

# R Notebook

This is an R Markdown Notebook. When you execute code within the notebook, the results appear beneath the code.

Try executing this chunk by clicking the *Run* button within the chunk or by placing your cursor inside it and pressing *Ctrl+Shift+Enter*.

```
library(tidyverse)
```

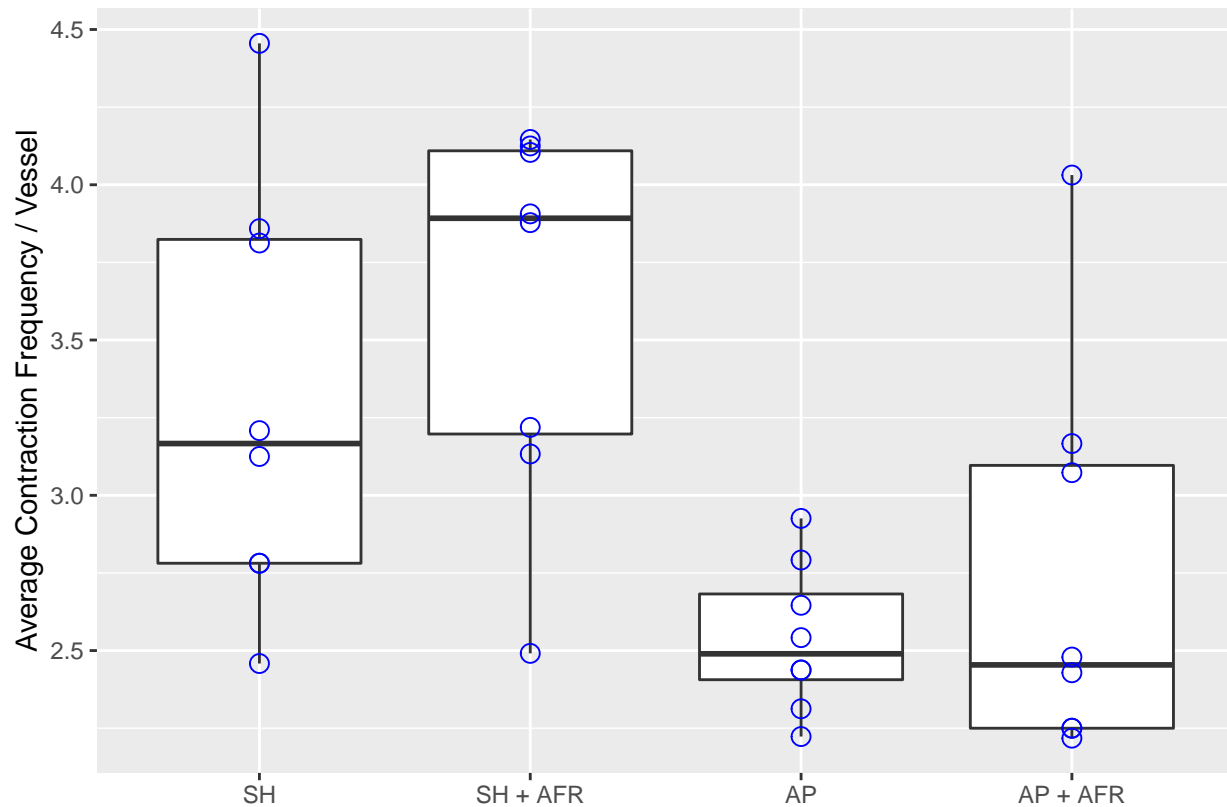
```
## -- Attaching packages ----- tidyverse 1.3.1 --
```

```
## v ggplot2 3.3.3      v purrr  0.3.4
## v tibble  3.1.0      v dplyr  1.0.5
## v tidyr   1.1.3      v stringr 1.4.0
## v readr   1.4.0      v forcats 0.5.1
```

```
## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()     masks stats::lag()
```

```
summ4.df = readRDS("TEST.rds")
```

```
ggplot(summ4.df) + geom_boxplot(aes(y = max_n_cont*2, x = treatment)) +
  geom_point(aes(y = max_n_cont*2, x = treatment), color = "blue", shape = 1, size = 3) +
  scale_y_continuous(limits = c(NA,NA)) +
  labs(y = "Average Contraction Frequency / Vessel", x = "")
```



```
# Compute the analysis of variance
```

```
res.aov <- aov(max_n_cont ~ treatment, data = summ4.df)
summary(res.aov)
```

