt,rsltAlt)
Ft5df02x04.1515$pvp10 <-    cbind(Ft5df02x04.1515$pvp10,pvp10)
Ft5df02x04.1515$pvp25 <-    cbind(Ft5df02x04.1515$pvp25,pvp25)
FastDisplayCase (Ft5df02x04.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr   AltMean    AltMdn     AltSD      PVP10
 PVP25
      tEq  0.0490 0.4981771 0.4964857 0.2909028 0.2414 0.2229559 0.1511828 0.2129715 0.01506182
 0.012353869
    tUneq  0.0481 0.4981823 0.4964867 0.2905231 0.2392 0.2233496 0.1516553 0.2126763 0.01498545
 0.012322769
    tHlth  0.0578 0.4983018 0.4963393 0.2935030 0.3054 0.2093029 0.1231016 0.2236612 0.02187909
 0.015810165
  e.tEq.1  0.0507 0.5005854 0.5005005 0.2901746 0.2478 0.2249606 0.1541542 0.2144715 0.01506182
 0.012353869
e.tUneq.1  0.0507 0.5005854 0.5005005 0.2901746 0.2478 0.2249606 0.1541542 0.2144715 0.01506182
 0.012353869
e.tHlth.1  0.0547 0.5006961 0.5005005 0.2900942 0.2945 0.2132693 0.1281281 0.2234117 0.02187909
 0.015810165
soutAAA.1  0.0547 0.3786279 0.4814815 0.1668317 0.1801 0.2655779 0.2482482 0.1903765 0.01092182
 0.008630627
soutAAH.1  0.0530 0.3995112 0.5005005 0.1856195 0.2682 0.2084547 0.1411411 0.1901471 0.01657545
 0.013101846
soutAHA.1  0.0541 0.3790623 0.4814815 0.1668648 0.2035 0.2516498 0.2172172 0.1902451 0.01230182
 0.009722923
soutAHH.1  0.0530 0.4000186 0.5005005 0.1857660 0.2617 0.2095329 0.1441441 0.1886241 0.01520273
 0.012341231
soutHAA.1  0.0546 0.3788680 0.4814815 0.1667404 0.1946 0.2570968 0.2352352 0.1896268 0.01194197
 0.009261692
soutHAH.1  0.0543 0.3996163 0.4984985 0.1855912 0.2865 0.2018606 0.1341341 0.1888955 0.01793742
 0.014230308
soutHHA.1  0.0559 0.3791979 0.4824825 0.1666839 0.2148 0.2451615 0.2022022 0.1904688 0.01334091
 0.010323538
soutHHH.1  0.0537 0.4000882 0.4994995 0.1856853 0.2747 0.2034545 0.1391391 0.1872147 0.01599470
 0.013147538
  e.tEq.2  0.0507 0.5006032 0.5005005 0.2901747 0.2478 0.2249606 0.1541542 0.2144715 0.01506182
 0.012353869
e.tUneq.2  0.0507 0.5006032 0.5005005 0.2901747 0.2478 0.2249606 0.1541542 0.2144715 0.01506182
 0.012353869
e.tHlth.2  0.0547 0.5007139 0.5005005 0.2900944 0.2945 0.2132693 0.1281281 0.2234117 0.02187909
 0.015810165
```

```
soutAAA.2  0.0547 0.5001401 0.5090090 0.2727854 0.1801 0.3261323 0.2482482 0.2771548 0.01092182
 0.008630627
soutAAH.2  0.0530 0.4974035 0.5005005 0.2780602 0.2682 0.2321398 0.1411411 0.2394656 0.01657545
 0.013101846
soutAHA.2  0.0541 0.5005745 0.5125125 0.2726123 0.2035 0.3122043 0.2172172 0.2800924 0.01230182
 0.009722923
soutAHH.2  0.0530 0.4979109 0.5005005 0.2779794 0.2617 0.2332181 0.1441441 0.2381509 0.01520273
 0.012341231
southAA.2  0.0546 0.5003802 0.5100100 0.2726226 0.1946 0.3176512 0.2352352 0.2784908 0.01194197
 0.009261692
southAH.2  0.0543 0.4975086 0.4984985 0.2780042 0.2865 0.2255457 0.1341341 0.2391271 0.01793742
 0.014230308
southHA.2  0.0559 0.5007101 0.5132633 0.2724411 0.2148 0.3057159 0.2022022 0.2816430 0.01334091
 0.010323538
southHH.2  0.0537 0.4979805 0.4994995 0.2779010 0.2747 0.2271396 0.1391391 0.2376428 0.01599470
 0.013147538
  e.tEq.3  0.0507 0.5006210 0.5005005 0.2901748 0.2478 0.2249606 0.1541542 0.2144715 0.01506182
 0.012353869
e.tUneq.3  0.0507 0.5006210 0.5005005 0.2901748 0.2478 0.2249606 0.1541542 0.2144715 0.01506182
 0.012353869
e.tHlth.3  0.0547 0.5007317 0.5005005 0.2900946 0.2945 0.2132693 0.1281281 0.2234117 0.02187909
 0.015810165
soutAAA.3  0.0547 0.6216524 0.5090090 0.3888886 0.1801 0.3866867 0.2482482 0.3739813 0.01092182
 0.008630627
soutAAH.3  0.0530 0.5952958 0.5005005 0.3800324 0.2682 0.2558250 0.1411411 0.2964962 0.01657545
 0.013101846
soutAHA.3  0.0541 0.6220867 0.5125125 0.3886315 0.2035 0.3727587 0.2172172 0.3783992 0.01230182
 0.009722923
soutAHH.3  0.0529 0.5958032 0.5005005 0.3798426 0.2617 0.2569033 0.1441441 0.2953489 0.01520273
 0.012341231
southAA.3  0.0545 0.6218924 0.5100100 0.3886993 0.1946 0.3782056 0.2352352 0.3763397 0.01194197
 0.009261692
southAH.3  0.0540 0.5954009 0.4984985 0.3799643 0.2865 0.2492309 0.1341341 0.2967497 0.01793742
 0.014230308
southHA.3  0.0559 0.6222223 0.5135135 0.3884690 0.2148 0.3662703 0.2022022 0.3805823 0.01334091
 0.010323538
southHH.3  0.0536 0.5958728 0.4994995 0.3797672 0.2747 0.2508248 0.1391391 0.2954271 0.01599470
 0.013147538

set.seed(10*seed+3)
Ft5df04x04.1515 <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 04,
    NoverExpressCases= 04,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 04
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df04x04.1515$rsltNull <- cbind(Ft5df04x04.1515$rsltNull,rsltNull)
Ft5df04x04.1515$rsltAlt <-  cbind(Ft5df04x04.1515$rsltAlt,rsltAlt)
Ft5df04x04.1515$pvp10 <-    cbind(Ft5df04x04.1515$pvp10,pvp10)
Ft5df04x04.1515$pvp25 <-    cbind(Ft5df04x04.1515$pvp25,pvp25)
FastDisplayCase (Ft5df04x04.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr   AltMean    AltMdn     AltSD      PVP10      PVP25
      tEq  0.0478 0.4973744 0.4961530 0.2887217 0.2352 0.2255043 0.1572019 0.2127477 0.02871364 0.02414478
    tUneq  0.0471 0.4973848 0.4961538 0.2883464 0.2324 0.2258903 0.1578874 0.2124498 0.02870636 0.02408601
```

```
    tHlth  0.0567 0.4975662 0.4961282 0.2922026 0.3006 0.2121493 0.1289433 0.2238800 0.04109909 0.03081077
  e.tEq.1  0.0497 0.5004660 0.5005005 0.2876152 0.2391 0.2280901 0.1611612 0.2144132 0.02871364 0.02414478
e.tUneq.1  0.0497 0.5004660 0.5005005 0.2876152 0.2391 0.2280901 0.1611612 0.2144132 0.02871364 0.02414478
e.tHlth.1  0.0514 0.5006482 0.5005005 0.2885162 0.2876 0.2168512 0.1351351 0.2236186 0.04109909 0.03081077
soutAAA.1  0.0506 0.3777701 0.4804805 0.1670460 0.1818 0.2667672 0.2482482 0.1919094 0.02126364 0.01714662
soutAAH.1  0.0491 0.4004146 0.4969970 0.1846180 0.2634 0.2122264 0.1426426 0.1924618 0.03144924 0.02575109
soutAHA.1  0.0499 0.3779008 0.4804805 0.1667386 0.2025 0.2527573 0.2182182 0.1915889 0.02277091 0.01887478
soutAHH.1  0.0491 0.4004688 0.4964965 0.1841211 0.2572 0.2131487 0.1481481 0.1905702 0.02856000 0.02413481
soutHAA.1  0.0504 0.3779694 0.4814815 0.1671023 0.1964 0.2586375 0.2352352 0.1909979 0.02332091 0.01812815
soutHAH.1  0.0487 0.4006639 0.4974975 0.1845370 0.2796 0.2058358 0.1361361 0.1907128 0.03419636 0.02757510
soutHHA.1  0.0500 0.3780847 0.4804805 0.1665574 0.2122 0.2464002 0.2052052 0.1918451 0.02461455 0.02022709
soutHHH.1  0.0489 0.4005924 0.4944945 0.1840555 0.2673 0.2070261 0.1411411 0.1888464 0.02957727 0.02550728
  e.tEq.2  0.0497 0.5004831 0.5005005 0.2876153 0.2391 0.2280902 0.1611612 0.2144132 0.02871364 0.02414478
e.tUneq.2  0.0497 0.5004831 0.5005005 0.2876153 0.2391 0.2280902 0.1611612 0.2144132 0.02871364 0.02414478
e.tHlth.2  0.0514 0.5006654 0.5005005 0.2885163 0.2876 0.2168513 0.1351351 0.2236186 0.04109909 0.03081077
soutAAA.2  0.0506 0.4979536 0.5015015 0.2728894 0.1818 0.3286536 0.2482482 0.2795920 0.02126364 0.01714662
soutAAH.2  0.0491 0.4980897 0.4969970 0.2771249 0.2634 0.2369395 0.1426426 0.2428198 0.03144924 0.02575109
soutAHA.2  0.0499 0.4980843 0.5035035 0.2726438 0.2025 0.3146437 0.2182182 0.2824589 0.02277091 0.01887478
soutAHH.2  0.0491 0.4981439 0.4964965 0.2767751 0.2572 0.2378619 0.1481481 0.2412288 0.02856000 0.02413481
soutHAA.2  0.0504 0.4981529 0.5035035 0.2728360 0.1964 0.3205240 0.2352352 0.2807650 0.02332091 0.01812815
soutHAH.2  0.0487 0.4983390 0.4974975 0.2769829 0.2796 0.2305489 0.1361361 0.2420892 0.03419636 0.02757510
soutHHA.2  0.0500 0.4982682 0.5040040 0.2724518 0.2122 0.3082866 0.2052052 0.2840214 0.02461455 0.02022709
soutHHH.2  0.0489 0.4982675 0.4944945 0.2766877 0.2673 0.2317392 0.1411411 0.2404994 0.02957727 0.02550728
  e.tEq.3  0.0496 0.5005002 0.5005005 0.2876154 0.2391 0.2280903 0.1611612 0.2144132 0.02871364 0.02414478
e.tUneq.3  0.0496 0.5005002 0.5005005 0.2876154 0.2391 0.2280903 0.1611612 0.2144132 0.02871364 0.02414478
e.tHlth.3  0.0514 0.5006825 0.5005005 0.2885164 0.2876 0.2168514 0.1351351 0.2236186 0.04109909 0.03081077
soutAAA.3  0.0506 0.6181370 0.5015015 0.3888177 0.1818 0.3905400 0.2482482 0.3771567 0.02126364 0.01714662
soutAAH.3  0.0491 0.5957649 0.4969970 0.3790484 0.2634 0.2616527 0.1426426 0.3009976 0.03144924 0.02575109
soutAHA.3  0.0498 0.6182678 0.5035035 0.3886050 0.2025 0.3765301 0.2182182 0.3815661 0.02277091 0.01887478
soutAHH.3  0.0490 0.5958190 0.4964965 0.3787788 0.2572 0.2625750 0.1481481 0.2996395 0.02856000 0.02413481
soutHAA.3  0.0504 0.6183363 0.5035035 0.3887185 0.1964 0.3824104 0.2352352 0.3793557 0.02332091 0.01812815
soutHAH.3  0.0486 0.5960141 0.4974975 0.3788803 0.2796 0.2552621 0.1361361 0.3009338 0.03419636 0.02757510
soutHHA.3  0.0500 0.6184517 0.5040040 0.3884134 0.2122 0.3701731 0.2052052 0.3837509 0.02461455 0.02022709
soutHHH.3  0.0489 0.5959426 0.4944945 0.3786830 0.2673 0.2564524 0.1411411 0.2995582 0.02957727 0.02550728

set.seed(10*seed+4)
Ft5df08x04.1515 <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 08,
    NoverExpressCases= 04,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 08
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df08x04.1515$rsltNull <- cbind(Ft5df08x04.1515$rsltNull,rsltNull)
Ft5df08x04.1515$rsltAlt <-  cbind(Ft5df08x04.1515$rsltAlt,rsltAlt)
Ft5df08x04.1515$pvp10 <-    cbind(Ft5df08x04.1515$pvp10,pvp10)
Ft5df08x04.1515$pvp25 <-    cbind(Ft5df08x04.1515$pvp25,pvp25)
FastDisplayCase (Ft5df08x04.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr   AltMean    AltMdn     AltSD      PVP10      PVP25
      tEq  0.0486 0.5013266 0.5004602 0.2906433 0.2424 0.2225971 0.1509368 0.2129693 0.05658182 0.04773938
    tUneq  0.0476 0.5013352 0.5004588 0.2902717 0.2392 0.2229876 0.1514220 0.2126722 0.05649909 0.04757463
    tHlth  0.0538 0.5013051 0.5005063 0.2931520 0.3086 0.2091037 0.1233706 0.2240044 0.08111091 0.06102115
  e.tEq.1  0.0485 0.5053276 0.5065065 0.2892678 0.2421 0.2263813 0.1571572 0.2147935 0.05658182 0.04773938
e.tUneq.1  0.0485 0.5053276 0.5065065 0.2892678 0.2421 0.2263813 0.1571572 0.2147935 0.05658182 0.04773938
e.tHlth.1  0.0480 0.5053207 0.5065065 0.2890202 0.2908 0.2148275 0.1321321 0.2239190 0.08111091 0.06102115
```

