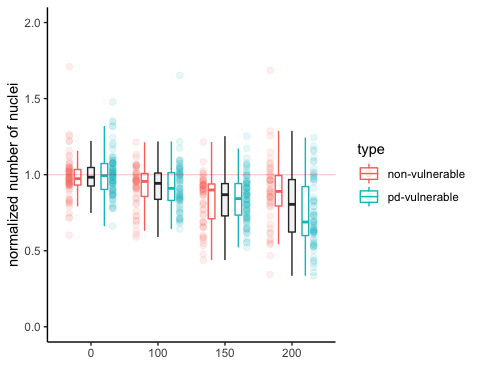
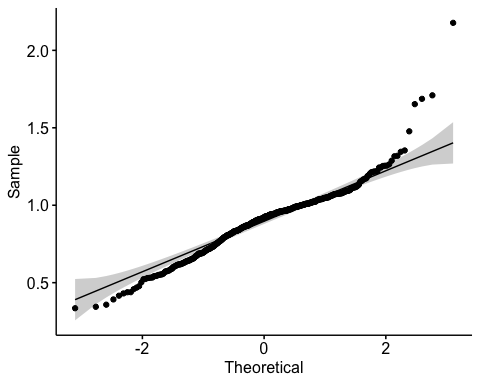
Supplementary data and figures

Table of Contents

# PD-vulnerable neurons are less resilient to cell stress induced by hydrogen peroxide

## Figure 1-1

Nuclei (DAPI) count

 Normality? 

# A tibble: 4 × 4  
 hydrogen\_peroxide variable statistic p  
 <fct> <chr> <dbl> <dbl>  
1 0 dapi\_normalized 0.808 5.36e-13  
2 100 dapi\_normalized 0.941 6.11e- 5  
3 150 dapi\_normalized 0.984 9.97e- 2  
4 200 dapi\_normalized 0.977 4.52e- 2

Kurskal-Wallis

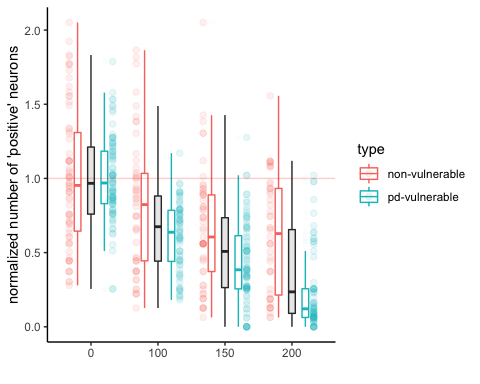
Kruskal-Wallis rank sum test  
  
data: dapi\_normalized by hydrogen\_peroxide  
Kruskal-Wallis chi-squared = 91.227, df = 3, p-value < 2.2e-16

Dunn test

Comparison Z P.unadj P.adj  
1 0 - 100 3.4001879 6.733956e-04 4.040373e-03  
2 0 - 150 7.8043915 5.978932e-15 3.587359e-14  
3 100 - 150 3.9718484 7.131711e-05 4.279026e-04  
4 0 - 200 8.1835348 2.756366e-16 1.653819e-15  
5 100 - 200 4.5069337 6.577117e-06 3.946270e-05  
6 150 - 200 0.7245953 4.687004e-01 1.000000e+00

Neuron count

## Figure 2-1



Kurskal-Wallis

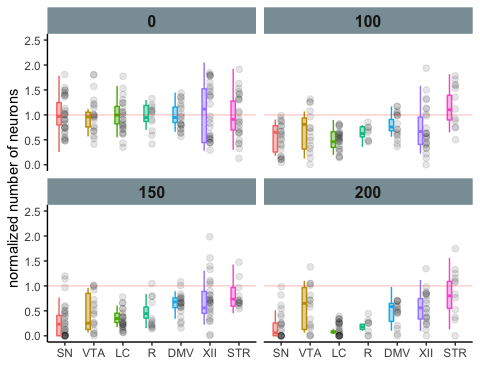
Kruskal-Wallis rank sum test  
  
data: neuron\_normalized by hydrogen\_peroxide  
Kruskal-Wallis chi-squared = 164.32, df = 3, p-value < 2.2e-16

Dunn test

Comparison Z P.unadj P.adj  
1 0 - 100 5.867938 4.412478e-09 2.647487e-08  
2 0 - 150 9.779527 1.378532e-22 8.271193e-22  
3 100 - 150 3.408957 6.521186e-04 3.912712e-03  
4 0 - 200 11.754230 6.717025e-32 4.030215e-31  
5 100 - 200 5.563542 2.643538e-08 1.586123e-07  
6 150 - 200 2.386850 1.699342e-02 1.019605e-01

# Differential vulnerability of neurons to hydrogen peroxide

## Figure 3-1



Kruskal-Wallis and Dunn test for each concetration

0 micromollar

Kruskal-Wallis rank sum test  
  
data: neuron\_normalized by neuron  
Kruskal-Wallis chi-squared = 0.43515, df = 6, p-value = 0.9985

Comparison Z P.unadj P.adj  
1 DMV - LC 0.04600991 0.9633024 1  
2 DMV - R -0.01706684 0.9863833 1  
3 LC - R -0.05702708 0.9545236 1  
4 DMV - SN 0.05968455 0.9524069 1  
5 LC - SN 0.01204718 0.9903880 1  
6 R - SN 0.06868787 0.9452381 1  
7 DMV - STR 0.38805723 0.6979737 1  
8 LC - STR 0.35874226 0.7197879 1  
9 R - STR 0.34993891 0.7263845 1  
10 SN - STR 0.36610036 0.7142902 1  
11 DMV - VTA 0.39298245 0.6943324 1  
12 LC - VTA 0.36444688 0.7155243 1  
13 R - VTA 0.35739962 0.7207927 1  
14 SN - VTA 0.37080616 0.7107819 1  
15 STR - VTA 0.02239956 0.9821292 1  
16 DMV - XII 0.34198331 0.7323635 1  
17 LC - XII 0.30997827 0.7565775 1  
18 R - XII 0.30876417 0.7575009 1  
19 SN - XII 0.31538169 0.7524719 1  
20 STR - XII -0.05916447 0.9528211 1  
21 VTA - XII -0.07924845 0.9368350 1

100 micromollar

Kruskal-Wallis rank sum test  
  
data: neuron\_normalized by neuron  
Kruskal-Wallis chi-squared = 27.496, df = 6, p-value = 0.0001169

Comparison Z P.unadj P.adj  
1 DMV - LC 3.05767631 2.230604e-03 4.684268e-02  
2 DMV - R 1.34734970 1.778676e-01 1.000000e+00  
3 LC - R -0.98822521 3.230424e-01 1.000000e+00  
4 DMV - SN 2.10964597 3.488886e-02 7.326661e-01  
5 LC - SN -0.95978913 3.371614e-01 1.000000e+00  
6 R - SN 0.28076187 7.788930e-01 1.000000e+00  
7 DMV - STR -1.83772941 6.610229e-02 1.000000e+00  
8 LC - STR -4.77623845 1.786046e-06 3.750697e-05  
9 R - STR -2.81576290 4.866157e-03 1.021893e-01  
10 SN - STR -3.87390539 1.071050e-04 2.249205e-03  
11 DMV - VTA 1.13666428 2.556787e-01 1.000000e+00  
12 LC - VTA -1.75714226 7.889356e-02 1.000000e+00  
13 R - VTA -0.39951133 6.895165e-01 1.000000e+00  
14 SN - VTA -0.86242974 3.884511e-01 1.000000e+00  
15 STR - VTA 2.86680545 4.146378e-03 8.707394e-02  
16 DMV - XII 1.29462100 1.954510e-01 1.000000e+00  
17 LC - XII -1.93767522 5.266286e-02 1.000000e+00  
18 R - XII -0.39459214 6.931439e-01 1.000000e+00  
19 SN - XII -0.92310331 3.559534e-01 1.000000e+00  
20 STR - XII 3.15425423 1.609088e-03 3.379086e-02  
21 VTA - XII 0.03899101 9.688976e-01 1.000000e+00

150 micromollar

Kruskal-Wallis rank sum test  
  
data: neuron\_normalized by neuron  
Kruskal-Wallis chi-squared = 43.006, df = 6, p-value = 1.163e-07