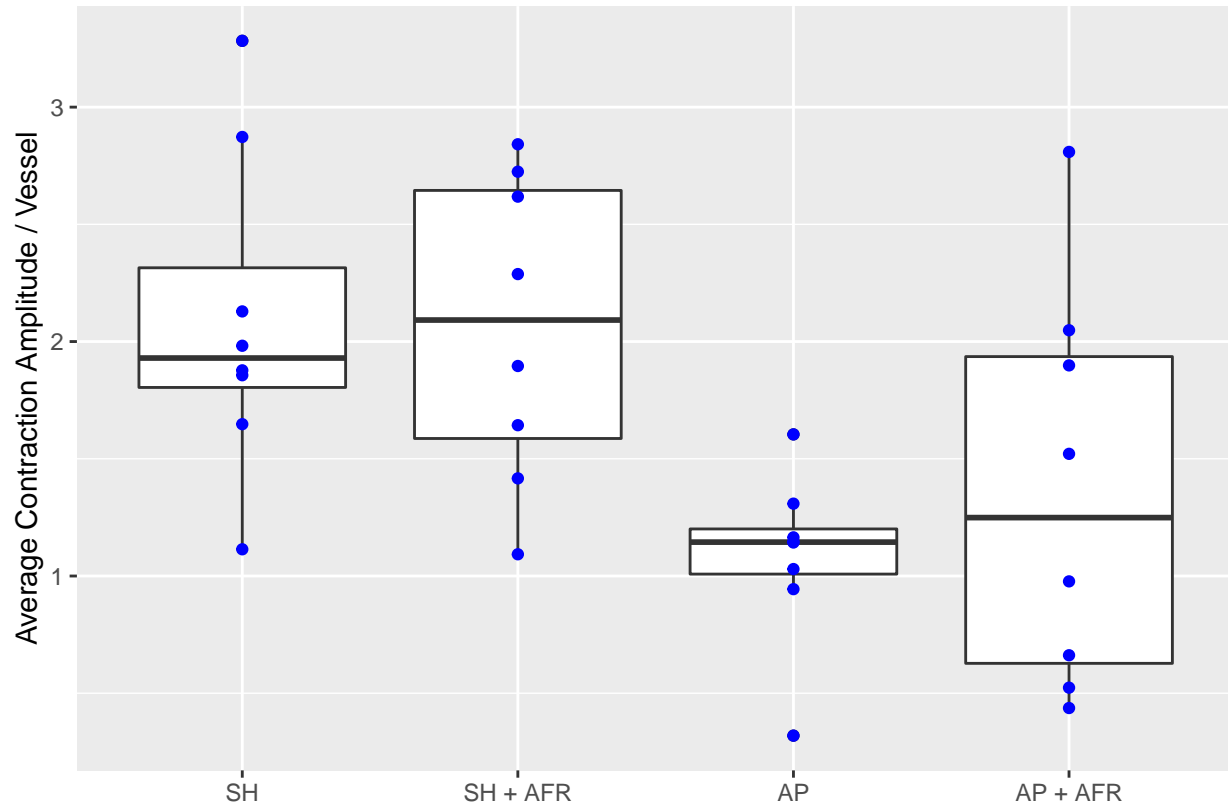
```
##           Df Sum Sq Mean Sq F value    Pr(>F)
## treatment   3  1.514   0.5048    6.243 0.00221 **
## Residuals  28  2.264   0.0809
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
TukeyHSD(res.aov)
```

```
##      Tukey multiple comparisons of means
##      95% family-wise confidence level
##
## Fit: aov(formula = max_n_cont ~ treatment, data = summ4.df)
##
## $treatment
##              diff            lwr            upr      p adj
## SH + AFR-SH      0.15759859 -0.2305728  0.545769999 0.6873725
## AP-SH            -0.38532366 -0.7734951  0.002847752 0.0522466
## AP + AFR-SH      -0.28650484 -0.6746762  0.101666576 0.2065822
## AP-SH + AFR      -0.54292225 -0.9310937 -0.154750834 0.0035968
## AP + AFR-SH + AFR -0.44410342 -0.8322748 -0.055932010 0.0202919
## AP + AFR-AP       0.09881882 -0.2893526  0.486990237 0.8981059
```