```
soutAAA.1  0.0493 0.3817970 0.4834835 0.1648158 0.1799 0.2673528 0.2522523 0.1910250 0.04136727 0.03370634
soutAAH.1  0.0510 0.4058064 0.5045045 0.1826292 0.2635 0.2094027 0.1401401 0.1911689 0.06308000 0.05132020
soutAHA.1  0.0502 0.3825177 0.4834835 0.1642183 0.1956 0.2519279 0.2162162 0.1903350 0.04573727 0.03747846
soutAHH.1  0.0493 0.4058412 0.5035035 0.1822550 0.2544 0.2095632 0.1431431 0.1887294 0.05679818 0.04799772
soutHAA.1  0.0489 0.3820138 0.4834835 0.1645704 0.1912 0.2589404 0.2402402 0.1898020 0.04540636 0.03577709
soutHAH.1  0.0494 0.4060538 0.5015015 0.1822876 0.2763 0.2030783 0.1331331 0.1895310 0.06781045 0.05480138
soutHHA.1  0.0493 0.3827208 0.4834835 0.1639614 0.2053 0.2455019 0.2032032 0.1902556 0.04897818 0.03969615
soutHHH.1  0.0484 0.4059837 0.5005005 0.1819491 0.2666 0.2035916 0.1361361 0.1869735 0.05939364 0.05051308
  e.tEq.2  0.0485 0.5053438 0.5065065 0.2892674 0.2421 0.2263813 0.1571572 0.2147936 0.05658182 0.04773938
e.tUneq.2  0.0485 0.5053438 0.5065065 0.2892674 0.2421 0.2263813 0.1571572 0.2147936 0.05658182 0.04773938
e.tHlth.2  0.0480 0.5053369 0.5065065 0.2890197 0.2908 0.2148276 0.1321321 0.2239190 0.08111091 0.06102115
soutAAA.2  0.0493 0.5029719 0.5145145 0.2704977 0.1799 0.3276478 0.2522523 0.2772411 0.04136727 0.03370634
soutAAH.2  0.0510 0.5032977 0.5045045 0.2741022 0.2635 0.2333177 0.1401401 0.2406820 0.06308000 0.05132020
soutAHA.2  0.0502 0.5036926 0.5125125 0.2698104 0.1956 0.3122230 0.2162162 0.2801067 0.04573727 0.03747846
soutAHH.2  0.0493 0.5033326 0.5035035 0.2738407 0.2544 0.2334782 0.1431431 0.2387330 0.05679818 0.04799772
soutHAA.2  0.0489 0.5031887 0.5120120 0.2702510 0.1912 0.3192355 0.2402402 0.2782291 0.04540636 0.03577709
soutHAH.2  0.0494 0.5035451 0.5017518 0.2737867 0.2763 0.2269933 0.1331331 0.2400142 0.06781045 0.05480138
soutHHA.2  0.0493 0.5038957 0.5120120 0.2695628 0.2053 0.3057969 0.2032032 0.2814330 0.04897818 0.03969615
soutHHH.2  0.0484 0.5034750 0.5005005 0.2735864 0.2666 0.2275066 0.1361361 0.2379482 0.05939364 0.05051308
  e.tEq.3  0.0485 0.5053601 0.5065065 0.2892669 0.2421 0.2263814 0.1571572 0.2147936 0.05658182 0.04773938
e.tUneq.3  0.0485 0.5053601 0.5065065 0.2892669 0.2421 0.2263814 0.1571572 0.2147936 0.05658182 0.04773938
e.tHlth.3  0.0480 0.5053532 0.5065065 0.2890191 0.2908 0.2148276 0.1321321 0.2239191 0.08111091 0.06102115
soutAAA.3  0.0493 0.6241467 0.5145145 0.3862996 0.1799 0.3879428 0.2522523 0.3735374 0.04136727 0.03370634
soutAAH.3  0.0509 0.6007891 0.5045045 0.3754297 0.2635 0.2572327 0.1401401 0.2978959 0.06308000 0.05132020
soutAHA.3  0.0502 0.6248675 0.5125125 0.3855922 0.1956 0.3725180 0.2162162 0.3781370 0.04573727 0.03747846
soutAHH.3  0.0491 0.6008239 0.5035035 0.3752297 0.2544 0.2573932 0.1431431 0.2963105 0.05679818 0.04799772
soutHAA.3  0.0489 0.6243636 0.5120120 0.3860588 0.1912 0.3795305 0.2402402 0.3756242 0.04540636 0.03577709
soutHAH.3  0.0494 0.6010364 0.5020020 0.3751352 0.2763 0.2509083 0.1331331 0.2978649 0.06781045 0.05480138
soutHHA.3  0.0493 0.6250706 0.5120120 0.3853551 0.2053 0.3660920 0.2032032 0.3801413 0.04897818 0.03969615
soutHHH.3  0.0483 0.6009664 0.5005005 0.3750072 0.2666 0.2514216 0.1361361 0.2961613 0.05939364 0.05051308
```

```
set.seed(10*seed+5)
Ft5df20x04.1515 <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 20,
    NoverExpressCases= 04,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 20
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df20x04.1515$rsltNull <- cbind(Ft5df20x04.1515$rsltNull,rsltNull)
Ft5df20x04.1515$rsltAlt <-  cbind(Ft5df20x04.1515$rsltAlt,rsltAlt)
Ft5df20x04.1515$pvp10 <-    cbind(Ft5df20x04.1515$pvp10,pvp10)
Ft5df20x04.1515$pvp25 <-    cbind(Ft5df20x04.1515$pvp25,pvp25)
FastDisplayCase (Ft5df20x04.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr   AltMean    AltMdn     AltSD     PVP10      PVP25
      tEq  0.0472 0.4948025 0.4896964 0.2901229 0.2390 0.2234230 0.1523125 0.2128834 0.1351936 0.11432313
    tUneq  0.0465 0.4948045 0.4897008 0.2897453 0.2364 0.2238150 0.1529932 0.2125878 0.1354458 0.11384590
    tHlth  0.0537 0.4947847 0.4894125 0.2928394 0.3038 0.2094713 0.1236643 0.2228107 0.1867503 0.14494163
  e.tEq.1  0.0453 0.5021219 0.5015015 0.2880206 0.2334 0.2302333 0.1631632 0.2150469 0.1351936 0.11432313
e.tUneq.1  0.0453 0.5021219 0.5015015 0.2880206 0.2334 0.2302333 0.1631632 0.2150469 0.1351936 0.11432313
e.tHlth.1  0.0465 0.5024049 0.5015015 0.2877997 0.2765 0.2185132 0.1351351 0.2229895 0.1867503 0.14494163
soutAAA.1  0.0457 0.3851830 0.4864865 0.1647557 0.1754 0.2707115 0.2562563 0.1926224 0.1025721 0.08212369
soutAAH.1  0.0430 0.4096141 0.5085085 0.1829348 0.2527 0.2154731 0.1451451 0.1938958 0.1495236 0.12218867
soutAHA.1  0.0428 0.3854978 0.4864865 0.1645676 0.1953 0.2555738 0.2222222 0.1922056 0.1102120 0.09133279
soutAHH.1  0.0452 0.4099408 0.5090090 0.1828530 0.2448 0.2152512 0.1481481 0.1911291 0.1358682 0.11514588
```

```
soutHAA.1  0.0459 0.3852258 0.4874875 0.1647553 0.1855 0.2627973 0.2457457 0.1916993 0.1111174 0.08766465
soutHAH.1  0.0426 0.4096450 0.5085085 0.1828050 0.2657 0.2094002 0.1391391 0.1925476 0.1603508 0.13102930
soutHHA.1  0.0417 0.3855689 0.4864865 0.1644830 0.2054 0.2494305 0.2092092 0.1923459 0.1177430 0.09694330
soutHHH.1  0.0451 0.4100077 0.5085085 0.1826920 0.2529 0.2094912 0.1421421 0.1896167 0.1409276 0.12100175
  e.tEq.2  0.0453 0.5021365 0.5015015 0.2880203 0.2334 0.2302336 0.1631632 0.2150470 0.1351936 0.11432313
e.tUneq.2  0.0453 0.5021365 0.5015015 0.2880203 0.2334 0.2302336 0.1631632 0.2150470 0.1351936 0.11432313
e.tHlth.2  0.0465 0.5024195 0.5015015 0.2877995 0.2765 0.2185135 0.1351351 0.2229896 0.1867503 0.14494163
soutAAA.2  0.0457 0.5065962 0.5310310 0.2701573 0.1754 0.3326516 0.2562563 0.2798029 0.1025721 0.08212369
soutAAH.2  0.0430 0.5067345 0.5095095 0.2738063 0.2527 0.2405455 0.1451451 0.2446051 0.1495236 0.12218867
soutAHA.2  0.0428 0.5069110 0.5310310 0.2699011 0.1953 0.3175139 0.2222222 0.2828510 0.1102120 0.09133279
soutAHH.2  0.0452 0.5070612 0.5095095 0.2736358 0.2448 0.2403236 0.1481481 0.2424408 0.1358682 0.11514588
soutHAA.2  0.0459 0.5066390 0.5285285 0.2701379 0.1855 0.3247374 0.2457457 0.2809189 0.1111174 0.08766465
soutHAH.2  0.0426 0.5067654 0.5085085 0.2737087 0.2657 0.2344727 0.1391391 0.2441623 0.1603508 0.13102930
soutHHA.2  0.0417 0.5069821 0.5300300 0.2698176 0.2054 0.3113706 0.2092092 0.2842881 0.1177430 0.09694330
soutHHH.2  0.0451 0.5071281 0.5085085 0.2735046 0.2529 0.2345637 0.1421421 0.2418483 0.1409276 0.12100175
  e.tEq.3  0.0453 0.5021511 0.5015015 0.2880201 0.2334 0.2302339 0.1631632 0.2150471 0.1351936 0.11432313
e.tUneq.3  0.0453 0.5021511 0.5015015 0.2880201 0.2334 0.2302339 0.1631632 0.2150471 0.1351936 0.11432313
e.tHlth.3  0.0464 0.5024340 0.5015015 0.2877994 0.2765 0.2185138 0.1351351 0.2229897 0.1867503 0.14494163
soutAAA.3  0.0457 0.6280094 0.5310310 0.3853348 0.1754 0.3945917 0.2562563 0.3768579 0.1025721 0.08212369
soutAAH.3  0.0430 0.6038549 0.5095095 0.3742997 0.2527 0.2656180 0.1451451 0.3029789 0.1495236 0.12218867
soutAHA.3  0.0427 0.6283242 0.5310310 0.3850560 0.1953 0.3794540 0.2222222 0.3815919 0.1102120 0.09133279
soutAHH.3  0.0452 0.6041816 0.5095095 0.3740902 0.2448 0.2653961 0.1481481 0.3012527 0.1358682 0.11514588
soutHAA.3  0.0458 0.6280523 0.5285285 0.3853077 0.1855 0.3866775 0.2457457 0.3789830 0.1111174 0.08766465
soutHAH.3  0.0426 0.6038858 0.5085085 0.3742203 0.2657 0.2595451 0.1391391 0.3031243 0.1603508 0.13102930
soutHHA.3  0.0417 0.6283953 0.5300300 0.3849751 0.2054 0.3733107 0.2092092 0.3836515 0.1177430 0.09694330
soutHHH.3  0.0451 0.6042484 0.5085085 0.3739769 0.2529 0.2596361 0.1421421 0.3012559 0.1409276 0.12100175

##########
##
## Ft5df01x08.1515
## Ft5df20x08.1515
##
##########

seed <- 7
set.seed(seed)
Ft5df01x08.1515 <-
caseGGxCC <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 01,
    NoverExpressCases= 08,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
Nsim <- 10000
#nullStats <- fastSumOutlierData (caseGGxCC, altDistn=F)
#altStats <- fastSumOutlierData (caseGGxCC, altDistn=T)
#St5dfGGx08.1515 <- list(nullStats=nullStats,altStats=altStats)
caseGGxCC$nullStats <- St5dfGGx08.1515$nullStats
caseGGxCC$altStats <- St5dfGGx08.1515$altStats

rsltNull <- matrix(0,36,Nsim) * NA
dimnames(rsltNull) <- list(c("tEq","tUneq","tHlth",
    "e.tEq.1","e.tUneq.1","e.tHlth.1","soutAAA.1","soutAAH.1",  "soutAHA.1","soutAHH.1","soutHAA.
1","soutHAH.1","soutHHA.1","soutHHH.1",
    "e.tEq.2","e.tUneq.2","e.tHlth.2","soutAAA.2","soutAAH.2",  "soutAHA.2","soutAHH.2","soutHAA.
2","soutHAH.2","soutHHA.2","soutHHH.2",
    "e.tEq.3","e.tUneq.3","e.tHlth.3","soutAAA.3","soutAAH.3",  "soutAHA.3","soutAHH.3","soutHAA.
3","soutHAH.3","soutHHA.3","soutHHH.3"),
    rep("",Nsim))
rsltAlt <- rsltNull
pvp10 <- pvp25  <- rsltNull[c(1:3,15:25),]

set.seed(10*seed+1)
```

```
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df01x08.1515$rsltNull <- cbind(Ft5df01x08.1515$rsltNull,rsltNull)
Ft5df01x08.1515$rsltAlt <-  cbind(Ft5df01x08.1515$rsltAlt,rsltAlt)
Ft5df01x08.1515$pvp10 <-    cbind(Ft5df01x08.1515$pvp10,pvp10)
Ft5df01x08.1515$pvp25 <-    cbind(Ft5df01x08.1515$pvp25,pvp25)
FastDisplayCase (Ft5df01x08.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr    AltMean     AltMdn     AltSD       PVP10
PVP25
      tEq  0.0513 0.4955755 0.4989810 0.2895914 0.6437 0.07072106 0.02546963 0.1117880 0.032509394
0.020180011
    tUneq  0.0503 0.4955797 0.4989835 0.2892140 0.6397 0.07125104 0.02620323 0.1117363 0.032248485
0.020109538
    tHlth  0.0586 0.4956990 0.4990340 0.2924694 0.7158 0.05908750 0.01562816 0.1101224 0.039150303
0.022210057
  e.tEq.1  0.0502 0.4992421 0.5045045 0.2884088 0.6418 0.07171742 0.02402402 0.1138860 0.032509394
0.020180011
e.tUneq.1  0.0502 0.4992421 0.5045045 0.2884088 0.6418 0.07171742 0.02402402 0.1138860 0.032509394
0.020180011
e.tHlth.1  0.0518 0.4992387 0.5035035 0.2890356 0.6934 0.06250190 0.01801802 0.1114670 0.039150303
0.022210057
soutAAA.1  0.0490 0.3778977 0.4774775 0.1636752 0.1298 0.31682082 0.36736737 0.1880563 0.003494545
0.003061538
soutAAH.1  0.0479 0.4019388 0.4994995 0.1836397 0.4370 0.14241702 0.06606607 0.1677761 0.014695455
0.011369088
soutAHA.1  0.0483 0.3773592 0.4774775 0.1632569 0.1829 0.28138759 0.26626627 0.1987696 0.005390909
0.004473231
soutAHH.1  0.0471 0.4015507 0.4984985 0.1834608 0.4683 0.13257728 0.05805806 0.1650651 0.019181061
0.013259407
soutHAA.1  0.0483 0.3777865 0.4784785 0.1638174 0.1459 0.29895175 0.31331331 0.1894072 0.004345455
0.003694154
soutHAH.1  0.0480 0.4017901 0.5020020 0.1837018 0.5031 0.12373243 0.04904905 0.1611979 0.020555455
0.014350627
soutHHA.1  0.0478 0.3773524 0.4784785 0.1634309 0.2069 0.26917107 0.23323323 0.2015286 0.006500909
0.005137077
soutHHH.1  0.0475 0.4014921 0.4984985 0.1835659 0.5190 0.11781271 0.04454454 0.1582237 0.023511818
0.015235077
  e.tEq.2  0.0502 0.4992589 0.5045045 0.2884092 0.6418 0.07171742 0.02402402 0.1138860 0.032509394
0.020180011
e.tUneq.2  0.0502 0.4992589 0.5045045 0.2884092 0.6418 0.07171742 0.02402402 0.1138860 0.032509394
0.020180011
e.tHlth.2  0.0518 0.4992555 0.5035035 0.2890360 0.6934 0.06250190 0.01801802 0.1114670 0.039150303
0.022210057
soutAAA.2  0.0490 0.5005198 0.5095095 0.2705468 0.1298 0.40668393 0.36736737 0.2886017 0.003494545
0.003061538
soutAAH.2  0.0479 0.5008295 0.4994995 0.2765355 0.4370 0.15298123 0.06606607 0.1978135 0.014695455
0.011369088
soutAHA.2  0.0483 0.4999813 0.5077578 0.2705386 0.1829 0.37125070 0.26626627 0.3062744 0.005390909
0.004473231
soutAHH.2  0.0471 0.5004413 0.4984985 0.2765559 0.4683 0.14314149 0.05805806 0.1960505 0.019181061
0.013259407
soutHAA.2  0.0483 0.5004086 0.5100100 0.2706834 0.1459 0.38881486 0.31331331 0.2949792 0.004345455
0.003694154
soutHAH.2  0.0480 0.5006808 0.5025025 0.2766300 0.5031 0.13429665 0.04904905 0.1932898 0.020555455
0.014350627
soutHHA.2  0.0478 0.4999745 0.5065065 0.2706467 0.2069 0.35903418 0.23323323 0.3116157 0.006500909
0.005137077
soutHHH.2  0.0475 0.5003828 0.4984985 0.2766466 0.5190 0.12837693 0.04454454 0.1911439 0.023511818
0.015235077
  e.tEq.3  0.0502 0.4992756 0.5045045 0.2884095 0.6418 0.07171742 0.02402402 0.1138860 0.032509394
```

