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title: "TCGA p53 Mutations and NOX4 Differential Expression Analysis" output: word\_document ---

# General Notes

P53 mutation status and expression data were first extracted from cbioportal data and cross-matched by Sample ID to obtain complete and validated p53 mutation status designations for each sample. Samples with ambiguous mutation status or lack designation were removed from the data set. Data were plotted as followed and analyzed by non-parametric Mann-Whitney Wilcoxon test (Wilcoxon Rank Sum and Signed Rank Tests). Differential threshold of p=0.05 were used to establish statistical significance. Some mutations were excluded from the Wilcoxon test due to low sample numbers in the specific mutation status in the corresponding cancer studies.

# Breast Invasive Carcinoma

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Breast.WT$NOX4 and Breast.Y220C$NOX4  
## W = 968, p-value = 0.004737  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Breast.WT$NOX4 and Breast.R175H$NOX4  
## W = 1735, p-value = 0.005831  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Breast.WT$NOX4 and Breast.R248W$NOX4  
## W = 508, p-value = 0.02264  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Breast.WT$NOX4 and Breast.G245D$NOX4  
## W = 255, p-value = 0.1004  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Breast.WT$NOX4 and Breast.H179R$NOX4  
## W = 283, p-value = 0.1811  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Breast.WT$NOX4 and Breast.R273C$NOX4  
## W = 413, p-value = 0.02092  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Breast.WT$NOX4 and Breast.R273H$NOX4  
## W = 1027, p-value = 0.6374  
## alternative hypothesis: true location shift is not equal to 0

Y220C, R175H, R248W, R273C p53 mutants have statistically significant differences in terms of NOX4 expression when compared to wild-type.

# Head and Neck Squamous Cell Carcinoma

## Warning in wilcox.test.default(Neck.H179R$NOX4, Neck.WT$NOX4): cannot  
## compute exact p-value with ties

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Neck.H179R$NOX4 and Neck.WT$NOX4  
## W = 38, p-value = 0.7538  
## alternative hypothesis: true location shift is not equal to 0

## Warning in wilcox.test.default(Neck.WT$NOX4, Neck.R175H$NOX4): cannot  
## compute exact p-value with ties

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Neck.WT$NOX4 and Neck.R175H$NOX4  
## W = 40, p-value = 0.1089  
## alternative hypothesis: true location shift is not equal to 0

## Warning in wilcox.test.default(Neck.WT$NOX4, Neck.R248Q$NOX4): cannot  
## compute exact p-value with ties

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Neck.WT$NOX4 and Neck.R248Q$NOX4  
## W = 58, p-value = 0.3316  
## alternative hypothesis: true location shift is not equal to 0

## Warning in wilcox.test.default(Neck.WT$NOX4, Neck.R248W$NOX4): cannot  
## compute exact p-value with ties

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Neck.WT$NOX4 and Neck.R248W$NOX4  
## W = 86, p-value = 0.98  
## alternative hypothesis: true location shift is not equal to 0

## Warning in wilcox.test.default(Neck.WT$NOX4, Neck.R273C$NOX4): cannot  
## compute exact p-value with ties

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Neck.WT$NOX4 and Neck.R273C$NOX4  
## W = 36, p-value = 0.3099  
## alternative hypothesis: true location shift is not equal to 0

## Warning in wilcox.test.default(Neck.WT$NOX4, Neck.R273H$NOX4): cannot  
## compute exact p-value with ties

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Neck.WT$NOX4 and Neck.R273H$NOX4  
## W = 58, p-value = 0.005217  
## alternative hypothesis: true location shift is not equal to 0

## Warning in wilcox.test.default(Neck.WT$NOX4, Neck.R282W$NOX4): cannot  
## compute exact p-value with ties

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Neck.WT$NOX4 and Neck.R282W$NOX4  
## W = 89, p-value = 0.8604  
## alternative hypothesis: true location shift is not equal to 0

## Warning in wilcox.test.default(Neck.WT$NOX4, Neck.V157F$NOX4): cannot  
## compute exact p-value with ties

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Neck.WT$NOX4 and Neck.V157F$NOX4  
## W = 15, p-value = 0.09743  
## alternative hypothesis: true location shift is not equal to 0

## Warning in wilcox.test.default(Neck.WT$NOX4, Neck.Y220C$NOX4): cannot  
## compute exact p-value with ties

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Neck.WT$NOX4 and Neck.Y220C$NOX4  
## W = 20, p-value = 0.2265  
## alternative hypothesis: true location shift is not equal to 0

R273H p53 mutants have statistically significant differences in terms of NOX4 expression when compared to wild-type.