```
ggplot(summ4.df) + geom_boxplot(aes(y = mean_mag, x = treatment)) +
  geom_point(aes(y = mean_mag, x = treatment), color = "blue", position = "dodge") +
  scale_y_continuous(limits = c(NA,NA)) +
  labs(y = "Average Contraction Amplitude / Vessel", x = "")
```

```
## Warning: Width not defined. Set with 'position_dodge(width = ?)'
```



```
# Compute the analysis of variance
res.aov <- aov(mean_mag ~ treatment, data = summ4.df)
summary(res.aov)
```

```
##           Df Sum Sq Mean Sq F value    Pr(>F)
## treatment   3  6.216   2.0720    4.725 0.00863 **
## Residuals  28 12.279   0.4385
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

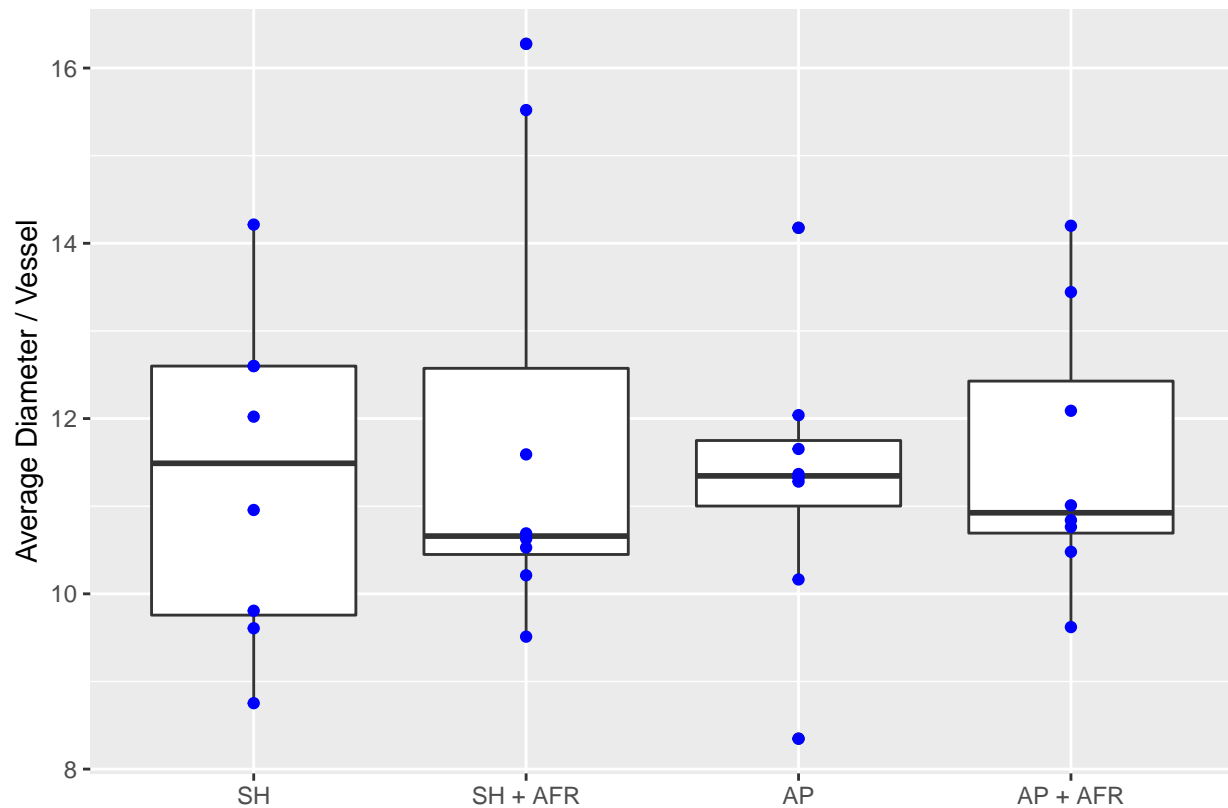
```
TukeyHSD(res.aov)
```