Comparison Z P.unadj P.adj  
1 DMV - LC 3.40923177 6.514611e-04 1.368068e-02  
2 DMV - R 1.86033898 6.283758e-02 1.000000e+00  
3 LC - R -0.99814183 3.182106e-01 1.000000e+00  
4 DMV - SN 4.59262928 4.376962e-06 9.191620e-05  
5 LC - SN 1.12299366 2.614402e-01 1.000000e+00  
6 R - SN 1.92817745 5.383306e-02 1.000000e+00  
7 DMV - STR -0.91146407 3.620509e-01 1.000000e+00  
8 LC - STR -3.86084771 1.129943e-04 2.372881e-03  
9 R - STR -2.47917602 1.316863e-02 2.765412e-01  
10 SN - STR -4.86157808 1.164536e-06 2.445526e-05  
11 DMV - VTA 2.09242381 3.640062e-02 7.644130e-01  
12 LC - VTA -1.07866488 2.807371e-01 1.000000e+00  
13 R - VTA 0.02906247 9.768148e-01 1.000000e+00  
14 SN - VTA -2.12809949 3.332884e-02 6.999055e-01  
15 STR - VTA 2.71346613 6.658337e-03 1.398251e-01  
16 DMV - XII 0.52063882 6.026184e-01 1.000000e+00  
17 LC - XII -3.09940140 1.939121e-03 4.072154e-02  
18 R - XII -1.50275652 1.329018e-01 1.000000e+00  
19 SN - XII -4.36835989 1.251831e-05 2.628845e-04  
20 STR - XII 1.39737195 1.623017e-01 1.000000e+00  
21 VTA - XII -1.71656602 8.605850e-02 1.000000e+00

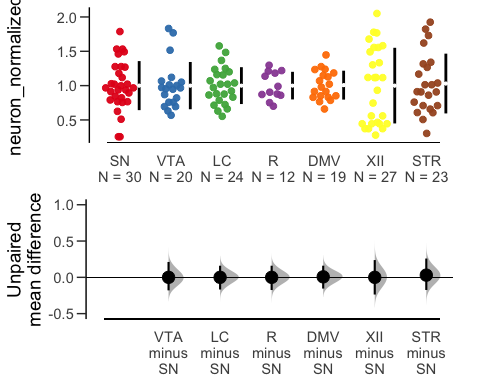
200 micromollar

Kruskal-Wallis rank sum test  
  
data: neuron\_normalized by neuron  
Kruskal-Wallis chi-squared = 55.538, df = 6, p-value = 3.608e-10

Comparison Z P.unadj P.adj  
1 DMV - LC 4.63069760 3.644358e-06 7.653152e-05  
2 DMV - R 1.77727430 7.552312e-02 1.000000e+00  
3 LC - R -1.77580383 7.576526e-02 1.000000e+00  
4 DMV - SN 3.66003770 2.521781e-04 5.295741e-03  
5 LC - SN -0.88166475 3.779581e-01 1.000000e+00  
6 R - SN 1.09490499 2.735583e-01 1.000000e+00  
7 DMV - STR -0.93784904 3.483220e-01 1.000000e+00  
8 LC - STR -5.24022196 1.603836e-07 3.368055e-06  
9 R - STR -2.47073125 1.348371e-02 2.831579e-01  
10 SN - STR -4.34278531 1.406876e-05 2.954440e-04  
11 DMV - VTA 0.27340288 7.845435e-01 1.000000e+00  
12 LC - VTA -4.33119975 1.482991e-05 3.114281e-04  
13 R - VTA -1.55404178 1.201745e-01 1.000000e+00  
14 SN - VTA -3.37184576 7.466625e-04 1.567991e-02  
15 STR - VTA 1.19097093 2.336650e-01 1.000000e+00  
16 DMV - XII -0.06428897 9.487401e-01 1.000000e+00  
17 LC - XII -5.00756106 5.512407e-07 1.157605e-05  
18 R - XII -1.89119953 5.859771e-02 1.000000e+00  
19 SN - XII -3.95024497 7.807125e-05 1.639496e-03  
20 STR - XII 0.92177281 3.566471e-01 1.000000e+00  
21 VTA - XII -0.35248092 7.244776e-01 1.000000e+00

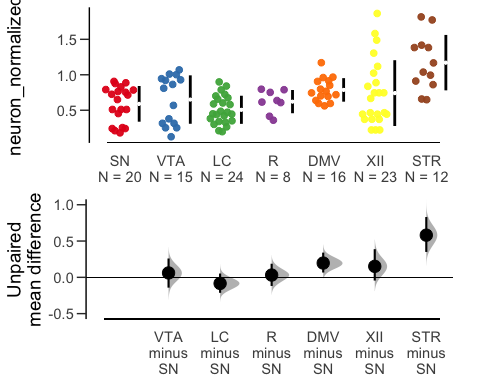
Estimation statistics

0 micromollar



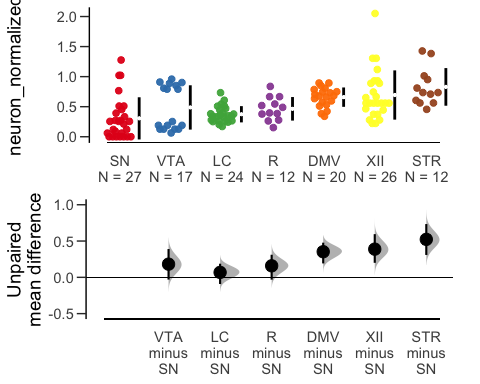
dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:31 am on Friday March 25, 2022.  
  
Dataset : .  
X Variable : neuron  
Y Variable : neuron\_normalized  
  
Unpaired mean difference of VTA (n = 20) minus SN (n = 30)  
 0 [95CI -0.179; 0.212]  
  
Unpaired mean difference of LC (n = 24) minus SN (n = 30)  
 0 [95CI -0.168; 0.16]  
  
Unpaired mean difference of R (n = 12) minus SN (n = 30)  
 -1.11e-16 [95CI -0.175; 0.16]  
  
Unpaired mean difference of DMV (n = 19) minus SN (n = 30)  
 0.00684 [95CI -0.155; 0.16]  
  
Unpaired mean difference of XII (n = 27) minus SN (n = 30)  
 0 [95CI -0.237; 0.238]  
  
Unpaired mean difference of STR (n = 23) minus SN (n = 30)  
 0.0303 [95CI -0.174; 0.259]  
  
  
5000 bootstrap resamples.  
All confidence intervals are bias-corrected and accelerated.

100 micromollar



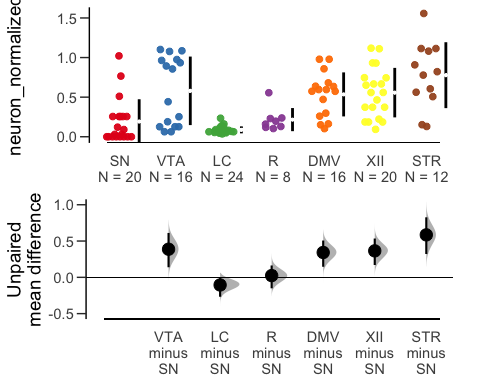
dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:31 am on Friday March 25, 2022.  
  
Dataset : .  
X Variable : neuron  
Y Variable : neuron\_normalized  
  
Unpaired mean difference of VTA (n = 15) minus SN (n = 20)  
 0.0605 [95CI -0.142; 0.26]  
  
Unpaired mean difference of LC (n = 24) minus SN (n = 20)  
 -0.0838 [95CI -0.213; 0.0524]  
  
Unpaired mean difference of R (n = 8) minus SN (n = 20)  
 0.0314 [95CI -0.119; 0.187]  
  
Unpaired mean difference of DMV (n = 16) minus SN (n = 20)  
 0.197 [95CI 0.0662; 0.34]  
  
Unpaired mean difference of XII (n = 23) minus SN (n = 20)  
 0.152 [95CI -0.0443; 0.388]  
  
Unpaired mean difference of STR (n = 12) minus SN (n = 20)  
 0.581 [95CI 0.35; 0.831]  
  
  
5000 bootstrap resamples.  
All confidence intervals are bias-corrected and accelerated.

150 micromollar



dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:32 am on Friday March 25, 2022.  
  
Dataset : .  
X Variable : neuron  
Y Variable : neuron\_normalized  
  
Unpaired mean difference of VTA (n = 17) minus SN (n = 27)  
 0.182 [95CI -0.0308; 0.39]  
  
Unpaired mean difference of LC (n = 24) minus SN (n = 27)  
 0.0681 [95CI -0.0918; 0.188]  
  
Unpaired mean difference of R (n = 12) minus SN (n = 27)  
 0.159 [95CI -0.0317; 0.311]  
  
Unpaired mean difference of DMV (n = 20) minus SN (n = 27)  
 0.353 [95CI 0.192; 0.478]  
  
Unpaired mean difference of XII (n = 26) minus SN (n = 27)  
 0.388 [95CI 0.2; 0.595]  
  
Unpaired mean difference of STR (n = 12) minus SN (n = 27)  
 0.523 [95CI 0.308; 0.734]  
  
  
5000 bootstrap resamples.  
All confidence intervals are bias-corrected and accelerated.