# Lung Squamous Cell Carcinoma

No Statistically Significant Data

# Pancreatic Adenocarcinoma

##   
## Wilcoxon rank sum test  
##   
## data: Panc.WT$NOX4 and Panc.R175H$NOX4  
## W = 31, p-value = 0.04364  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test  
##   
## data: Panc.WT$NOX4 and Panc.R248W$NOX4  
## W = 34, p-value = 0.06333  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test  
##   
## data: Panc.WT$NOX4 and Panc.R248Q$NOX4  
## W = 17, p-value = 0.09556  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test  
##   
## data: Panc.WT$NOX4 and Panc.R273C$NOX4  
## W = 10, p-value = 0.02702  
## alternative hypothesis: true location shift is not equal to 0

R175H and R273C p53 mutants have statistically significant differences in terms of NOX4 expression when compared to wild-type.

# Brain Lower Grade Glioma

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Brain.H179R$NOX4 and Brain.WT$NOX4  
## W = 574, p-value = 0.04226  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Brain.WT$NOX4 and Brain.R175H$NOX4  
## W = 849, p-value = 0.1682  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Brain.WT$NOX4 and Brain.R248Q$NOX4  
## W = 992, p-value = 0.01398  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Brain.WT$NOX4 and Brain.R248W$NOX4  
## W = 769, p-value = 0.002446  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Brain.WT$NOX4 and Brain.R273C$NOX4  
## W = 6804, p-value = 4.467e-06  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Brain.WT$NOX4 and Brain.R273H$NOX4  
## W = 1329, p-value = 0.2097  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Brain.WT$NOX4 and Brain.R282W$NOX4  
## W = 917, p-value = 0.009128  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Brain.WT$NOX4 and Brain.Y220C$NOX4  
## W = 751, p-value = 0.5234  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Brain.WT$NOX4 and Brain.R273L$NOX4  
## W = 624, p-value = 0.3633  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Brain.WT$NOX4 and Brain.H193R$NOX4  
## W = 438, p-value = 0.1034  
## alternative hypothesis: true location shift is not equal to 0

H179R, R248Q, R248W, R273C, R282W p53 mutants have statistically significant differences in terms of NOX4 expression when compared to wild-type. WTp53 NOX4 data was heavily skewed so the data were log transformed.

# Glioblastoma Multiforme

## Warning in wilcox.test.default(Glio.H179R$NOX4, Glio.WT$NOX4): cannot  
## compute exact p-value with ties

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Glio.H179R$NOX4 and Glio.WT$NOX4  
## W = 66, p-value = 0.05188  
## alternative hypothesis: true location shift is not equal to 0

## Warning in wilcox.test.default(Glio.WT$NOX4, Glio.R248Q$NOX4): cannot  
## compute exact p-value with ties

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Glio.WT$NOX4 and Glio.R248Q$NOX4  
## W = 42, p-value = 0.547  
## alternative hypothesis: true location shift is not equal to 0

## Warning in wilcox.test.default(Glio.WT$NOX4, Glio.R273H$NOX4): cannot  
## compute exact p-value with ties

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Glio.WT$NOX4 and Glio.R273H$NOX4  
## W = 11, p-value = 0.02944  
## alternative hypothesis: true location shift is not equal to 0

##   
## Mood two-sample test of scale  
##   
## data: Glio.WT$NOX4 and Glio.R273H$NOX4  
## Z = -0.53712, p-value = 0.5912  
## alternative hypothesis: two.sided

No Statistically Significant Data

# Bladder Urothelial Carcinoma

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: bla.WT$NOX4 and bla.R248Q$NOX4  
## W = 2546, p-value = 0.05545  
## alternative hypothesis: true location shift is not equal to 0

##   
## Mood two-sample test of scale  
##   
## data: bla.WT$NOX4 and bla.R248Q$NOX4  
## Z = -1.5624, p-value = 0.1182  
## alternative hypothesis: two.sided

No Statistically Significant Data

# Liver Hep Carcinoma

##   
## Wilcoxon rank sum test  
##   
## data: Liver.WT$NOX4 and Liver.R249S$NOX4  
## W = 58, p-value = 0.01034  
## alternative hypothesis: true location shift is not equal to 0

R249S p53 mutants have statistically significant differences in terms of NOX4 expression when compared to wild-type.