```
##      Tukey multiple comparisons of means
##      95% family-wise confidence level
##
## Fit: aov(formula = mean_mag ~ treatment, data = summ4.df)
```

```
##
## $treatment
##               diff      lwr      upr    p adj
## SH + AFR-SH    -0.03018752 -0.9342112  0.87383612 0.9997215
## AP-SH          -1.01280563 -1.9168293 -0.10878198 0.0236550
## AP + AFR-SH    -0.73566186 -1.6396855  0.16836179 0.1420010
## AP-SH + AFR    -0.98261810 -1.8866418 -0.07859446 0.0292584
## AP + AFR-SH + AFR -0.70547433 -1.6094980  0.19854931 0.1682023
## AP + AFR-AP     0.27714377 -0.6268799  1.18116742 0.8364023
```

```
ggplot(summ4.df) + geom_boxplot(aes(y = width, x = treatment)) +
  geom_point(aes(y = width, x = treatment), color = "blue", position = "dodge") +
  scale_y_continuous(limits = c(NA,NA)) +
  labs(y = "Average Diameter / Vessel", x = "")
```

```
## Warning: Width not defined. Set with 'position_dodge(width = ?)'
```



```
# Compute the analysis of variance
res.aov <- aov(width ~ treatment, data = summ4.df)
summary(res.aov)
```

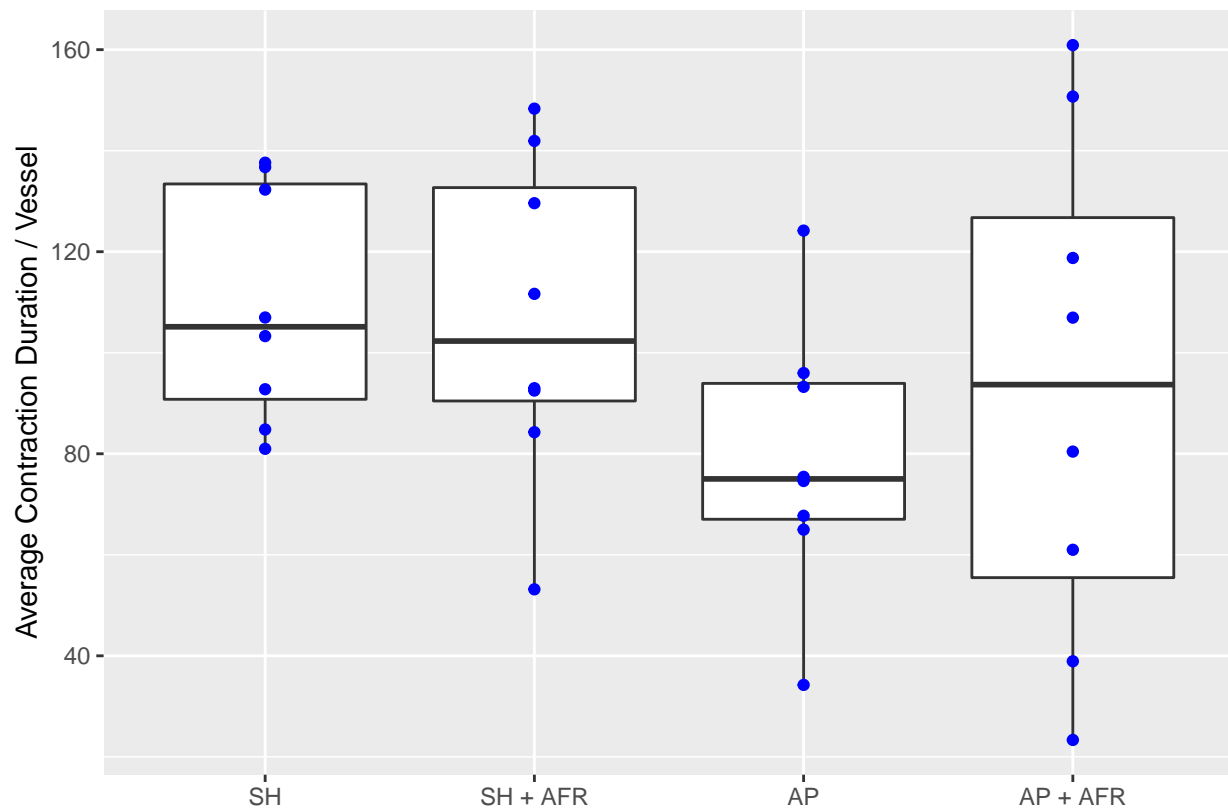
```
##           Df Sum Sq Mean Sq F value Pr(>F)
## treatment  3   1.71   0.571    0.151  0.928
## Residuals 28 106.10   3.789
```