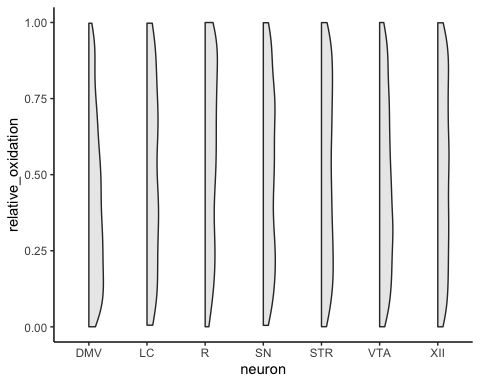
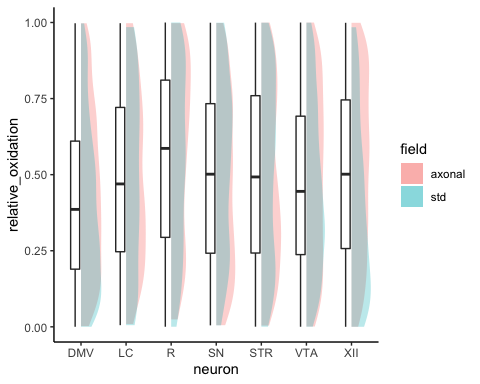
200 micromollar



dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:32 am on Friday March 25, 2022.  
  
Dataset : .  
X Variable : neuron  
Y Variable : neuron\_normalized  
  
Unpaired mean difference of VTA (n = 16) minus SN (n = 20)  
 0.387 [95CI 0.139; 0.611]  
  
Unpaired mean difference of LC (n = 24) minus SN (n = 20)  
 -0.105 [95CI -0.268; -0.0105]  
  
Unpaired mean difference of R (n = 8) minus SN (n = 20)  
 0.0239 [95CI -0.151; 0.163]  
  
Unpaired mean difference of DMV (n = 16) minus SN (n = 20)  
 0.342 [95CI 0.146; 0.507]  
  
Unpaired mean difference of XII (n = 20) minus SN (n = 20)  
 0.365 [95CI 0.17; 0.534]  
  
Unpaired mean difference of STR (n = 12) minus SN (n = 20)  
 0.585 [95CI 0.322; 0.827]  
  
  
5000 bootstrap resamples.  
All confidence intervals are bias-corrected and accelerated.

# No overt difference in mitochondrial ROS production observed between neurons

## Figure 4-1



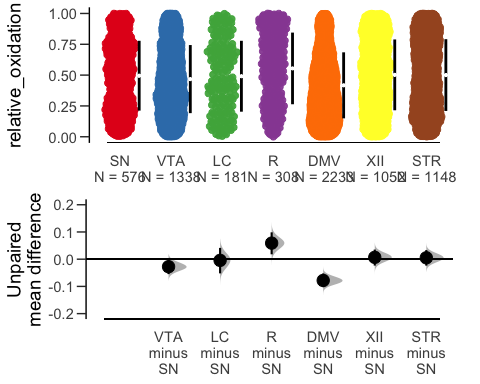
Kruskal-Wallis

Kruskal-Wallis rank sum test  
  
data: relative\_oxidation by neuron  
Kruskal-Wallis chi-squared = 133.58, df = 6, p-value < 2.2e-16

Dunn

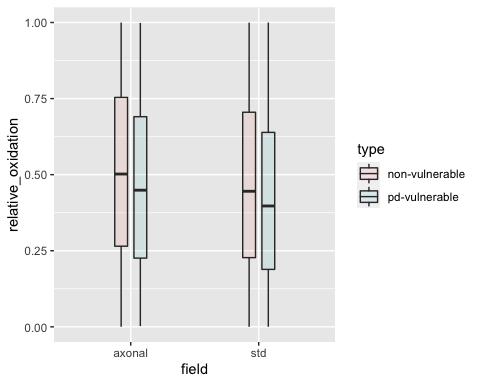
Comparison Z P.unadj P.adj  
1 DMV - LC -3.3231328 8.901252e-04 1.869263e-02  
2 DMV - R -7.8362467 4.642135e-15 9.748483e-14  
3 LC - R -2.3435415 1.910163e-02 4.011343e-01  
4 DMV - SN -5.8719183 4.307810e-09 9.046400e-08  
5 LC - SN -0.2064038 8.364755e-01 1.000000e+00  
6 R - SN 2.8602152 4.233536e-03 8.890425e-02  
7 DMV - STR -7.9501041 1.863548e-15 3.913451e-14  
8 LC - STR -0.3988749 6.899854e-01 1.000000e+00  
9 R - STR 2.9232967 3.463463e-03 7.273272e-02  
10 SN - STR -0.2802927 7.792529e-01 1.000000e+00  
11 DMV - VTA -5.1989318 2.004370e-07 4.209178e-06  
12 LC - VTA 0.9733339 3.303874e-01 1.000000e+00  
13 R - VTA 4.6926942 2.696303e-06 5.662237e-05  
14 SN - VTA 1.8997528 5.746557e-02 1.000000e+00  
15 STR - VTA 2.7090509 6.747598e-03 1.416996e-01  
16 DMV - XII -7.9440379 1.957037e-15 4.109778e-14  
17 LC - XII -0.5001405 6.169762e-01 1.000000e+00  
18 R - XII 2.7666535 5.663492e-03 1.189333e-01  
19 SN - XII -0.4371405 6.620094e-01 1.000000e+00  
20 STR - XII -0.1955555 8.449581e-01 1.000000e+00  
21 VTA - XII -2.8474318 4.407354e-03 9.255444e-02

Estimation statistics



dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:33 am on Friday March 25, 2022.  
  
Dataset : .  
X Variable : neuron  
Y Variable : relative\_oxidation  
  
Unpaired mean difference of VTA (n = 1338) minus SN (n = 576)  
 -0.0276 [95CI -0.0548; 0.000542]  
  
Unpaired mean difference of LC (n = 181) minus SN (n = 576)  
 -0.00436 [95CI -0.0521; 0.0415]  
  
Unpaired mean difference of R (n = 308) minus SN (n = 576)  
 0.059 [95CI 0.018; 0.0987]  
  
Unpaired mean difference of DMV (n = 2233) minus SN (n = 576)  
 -0.0782 [95CI -0.103; -0.0525]  
  
Unpaired mean difference of XII (n = 1052) minus SN (n = 576)  
 0.00677 [95CI -0.0235; 0.0352]  
  
Unpaired mean difference of STR (n = 1148) minus SN (n = 576)  
 0.00515 [95CI -0.0237; 0.0334]  
  
  
5000 bootstrap resamples.  
All confidence intervals are bias-corrected and accelerated.

Comparing axonal vs std (note - very small effect - significant)



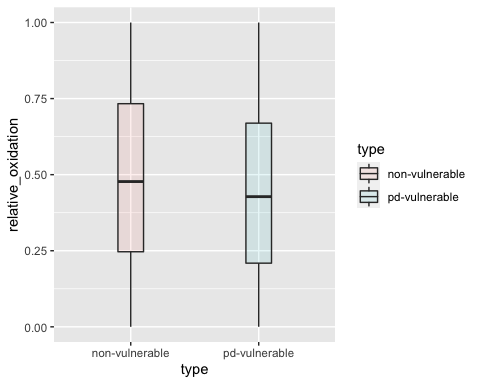
Welch Two Sample t-test - Axonal only

Welch Two Sample t-test  
  
data: relative\_oxidation by type  
t = 4.0736, df = 3485, p-value = 4.732e-05  
alternative hypothesis: true difference in means is not equal to 0  
95 percent confidence interval:  
 0.01993059 0.05691848  
sample estimates:  
mean in group non-vulnerable mean in group pd-vulnerable   
 0.5063470 0.4679225

Welch Two Sample t-test - STD only

Welch Two Sample t-test  
  
data: relative\_oxidation by type  
t = 4.0736, df = 3485, p-value = 4.732e-05  
alternative hypothesis: true difference in means is not equal to 0  
95 percent confidence interval:  
 0.01993059 0.05691848  
sample estimates:  
mean in group non-vulnerable mean in group pd-vulnerable   
 0.5063470 0.4679225