```
 0.020180011
e.tUneq.3  0.0502 0.4992756 0.5045045 0.2884095 0.6418 0.07171742 0.02402402 0.1138860 0.032509394
 0.020180011
e.tHlth.3  0.0518 0.4992722 0.5035035 0.2890365 0.6934 0.06250190 0.01801802 0.1114670 0.039150303
 0.022210057
soutAAA.3  0.0490 0.6231419 0.5095095 0.3876550 0.1298 0.49654705 0.36736737 0.3994930 0.003494545
 0.003061538
soutAAH.3  0.0479 0.5997202 0.4994995 0.3788090 0.4370 0.16354545 0.06606607 0.2336103 0.014695455
 0.011369088
soutAHA.3  0.0483 0.6226034 0.5080080 0.3878198 0.1829 0.46111381 0.26626627 0.4200913 0.005390909
 0.004473231
soutAHH.3  0.0471 0.5993320 0.4984985 0.3789254 0.4683 0.15370571 0.05805806 0.2325668 0.019181061
 0.013259407
soutHAA.3  0.0483 0.6230307 0.5100100 0.3877855 0.1459 0.47867798 0.31331331 0.4080789 0.004345455
 0.003694154
soutHAH.3  0.0479 0.5995715 0.5025025 0.3789168 0.5031 0.14486086 0.04904905 0.2306499 0.020555455
 0.014350627
soutHHA.3  0.0478 0.6225966 0.5065065 0.3878974 0.2069 0.44889730 0.23323323 0.4265827 0.006500909
 0.005137077
soutHHH.3  0.0475 0.5992735 0.4984985 0.3790070 0.5190 0.13894114 0.04454454 0.2291277 0.023511818
 0.015235077

set.seed(10*seed+2)
Ft5df20x08.1515 <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 20,
    NoverExpressCases= 08,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 20
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df20x08.1515$rsltNull <- cbind(Ft5df20x08.1515$rsltNull,rsltNull)
Ft5df20x08.1515$rsltAlt <-  cbind(Ft5df20x08.1515$rsltAlt,rsltAlt)
Ft5df20x08.1515$pvp10 <-    cbind(Ft5df20x08.1515$pvp10,pvp10)
Ft5df20x08.1515$pvp25 <-    cbind(Ft5df20x08.1515$pvp25,pvp25)
FastDisplayCase (Ft5df20x08.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr    AltMean     AltMdn     AltSD      PVP10
 PVP25
      tEq  0.0556 0.4955913 0.4894097 0.2938313 0.6487 0.06916149 0.02481638 0.1076309 0.48279136
 0.34193615
    tUneq  0.0548 0.4955916 0.4894121 0.2934509 0.6457 0.06968195 0.02558562 0.1075936 0.47834591
 0.34014354
    tHlth  0.0615 0.4957588 0.4888657 0.2962281 0.7189 0.05748252 0.01487719 0.1051288 0.56080136
 0.38166438
  e.tEq.1  0.0468 0.5071199 0.5045045 0.2890674 0.5990 0.07813023 0.03303303 0.1117125 0.48279136
 0.34193615
e.tUneq.1  0.0468 0.5071199 0.5045045 0.2890674 0.5990 0.07813023 0.03303303 0.1117125 0.48279136
 0.34193615
e.tHlth.1  0.0429 0.5073824 0.5045045 0.2888185 0.6465 0.06914905 0.02602603 0.1086010 0.56080136
 0.38166438
soutAAA.1  0.0529 0.3789995 0.4794795 0.1644387 0.1262 0.32055746 0.37237237 0.1887576 0.06877909
 0.05954370
soutAAH.1  0.0433 0.4088747 0.5055055 0.1838131 0.4040 0.14671702 0.07307307 0.1678296 0.24278364
 0.20125297
soutAHA.1  0.0501 0.3798869 0.4794795 0.1638861 0.1783 0.28609429 0.27427427 0.1992955 0.10786379
 0.08573732
```

```
soutAHH.1  0.0454 0.4095835 0.5065065 0.1833721 0.4367 0.13671191 0.06406406 0.1648201 0.31263227
 0.23380521
soutHAA.1  0.0519 0.3791279 0.4794795 0.1643223 0.1469 0.30338579 0.31931932 0.1906698 0.08313273
 0.07034402
soutHAH.1  0.0419 0.4091141 0.5055055 0.1833944 0.4678 0.12851431 0.05705706 0.1612723 0.32898621
 0.24933992
soutHHA.1  0.0493 0.3799222 0.4794795 0.1638275 0.2020 0.27432332 0.24324324 0.2022413 0.12473652
 0.09795131
soutHHH.1  0.0443 0.4096776 0.5045045 0.1829650 0.4871 0.12230671 0.05205205 0.1578764 0.36610712
 0.26796117
  e.tEq.2  0.0468 0.5071377 0.5045045 0.2890674 0.5990 0.07813038 0.03303303 0.1117124 0.48279136
 0.34193615
e.tUneq.2  0.0468 0.5071377 0.5045045 0.2890674 0.5990 0.07813038 0.03303303 0.1117124 0.48279136
 0.34193615
e.tHlth.2  0.0429 0.5074002 0.5045045 0.2888182 0.6465 0.06914920 0.02602603 0.1086009 0.56080136
 0.38166438
soutAAA.2  0.0529 0.5003073 0.5065065 0.2706340 0.1262 0.41211692 0.37237237 0.2896877 0.06877909
 0.05954370
soutAAH.2  0.0433 0.5045941 0.5055055 0.2740682 0.4040 0.15662467 0.07307307 0.1962059 0.24278364
 0.20125297
soutAHA.2  0.0501 0.5011947 0.5065065 0.2699001 0.1783 0.37765375 0.27427427 0.3071151 0.10786379
 0.08573732
soutAHH.2  0.0454 0.5053029 0.5067568 0.2735249 0.4367 0.14661957 0.06406406 0.1941492 0.31263227
 0.23380521
soutHAA.2  0.0519 0.5004357 0.5045045 0.2705058 0.1469 0.39494525 0.31931932 0.2962925 0.08313273
 0.07034402
soutHAH.2  0.0419 0.5048335 0.5055055 0.2737039 0.4678 0.13842197 0.05705706 0.1915710 0.32898621
 0.24933992
soutHHA.2  0.0493 0.5012300 0.5055055 0.2698487 0.2020 0.36588278 0.24324324 0.3125032 0.12473652
 0.09795131
soutHHH.2  0.0443 0.5053970 0.5045045 0.2732192 0.4871 0.13221436 0.05205205 0.1890468 0.36610712
 0.26796117
  e.tEq.3  0.0468 0.5071555 0.5045045 0.2890673 0.5990 0.07813053 0.03303303 0.1117123 0.48279136
 0.34193615
e.tUneq.3  0.0468 0.5071555 0.5045045 0.2890673 0.5990 0.07813053 0.03303303 0.1117123 0.48279136
 0.34193615
e.tHlth.3  0.0429 0.5074179 0.5045045 0.2888180 0.6465 0.06914935 0.02602603 0.1086008 0.56080136
 0.38166438
soutAAA.3  0.0529 0.6216151 0.5065065 0.3870936 0.1262 0.50367638 0.37237237 0.4007645 0.06877909
 0.05954370
soutAAH.3  0.0432 0.6003135 0.5055055 0.3740243 0.4040 0.16653233 0.07307307 0.2301114 0.24278364
 0.20125297
soutAHA.3  0.0501 0.6225025 0.5065065 0.3863023 0.1783 0.46921321 0.27427427 0.4210991 0.10786379
 0.08573732
soutAHH.3  0.0454 0.6010223 0.5070070 0.3734448 0.4367 0.15652723 0.06406406 0.2287940 0.31263227
 0.23380521
soutHAA.3  0.0517 0.6217435 0.5045045 0.3869637 0.1469 0.48650470 0.31931932 0.4094231 0.08313273
 0.07034402
soutHAH.3  0.0419 0.6005530 0.5055055 0.3736961 0.4678 0.14832963 0.05705706 0.2269685 0.32898621
 0.24933992
soutHHA.3  0.0493 0.6225378 0.5055055 0.3862553 0.2020 0.45744224 0.24324324 0.4275730 0.12473652
 0.09795131
soutHHH.3  0.0440 0.6011164 0.5045045 0.3731969 0.4871 0.14212202 0.05205205 0.2251154 0.36610712
 0.26796117


##########
##
## Ft5df01x15.1515
## Ft5df20x15.1515
##
##########

seed <- 8
set.seed(seed)
Ft5df01x15.1515 <-
```

```
caseGGxCC <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 01,
    NoverExpressCases= 15,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
Nsim <- 10000
#nullStats <- fastSumOutlierData (caseGGxCC, altDistn=F)
#altStats <- fastSumOutlierData (caseGGxCC, altDistn=T)
#St5dfGGx15.1515 <- list(nullStats=nullStats,altStats=altStats)
caseGGxCC$nullStats <- St5dfGGx15.1515$nullStats
caseGGxCC$altStats <- St5dfGGx15.1515$altStats

rsltNull <- matrix(0,36,Nsim) * NA
dimnames(rsltNull) <- list(c("tEq","tUneq","tHlth",
    "e.tEq.1","e.tUneq.1","e.tHlth.1","soutAAA.1","soutAAH.1",  "soutAHA.1","soutAHH.1","soutHAA.
1","soutHAH.1","soutHHA.1","soutHHH.1",
    "e.tEq.2","e.tUneq.2","e.tHlth.2","soutAAA.2","soutAAH.2",  "soutAHA.2","soutAHH.2","soutHAA.
2","soutHAH.2","soutHHA.2","soutHHH.2",
    "e.tEq.3","e.tUneq.3","e.tHlth.3","soutAAA.3","soutAAH.3",  "soutAHA.3","soutAHH.3","soutHAA.
3","soutHAH.3","soutHHA.3","soutHHH.3"),
    rep("",Nsim))
rsltAlt <- rsltNull
pvp10 <- pvp25  <- rsltNull[c(1:3,15:25),]

set.seed(10*seed+1)
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df01x15.1515$rsltNull <- cbind(Ft5df01x15.1515$rsltNull,rsltNull)
Ft5df01x15.1515$rsltAlt <-  cbind(Ft5df01x15.1515$rsltAlt,rsltAlt)
Ft5df01x15.1515$pvp10 <-    cbind(Ft5df01x15.1515$pvp10,pvp10)
Ft5df01x15.1515$pvp25 <-    cbind(Ft5df01x15.1515$pvp25,pvp25)
FastDisplayCase (Ft5df01x15.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr     AltMean        AltMdn      AltSD        PVP10
PVP25
      tEq  0.0503 0.5026309 0.5091797 0.2886538 0.9869 0.003092543 0.00006516318 0.01670688 0.0937228788
0.0388641538
    tUneq  0.0498 0.5026299 0.5091752 0.2882842 0.9863 0.003194679 0.00007861017 0.01682646 0.0936412121
0.0388395385
    tHlth  0.0533 0.5025455 0.5099462 0.2917712 0.9818 0.004120414 0.00022827931 0.01853771 0.0895463636
0.0381058689
  e.tEq.1  0.0507 0.5040582 0.5085085 0.2879367 0.9869 0.003009910 0.00000000000 0.01702272 0.0937228788
0.0388641538
e.tUneq.1  0.0507 0.5040582 0.5085085 0.2879367 0.9869 0.003009910 0.00000000000 0.01702272 0.0937228788
0.0388641538
e.tHlth.1  0.0468 0.5038764 0.5085085 0.2880477 0.9790 0.004831031 0.00000000000 0.01949707 0.0895463636
0.0381058689
soutAAA.1  0.0488 0.3813706 0.4844845 0.1677360 0.0371 0.408699199 0.49649649650 0.15504547 0.0006590909
0.0006796923
soutAAH.1  0.0489 0.4034676 0.5025025 0.1865826 0.4958 0.104175175 0.05005005005 0.13663707 0.0119045455
0.0123972308
soutAHA.1  0.0495 0.3810371 0.4844845 0.1676725 0.0862 0.364148148 0.49449449449 0.18833256 0.0021036364
0.0018873846
soutAHH.1  0.0524 0.4038538 0.5015015 0.1865889 0.6082 0.091267868 0.03003003003 0.14083376 0.0290519697
0.0182504843
soutHAA.1  0.0478 0.3813172 0.4844845 0.1677457 0.0567 0.374626627 0.49349349349 0.17288458 0.0012990909
0.0013352308
```