```
TukeyHSD(res.aov)
```

```
## Tukey multiple comparisons of means
## 95% family-wise confidence level
##
## Fit: aov(formula = width ~ treatment, data = summ4.df)
##
## $treatment
##              diff      lwr      upr    p adj
## SH + AFR-SH      0.54991001 -2.107482 3.207302 0.9416076
## AP-SH            -0.02553014 -2.682922 2.631862 0.9999933
## AP + AFR-SH      0.23621883 -2.421173 2.893611 0.9948560
## AP-SH + AFR     -0.57544014 -3.232832 2.081952 0.9338955
## AP + AFR-SH + AFR -0.31369118 -2.971083 2.343701 0.9881741
## AP + AFR-AP      0.26174897 -2.395643 2.919141 0.9930400
```

```
ggplot(summ4.df) + geom_boxplot(aes(y = duration, x = treatment)) +
  geom_point(aes(y = duration, x = treatment), color = "blue", position = "dodge") +
  scale_y_continuous(limits = c(NA, NA)) +
  labs(y = "Average Contraction Duration / Vessel", x = "")
```

```
## Warning: Width not defined. Set with 'position_dodge(width = ?)'
```



```
# Compute the analysis of variance
res.aov <- aov(duration ~ treatment, data = summ4.df)
summary(res.aov)
```

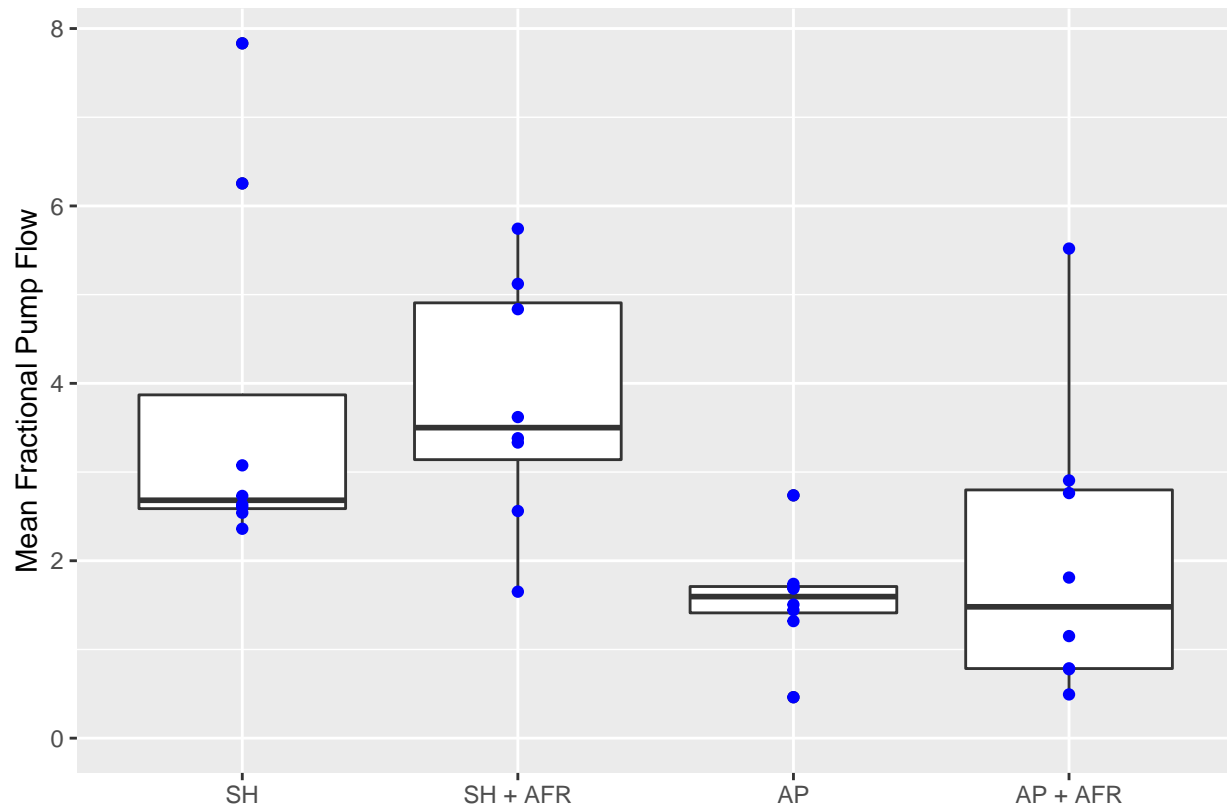
```
##           Df Sum Sq Mean Sq F value Pr(>F)
## treatment    3   4810     1603   1.331  0.284
## Residuals   28  33730     1205
```