Comparing vulnerable vs non-vulnerable - significant by very small effect size

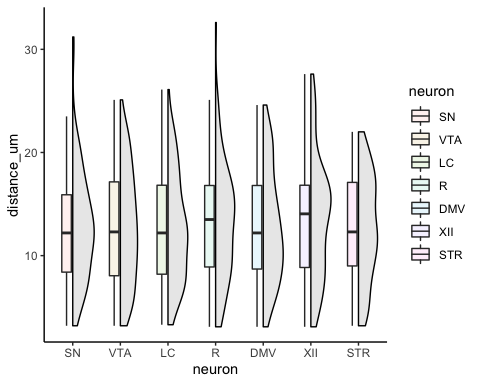


Welch Two Sample t-test

Welch Two Sample t-test  
  
data: relative\_oxidation by type  
t = 6.016, df = 6820.1, p-value = 1.881e-09  
alternative hypothesis: true difference in means is not equal to 0  
95 percent confidence interval:  
 0.02759581 0.05427272  
sample estimates:  
mean in group non-vulnerable mean in group pd-vulnerable   
 0.4884508 0.4475166

### Intermitochondrial distance (roGFP)

## Figure 4-2



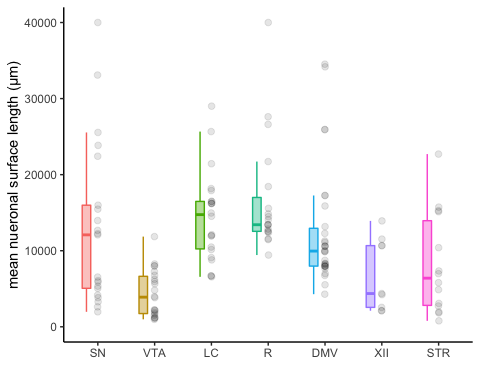
Kurskal-Wallis

Kruskal-Wallis rank sum test  
  
data: distance\_um by neuron  
Kruskal-Wallis chi-squared = 1.4927, df = 6, p-value = 0.96

Estimation statistics — not applicable

# PD-vulnerable neurons have large axonal domains, that are globally more complex than PD-resilient neurons

## Figure 6-1



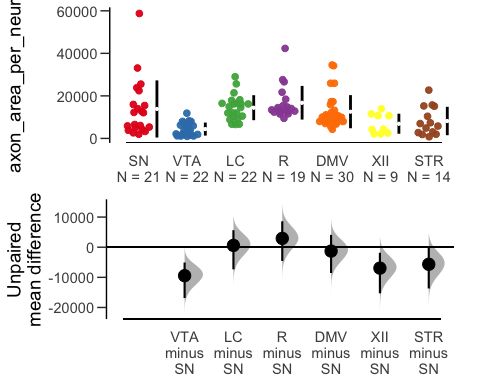
Kruskal-Wallis

Kruskal-Wallis rank sum test  
  
data: axon\_area\_per\_neuron by neuron  
Kruskal-Wallis chi-squared = 49.602, df = 6, p-value = 5.649e-09

Dunn

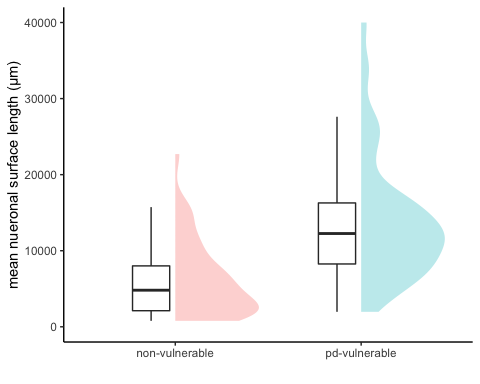
Comparison Z P.unadj P.adj  
1 DMV - LC -1.4910572 1.359465e-01 1.000000e+00  
2 DMV - R -2.1697753 3.002387e-02 6.305013e-01  
3 LC - R -0.6949384 4.870939e-01 1.000000e+00  
4 DMV - SN 0.3799178 7.040065e-01 1.000000e+00  
5 LC - SN 1.7261794 8.431515e-02 1.000000e+00  
6 R - SN 2.3506380 1.874126e-02 3.935664e-01  
7 DMV - STR 1.8240271 6.814798e-02 1.000000e+00  
8 LC - STR 2.9510478 3.166979e-03 6.650657e-02  
9 R - STR 3.4823377 4.970564e-04 1.043819e-02  
10 SN - STR 1.3978009 1.621729e-01 1.000000e+00  
11 DMV - VTA 4.2860413 1.818852e-05 3.819588e-04  
12 LC - VTA 5.3781860 7.524006e-08 1.580041e-06  
13 R - VTA 5.8726242 4.289502e-09 9.007953e-08  
14 SN - VTA 3.5891017 3.318193e-04 6.968206e-03  
15 STR - VTA 1.7920665 7.312232e-02 1.000000e+00  
16 DMV - XII 1.8995788 5.748842e-02 1.000000e+00  
17 LC - XII 2.8822979 3.947864e-03 8.290513e-02  
18 R - XII 3.3562827 7.899777e-04 1.658953e-02  
19 SN - XII 1.5407671 1.233735e-01 1.000000e+00  
20 STR - XII 0.3079467 7.581229e-01 1.000000e+00  
21 VTA - XII -1.2158840 2.240291e-01 1.000000e+00

Estimation statistics



dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:33 am on Friday March 25, 2022.  
  
Dataset : .  
X Variable : neuron  
Y Variable : axon\_area\_per\_neuron  
  
Unpaired mean difference of VTA (n = 22) minus SN (n = 21)  
 -9450 [95CI -16900; -5080]  
  
Unpaired mean difference of LC (n = 22) minus SN (n = 21)  
 595 [95CI -7340; 5640]  
  
Unpaired mean difference of R (n = 19) minus SN (n = 21)  
 2920 [95CI -4570; 8600]  
  
Unpaired mean difference of DMV (n = 30) minus SN (n = 21)  
 -1290 [95CI -8570; 4100]  
  
Unpaired mean difference of XII (n = 9) minus SN (n = 21)  
 -6940 [95CI -15300; -1850]  
  
Unpaired mean difference of STR (n = 14) minus SN (n = 21)  
 -5660 [95CI -13700; -190]  
  
  
5000 bootstrap resamples.  
All confidence intervals are bias-corrected and accelerated.

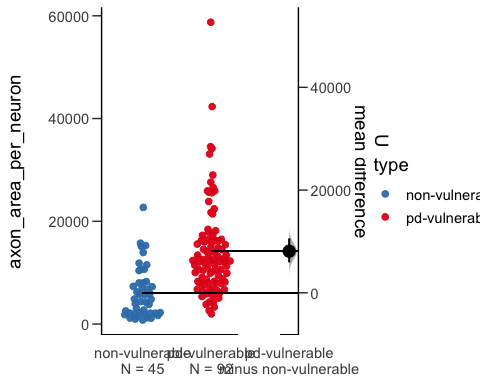
*PD-vulnerable vs PD-resilient*

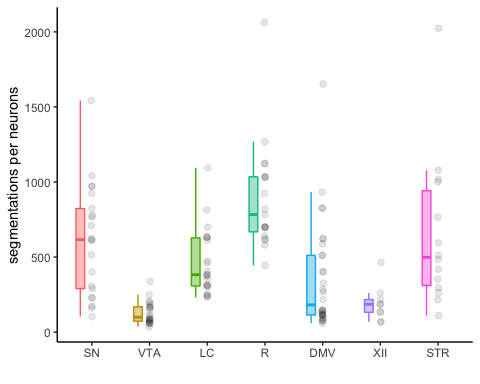


Wilcoxon rank sum test with continuity correction  
  
data: data$axon\_area\_per\_neuron by data$type  
W = 723, p-value = 6.78e-10  
alternative hypothesis: true location shift is not equal to 0

dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:33 am on Friday March 25, 2022.  
  
Dataset : .  
The first five rows are:  
# A tibble: 5 × 9  
 Count `Total Area` `Average Size` `%Area` neuron\_number neuron  
 <dbl> <dbl> <dbl> <dbl> <dbl> <fct>   
1 1652 63087 38.2 0.394 1 DMV   
2 814 53004 65.1 0.331 1 LC   
3 1094 46894 42.9 0.293 1 LC   
4 2062 77341 37.5 0.483 1 R   
5 820 25720 31.4 0.161 1 R   
# … with 3 more variables: axon\_area\_per\_neuron <dbl>, count\_per\_neuron <dbl>,  
# type <fct>  
  
X Variable : type  
Y Variable : axon\_area\_per\_neuron  
  
Effect sizes(s) will be computed for:  
 1. pd-vulnerable minus non-vulnerable

dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:33 am on Friday March 25, 2022.  
  
Dataset : .  
X Variable : type  
Y Variable : axon\_area\_per\_neuron  
  
Unpaired mean difference of pd-vulnerable (n = 92) minus non-vulnerable (n = 45)  
 8100 [95CI 5930; 10600]  
  
  
5000 bootstrap resamples.  
All confidence intervals are bias-corrected and accelerated.