```
soutHAH.1  0.0491 0.4034760 0.5005005 0.1863717 0.7671 0.058016617 0.01001001001 0.11872446 0.0486630303
 0.0265618689
soutHHA.1  0.0496 0.3810879 0.4844845 0.1676866 0.1240 0.343013714 0.49349349349 0.20268830 0.0034036364
 0.0028904615
soutHHH.1  0.0531 0.4038040 0.5015015 0.1864472 0.7546 0.060614515 0.00900900901 0.12286692 0.0502228788
 0.0260334074
  e.tEq.2  0.0507 0.5040730 0.5085085 0.2879362 0.9869 0.003009910 0.00000000000 0.01702272 0.0937228788
 0.0388641538
e.tUneq.2  0.0507 0.5040730 0.5085085 0.2879362 0.9869 0.003009910 0.00000000000 0.01702272 0.0937228788
 0.0388641538
e.tHlth.2  0.0468 0.5038912 0.5085085 0.2880475 0.9790 0.004831031 0.00000000000 0.01949707 0.0895463636
 0.0381058689
soutAAA.2  0.0488 0.4995559 0.5025025 0.2723143 0.0371 0.542554204 0.74674674675 0.25845314 0.0006590909
 0.0006796923
soutAAH.2  0.0489 0.5000072 0.5025025 0.2777529 0.4958 0.108512412 0.05005005005 0.15351865 0.0119045455
 0.0123972308
soutAHA.2  0.0495 0.4992224 0.5015015 0.2724199 0.0862 0.498003153 0.74674674675 0.30025994 0.0021036364
 0.0018873846
soutAHH.2  0.0524 0.5003934 0.5015015 0.2776229 0.6082 0.095605105 0.03003003003 0.15762109 0.0290519697
 0.0182504843
soutHAA.2  0.0478 0.4995025 0.5015015 0.2723435 0.0567 0.508481632 0.74674674675 0.28595539 0.0012990909
 0.0013352308
soutHAH.2  0.0491 0.5000156 0.5005005 0.2776084 0.7671 0.062353854 0.01001001001 0.13926315 0.0486630303
 0.0265618689
soutHHA.2  0.0496 0.4992732 0.5015015 0.2724066 0.1240 0.476868719 0.74674674675 0.31847746 0.0034036364
 0.0028904615
soutHHH.2  0.0531 0.5003436 0.5015015 0.2775450 0.7546 0.064951752 0.00900900901 0.14273216 0.0502228788
 0.0260334074
  e.tEq.3  0.0507 0.5040879 0.5085085 0.2879358 0.9869 0.003009910 0.00000000000 0.01702272 0.0937228788
 0.0388641538
e.tUneq.3  0.0507 0.5040879 0.5085085 0.2879358 0.9869 0.003009910 0.00000000000 0.01702272 0.0937228788
 0.0388641538
e.tHlth.3  0.0468 0.5039061 0.5085085 0.2880472 0.9790 0.004831031 0.00000000000 0.01949707 0.0895463636
 0.0381058689
soutAAA.3  0.0488 0.6177411 0.5025025 0.3869495 0.0371 0.676409209 1.00000000000 0.37257094 0.0006590909
 0.0006796923
soutAAH.3  0.0489 0.5965468 0.5025025 0.3784006 0.4958 0.112849650 0.05005005005 0.17415977 0.0119045455
 0.0123972308
soutAHA.3  0.0495 0.6174077 0.5015015 0.3871255 0.0862 0.631858158 1.00000000000 0.41724701 0.0021036364
 0.0018873846
soutAHH.3  0.0524 0.5969330 0.5015015 0.3782066 0.6082 0.099942342 0.03003003003 0.17810119 0.0290519697
 0.0182504843
soutHAA.3  0.0478 0.6176878 0.5015015 0.3869864 0.0567 0.642336637 1.00000000000 0.40361374 0.0012990909
 0.0013352308
soutHAH.3  0.0489 0.5965553 0.5005005 0.3782924 0.7671 0.066691091 0.01001001001 0.16296723 0.0486630303
 0.0265618689
soutHHA.3  0.0495 0.6174585 0.5015015 0.3871008 0.1240 0.610723724 1.00000000000 0.43706452 0.0034036364
 0.0028904615
soutHHH.3  0.0531 0.5968833 0.5015015 0.3781622 0.7546 0.069288989 0.00900900901 0.16587352 0.0502228788
 0.0260334074

set.seed(10*seed+2)
Ft5df20x15.1515 <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 20,
    NoverExpressCases= 15,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 20
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
```

```
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df20x15.1515$rsltNull <- cbind(Ft5df20x15.1515$rsltNull,rsltNull)
Ft5df20x15.1515$rsltAlt <-  cbind(Ft5df20x15.1515$rsltAlt,rsltAlt)
Ft5df20x15.1515$pvp10 <-    cbind(Ft5df20x15.1515$pvp10,pvp10)
Ft5df20x15.1515$pvp25 <-    cbind(Ft5df20x15.1515$pvp25,pvp25)
FastDisplayCase (Ft5df20x15.1515)
Number of simulations:  10000
          NullPwr  NullMean   NullMdn    NullSD AltPwr     AltMean        AltMdn      AltSD      PVP10
PVP25
      tEq  0.0511 0.4999155 0.5048064 0.2910945 0.9873 0.003116876 0.00006981691 0.01721236 0.99529818
0.74218852
    tUneq  0.0507 0.4999156 0.5048003 0.2907239 0.9870 0.003223872 0.00008551117 0.01734133 0.99516091
0.74143468
    tHlth  0.0592 0.4996375 0.5048064 0.2945066 0.9835 0.004132670 0.00022562436 0.01939393 0.96256364
0.70462453
  e.tEq.1  0.0352 0.5107635 0.5115115 0.2851368 0.9783 0.012529129 0.01001001001 0.01927239 0.99529818
0.74218852
e.tUneq.1  0.0352 0.5107635 0.5115115 0.2851368 0.9783 0.012529129 0.01001001001 0.01927239 0.99529818
0.74218852
e.tHlth.1  0.0353 0.5105508 0.5115115 0.2854715 0.9664 0.014275175 0.01001001001 0.02234873 0.96256364
0.70462453
soutAAA.1  0.0486 0.3812222 0.4824825 0.1663030 0.0338 0.404737037 0.49249249249 0.15486877 0.01217545
0.01352862
soutAAH.1  0.0415 0.4132526 0.5045045 0.1843486 0.4499 0.109365365 0.05805805806 0.13456553 0.19445439
0.20454534
soutAHA.1  0.0468 0.3812425 0.4824825 0.1661179 0.0857 0.359927628 0.49049049049 0.18756953 0.04154591
0.03691878
soutAHH.1  0.0413 0.4134021 0.5075075 0.1844286 0.5585 0.097393293 0.03903903904 0.13869394 0.42540727
0.31263219
soutHAA.1  0.0473 0.3815591 0.4824825 0.1659683 0.0543 0.370486787 0.48948948949 0.17210153 0.02363182
0.02540159
soutHAH.1  0.0352 0.4138307 0.5055055 0.1834951 0.7293 0.063908108 0.01901901902 0.11531277 0.62858530
0.45264369
soutHHA.1  0.0455 0.3814348 0.4824825 0.1658307 0.1233 0.338440040 0.48948948949 0.20156024 0.06449061
0.05539908
soutHHH.1  0.0375 0.4138512 0.5095095 0.1839640 0.7079 0.066932232 0.01901901902 0.11944991 0.67269712
0.45001916
  e.tEq.2  0.0352 0.5107798 0.5115115 0.2851371 0.9783 0.012529479 0.01001001001 0.01927234 0.99529818
0.74218852
e.tUneq.2  0.0352 0.5107798 0.5115115 0.2851371 0.9783 0.012529479 0.01001001001 0.01927234 0.99529818
0.74218852
e.tHlth.2  0.0353 0.5105671 0.5115115 0.2854719 0.9664 0.014275526 0.01001001001 0.02234860 0.96256364
0.70462453
soutAAA.2  0.0486 0.4983376 0.4954955 0.2706710 0.0338 0.535781532 0.74474474474 0.25888277 0.01217545
0.01352862
soutAAH.2  0.0415 0.5070540 0.5045045 0.2733062 0.4499 0.113265465 0.05805805806 0.15005244 0.19445439
0.20454534
soutAHA.2  0.0468 0.4983580 0.4964965 0.2705482 0.0857 0.490972122 0.74474474474 0.29993908 0.04154591
0.03691878
soutAHH.2  0.0413 0.5072036 0.5075075 0.2733087 0.5585 0.101293393 0.03903903904 0.15406899 0.42540727
0.31263219
soutHAA.2  0.0473 0.4986745 0.4944945 0.2703197 0.0543 0.501531281 0.74474474474 0.28571381 0.02363182
0.02540159
soutHAH.2  0.0352 0.5076322 0.5055055 0.2725324 0.7293 0.067808208 0.01901901902 0.13438560 0.62858530
0.45264369
soutHHA.2  0.0455 0.4985503 0.4964965 0.2702887 0.1233 0.469484535 0.74474474474 0.31786768 0.06449061
0.05539908
soutHHH.2  0.0375 0.5076526 0.5100100 0.2728411 0.7079 0.070832332 0.01901901902 0.13786640 0.67269712
0.45001916
  e.tEq.3  0.0352 0.5107962 0.5115115 0.2851375 0.9783 0.012529830 0.01001001001 0.01927231 0.99529818
0.74218852
e.tUneq.3  0.0352 0.5107962 0.5115115 0.2851375 0.9783 0.012529830 0.01001001001 0.01927231 0.99529818
0.74218852
e.tHlth.3  0.0353 0.5105835 0.5115115 0.2854724 0.9664 0.014275876 0.01001001001 0.02234848 0.96256364
```

```
 0.70462453
soutAAA.3  0.0486 0.6154531 0.4954955 0.3853710 0.0338 0.666826026 1.00000000000 0.37361118 0.01217545
 0.01352862
soutAAH.3  0.0415 0.6008555 0.5045045 0.3717299 0.4499 0.117165566 0.05805805806 0.16904402 0.19445439
 0.20454534
soutAHA.3  0.0467 0.6154734 0.4964965 0.3852784 0.0857 0.622016617 1.00000000000 0.41746096 0.04154591
 0.03691878
soutAHH.3  0.0413 0.6010050 0.5075075 0.3716939 0.5585 0.105193493 0.03903903904 0.17288952 0.42540727
 0.31263219
southAA.3  0.0473 0.6157899 0.4944945 0.3850220 0.0543 0.632575776 1.00000000000 0.40394913 0.02363182
 0.02540159
southAH.3  0.0352 0.6014336 0.5055055 0.3710153 0.7293 0.071708308 0.01901901902 0.15644243 0.62858530
 0.45264369
southHA.3  0.0454 0.6156657 0.4964965 0.3850378 0.1233 0.600529029 1.00000000000 0.43701519 0.06449061
 0.05539908
southHH.3  0.0375 0.6014541 0.5105105 0.3712368 0.7079 0.074732432 0.01901901902 0.15936844 0.67269712
 0.45001916


##########
##
## Fnorm01x02.25.1515
## Fnorm20x02.25.1515
##
##########

seed <- 9
set.seed(seed)
Fnorm01x02.25.1515 <-
caseGGxCC <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 01,
    NoverExpressCases= 02,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2.5,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
Nsim <- 1000
nullStats <- fastSumOutlierData (caseGGxCC, altDistn=F)
altStats <- fastSumOutlierData (caseGGxCC, altDistn=T)
SnormGGx02.25.1515 <- list(nullStats=nullStats,altStats=altStats)
caseGGxCC$nullStats <- nullStats
caseGGxCC$altStats <- altStats

rsltNull <- matrix(0,36,Nsim) * NA
dimnames(rsltNull) <- list(c("tEq","tUneq","tHlth",
    "e.tEq.1","e.tUneq.1","e.tHlth.1","soutAAA.1","soutAAH.1",  "soutAHA.1","soutAHH.1","southAA.
1","southAH.1","southHA.1","southHH.1",
    "e.tEq.2","e.tUneq.2","e.tHlth.2","soutAAA.2","soutAAH.2",  "soutAHA.2","soutAHH.2","southAA.
2","southAH.2","southHA.2","southHH.2",
    "e.tEq.3","e.tUneq.3","e.tHlth.3","soutAAA.3","soutAAH.3",  "soutAHA.3","soutAHH.3","southAA.
3","southAH.3","southHA.3","southHH.3"),
    rep("",Nsim))
rsltAlt <- rsltNull
pvp10 <- pvp25  <- rsltNull[c(1:3,15:25),]

set.seed(10*seed+1)
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm01x02.25.1515$rsltNull <- cbind(Fnorm01x02.25.1515$rsltNull,rsltNull)
```

```
Fnorm01x02.25.1515$rsltAlt <-  cbind(Fnorm01x02.25.1515$rsltAlt,rsltAlt)
Fnorm01x02.25.1515$pvp10 <-    cbind(Fnorm01x02.25.1515$pvp10,pvp10)
Fnorm01x02.25.1515$pvp25 <-    cbind(Fnorm01x02.25.1515$pvp25,pvp25)
FastDisplayCase (Fnorm01x02.25.1515)

set.seed(10*seed+2)
Fnorm20x02.25.1515 <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 20,
    NoverExpressCases= 02,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2.5,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 20
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm20x02.25.1515$rsltNull <- cbind(Fnorm20x02.25.1515$rsltNull,rsltNull)
Fnorm20x02.25.1515$rsltAlt <-  cbind(Fnorm20x02.25.1515$rsltAlt,rsltAlt)
Fnorm20x02.25.1515$pvp10 <-    cbind(Fnorm20x02.25.1515$pvp10,pvp10)
Fnorm20x02.25.1515$pvp25 <-    cbind(Fnorm20x02.25.1515$pvp25,pvp25)
FastDisplayCase (Fnorm20x02.25.1515)

##########
##
## Fnorm01x02.30.1515
## Fnorm20x02.30.1515
##
##########

seed <- 10
set.seed(seed)
Fnorm01x02.30.1515 <-
caseGGxCC <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 01,
    NoverExpressCases= 02,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        3.0,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
Nsim <- 1000
nullStats <- fastSumOutlierData (caseGGxCC, altDistn=F)
altStats <- fastSumOutlierData (caseGGxCC, altDistn=T)
SnormGGx02.30.1515 <- list(nullStats=nullStats,altStats=altStats)
caseGGxCC$nullStats <- nullStats
caseGGxCC$altStats <- altStats

rsltNull <- matrix(0,36,Nsim) * NA
dimnames(rsltNull) <- list(c("tEq","tUneq","tHlth",
    "e.tEq.1","e.tUneq.1","e.tHlth.1","soutAAA.1","soutAAH.1",  "soutAHA.1","soutAHH.1","soutHAA.
1","soutHAH.1","soutHHA.1","soutHHH.1",
    "e.tEq.2","e.tUneq.2","e.tHlth.2","soutAAA.2","soutAAH.2",  "soutAHA.2","soutAHH.2","soutHAA.
2","soutHAH.2","soutHHA.2","soutHHH.2",
    "e.tEq.3","e.tUneq.3","e.tHlth.3","soutAAA.3","soutAAH.3",  "soutAHA.3","soutAHH.3","soutHAA.
3","soutHAH.3","soutHHA.3","soutHHH.3"),
    rep("",Nsim))
rsltAlt <- rsltNull
pvp10 <- pvp25  <- rsltNull[c(1:3,15:25),]
```