# Ovarian Cystadenocarcinoma

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Ovar.H179R$NOX4 and Ovar.WT$NOX4  
## W = 222, p-value = 0.7648  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Ovar.WT$NOX4 and Ovar.R175H$NOX4  
## W = 652, p-value = 0.149  
## alternative hypothesis: true location shift is not equal to 0

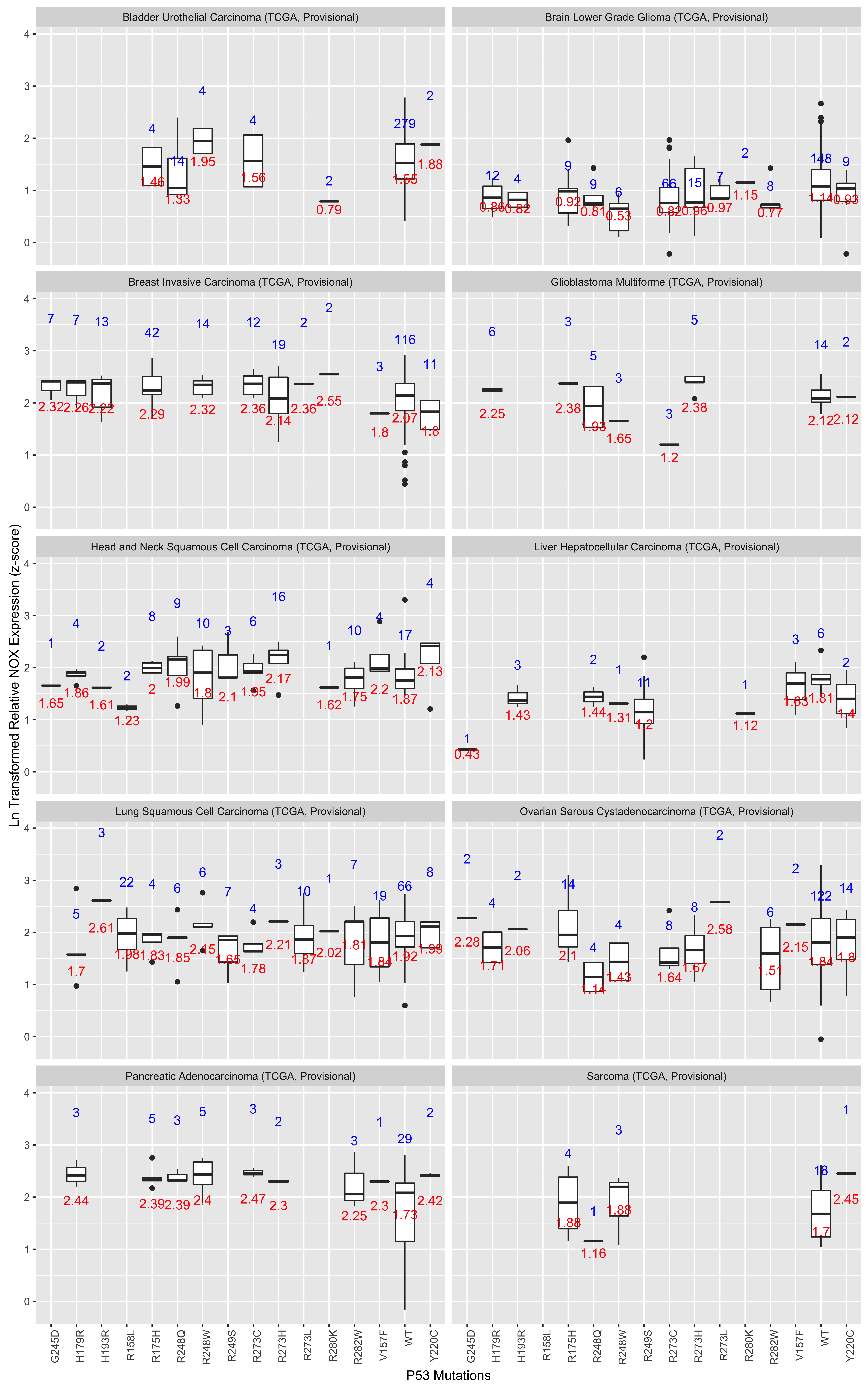
##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Ovar.WT$NOX4 and Ovar.R248Q$NOX4  
## W = 408, p-value = 0.0229  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Ovar.WT$NOX4 and Ovar.R273C$NOX4  
## W = 596, p-value = 0.2977  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Ovar.WT$NOX4 and Ovar.R273H$NOX4  
## W = 556, p-value = 0.5132  
## alternative hypothesis: true location shift is not equal to 0

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: Ovar.WT$NOX4 and Ovar.Y220C$NOX4  
## W = 862, p-value = 0.9572  
## alternative hypothesis: true location shift is not equal to 0

R248Q p53 mutants have statistically significant differences in terms of NOX4 expression when compared to wild-type.



# Studies with Statistically Significant Differential Expression of NOX4