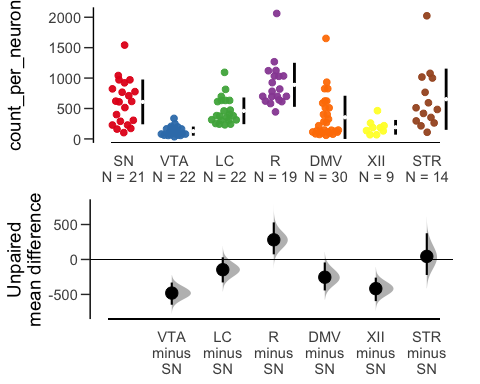
Kruskal-Wallis

Kruskal-Wallis rank sum test  
  
data: count\_per\_neuron by neuron  
Kruskal-Wallis chi-squared = 67.386, df = 6, p-value = 1.403e-12

Dunn

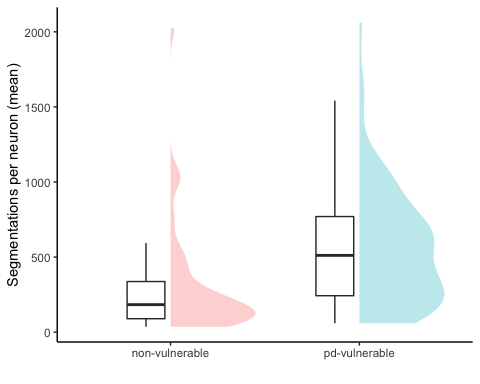
Comparison Z P.unadj P.adj  
1 DMV - LC -2.1117441 3.470840e-02 7.288765e-01  
2 DMV - R -4.9124144 8.996166e-07 1.889195e-05  
3 LC - R -2.7062408 6.804969e-03 1.429043e-01  
4 DMV - SN -2.8158643 4.864621e-03 1.021570e-01  
5 LC - SN -0.6831796 4.944934e-01 1.000000e+00  
6 R - SN 2.0185955 4.352928e-02 9.141149e-01  
7 DMV - STR -2.4474832 1.438578e-02 3.021014e-01  
8 LC - STR -0.5833195 5.596782e-01 1.000000e+00  
9 R - STR 1.8401285 6.574937e-02 1.000000e+00  
10 SN - STR 0.0260784 9.791948e-01 1.000000e+00  
11 DMV - VTA 2.7269895 6.391507e-03 1.342216e-01  
12 LC - VTA 4.5046159 6.649311e-06 1.396355e-04  
13 R - VTA 7.0429233 1.882478e-12 3.953204e-11  
14 SN - VTA 5.1351081 2.819820e-07 5.921621e-06  
15 STR - VTA 4.5560173 5.213265e-06 1.094786e-04  
16 DMV - XII 1.1254594 2.603944e-01 1.000000e+00  
17 LC - XII 2.5790534 9.907147e-03 2.080501e-01  
18 R - XII 4.6164416 3.903759e-06 8.197894e-05  
19 SN - XII 3.0845492 2.038609e-03 4.281079e-02  
20 STR - XII 2.8552967 4.299664e-03 9.029294e-02  
21 VTA - XII -0.8534673 3.934002e-01 1.000000e+00

Estimation statistics



dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:33 am on Friday March 25, 2022.  
  
Dataset : .  
X Variable : neuron  
Y Variable : count\_per\_neuron  
  
Unpaired mean difference of VTA (n = 22) minus SN (n = 21)  
 -481 [95CI -647; -330]  
  
Unpaired mean difference of LC (n = 22) minus SN (n = 21)  
 -147 [95CI -329; 31]  
  
Unpaired mean difference of R (n = 19) minus SN (n = 21)  
 281 [95CI 73.5; 530]  
  
Unpaired mean difference of DMV (n = 30) minus SN (n = 21)  
 -254 [95CI -443; -42.9]  
  
Unpaired mean difference of XII (n = 9) minus SN (n = 21)  
 -417 [95CI -596; -260]  
  
Unpaired mean difference of STR (n = 14) minus SN (n = 21)  
 43.9 [95CI -222; 375]  
  
  
5000 bootstrap resamples.  
All confidence intervals are bias-corrected and accelerated.

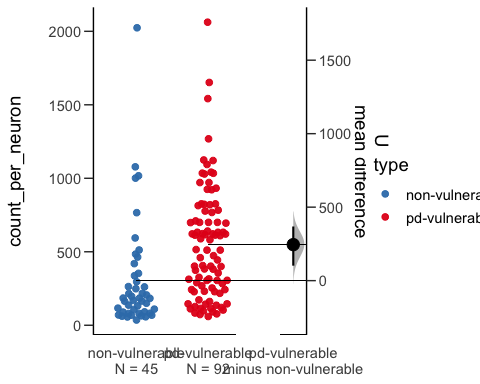
*PD-vulnerable vs PD-resilient*



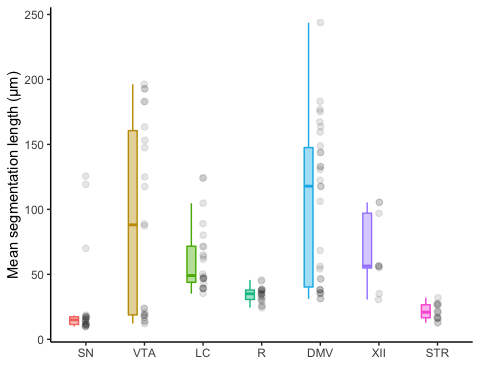
Wilcoxon rank sum test with continuity correction  
  
data: data$count\_per\_neuron by data$type  
W = 1068, p-value = 4.433e-06  
alternative hypothesis: true location shift is not equal to 0

dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:33 am on Friday March 25, 2022.  
  
Dataset : .  
The first five rows are:  
# A tibble: 5 × 9  
 Count `Total Area` `Average Size` `%Area` neuron\_number neuron  
 <dbl> <dbl> <dbl> <dbl> <dbl> <fct>   
1 1652 63087 38.2 0.394 1 DMV   
2 814 53004 65.1 0.331 1 LC   
3 1094 46894 42.9 0.293 1 LC   
4 2062 77341 37.5 0.483 1 R   
5 820 25720 31.4 0.161 1 R   
# … with 3 more variables: axon\_area\_per\_neuron <dbl>, count\_per\_neuron <dbl>,  
# type <fct>  
  
X Variable : type  
Y Variable : count\_per\_neuron  
  
Effect sizes(s) will be computed for:  
 1. pd-vulnerable minus non-vulnerable

dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:33 am on Friday March 25, 2022.  
  
Dataset : .  
X Variable : type  
Y Variable : count\_per\_neuron  
  
Unpaired mean difference of pd-vulnerable (n = 92) minus non-vulnerable (n = 45)  
 245 [95CI 102; 368]  
  
  
5000 bootstrap resamples.  
All confidence intervals are bias-corrected and accelerated.



Average segmentation length (µm)



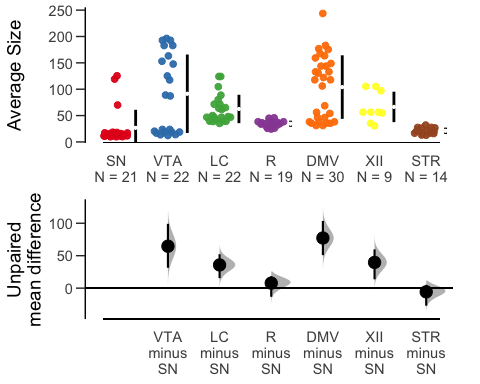
Kruskal-Wallis

Kruskal-Wallis rank sum test  
  
data: Average Size by neuron  
Kruskal-Wallis chi-squared = 63.024, df = 6, p-value = 1.092e-11