```
set.seed(10*seed+1)
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm01x02.30.1515$rsltNull <- cbind(Fnorm01x02.30.1515$rsltNull,rsltNull)
Fnorm01x02.30.1515$rsltAlt <-  cbind(Fnorm01x02.30.1515$rsltAlt,rsltAlt)
Fnorm01x02.30.1515$pvp10 <-    cbind(Fnorm01x02.30.1515$pvp10,pvp10)
Fnorm01x02.30.1515$pvp25 <-    cbind(Fnorm01x02.30.1515$pvp25,pvp25)
FastDisplayCase (Fnorm01x02.30.1515)

set.seed(10*seed+2)
Fnorm20x02.30.1515 <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 20,
    NoverExpressCases= 02,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        3.0,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 20
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm20x02.30.1515$rsltNull <- cbind(Fnorm20x02.30.1515$rsltNull,rsltNull)
Fnorm20x02.30.1515$rsltAlt <-  cbind(Fnorm20x02.30.1515$rsltAlt,rsltAlt)
Fnorm20x02.30.1515$pvp10 <-    cbind(Fnorm20x02.30.1515$pvp10,pvp10)
Fnorm20x02.30.1515$pvp25 <-    cbind(Fnorm20x02.30.1515$pvp25,pvp25)
FastDisplayCase (Fnorm20x02.30.1515)

##########
##
## Fnorm01x04.25.1515
## Fnorm20x04.25.1515
##
##########

seed <- 11
set.seed(seed)
Fnorm01x04.25.1515 <-
caseGGxCC <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 01,
    NoverExpressCases= 04,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2.5,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
Nsim <- 1000
nullStats <- fastSumOutlierData (caseGGxCC, altDistn=F)
altStats <- fastSumOutlierData (caseGGxCC, altDistn=T)
SnormGGx04.25.1515 <- list(nullStats=nullStats,altStats=altStats)
caseGGxCC$nullStats <- nullStats
caseGGxCC$altStats <- altStats

rsltNull <- matrix(0,36,Nsim) * NA
```

```
dimnames(rsltNull) <- list(c("tEq","tUneq","tHlth",
    "e.tEq.1","e.tUneq.1","e.tHlth.1","soutAAA.1","soutAAH.1",  "soutAHA.1","soutAHH.1","soutHAA.
1","soutHAH.1","soutHHA.1","soutHHH.1",
    "e.tEq.2","e.tUneq.2","e.tHlth.2","soutAAA.2","soutAAH.2",  "soutAHA.2","soutAHH.2","soutHAA.
2","soutHAH.2","soutHHA.2","soutHHH.2",
    "e.tEq.3","e.tUneq.3","e.tHlth.3","soutAAA.3","soutAAH.3",  "soutAHA.3","soutAHH.3","soutHAA.
3","soutHAH.3","soutHHA.3","soutHHH.3"),
    rep("",Nsim))
rsltAlt <- rsltNull
pvp10 <- pvp25  <- rsltNull[c(1:3,15:25),]

set.seed(10*seed+1)
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm01x04.25.1515$rsltNull <- cbind(Fnorm01x04.25.1515$rsltNull,rsltNull)
Fnorm01x04.25.1515$rsltAlt <-  cbind(Fnorm01x04.25.1515$rsltAlt,rsltAlt)
Fnorm01x04.25.1515$pvp10 <-    cbind(Fnorm01x04.25.1515$pvp10,pvp10)
Fnorm01x04.25.1515$pvp25 <-    cbind(Fnorm01x04.25.1515$pvp25,pvp25)
FastDisplayCase (Fnorm01x04.25.1515)

set.seed(10*seed+2)
Fnorm20x04.25.1515 <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 20,
    NoverExpressCases= 04,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2.5,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 20
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm20x04.25.1515$rsltNull <- cbind(Fnorm20x04.25.1515$rsltNull,rsltNull)
Fnorm20x04.25.1515$rsltAlt <-  cbind(Fnorm20x04.25.1515$rsltAlt,rsltAlt)
Fnorm20x04.25.1515$pvp10 <-    cbind(Fnorm20x04.25.1515$pvp10,pvp10)
Fnorm20x04.25.1515$pvp25 <-    cbind(Fnorm20x04.25.1515$pvp25,pvp25)
FastDisplayCase (Fnorm20x04.25.1515)

##########
##
## Fnorm01x04.30.1515
## Fnorm20x04.30.1515
##
##########

seed <- 12
set.seed(seed)
Fnorm01x04.30.1515 <-
caseGGxCC <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 01,
    NoverExpressCases= 04,
    NDisease=          15,
    NHealthy=          15,
```

```
    overExpress=        3.0,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
Nsim <- 1000
nullStats <- fastSumOutlierData (caseGGxCC, altDistn=F)
altStats <- fastSumOutlierData (caseGGxCC, altDistn=T)
SnormGGx04.30.1515 <- list(nullStats=nullStats,altStats=altStats)
caseGGxCC$nullStats <- nullStats
caseGGxCC$altStats <- altStats

rsltNull <- matrix(0,36,Nsim) * NA
dimnames(rsltNull) <- list(c("tEq","tUneq","tHlth",
    "e.tEq.1","e.tUneq.1","e.tHlth.1","soutAAA.1","soutAAH.1",  "soutAHA.1","soutAHH.1","soutHAA.
1","soutHAH.1","soutHHA.1","soutHHH.1",
    "e.tEq.2","e.tUneq.2","e.tHlth.2","soutAAA.2","soutAAH.2",  "soutAHA.2","soutAHH.2","soutHAA.
2","soutHAH.2","soutHHA.2","soutHHH.2",
    "e.tEq.3","e.tUneq.3","e.tHlth.3","soutAAA.3","soutAAH.3",  "soutAHA.3","soutAHH.3","soutHAA.
3","soutHAH.3","soutHHA.3","soutHHH.3"),
    rep("",Nsim))
rsltAlt <- rsltNull
pvp10 <- pvp25  <- rsltNull[c(1:3,15:25),]

set.seed(10*seed+1)
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm01x04.30.1515$rsltNull <- cbind(Fnorm01x04.30.1515$rsltNull,rsltNull)
Fnorm01x04.30.1515$rsltAlt <-  cbind(Fnorm01x04.30.1515$rsltAlt,rsltAlt)
Fnorm01x04.30.1515$pvp10 <-    cbind(Fnorm01x04.30.1515$pvp10,pvp10)
Fnorm01x04.30.1515$pvp25 <-    cbind(Fnorm01x04.30.1515$pvp25,pvp25)
FastDisplayCase (Fnorm01x04.30.1515)

set.seed(10*seed+2)
Fnorm20x04.30.1515 <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 20,
    NoverExpressCases= 04,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        3.0,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 20
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm20x04.30.1515$rsltNull <- cbind(Fnorm20x04.30.1515$rsltNull,rsltNull)
Fnorm20x04.30.1515$rsltAlt <-  cbind(Fnorm20x04.30.1515$rsltAlt,rsltAlt)
Fnorm20x04.30.1515$pvp10 <-    cbind(Fnorm20x04.30.1515$pvp10,pvp10)
Fnorm20x04.30.1515$pvp25 <-    cbind(Fnorm20x04.30.1515$pvp25,pvp25)
FastDisplayCase (Fnorm20x04.30.1515)

##########
##
## Ft5df01x02.25.1515
## Ft5df20x02.25.1515
##
##########
```

```
seed <- 13
set.seed(seed)
Ft5df01x02.25.1515 <-
caseGGxCC <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 01,
    NoverExpressCases= 02,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2.5,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
Nsim <- 1000
nullStats <- fastSumOutlierData (caseGGxCC, altDistn=F)
altStats <- fastSumOutlierData (caseGGxCC, altDistn=T)
St5dfGGx02.25.1515 <- list(nullStats=nullStats,altStats=altStats)
caseGGxCC$nullStats <- nullStats
caseGGxCC$altStats <- altStats

rsltNull <- matrix(0,36,Nsim) * NA
dimnames(rsltNull) <- list(c("tEq","tUneq","tHlth",
    "e.tEq.1","e.tUneq.1","e.tHlth.1","soutAAA.1","soutAAH.1",  "soutAHA.1","soutAHH.1","soutHAA.
1","soutHAH.1","soutHHA.1","soutHHH.1",
    "e.tEq.2","e.tUneq.2","e.tHlth.2","soutAAA.2","soutAAH.2",  "soutAHA.2","soutAHH.2","soutHAA.
2","soutHAH.2","soutHHA.2","soutHHH.2",
    "e.tEq.3","e.tUneq.3","e.tHlth.3","soutAAA.3","soutAAH.3",  "soutAHA.3","soutAHH.3","soutHAA.
3","soutHAH.3","soutHHA.3","soutHHH.3"),
    rep("",Nsim))
rsltAlt <- rsltNull
pvp10 <- pvp25  <- rsltNull[c(1:3,15:25),]

set.seed(10*seed+1)
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df01x02.25.1515$rsltNull <- cbind(Ft5df01x02.25.1515$rsltNull,rsltNull)
Ft5df01x02.25.1515$rsltAlt <-  cbind(Ft5df01x02.25.1515$rsltAlt,rsltAlt)
Ft5df01x02.25.1515$pvp10 <-    cbind(Ft5df01x02.25.1515$pvp10,pvp10)
Ft5df01x02.25.1515$pvp25 <-    cbind(Ft5df01x02.25.1515$pvp25,pvp25)
FastDisplayCase (Ft5df01x02.25.1515)

set.seed(10*seed+2)
Ft5df20x02.25.1515 <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 20,
    NoverExpressCases= 02,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2.5,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 20
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df20x02.25.1515$rsltNull <- cbind(Ft5df20x02.25.1515$rsltNull,rsltNull)
Ft5df20x02.25.1515$rsltAlt <-  cbind(Ft5df20x02.25.1515$rsltAlt,rsltAlt)
Ft5df20x02.25.1515$pvp10 <-    cbind(Ft5df20x02.25.1515$pvp10,pvp10)
```

```
Ft5df20x02.25.1515$pvp25 <-    cbind(Ft5df20x02.25.1515$pvp25,pvp25)
FastDisplayCase (Ft5df20x02.25.1515)

##########
##
## Ft5df01x02.30.1515
## Ft5df20x02.30.1515
##
##########

seed <- 14
set.seed(seed)
Ft5df01x02.30.1515 <-
caseGGxCC <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 01,
    NoverExpressCases= 02,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        3.0,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
Nsim <- 1000
nullStats <- fastSumOutlierData (caseGGxCC, altDistn=F)
altStats <- fastSumOutlierData (caseGGxCC, altDistn=T)
St5dfGGx02.30.1515 <- list(nullStats=nullStats,altStats=altStats)
caseGGxCC$nullStats <- nullStats
caseGGxCC$altStats <- altStats

rsltNull <- matrix(0,36,Nsim) * NA
dimnames(rsltNull) <- list(c("tEq","tUneq","tHlth",
    "e.tEq.1","e.tUneq.1","e.tHlth.1","soutAAA.1","soutAAH.1",  "soutAHA.1","soutAHH.1","soutHAA.
1","soutHAH.1","soutHHA.1","soutHHH.1",
    "e.tEq.2","e.tUneq.2","e.tHlth.2","soutAAA.2","soutAAH.2",  "soutAHA.2","soutAHH.2","soutHAA.
2","soutHAH.2","soutHHA.2","soutHHH.2",
    "e.tEq.3","e.tUneq.3","e.tHlth.3","soutAAA.3","soutAAH.3",  "soutAHA.3","soutAHH.3","soutHAA.
3","soutHAH.3","soutHHA.3","soutHHH.3"),
    rep("",Nsim))
rsltAlt <- rsltNull
pvp10 <- pvp25  <- rsltNull[c(1:3,15:25),]

set.seed(10*seed+1)
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df01x02.30.1515$rsltNull <- cbind(Ft5df01x02.30.1515$rsltNull,rsltNull)
Ft5df01x02.30.1515$rsltAlt <-  cbind(Ft5df01x02.30.1515$rsltAlt,rsltAlt)
Ft5df01x02.30.1515$pvp10 <-    cbind(Ft5df01x02.30.1515$pvp10,pvp10)
Ft5df01x02.30.1515$pvp25 <-    cbind(Ft5df01x02.30.1515$pvp25,pvp25)
FastDisplayCase (Ft5df01x02.30.1515)

set.seed(10*seed+2)
Ft5df20x02.30.1515 <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 20,
    NoverExpressCases= 02,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        3.0,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 20
```

```
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df20x02.30.1515$rsltNull <- cbind(Ft5df20x02.30.1515$rsltNull,rsltNull)
Ft5df20x02.30.1515$rsltAlt <-  cbind(Ft5df20x02.30.1515$rsltAlt,rsltAlt)
Ft5df20x02.30.1515$pvp10 <-    cbind(Ft5df20x02.30.1515$pvp10,pvp10)
Ft5df20x02.30.1515$pvp25 <-    cbind(Ft5df20x02.30.1515$pvp25,pvp25)
FastDisplayCase (Ft5df20x02.30.1515)

##########
##
## Ft5df01x04.25.1515
## Ft5df20x04.25.1515
##
##########

seed <- 15
set.seed(seed)
Ft5df01x04.25.1515 <-
caseGGxCC <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 01,
    NoverExpressCases= 04,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2.5,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
Nsim <- 1000
nullStats <- fastSumOutlierData (caseGGxCC, altDistn=F)
altStats <- fastSumOutlierData (caseGGxCC, altDistn=T)
St5dfGGx04.25.1515 <- list(nullStats=nullStats,altStats=altStats)
caseGGxCC$nullStats <- nullStats
caseGGxCC$altStats <- altStats

rsltNull <- matrix(0,36,Nsim) * NA
dimnames(rsltNull) <- list(c("tEq","tUneq","tHlth",
    "e.tEq.1","e.tUneq.1","e.tHlth.1","soutAAA.1","soutAAH.1",  "soutAHA.1","soutAHH.1","soutHAA.
 1","soutHAH.1","soutHHA.1","soutHHH.1",
    "e.tEq.2","e.tUneq.2","e.tHlth.2","soutAAA.2","soutAAH.2",  "soutAHA.2","soutAHH.2","soutHAA.
 2","soutHAH.2","soutHHA.2","soutHHH.2",
    "e.tEq.3","e.tUneq.3","e.tHlth.3","soutAAA.3","soutAAH.3",  "soutAHA.3","soutAHH.3","soutHAA.
 3","soutHAH.3","soutHHA.3","soutHHH.3"),
    rep("",Nsim))
rsltAlt <- rsltNull
pvp10 <- pvp25  <- rsltNull[c(1:3,15:25),]

set.seed(10*seed+1)
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df01x04.25.1515$rsltNull <- cbind(Ft5df01x04.25.1515$rsltNull,rsltNull)
Ft5df01x04.25.1515$rsltAlt <-  cbind(Ft5df01x04.25.1515$rsltAlt,rsltAlt)
Ft5df01x04.25.1515$pvp10 <-    cbind(Ft5df01x04.25.1515$pvp10,pvp10)
Ft5df01x04.25.1515$pvp25 <-    cbind(Ft5df01x04.25.1515$pvp25,pvp25)
FastDisplayCase (Ft5df01x04.25.1515)

set.seed(10*seed+2)
```

```
Ft5df20x04.25.1515 <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 20,
    NoverExpressCases= 04,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        2.5,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 20
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df20x04.25.1515$rsltNull <- cbind(Ft5df20x04.25.1515$rsltNull,rsltNull)
Ft5df20x04.25.1515$rsltAlt <-  cbind(Ft5df20x04.25.1515$rsltAlt,rsltAlt)
Ft5df20x04.25.1515$pvp10 <-    cbind(Ft5df20x04.25.1515$pvp10,pvp10)
Ft5df20x04.25.1515$pvp25 <-    cbind(Ft5df20x04.25.1515$pvp25,pvp25)
FastDisplayCase (Ft5df20x04.25.1515)