```
TukeyHSD(res.aov)
```

```
##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = duration ~ treatment, data = summ4.df)
##
## $treatment
##           diff          lwr          upr          p adj
## SH + AFR-SH    -2.633452 -50.01539  44.74848  0.9987239
## AP-SH          -30.639102 -78.02104  16.74283  0.3105873
## AP + AFR-SH    -16.810861 -64.19280  30.57107  0.7680952
## AP-SH + AFR    -28.005650 -75.38758  19.37628  0.3874764
## AP + AFR-SH + AFR -14.177410 -61.55934  33.20453  0.8459495
## AP + AFR-AP     13.828241 -33.55369  61.21018  0.8552618
```

```
ggplot(summ4.df) + geom_boxplot(aes(y = fpf, x = treatment)) +
  geom_point(aes(y = fpf, x = treatment), color = "blue", position = "dodge") +
  scale_y_continuous(limits = c(0,NA)) +
  labs(y = "Mean Fractional Pump Flow", x = "")
```

```
## Warning: Width not defined. Set with 'position_dodge(width = ?)'
```



```
# Compute the analysis of variance
```

```
res.aov <- aov(fpf ~ treatment, data = summ4.df)
summary(res.aov)
```

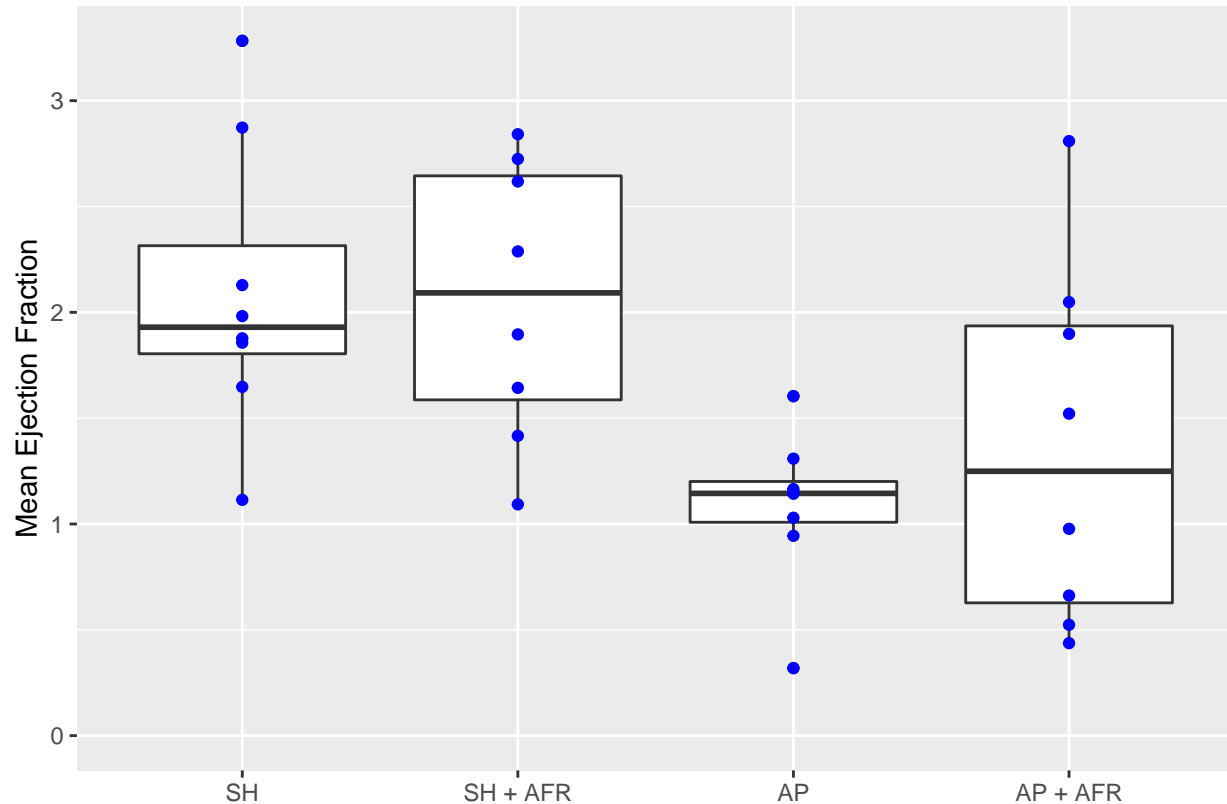
```
##           Df Sum Sq Mean Sq F value Pr(>F)
## treatment  3  31.79   10.60    4.49 0.0108 *
## Residuals 28   66.07    2.36
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
TukeyHSD(res.aov)
```

```
##      Tukey multiple comparisons of means
##      95% family-wise confidence level
##
## Fit: aov(formula = fpf ~ treatment, data = summ4.df)
##
## $treatment
##              diff          lwr          upr      p adj
## SH + AFR-SH      0.02709538 -2.070004   2.12419484 0.9999838
## AP-SH           -2.17981591 -4.276915  -0.08271645 0.0393399
## AP + AFR-SH     -1.72805775 -3.825157   0.36904170 0.1346421
## AP-SH + AFR     -2.20691129 -4.304011  -0.10981183 0.0363235
## AP + AFR-SH + AFR -1.75515314 -3.852253   0.34194632 0.1258166
## AP + AFR-AP      0.45175815 -1.645341   2.54885761 0.9348247
```

```
ggplot(summ4.df) + geom_boxplot(aes(y = ef, x = treatment)) +
  geom_point(aes(y = ef, x = treatment), color = "blue", position = "dodge") +
  scale_y_continuous(limits = c(0,NA)) +
  labs(y = "Mean Ejection Fraction", x = "")
```

```
## Warning: Width not defined. Set with 'position_dodge(width = ?)'
```



```
# Compute the analysis of variance
res.aov <- aov(ef ~ treatment, data = summ4.df)
summary(res.aov)
```

```
##           Df Sum Sq Mean Sq F value    Pr(>F)
## treatment   3  6.216   2.0720   4.725 0.00863 **
## Residuals  28 12.279   0.4385
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
TukeyHSD(res.aov)
```

```
##      Tukey multiple comparisons of means
##      95% family-wise confidence level
##
## Fit: aov(formula = ef ~ treatment, data = summ4.df)
```



```
##
## $treatment
##           diff           lwr           upr           p adj
## SH + AFR-SH    -0.03018752 -0.9342112    0.87383612 0.9997215
## AP-SH          -1.01280563 -1.9168293   -0.10878198 0.0236550
## AP + AFR-SH    -0.73566186 -1.6396855    0.16836179 0.1420010
## AP-SH + AFR    -0.98261810 -1.8866418   -0.07859446 0.0292584
## AP + AFR-SH + AFR -0.70547433 -1.6094980    0.19854931 0.1682023
## AP + AFR-AP      0.27714377 -0.6268799    1.18116742 0.8364023
```