Dunn

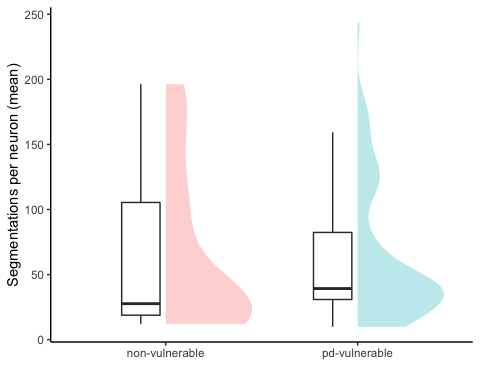
Comparison Z P.unadj P.adj  
1 DMV - LC 1.03059727 3.027297e-01 1.000000e+00  
2 DMV - R 3.60998615 3.062134e-04 6.430480e-03  
3 LC - R 2.45591123 1.405279e-02 2.951085e-01  
4 DMV - SN 6.35795802 2.044533e-10 4.293520e-09  
5 LC - SN 4.98130378 6.315730e-07 1.326303e-05  
6 R - SN 2.37043094 1.776736e-02 3.731146e-01  
7 DMV - STR 5.32207495 1.025903e-07 2.154396e-06  
8 LC - STR 4.19242298 2.759908e-05 5.795807e-04  
9 R - STR 1.88561118 5.934737e-02 1.000000e+00  
10 SN - STR -0.25035765 8.023108e-01 1.000000e+00  
11 DMV - VTA 1.85882864 6.305143e-02 1.000000e+00  
12 LC - VTA 0.77104145 4.406824e-01 1.000000e+00  
13 R - VTA -1.71361442 8.659956e-02 1.000000e+00  
14 SN - VTA -4.21928067 2.450830e-05 5.146743e-04  
15 STR - VTA -3.51242834 4.440317e-04 9.324666e-03  
16 DMV - XII 0.81906785 4.127477e-01 1.000000e+00  
17 LC - XII 0.05563405 9.556333e-01 1.000000e+00  
18 R - XII -1.84639479 6.483490e-02 1.000000e+00  
19 SN - XII -3.75914928 1.704921e-04 3.580334e-03  
20 STR - XII -3.30324274 9.557362e-04 2.007046e-02  
21 VTA - XII -0.53190012 5.947952e-01 1.000000e+00

Estimation statistics



dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:33 am on Friday March 25, 2022.  
  
Dataset : .  
X Variable : neuron  
Y Variable : Average Size  
  
Unpaired mean difference of VTA (n = 22) minus SN (n = 21)  
 64.6 [95CI 31.4; 99.1]  
  
Unpaired mean difference of LC (n = 22) minus SN (n = 21)  
 35.8 [95CI 15.4; 52.3]  
  
Unpaired mean difference of R (n = 19) minus SN (n = 21)  
 7.73 [95CI -13.3; 18.4]  
  
Unpaired mean difference of DMV (n = 30) minus SN (n = 21)  
 77.3 [95CI 50.9; 104]  
  
Unpaired mean difference of XII (n = 9) minus SN (n = 21)  
 39.6 [95CI 13.6; 59.7]  
  
Unpaired mean difference of STR (n = 14) minus SN (n = 21)  
 -5.7 [95CI -27; 5.07]  
  
  
5000 bootstrap resamples.  
All confidence intervals are bias-corrected and accelerated.

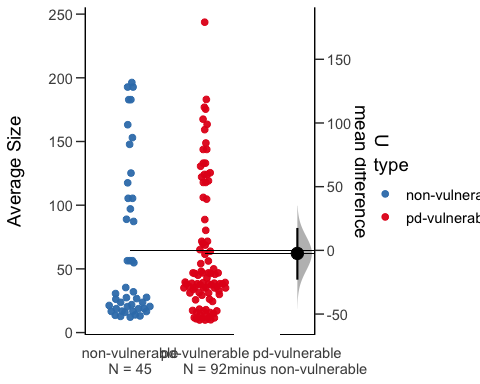
*PD-vulnerable vs PD-resilient*



Wilcoxon rank sum test with continuity correction  
  
data: data$`Average Size` by data$type  
W = 1887, p-value = 0.4029  
alternative hypothesis: true location shift is not equal to 0

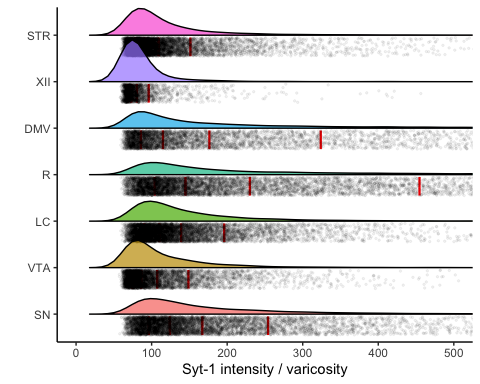
dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:33 am on Friday March 25, 2022.  
  
Dataset : .  
The first five rows are:  
# A tibble: 5 × 9  
 Count `Total Area` `Average Size` `%Area` neuron\_number neuron  
 <dbl> <dbl> <dbl> <dbl> <dbl> <fct>   
1 1652 63087 38.2 0.394 1 DMV   
2 814 53004 65.1 0.331 1 LC   
3 1094 46894 42.9 0.293 1 LC   
4 2062 77341 37.5 0.483 1 R   
5 820 25720 31.4 0.161 1 R   
# … with 3 more variables: axon\_area\_per\_neuron <dbl>, count\_per\_neuron <dbl>,  
# type <fct>  
  
X Variable : type  
Y Variable : Average Size  
  
Effect sizes(s) will be computed for:  
 1. pd-vulnerable minus non-vulnerable

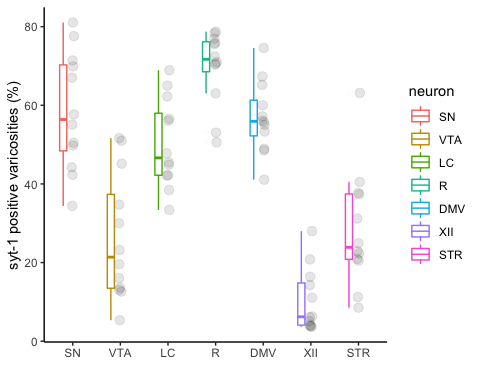
dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:33 am on Friday March 25, 2022.  
  
Dataset : .  
X Variable : type  
Y Variable : Average Size  
  
Unpaired mean difference of pd-vulnerable (n = 92) minus non-vulnerable (n = 45)  
 -2.4 [95CI -23; 17.6]  
  
  
5000 bootstrap resamples.  
All confidence intervals are bias-corrected and accelerated.



# PD-vulnerable neurons have a higher proportion of varicosities that are positive for Syt1

## Figure 7-1





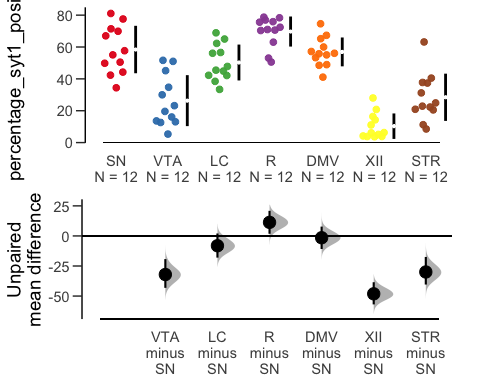
Kruskal-Wallis

Kruskal-Wallis rank sum test  
  
data: percentage\_syt1\_positive by neuron  
Kruskal-Wallis chi-squared = 59.589, df = 6, p-value = 5.456e-11

Dunn

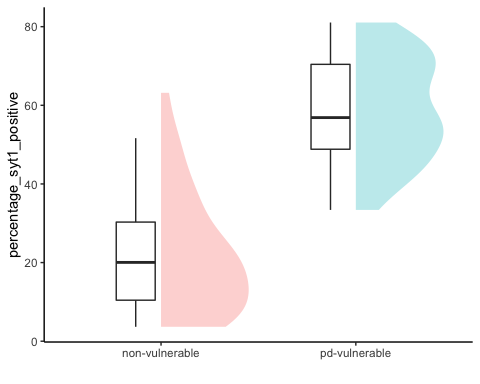
Comparison Z P.unadj P.adj  
1 DMV - LC 0.8368274 4.026896e-01 1.000000e+00  
2 DMV - R -1.5062893 1.319929e-01 1.000000e+00  
3 LC - R -2.3431167 1.912340e-02 4.015914e-01  
4 DMV - SN -0.1422607 8.868741e-01 1.000000e+00  
5 LC - SN -0.9790881 3.275365e-01 1.000000e+00  
6 R - SN 1.3640287 1.725585e-01 1.000000e+00  
7 DMV - STR 3.0042104 2.662711e-03 5.591694e-02  
8 LC - STR 2.1673830 3.020566e-02 6.343189e-01  
9 R - STR 4.5104997 6.467508e-06 1.358177e-04  
10 SN - STR 3.1464711 1.652536e-03 3.470326e-02  
11 DMV - VTA 3.1632076 1.560410e-03 3.276861e-02  
12 LC - VTA 2.3263802 1.999828e-02 4.199638e-01  
13 R - VTA 4.6694969 3.019382e-06 6.340702e-05  
14 SN - VTA 3.3054683 9.481784e-04 1.991175e-02  
15 STR - VTA 0.1589972 8.736711e-01 1.000000e+00  
16 DMV - XII 4.7197066 2.361851e-06 4.959887e-05  
17 LC - XII 3.8828792 1.032269e-04 2.167764e-03  
18 R - XII 6.2259959 4.785065e-10 1.004864e-08  
19 SN - XII 4.8619672 1.162249e-06 2.440722e-05  
20 STR - XII 1.7154962 8.625429e-02 1.000000e+00  
21 VTA - XII 1.5564990 1.195895e-01 1.000000e+00

Estimation statistics



dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:33 am on Friday March 25, 2022.  
  