##########
##
## Ft5df01x04.30.1515
## Ft5df20x04.30.1515
##
##########

seed <- 16
set.seed(seed)
Ft5df01x04.30.1515 <-
caseGGxCC <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 01,
    NoverExpressCases= 04,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        3.0,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
Nsim <- 1000
nullStats <- fastSumOutlierData (caseGGxCC, altDistn=F)
altStats <- fastSumOutlierData (caseGGxCC, altDistn=T)
St5dfGGx04.30.1515 <- list(nullStats=nullStats,altStats=altStats)
caseGGxCC$nullStats <- nullStats
caseGGxCC$altStats <- altStats

rsltNull <- matrix(0,36,Nsim) * NA
dimnames(rsltNull) <- list(c("tEq","tUneq","tHlth",
    "e.tEq.1","e.tUneq.1","e.tHlth.1","soutAAA.1","soutAAH.1",  "soutAHA.1","soutAHH.1","soutHAA.
1","soutHAH.1","soutHHA.1","soutHHH.1",
    "e.tEq.2","e.tUneq.2","e.tHlth.2","soutAAA.2","soutAAH.2",  "soutAHA.2","soutAHH.2","soutHAA.
2","soutHAH.2","soutHHA.2","soutHHH.2",
    "e.tEq.3","e.tUneq.3","e.tHlth.3","soutAAA.3","soutAAH.3",  "soutAHA.3","soutAHH.3","soutHAA.
3","soutHAH.3","soutHHA.3","soutHHH.3"),
    rep("",Nsim))
rsltAlt <- rsltNull
pvp10 <- pvp25  <- rsltNull[c(1:3,15:25),]

set.seed(10*seed+1)
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
```

```
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df01x04.30.1515$rsltNull <- cbind(Ft5df01x04.30.1515$rsltNull,rsltNull)
Ft5df01x04.30.1515$rsltAlt <-  cbind(Ft5df01x04.30.1515$rsltAlt,rsltAlt)
Ft5df01x04.30.1515$pvp10 <-    cbind(Ft5df01x04.30.1515$pvp10,pvp10)
Ft5df01x04.30.1515$pvp25 <-    cbind(Ft5df01x04.30.1515$pvp25,pvp25)
FastDisplayCase (Ft5df01x04.30.1515)

set.seed(10*seed+2)
Ft5df20x04.30.1515 <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 20,
    NoverExpressCases= 04,
    NDisease=          15,
    NHealthy=          15,
    overExpress=        3.0,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 20
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df20x04.30.1515$rsltNull <- cbind(Ft5df20x04.30.1515$rsltNull,rsltNull)
Ft5df20x04.30.1515$rsltAlt <-  cbind(Ft5df20x04.30.1515$rsltAlt,rsltAlt)
Ft5df20x04.30.1515$pvp10 <-    cbind(Ft5df20x04.30.1515$pvp10,pvp10)
Ft5df20x04.30.1515$pvp25 <-    cbind(Ft5df20x04.30.1515$pvp25,pvp25)
FastDisplayCase (Ft5df20x04.30.1515)

##########
##
## Fnorm01x08.6060
## Fnorm20x08.6060
##
##########

seed <- 17
set.seed(seed)
Fnorm01x08.6060 <-
caseGGxCC <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 01,
    NoverExpressCases= 08,
    NDisease=          60,
    NHealthy=          60,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
Nsim <- 1000
nullStats <- fastSumOutlierData (caseGGxCC, altDistn=F)
altStats <- fastSumOutlierData (caseGGxCC, altDistn=T)
SnormGGx08.6060 <- list(nullStats=nullStats,altStats=altStats)
caseGGxCC$nullStats <- nullStats
caseGGxCC$altStats <- altStats

rsltNull <- matrix(0,36,Nsim) * NA
dimnames(rsltNull) <- list(c("tEq","tUneq","tHlth",
    "e.tEq.1","e.tUneq.1","e.tHlth.1","soutAAA.1","soutAAH.1",  "soutAHA.1","soutAHH.1","soutHAA.
1","soutHAH.1","soutHHA.1","soutHHH.1",
    "e.tEq.2","e.tUneq.2","e.tHlth.2","soutAAA.2","soutAAH.2",  "soutAHA.2","soutAHH.2","soutHAA.
2","soutHAH.2","soutHHA.2","soutHHH.2",
    "e.tEq.3","e.tUneq.3","e.tHlth.3","soutAAA.3","soutAAH.3",  "soutAHA.3","soutAHH.3","soutHAA.
```

```
 3","soutHAH.3","soutHHA.3","soutHHH.3"),
    rep("",Nsim))
rsltAlt <- rsltNull
pvp10 <- pvp25  <- rsltNull[c(1:3,15:25),]

set.seed(10*seed+1)
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm01x08.6060$rsltNull <- cbind(Fnorm01x08.6060$rsltNull,rsltNull)
Fnorm01x08.6060$rsltAlt <-  cbind(Fnorm01x08.6060$rsltAlt,rsltAlt)
Fnorm01x08.6060$pvp10 <-    cbind(Fnorm01x08.6060$pvp10,pvp10)
Fnorm01x08.6060$pvp25 <-    cbind(Fnorm01x08.6060$pvp25,pvp25)
FastDisplayCase (Fnorm01x08.6060)

set.seed(10*seed+2)
Fnorm20x08.6060 <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 20,
    NoverExpressCases= 08,
    NDisease=          60,
    NHealthy=          60,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 20
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm20x08.6060$rsltNull <- cbind(Fnorm20x08.6060$rsltNull,rsltNull)
Fnorm20x08.6060$rsltAlt <-  cbind(Fnorm20x08.6060$rsltAlt,rsltAlt)
Fnorm20x08.6060$pvp10 <-    cbind(Fnorm20x08.6060$pvp10,pvp10)
Fnorm20x08.6060$pvp25 <-    cbind(Fnorm20x08.6060$pvp25,pvp25)
FastDisplayCase (Fnorm20x08.6060)

##########
##
## Fnorm01x15.6060
## Fnorm20x15.6060
##
##########

seed <- 18
set.seed(seed)
Fnorm01x15.6060 <-
caseGGxCC <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 01,
    NoverExpressCases= 15,
    NDisease=          60,
    NHealthy=          60,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
Nsim <- 1000
nullStats <- fastSumOutlierData (caseGGxCC, altDistn=F)
altStats <- fastSumOutlierData (caseGGxCC, altDistn=T)
SnormGGx15.6060 <- list(nullStats=nullStats,altStats=altStats)
```

```
caseGGxCC$nullStats <- nullStats
caseGGxCC$altStats <- altStats

rsltNull <- matrix(0,36,Nsim) * NA
dimnames(rsltNull) <- list(c("tEq","tUneq","tHlth",
    "e.tEq.1","e.tUneq.1","e.tHlth.1","soutAAA.1","soutAAH.1",  "soutAHA.1","soutAHH.1","soutHAA.
1","soutHAH.1","soutHHA.1","soutHHH.1",
    "e.tEq.2","e.tUneq.2","e.tHlth.2","soutAAA.2","soutAAH.2",  "soutAHA.2","soutAHH.2","soutHAA.
2","soutHAH.2","soutHHA.2","soutHHH.2",
    "e.tEq.3","e.tUneq.3","e.tHlth.3","soutAAA.3","soutAAH.3",  "soutAHA.3","soutAHH.3","soutHAA.
3","soutHAH.3","soutHHA.3","soutHHH.3"),
    rep("",Nsim))
rsltAlt <- rsltNull
pvp10 <- pvp25  <- rsltNull[c(1:3,15:25),]

set.seed(10*seed+1)
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm01x15.6060$rsltNull <- cbind(Fnorm01x15.6060$rsltNull,rsltNull)
Fnorm01x15.6060$rsltAlt <-  cbind(Fnorm01x15.6060$rsltAlt,rsltAlt)
Fnorm01x15.6060$pvp10 <-    cbind(Fnorm01x15.6060$pvp10,pvp10)
Fnorm01x15.6060$pvp25 <-    cbind(Fnorm01x15.6060$pvp25,pvp25)
FastDisplayCase (Fnorm01x15.6060)

set.seed(10*seed+2)
Fnorm20x15.6060 <- list(
    Ngenes=          1000,
    rdata =         rnorm,
    NoverExpressGenes= 20,
    NoverExpressCases= 15,
    NDisease=          60,
    NHealthy=          60,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 20
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Fnorm20x15.6060$rsltNull <- cbind(Fnorm20x15.6060$rsltNull,rsltNull)
Fnorm20x15.6060$rsltAlt <-  cbind(Fnorm20x15.6060$rsltAlt,rsltAlt)
Fnorm20x15.6060$pvp10 <-    cbind(Fnorm20x15.6060$pvp10,pvp10)
Fnorm20x15.6060$pvp25 <-    cbind(Fnorm20x15.6060$pvp25,pvp25)
FastDisplayCase (Fnorm20x15.6060)


##########
##
## Ft5df01x08.6060
## Ft5df20x08.6060
##
##########

seed <- 18
set.seed(seed)
Ft5df01x08.6060 <-
caseGGxCC <- list(
    Ngenes=          1000,
```

```
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 01,
    NoverExpressCases= 08,
    NDisease=          60,
    NHealthy=          60,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
Nsim <- 1000
nullStats <- fastSumOutlierData (caseGGxCC, altDistn=F)
altStats <- fastSumOutlierData (caseGGxCC, altDistn=T)
St5dfGGx08.6060 <- list(nullStats=nullStats,altStats=altStats)
caseGGxCC$nullStats <- nullStats
caseGGxCC$altStats <- altStats

rsltNull <- matrix(0,36,Nsim) * NA
dimnames(rsltNull) <- list(c("tEq","tUneq","tHlth",
    "e.tEq.1","e.tUneq.1","e.tHlth.1","soutAAA.1","soutAAH.1",  "soutAHA.1","soutAHH.1","soutHAA.
1","soutHAH.1","soutHHA.1","soutHHH.1",
    "e.tEq.2","e.tUneq.2","e.tHlth.2","soutAAA.2","soutAAH.2",  "soutAHA.2","soutAHH.2","soutHAA.
2","soutHAH.2","soutHHA.2","soutHHH.2",
    "e.tEq.3","e.tUneq.3","e.tHlth.3","soutAAA.3","soutAAH.3",  "soutAHA.3","soutAHH.3","soutHAA.
3","soutHAH.3","soutHHA.3","soutHHH.3"),
    rep("",Nsim))
rsltAlt <- rsltNull
pvp10 <- pvp25  <- rsltNull[c(1:3,15:25),]

set.seed(10*seed+1)
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df01x08.6060$rsltNull <- cbind(Ft5df01x08.6060$rsltNull,rsltNull)
Ft5df01x08.6060$rsltAlt <-  cbind(Ft5df01x08.6060$rsltAlt,rsltAlt)
Ft5df01x08.6060$pvp10 <-    cbind(Ft5df01x08.6060$pvp10,pvp10)
Ft5df01x08.6060$pvp25 <-    cbind(Ft5df01x08.6060$pvp25,pvp25)
FastDisplayCase (Ft5df01x08.6060)

set.seed(10*seed+2)
Ft5df20x08.6060 <- list(
    Ngenes=          1000,
    rdata =         function (n) {rt (n, 5)},
    NoverExpressGenes= 20,
    NoverExpressCases= 08,
    NDisease=          60,
    NHealthy=          60,
    overExpress=        2,
    rsltNull=NULL,rsltAlt=NULL,pvp10=NULL,pvp25=NULL)
caseGGxCC$NoverExpressGenes <- 20
for (i in 1:Nsim) {
    z <- fastSumOutlierStats (caseGGxCC)
    rsltNull[,i] <- z$rsltNull
    rsltAlt[,i] <- z$rsltAlt
    pvp10[,i] <- z$pvp10
    pvp25[,i] <- z$pvp25
}
Ft5df20x08.6060$rsltNull <- cbind(Ft5df20x08.6060$rsltNull,rsltNull)
Ft5df20x08.6060$rsltAlt <-  cbind(Ft5df20x08.6060$rsltAlt,rsltAlt)
Ft5df20x08.6060$pvp10 <-    cbind(Ft5df20x08.6060$pvp10,pvp10)
Ft5df20x08.6060$pvp25 <-    cbind(Ft5df20x08.6060$pvp25,pvp25)
FastDisplayCase (Ft5df20x08.6060)
```

```
###############
##
## Summaries for talk
##
###############

# First check for agreement with T&H

u <- c(7,9,14,18,20,25,29,31,36)
round(cbind(FastDisplayCase(Fnorm01x15.1515)[u,c("AltMean","AltMdn","AltSD")],
    FastDisplayCase(Fnorm01x08.1515)[u,c("AltMean","AltMdn","AltSD")],
    FastDisplayCase(Fnorm01x04.1515)[u,c("AltMean","AltMdn","AltSD")],
    FastDisplayCase(Fnorm01x02.1515)[u,c("AltMean","AltMdn","AltSD")]),4)
         AltMean AltMdn  AltSD AltMean AltMdn  AltSD AltMean AltMdn  AltSD AltMean AltMdn  AltSD
soutAAA.1  0.2998 0.3463 0.1031  0.2071 0.2272 0.1427  0.1579 0.1141 0.1376  0.1835 0.1612 0.1320
soutAHA.1  0.2763 0.3463 0.1255  0.1854 0.1522 0.1479  0.1497 0.0991 0.1357  0.1841 0.1657 0.1314
soutHHH.1  0.0278 0.0030 0.0708  0.0687 0.0230 0.1079  0.1397 0.0821 0.1422  0.2183 0.1912 0.1549
soutAAA.2  0.5180 0.6727 0.2399  0.3276 0.2272 0.2839  0.2364 0.1141 0.2612  0.2789 0.1612 0.2658
soutAHA.2  0.4945 0.6727 0.2701  0.3059 0.1522 0.2955  0.2282 0.0991 0.2627  0.2796 0.1657 0.2653
soutHHH.2  0.0306 0.0030 0.0900  0.0773 0.0230 0.1430  0.1654 0.0821 0.2055  0.2717 0.1912 0.2451
soutAAA.3  0.7362 1.0000 0.3873  0.4481 0.2272 0.4351  0.3149 0.1141 0.3954  0.3744 0.1612 0.4099
soutAHA.3  0.7127 1.0000 0.4190  0.4264 0.1522 0.4487  0.3066 0.0991 0.3980  0.3750 0.1657 0.4094
soutHHH.3  0.0334 0.0030 0.1126  0.0860 0.0230 0.1841  0.1911 0.0821 0.2780  0.3252 0.1912 0.3467

u <- 18:25
round(cbind(FastDisplayCase(Fnorm01x15.1515)[u,c("AltMean","AltMdn","AltSD")],
    FastDisplayCase(Fnorm01x08.1515)[u,c("AltMean","AltMdn","AltSD")],
    FastDisplayCase(Fnorm01x04.1515)[u,c("AltMean","AltMdn","AltSD")],
    FastDisplayCase(Fnorm01x02.1515)[u,c("AltMean","AltMdn","AltSD")]),4)
         AltMean AltMdn  AltSD AltMean AltMdn  AltSD AltMean AltMdn  AltSD AltMean AltMdn  AltSD
soutAAA.2  0.5180 0.6727 0.2399  0.3276 0.2272 0.2839  0.2364 0.1141 0.2612  0.2789 0.1612 0.2658
soutAAH.2  0.0494 0.0170 0.0984  0.0856 0.0260 0.1492  0.1617 0.0741 0.2086  0.2629 0.1782 0.2489
soutAHA.2  0.4945 0.6727 0.2701  0.3059 0.1522 0.2955  0.2282 0.0991 0.2627  0.2796 0.1657 0.2653
soutAHH.2  0.0496 0.0110 0.1029  0.0876 0.0310 0.1479  0.1693 0.0861 0.2065  0.2725 0.1922 0.2454
soutHAA.2  0.4942 0.6727 0.2687  0.3125 0.1742 0.2909  0.2300 0.1081 0.2622  0.2774 0.1582 0.2662
soutHAH.2  0.0247 0.0010 0.0855  0.0741 0.0180 0.1441  0.1583 0.0701 0.2073  0.2631 0.1802 0.2482
soutHHA.2  0.4822 0.6727 0.2854  0.2970 0.1271 0.3003  0.2236 0.0921 0.2639  0.2781 0.1622 0.2658
soutHHH.2  0.0306 0.0030 0.0900  0.0773 0.0230 0.1430  0.1654 0.0821 0.2055  0.2717 0.1912 0.2451