Dataset : .  
X Variable : neuron  
Y Variable : percentage\_syt1\_positive  
  
Unpaired mean difference of VTA (n = 12) minus SN (n = 12)  
 -32.1 [95CI -43.2; -19.3]  
  
Unpaired mean difference of LC (n = 12) minus SN (n = 12)  
 -8.15 [95CI -18; 2.03]  
  
Unpaired mean difference of R (n = 12) minus SN (n = 12)  
 11.3 [95CI 1.79; 20.9]  
  
Unpaired mean difference of DMV (n = 12) minus SN (n = 12)  
 -1.49 [95CI -10.9; 7.75]  
  
Unpaired mean difference of XII (n = 12) minus SN (n = 12)  
 -48.1 [95CI -56.9; -38.5]  
  
Unpaired mean difference of STR (n = 12) minus SN (n = 12)  
 -30 [95CI -40.4; -17.5]  
  
  
5000 bootstrap resamples.  
All confidence intervals are bias-corrected and accelerated.

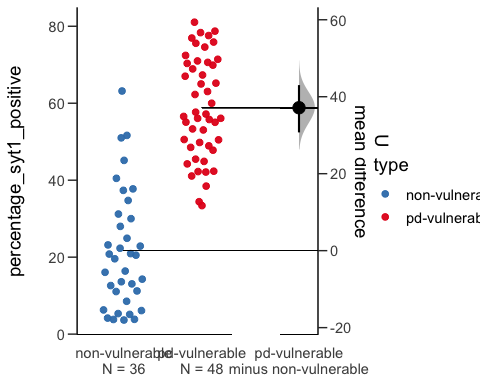
*PD-vulnerable vs PD-resilient*

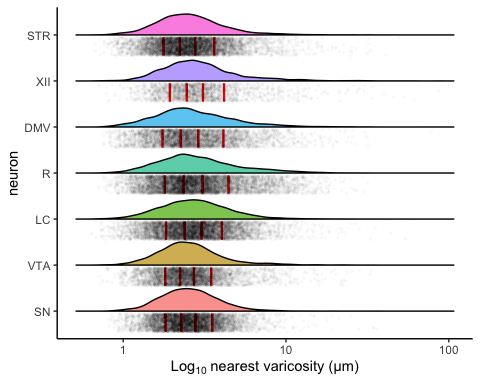


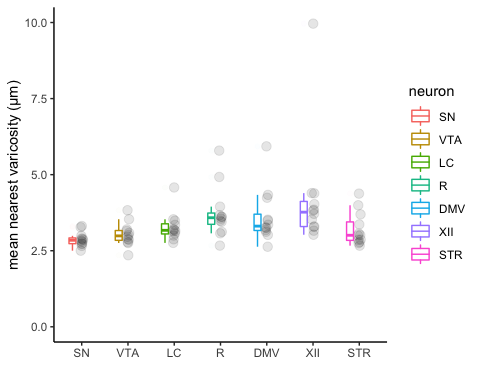
Wilcoxon rank sum exact test  
  
data: data\_percentage\_syt1\_positive$percentage\_syt1\_positive by data\_percentage\_syt1\_positive$type  
W = 79, p-value = 2.941e-16  
alternative hypothesis: true location shift is not equal to 0

dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:33 am on Friday March 25, 2022.  
  
Dataset : .  
The first five rows are:  
# A tibble: 5 × 6  
 neuron image negative positive percentage\_syt1\_positive type   
 <fct> <chr> <int> <int> <dbl> <fct>   
1 SN SN\_01 358 439 55.1 pd-vulnerable  
2 SN SN\_02 244 128 34.4 pd-vulnerable  
3 SN SN\_03 361 492 57.7 pd-vulnerable  
4 SN SN\_04 286 210 42.3 pd-vulnerable  
5 SN SN\_05 141 488 77.6 pd-vulnerable  
  
X Variable : type  
Y Variable : percentage\_syt1\_positive  
  
Effect sizes(s) will be computed for:  
 1. pd-vulnerable minus non-vulnerable

dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:33 am on Friday March 25, 2022.  
  
Dataset : .  
X Variable : type  
Y Variable : percentage\_syt1\_positive  
  
Unpaired mean difference of pd-vulnerable (n = 48) minus non-vulnerable (n = 36)  
 37.1 [95CI 30.7; 43]  
  
  
5000 bootstrap resamples.  
All confidence intervals are bias-corrected and accelerated.







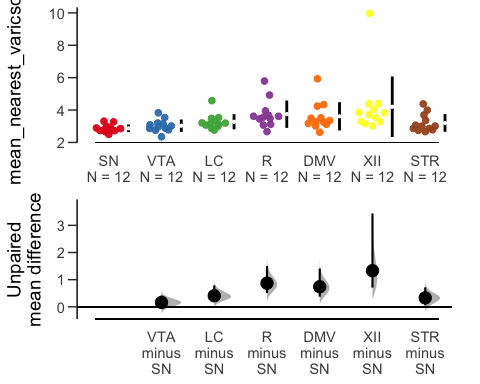
Kruskal-Wallis

Kruskal-Wallis rank sum test  
  
data: mean\_nearest\_varicsotiey by neuron  
Kruskal-Wallis chi-squared = 28.368, df = 6, p-value = 8.011e-05

Dunn

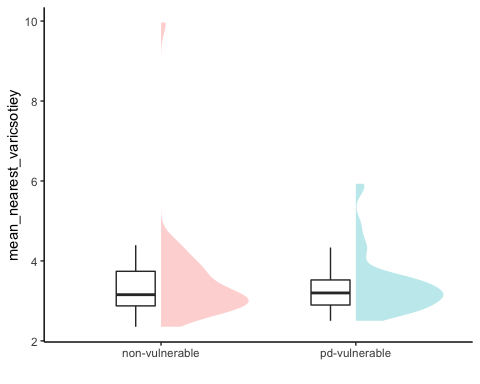
Comparison Z P.unadj P.adj  
1 DMV - LC 0.8703005 3.841362e-01 1.0000000000  
2 DMV - R -0.5941475 5.524135e-01 1.0000000000  
3 LC - R -1.4644480 1.430716e-01 1.0000000000  
4 DMV - SN 3.1297345 1.749644e-03 0.0367425146  
5 LC - SN 2.2594340 2.385640e-02 0.5009844259  
6 R - SN 3.7238820 1.961827e-04 0.0041198361  
7 DMV - STR 1.5732355 1.156643e-01 1.0000000000  
8 LC - STR 0.7029350 4.820962e-01 1.0000000000  
9 R - STR 2.1673830 3.020566e-02 0.6343189291  
10 SN - STR -1.5564990 1.195895e-01 1.0000000000  
11 DMV - VTA 2.0334906 4.200298e-02 0.8820626214  
12 LC - VTA 1.1631901 2.447524e-01 1.0000000000  
13 R - VTA 2.6276381 8.597994e-03 0.1805578807  
14 SN - VTA -1.0962439 2.729721e-01 1.0000000000  
15 STR - VTA 0.4602551 6.453331e-01 1.0000000000  
16 DMV - XII -1.2133997 2.249770e-01 1.0000000000  
17 LC - XII -2.0837002 3.718744e-02 0.7809362753  
18 R - XII -0.6192523 5.357502e-01 1.0000000000  
19 SN - XII -4.3431343 1.404642e-05 0.0002949749  
20 STR - XII -2.7866353 5.325838e-03 0.1118426079  
21 VTA - XII -3.2468903 1.166733e-03 0.0245013998

Estimation Statistics



dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:33 am on Friday March 25, 2022.  
  
Dataset : .  
X Variable : neuron  
Y Variable : mean\_nearest\_varicsotiey  
  
Unpaired mean difference of VTA (n = 12) minus SN (n = 12)  
 0.162 [95CI -0.0767; 0.415]  
  
Unpaired mean difference of LC (n = 12) minus SN (n = 12)  
 0.406 [95CI 0.183; 0.789]  
  
Unpaired mean difference of R (n = 12) minus SN (n = 12)  
 0.871 [95CI 0.507; 1.5]  
  
Unpaired mean difference of DMV (n = 12) minus SN (n = 12)  
 0.74 [95CI 0.375; 1.41]  
  
Unpaired mean difference of XII (n = 12) minus SN (n = 12)  
 1.33 [95CI 0.708; 3.44]  
  
Unpaired mean difference of STR (n = 12) minus SN (n = 12)  
 0.331 [95CI 0.0556; 0.717]  
  
  
5000 bootstrap resamples.  
All confidence intervals are bias-corrected and accelerated.

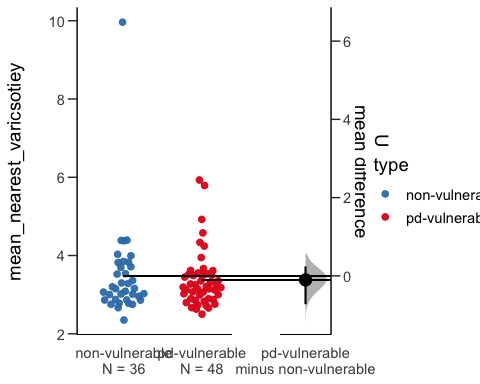
*PD-vulnerable vs PD-resilient*

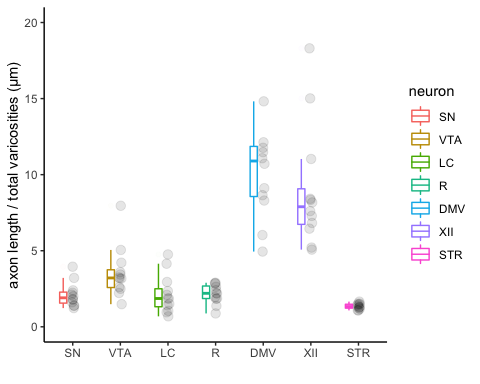


Wilcoxon rank sum exact test  
  
data: mean\_varicosity\_nn\_length$mean\_nearest\_varicsotiey by mean\_varicosity\_nn\_length$type  
W = 875, p-value = 0.9248  
alternative hypothesis: true location shift is not equal to 0

dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:33 am on Friday March 25, 2022.  
  
Dataset : .  
The first five rows are:  
# A tibble: 5 × 5  
 neuron image mean\_nearest\_varicsotiey n type   
 <fct> <chr> <dbl> <int> <fct>   
1 SN SN\_01 2.74 797 pd-vulnerable  
2 SN SN\_02 2.72 372 pd-vulnerable  
3 SN SN\_03 2.90 853 pd-vulnerable  
4 SN SN\_04 2.89 496 pd-vulnerable  
5 SN SN\_05 2.99 629 pd-vulnerable  
  
X Variable : type  
Y Variable : mean\_nearest\_varicsotiey  
  
Effect sizes(s) will be computed for:  
 1. pd-vulnerable minus non-vulnerable

dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:33 am on Friday March 25, 2022.  
  
Dataset : .  
X Variable : type  
Y Variable : mean\_nearest\_varicsotiey  
  
Unpaired mean difference of pd-vulnerable (n = 48) minus non-vulnerable (n = 36)  
 -0.104 [95CI -0.725; 0.242]  
  
  
5000 bootstrap resamples.  
All confidence intervals are bias-corrected and accelerated.





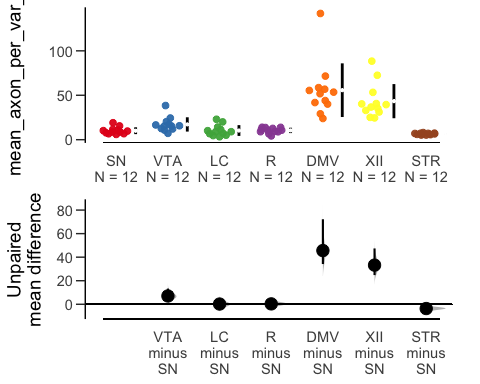
Kruskal-Wallis

Kruskal-Wallis rank sum test  
  
data: mean\_axon\_per\_var\_px by neuron  
Kruskal-Wallis chi-squared = 62.576, df = 6, p-value = 1.346e-11

Dunn

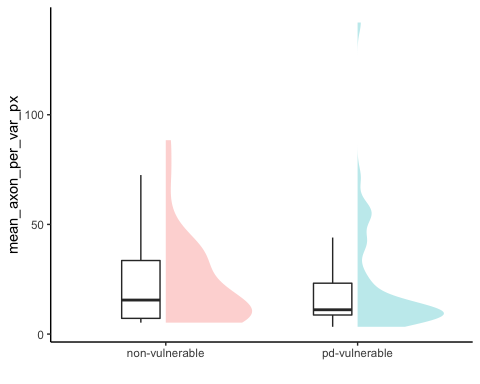
Comparison Z P.unadj P.adj  
1 DMV - LC 4.6611287 3.144800e-06 6.604081e-05  
2 DMV - R 4.1506639 3.315122e-05 6.961756e-04  
3 LC - R -0.5104647 6.097259e-01 1.000000e+00  
4 DMV - SN 4.4519218 8.510516e-06 1.787208e-04  
5 LC - SN -0.2092069 8.342868e-01 1.000000e+00  
6 R - SN 0.3012579 7.632179e-01 1.000000e+00  
7 DMV - STR 6.1255766 9.035577e-10 1.897471e-08  
8 LC - STR 1.4644480 1.430716e-01 1.000000e+00  
9 R - STR 1.9749127 4.827806e-02 1.000000e+00  
10 SN - STR 1.6736548 9.419846e-02 1.000000e+00  
11 DMV - VTA 2.5857967 9.715422e-03 2.040239e-01  
12 LC - VTA -2.0753320 3.795578e-02 7.970713e-01  
13 R - VTA -1.5648673 1.176140e-01 1.000000e+00  
14 SN - VTA -1.8661251 6.202386e-02 1.000000e+00  
15 STR - VTA -3.5397799 4.004608e-04 8.409677e-03  
16 DMV - XII 0.4602551 6.453331e-01 1.000000e+00  
17 LC - XII -4.2008736 2.658870e-05 5.583627e-04  
18 R - XII -3.6904089 2.238939e-04 4.701772e-03  
19 SN - XII -3.9916667 6.561053e-05 1.377821e-03  
20 STR - XII -5.6653216 1.467491e-08 3.081731e-07  
21 VTA - XII -2.1255416 3.354145e-02 7.043703e-01

Estimation Statistics



dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:33 am on Friday March 25, 2022.  
  
Dataset : .  
X Variable : neuron  
Y Variable : mean\_axon\_per\_var\_px  
  
Unpaired mean difference of VTA (n = 12) minus SN (n = 12)  
 7.05 [95CI 3.24; 13.3]  
  
Unpaired mean difference of LC (n = 12) minus SN (n = 12)  
 0.197 [95CI -3.3; 4.45]  
  
Unpaired mean difference of R (n = 12) minus SN (n = 12)  
 0.326 [95CI -2.72; 2.68]  
  
Unpaired mean difference of DMV (n = 12) minus SN (n = 12)  
 45.6 [95CI 34.2; 72.2]  
  
Unpaired mean difference of XII (n = 12) minus SN (n = 12)  
 33.2 [95CI 24.8; 47.4]  
  
Unpaired mean difference of STR (n = 12) minus SN (n = 12)  
 -3.62 [95CI -6.41; -1.89]  
  
  
5000 bootstrap resamples.  
All confidence intervals are bias-corrected and accelerated.

*PD-vulnerable vs PD-resilient*



Wilcoxon rank sum exact test  
  
data: mean\_varicosity\_lengthpervar\_length$mean\_axon\_per\_var\_px by mean\_varicosity\_lengthpervar\_length$type  
W = 917, p-value = 0.6369  
alternative hypothesis: true location shift is not equal to 0

dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:33 am on Friday March 25, 2022.  
  
Dataset : .  
The first five rows are:  
# A tibble: 5 × 5  
 neuron image mean\_axon\_per\_var\_px n type   
 <fct> <chr> <dbl> <int> <fct>   
1 SN SN\_01 10.2 797 pd-vulnerable  
2 SN SN\_02 7.78 372 pd-vulnerable  
3 SN SN\_03 8.71 853 pd-vulnerable  
4 SN SN\_04 5.94 496 pd-vulnerable  
5 SN SN\_05 9.70 629 pd-vulnerable  
  
X Variable : type  
Y Variable : mean\_axon\_per\_var\_px  
  
Effect sizes(s) will be computed for:  
 1. pd-vulnerable minus non-vulnerable

dabestr (Data Analysis with Bootstrap Estimation in R) v0.3.0  
=============================================================  
  
Good morning!  
The current time is 11:33 am on Friday March 25, 2022.  
  
Dataset : .  
X Variable : type  
Y Variable : mean\_axon\_per\_var\_px  
  
Unpaired mean difference of pd-vulnerable (n = 48) minus non-vulnerable (n = 36)  
 -0.694 [95CI -9.26; 9.77]  
  
  
5000 bootstrap resamples.  
All confidence intervals are bias-corrected and accelerated.