# Now, which outlier sum is optimal:
#          For PVP25: 15 (HAH HHH) 8 (HAH HHH) 4 (AAH HAH) 2(HAA AAA)

u <- c(18:25)
a <- c("AltPwr","PVP10","PVP25")
round(cbind(FastDisplayCase(Fnorm01x15.1515)[u,a],
    FastDisplayCase(Fnorm01x08.1515)[u,a],
    FastDisplayCase(Fnorm01x04.1515)[u,a],
    FastDisplayCase(Fnorm01x02.1515)[u,a]),4)
         AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25
soutAAA.2 0.0519 0.0015 0.0012 0.2335 0.0095 0.0066 0.3519 0.0142 0.0098 0.2356 0.0058 0.0055
soutAAH.2 0.7643 0.0358 0.0240 0.6433 0.0311 0.0196 0.4122 0.0157 0.0114 0.2072 0.0056 0.0049
soutAHA.2 0.0988 0.0026 0.0024 0.2989 0.0122 0.0083 0.3622 0.0142 0.0100 0.2274 0.0063 0.0054
soutAHH.2 0.7599 0.0465 0.0259 0.6107 0.0291 0.0182 0.3592 0.0118 0.0092 0.1765 0.0046 0.0041
soutHAA.2 0.0943 0.0026 0.0020 0.2759 0.0118 0.0076 0.3640 0.0149 0.0103 0.2320 0.0059 0.0055
soutHAH.2 0.8973 0.0754 0.0338 0.7013 0.0388 0.0225 0.4157 0.0153 0.0113 0.2020 0.0052 0.0046
soutHHA.2 0.1441 0.0049 0.0037 0.3313 0.0146 0.0095 0.3773 0.0149 0.0105 0.2288 0.0064 0.0055
soutHHH.2 0.8657 0.0670 0.0318 0.6707 0.0338 0.0204 0.3712 0.0117 0.0093 0.1767 0.0044 0.0039

round(cbind(FastDisplayCase(Ft5df01x15.1515)[u,a],
    FastDisplayCase(Ft5df01x08.1515)[u,a],
    FastDisplayCase(Ft5df01x04.1515)[u,a],
```

```
    FastDisplayCase(Ft5df01x02.1515)[u,a]),4)
          AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25
soutAAA.2 0.0371 0.0007 0.0007 0.1298 0.0035 0.0031 0.1792 0.0051 0.0041 0.1295 0.0032 0.0030
soutAAH.2 0.4958 0.0119 0.0124 0.4370 0.0147 0.0114 0.2681 0.0079 0.0066 0.1440 0.0037 0.0033
soutAHA.2 0.0862 0.0021 0.0019 0.1829 0.0054 0.0045 0.2020 0.0058 0.0048 0.1305 0.0033 0.0029
soutAHH.2 0.6082 0.0291 0.0183 0.4683 0.0192 0.0133 0.2628 0.0075 0.0061 0.1305 0.0033 0.0030
southAA.2 0.0567 0.0013 0.0013 0.1459 0.0043 0.0037 0.1899 0.0055 0.0044 0.1366 0.0033 0.0030
southAH.2 0.7671 0.0487 0.0266 0.5031 0.0206 0.0144 0.2847 0.0087 0.0071 0.1476 0.0037 0.0034
southHA.2 0.1240 0.0034 0.0029 0.2069 0.0065 0.0051 0.2124 0.0063 0.0052 0.1329 0.0034 0.0029
southHH.2 0.7546 0.0502 0.0260 0.5190 0.0235 0.0152 0.2759 0.0078 0.0065 0.1323 0.0034 0.0030

u <- c(1,15,3,17,18,20,23,25)
round(cbind(FastDisplayCase(Fnorm01x15.1515)[u,a],
    FastDisplayCase(Fnorm01x08.1515)[u,a],
    FastDisplayCase(Fnorm01x04.1515)[u,a],
    FastDisplayCase(Fnorm01x02.1515)[u,a]),4)
          AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25
      tEq 0.9999 0.0996 0.0399 0.7883 0.0441 0.0257 0.2966 0.0086 0.0069 0.1316 0.0031 0.0027
  e.tEq.2 0.9997 0.0996 0.0399 0.7937 0.0441 0.0257 0.2871 0.0086 0.0069 0.1302 0.0031 0.0027
    tHlth 0.9997 0.0993 0.0399 0.8667 0.0611 0.0310 0.3988 0.0148 0.0107 0.1733 0.0050 0.0041
e.tHlth.2 0.9992 0.0993 0.0399 0.8710 0.0611 0.0310 0.3955 0.0148 0.0107 0.1705 0.0050 0.0041
soutAAA.2 0.0519 0.0015 0.0012 0.2335 0.0095 0.0066 0.3519 0.0142 0.0098 0.2356 0.0058 0.0055
soutAHA.2 0.0988 0.0026 0.0024 0.2989 0.0122 0.0083 0.3622 0.0142 0.0100 0.2274 0.0063 0.0054
southAH.2 0.8973 0.0754 0.0338 0.7013 0.0388 0.0225 0.4157 0.0153 0.0113 0.2020 0.0052 0.0046
southHH.2 0.8657 0.0670 0.0318 0.6707 0.0338 0.0204 0.3712 0.0117 0.0093 0.1767 0.0044 0.0039

round(cbind(FastDisplayCase(Ft5df01x15.1515)[u,a],
    FastDisplayCase(Ft5df01x08.1515)[u,a],
    FastDisplayCase(Ft5df01x04.1515)[u,a],
    FastDisplayCase(Ft5df01x02.1515)[u,a]),4)
          AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25
      tEq 0.9869 0.0937 0.0389 0.6437 0.0325 0.0202 0.2433 0.0075 0.0062 0.1156 0.0029 0.0025
  e.tEq.2 0.9869 0.0937 0.0389 0.6418 0.0325 0.0202 0.2487 0.0075 0.0062 0.1163 0.0029 0.0025
    tHlth 0.9818 0.0895 0.0381 0.7158 0.0392 0.0222 0.3101 0.0108 0.0079 0.1444 0.0036 0.0031
e.tHlth.2 0.9790 0.0895 0.0381 0.6934 0.0392 0.0222 0.2976 0.0108 0.0079 0.1365 0.0036 0.0031
soutAAA.2 0.0371 0.0007 0.0007 0.1298 0.0035 0.0031 0.1792 0.0051 0.0041 0.1295 0.0032 0.0030
soutAHA.2 0.0862 0.0021 0.0019 0.1829 0.0054 0.0045 0.2020 0.0058 0.0048 0.1305 0.0033 0.0029
southAH.2 0.7671 0.0487 0.0266 0.5031 0.0206 0.0144 0.2847 0.0087 0.0071 0.1476 0.0037 0.0034
southHH.2 0.7546 0.0502 0.0260 0.5190 0.0235 0.0152 0.2759 0.0078 0.0065 0.1323 0.0034 0.0030

round(cbind(FastDisplayCase(Fnorm20x15.1515)[u,a],
    FastDisplayCase(Fnorm20x08.1515)[u,a],
    FastDisplayCase(Fnorm20x04.1515)[u,a],
    FastDisplayCase(Fnorm20x02.1515)[u,a]),4)
          AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25
      tEq 1.0000 1.0000 0.7954 0.7875 0.5768 0.4270 0.2906 0.1537 0.1294 0.1286 0.0594 0.0542
  e.tEq.2 1.0000 1.0000 0.7954 0.7344 0.5768 0.4270 0.2672 0.1537 0.1294 0.1215 0.0594 0.0542
    tHlth 1.0000 0.9961 0.7894 0.8726 0.7497 0.5251 0.3975 0.2598 0.1957 0.1734 0.0898 0.0765
e.tHlth.2 0.9997 0.9961 0.7894 0.8285 0.7497 0.5251 0.3693 0.2598 0.1957 0.1660 0.0898 0.0765
soutAAA.2 0.0545 0.0313 0.0259 0.2258 0.1772 0.1288 0.3273 0.2465 0.1767 0.2347 0.1156 0.1077
soutAHA.2 0.0997 0.0589 0.0476 0.2842 0.2287 0.1574 0.3425 0.2442 0.1817 0.2211 0.1176 0.1017
southAH.2 0.8760 0.8918 0.6108 0.6470 0.5415 0.3831 0.3842 0.2626 0.2013 0.1938 0.0966 0.0892
southHH.2 0.8339 0.8342 0.5581 0.6055 0.4920 0.3500 0.3387 0.2045 0.1690 0.1683 0.0796 0.0732

round(cbind(FastDisplayCase(Ft5df20x15.1515)[u,a],
    FastDisplayCase(Ft5df20x08.1515)[u,a],
    FastDisplayCase(Ft5df20x04.1515)[u,a],
    FastDisplayCase(Ft5df20x02.1515)[u,a]),4)
          AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25
      tEq 0.9873 0.9953 0.7422 0.6487 0.4828 0.3419 0.2390 0.1352 0.1143 0.1162 0.0604 0.0524
  e.tEq.2 0.9783 0.9953 0.7422 0.5990 0.4828 0.3419 0.2334 0.1352 0.1143 0.1155 0.0604 0.0524
    tHlth 0.9835 0.9626 0.7046 0.7189 0.5608 0.3817 0.3038 0.1868 0.1449 0.1450 0.0749 0.0631
e.tHlth.2 0.9664 0.9626 0.7046 0.6465 0.5608 0.3817 0.2765 0.1868 0.1449 0.1351 0.0749 0.0631
soutAAA.2 0.0338 0.0122 0.0135 0.1262 0.0688 0.0595 0.1754 0.1026 0.0821 0.1197 0.0580 0.0565
soutAHA.2 0.0857 0.0415 0.0369 0.1783 0.1079 0.0857 0.1953 0.1102 0.0913 0.1196 0.0592 0.0540
southAH.2 0.7293 0.6286 0.4526 0.4678 0.3290 0.2493 0.2657 0.1604 0.1310 0.1397 0.0650 0.0631
```

```
soutHHH.2 0.7079 0.6727 0.4500 0.4871 0.3661 0.2680 0.2529 0.1409 0.1210 0.1315 0.0612 0.0561

round(cbind(FastDisplayCase(Fnorm20x02.1515)[u,a],
    FastDisplayCase(Fnorm20x02.25.1515)[u,a],
    FastDisplayCase(Fnorm20x02.30.1515)[u,a]),4)
          AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25
      tEq 0.1162 0.0604 0.0524  0.145 0.0566 0.0560  0.143 0.0704 0.0635
  e.tEq.2 0.1155 0.0604 0.0524  0.141 0.0566 0.0560  0.141 0.0704 0.0635
    tHlth 0.1450 0.0749 0.0631  0.205 0.0901 0.0764  0.216 0.1165 0.0945
e.tHlth.2 0.1351 0.0749 0.0631  0.185 0.0901 0.0764  0.181 0.1165 0.0945
soutAAA.2 0.1197 0.0580 0.0565  0.190 0.0864 0.0850  0.304 0.1419 0.1305
soutAHA.2 0.1196 0.0592 0.0540  0.193 0.0862 0.0855  0.283 0.1230 0.1134
soutHAH.2 0.1397 0.0650 0.0631  0.202 0.0887 0.0819  0.274 0.1310 0.1155
soutHHH.2 0.1315 0.0612 0.0561  0.182 0.0709 0.0719  0.224 0.0876 0.0874

round(cbind(FastDisplayCase(Fnorm20x04.1515)[u,a],
    FastDisplayCase(Fnorm20x04.25.1515)[u,a],
    FastDisplayCase(Fnorm20x04.30.1515)[u,a]),4)
          AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25
      tEq 0.2906 0.1537 0.1294  0.356 0.2012 0.1730  0.454 0.2109 0.1850
  e.tEq.2 0.2672 0.1537 0.1294  0.334 0.2012 0.1730  0.418 0.2109 0.1850
    tHlth 0.3975 0.2598 0.1957  0.540 0.4129 0.2928  0.680 0.5160 0.3543
e.tHlth.2 0.3693 0.2598 0.1957  0.509 0.4129 0.2928  0.634 0.5160 0.3543
soutAAA.2 0.3273 0.2465 0.1767  0.501 0.4514 0.2985  0.704 0.6830 0.4538
soutAHA.2 0.3425 0.2442 0.1817  0.510 0.4329 0.3027  0.719 0.6159 0.4440
soutHAH.2 0.3842 0.2626 0.2013  0.566 0.4246 0.3158  0.724 0.5914 0.4248
soutHHH.2 0.3387 0.2045 0.1690  0.497 0.2764 0.2416  0.643 0.3835 0.3212

round(cbind(FastDisplayCase(Ft5df20x02.1515)[u,a],
    FastDisplayCase(Ft5df20x02.25.1515)[u,a],
    FastDisplayCase(Ft5df20x02.30.1515)[u,a]),4)
          AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25
      tEq 0.1162 0.0604 0.0524  0.145 0.0566 0.0560  0.143 0.0704 0.0635
  e.tEq.2 0.1155 0.0604 0.0524  0.141 0.0566 0.0560  0.141 0.0704 0.0635
    tHlth 0.1450 0.0749 0.0631  0.205 0.0901 0.0764  0.216 0.1165 0.0945
e.tHlth.2 0.1351 0.0749 0.0631  0.185 0.0901 0.0764  0.181 0.1165 0.0945
soutAAA.2 0.1197 0.0580 0.0565  0.190 0.0864 0.0850  0.304 0.1419 0.1305
soutAHA.2 0.1196 0.0592 0.0540  0.193 0.0862 0.0855  0.283 0.1230 0.1134
soutHAH.2 0.1397 0.0650 0.0631  0.202 0.0887 0.0819  0.274 0.1310 0.1155
soutHHH.2 0.1315 0.0612 0.0561  0.182 0.0709 0.0719  0.224 0.0876 0.0874

round(cbind(FastDisplayCase(Ft5df20x04.1515)[u,a],
    FastDisplayCase(Ft5df20x04.25.1515)[u,a],
    FastDisplayCase(Ft5df20x04.30.1515)[u,a]),4)
          AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25 AltPwr  PVP10  PVP25
      tEq 0.2390 0.1352 0.1143  0.279 0.1667 0.1348  0.368 0.1945 0.1596
  e.tEq.2 0.2334 0.1352 0.1143  0.263 0.1667 0.1348  0.343 0.1945 0.1596
    tHlth 0.3038 0.1868 0.1449  0.410 0.2549 0.1920  0.528 0.3502 0.2562
e.tHlth.2 0.2765 0.1868 0.1449  0.369 0.2549 0.1920  0.485 0.3502 0.2562
soutAAA.2 0.1754 0.1026 0.0821  0.276 0.1939 0.1491  0.453 0.3500 0.2522
soutAHA.2 0.1953 0.1102 0.0913  0.298 0.2003 0.1596  0.460 0.3270 0.2454
soutHAH.2 0.2657 0.1604 0.1310  0.399 0.2631 0.2007  0.558 0.3920 0.3007
soutHHH.2 0.2529 0.1409 0.1210  0.354 0.2140 0.1822  0.494 0.2891 0.2424


##########
##
## Now to produce output for the tables
##
##########

# Table 2

u <- c(1,3,18,20,23,25)
a <- c("AltMean","AltMdn","AltSD")
tbl <- round(cbind(FastDisplayCase(Fnorm01x15.1515)[u,a],
```

```
    FastDisplayCase(Fnorm01x08.1515)[u,a],
    FastDisplayCase(Fnorm01x04.1515)[u,a],
    FastDisplayCase(Fnorm01x02.1515)[u,a]),3)
tbl
          AltMean AltMdn AltSD AltMean AltMdn AltSD AltMean AltMdn AltSD AltMean AltMdn AltSD
      tEq   0.000  0.000 0.001   0.037  0.012 0.065   0.174  0.114 0.179   0.313  0.258 0.246
    tHlth   0.000  0.000 0.002   0.025  0.005 0.058   0.154  0.079 0.187   0.304  0.236 0.259
soutAAA.2   0.518  0.673 0.240   0.328  0.227 0.284   0.236  0.114 0.261   0.279  0.161 0.266
soutAHA.2   0.495  0.673 0.270   0.306  0.152 0.295   0.228  0.099 0.263   0.280  0.166 0.265
soutHAH.2   0.025  0.001 0.085   0.074  0.018 0.144   0.158  0.070 0.207   0.263  0.180 0.248
soutHHH.2   0.031  0.003 0.090   0.077  0.023 0.143   0.165  0.082 0.205   0.272  0.191 0.245

frmt <- "    "
for (i in 1:(dim(tbl)[2])) frmt <- paste(frmt,format(tbl[,i]),sep=" & ")
frmt <- as.matrix(frmt)
dimnames(frmt) <- list(rep("",dim(frmt)[1]),"")
print(frmt,quote=F)
      & 0.000 & 0.000 & 0.001 & 0.037 & 0.012 & 0.065 & 0.174 & 0.114 & 0.179 & 0.313 & 0.258 & 0.246
      & 0.000 & 0.000 & 0.002 & 0.025 & 0.005 & 0.058 & 0.154 & 0.079 & 0.187 & 0.304 & 0.236 & 0.259
      & 0.518 & 0.673 & 0.240 & 0.328 & 0.227 & 0.284 & 0.236 & 0.114 & 0.261 & 0.279 & 0.161 & 0.266
      & 0.495 & 0.673 & 0.270 & 0.306 & 0.152 & 0.295 & 0.228 & 0.099 & 0.263 & 0.280 & 0.166 & 0.265
      & 0.025 & 0.001 & 0.085 & 0.074 & 0.018 & 0.144 & 0.158 & 0.070 & 0.207 & 0.263 & 0.180 & 0.248
      & 0.031 & 0.003 & 0.090 & 0.077 & 0.023 & 0.143 & 0.165 & 0.082 & 0.205 & 0.272 & 0.191 & 0.245

round(cbind(FastDisplayCase(Ft5df01x15.1515)[u,a],
    FastDisplayCase(Ft5df01x08.1515)[u,a],
    FastDisplayCase(Ft5df01x04.1515)[u,a],
    FastDisplayCase(Ft5df01x02.1515)[u,a]),3)
          AltMean AltMdn AltSD AltMean AltMdn AltSD AltMean AltMdn AltSD AltMean AltMdn AltSD
      tEq   0.003  0.000 0.017   0.071  0.025 0.112   0.223  0.158 0.211   0.349  0.294 0.263
    tHlth   0.004  0.000 0.019   0.059  0.016 0.110   0.209  0.127 0.222   0.344  0.277 0.275
soutAAA.2   0.543  0.747 0.258   0.407  0.367 0.289   0.331  0.253 0.279   0.361  0.303 0.275
soutAHA.2   0.498  0.747 0.300   0.371  0.266 0.306   0.315  0.219 0.282   0.355  0.282 0.276
soutHAH.2   0.062  0.010 0.139   0.134  0.049 0.193   0.229  0.133 0.243   0.325  0.250 0.266
soutHHH.2   0.065  0.009 0.143   0.128  0.045 0.191   0.229  0.136 0.240   0.327  0.251 0.265

# Table 3

u <- c(1,3,18:25)
a <- c("AltPwr","PVP10","PVP25")
tbl <- rbind(
    cbind(FastDisplayCase(Fnorm01x15.1515)[u,a],
        FastDisplayCase(Fnorm01x08.1515)[u,a],
        FastDisplayCase(Fnorm01x04.1515)[u,a],
        FastDisplayCase(Fnorm01x02.1515)[u,a]),
    cbind(FastDisplayCase(Fnorm20x15.1515)[u,a],
        FastDisplayCase(Fnorm20x08.1515)[u,a],
        FastDisplayCase(Fnorm20x04.1515)[u,a],
        FastDisplayCase(Fnorm20x02.1515)[u,a]),
    cbind(FastDisplayCase(Ft5df01x15.1515)[u,a],
        FastDisplayCase(Ft5df01x08.1515)[u,a],
        FastDisplayCase(Ft5df01x04.1515)[u,a],
        FastDisplayCase(Ft5df01x02.1515)[u,a]),
    cbind(FastDisplayCase(Ft5df20x15.1515)[u,a],
        FastDisplayCase(Ft5df20x08.1515)[u,a],
        FastDisplayCase(Ft5df20x04.1515)[u,a],
        FastDisplayCase(Ft5df20x02.1515)[u,a]))
# Comparisons of ratio of PVP for each statistic to PVP for tHlth
#         - y axis: PVP10 (black line) and PVP25 (blue line)
#         - x axis: various statistics (tEq, tHlth, AAA, AAH, AHA, AHH, HAA, HAH, HHA, HHH)
#         across
#              - number of cases with affected gene overexpressed (columns: 15, 8, 4, 2 from left to
 right)
#              - distributions (first and second row normal, third and fourth t 5df)
#              - number of genes with some overexpression (first and third row=1, second and fourth
 row=20)
```

```
par(mfrow=c(4,4))
for (i in 0:3)
    for (j in 0:3) {
        plot(rep(1:10,2),c(tbl[(1:10)+i*10,2+j*3]/tbl[2+i*10,2+j*3],tbl[(1:10)+i*10,3+j*3]/tbl
[2+i*10,3+j*3]),type="n",xlab="Statistic",ylab="PVP")
        lines(1:10,tbl[(1:10)+i*10,2+j*3]/tbl[2+i*10,2+j*3])
        lines(1:10,tbl[(1:10)+i*10,3+j*3]/tbl[2+i*10,3+j*3],col=2)
    }

par(mfrow=c(2,2))
for (j in 0:3) {
    plot(c(1,10),c(0,max(c(tbl[(1:10)+1*10,3+j*3],tbl[(1:10)+3*10,3+j*3])
*25)),type="n",xaxt="n",xlab="",ylab="Number Affected Genes Identified")
    axis(1,1:10,c("tEq","tHl","AAA","AAH","AHA","AHH","HAA","HAH","HHA","HHH"))
    title(paste("Overexpression in",c(15,8,4,2)[j+1],"of 15 Diseased"))
    lines(1:10,tbl[(1:10)+1*10,3+j*3]*25)
    points(1:10,tbl[(1:10)+1*10,3+j*3]*25,pch=1)
    lines(1:10,tbl[(1:10)+3*10,3+j*3]*25,lty=3,col=2)
    points(1:10,tbl[(1:10)+3*10,3+j*3]*25,pch=2,col=2)
}


u <- c(1,3,18,20,23,25)
a <- c("AltPwr","PVP25")
tbl <- rbind(
    cbind(FastDisplayCase(Fnorm20x15.1515)[u,a],
        FastDisplayCase(Fnorm20x08.1515)[u,a],
        FastDisplayCase(Fnorm20x04.1515)[u,a],
        FastDisplayCase(Fnorm20x02.1515)[u,a]),
    cbind(FastDisplayCase(Ft5df20x15.1515)[u,a],
        FastDisplayCase(Ft5df20x08.1515)[u,a],
        FastDisplayCase(Ft5df20x04.1515)[u,a],
        FastDisplayCase(Ft5df20x02.1515)[u,a]))
round(tbl,3)
          AltPwr PVP25 AltPwr PVP25 AltPwr PVP25 AltPwr PVP25
      tEq  1.000 0.795  0.788 0.427  0.291 0.129  0.129 0.054
    tHlth  1.000 0.789  0.873 0.525  0.398 0.196  0.173 0.077
soutAAA.2  0.054 0.026  0.226 0.129  0.327 0.177  0.235 0.108
soutAHA.2  0.100 0.048  0.284 0.157  0.342 0.182  0.221 0.102
soutHAH.2  0.876 0.611  0.647 0.383  0.384 0.201  0.194 0.089
soutHHH.2  0.834 0.558  0.606 0.350  0.339 0.169  0.168 0.073
      tEq  0.987 0.742  0.649 0.342  0.239 0.114  0.116 0.052
    tHlth  0.984 0.705  0.719 0.382  0.304 0.145  0.145 0.063
soutAAA.2  0.034 0.014  0.126 0.060  0.175 0.082  0.120 0.056
soutAHA.2  0.086 0.037  0.178 0.086  0.195 0.091  0.120 0.054
soutHAH.2  0.729 0.453  0.468 0.249  0.266 0.131  0.140 0.063
soutHHH.2  0.708 0.450  0.487 0.268  0.253 0.121  0.132 0.056

tbl[,2*(1:4)] <- 1 - tbl[,2*(1:4)]
tbl <- round(tbl,3)
frmt <- "    "
for (i in 1:(dim(tbl)[2])) frmt <- paste(frmt,format(tbl[,i]),sep=" & ")
frmt <- as.matrix(frmt)
dimnames(frmt) <- list(rep("",dim(frmt)[1]),"")
print(frmt,quote=F)
      & 1.000 & 0.205 & 0.788 & 0.573 & 0.291 & 0.871 & 0.129 & 0.946
      & 1.000 & 0.211 & 0.873 & 0.475 & 0.398 & 0.804 & 0.173 & 0.923
      & 0.054 & 0.974 & 0.226 & 0.871 & 0.327 & 0.823 & 0.235 & 0.892
      & 0.100 & 0.952 & 0.284 & 0.843 & 0.342 & 0.818 & 0.221 & 0.898
      & 0.876 & 0.389 & 0.647 & 0.617 & 0.384 & 0.799 & 0.194 & 0.911
      & 0.834 & 0.442 & 0.606 & 0.650 & 0.339 & 0.831 & 0.168 & 0.927
      & 0.987 & 0.258 & 0.649 & 0.658 & 0.239 & 0.886 & 0.116 & 0.948
      & 0.984 & 0.295 & 0.719 & 0.618 & 0.304 & 0.855 & 0.145 & 0.937
      & 0.034 & 0.986 & 0.126 & 0.940 & 0.175 & 0.918 & 0.120 & 0.944
      & 0.086 & 0.963 & 0.178 & 0.914 & 0.195 & 0.909 & 0.120 & 0.946
      & 0.729 & 0.547 & 0.468 & 0.751 & 0.266 & 0.869 & 0.140 & 0.937
```

```
      & 0.708 & 0.550 & 0.487 & 0.732 & 0.253 & 0.879 & 0.132 & 0.944

paste("     ",tbl[,1],tbl[,2],tbl[,3],tbl[,4],tbl[,5],tbl[,6],tbl[,7],tbl[,8],sep=" & ")


# Compare ordering of PVP10 and PVP25
plot(as.vector(tbl[,c(2,5,8,11)]),as.vector(tbl[,c(2,5,8,11)+1]))
# Compare ordering of PVP25 with 1 affected gene or 20 affected genes
plot(as.vector(tbl[c(1:6,13:18),c(2,5,8,11)+1]),as.vector(tbl[c(1:6,13:18)+6,c(2,5,8,11)+1]))
plot(as.vector(tbl[c(1:6),c(2,5,8,11)+1]),as.vector(tbl[c(1:6)+6,c(2,5,8,11)+1]))
points(as.vector(tbl[c(13:18),c(2,5,8,11)+1]),as.vector(tbl[c(13:18)+6,c(2,5,8,11)+1]),col=2)

# Comparisons of ratio of PVP for each statistic to PVP for tHlth
#         - y axis: PVP10 (black line) and PVP25 (blue line)
#         - x axis: various statistics (tEq, tHlth, AAA, AHA, HAH, HHH)
#         across
#              - number of cases with affected gene overexpressed (columns: 15, 8, 4, 2 from left to
 right)
#              - distributions (first and second row normal, third and fourth t 5df)
#              - number of genes with some overexpression (first and third row=1, second and fourth
 row=20)
par(mfrow=c(4,4))
for (i in 0:3)
    for (j in 0:3) {
        plot(rep(1:6,2),c(tbl[(1:6)+i*6,2+j*3]/tbl[2+i*6,2+j*3],tbl[(1:6)+i*6,3+j*3]/tbl
[2+i*6,3+j*3]),type="n",xlab="Statistic",ylab="PVP")
        lines(1:6,tbl[(1:6)+i*6,2+j*3]/tbl[2+i*6,2+j*3])
        lines(1:6,tbl[(1:6)+i*6,3+j*3]/tbl[2+i*6,3+j*3],col=2)
    }
```