University of Kentucky
UKnowledge

Biostatistics Presentations | Biostatistics

2-16-2016

Statistical Interpretation including the APPROPRIATE Statistical Tests

Olga A. Vsevolozhskaya
University of Kentucky, vsevolozhskaya@uky.edu

Follow this and additional works at: https://uknowledge.uky.edu/biostatistics_present

Part of the Biostatistics Commons

Right click to open a feedback form in a new tab to let us know how this document benefits you.

Repository Citation

Vsevolozhskaya, Olga A., "Statistical Interpretation including the APPROPRIATE Statistical Tests" (2016). *Biostatistics Presentations*. 3.
https://uknowledge.uky.edu/biostatistics_present/3

This Presentation is brought to you for free and open access by the Biostatistics at UKnowledge. It has been accepted for inclusion in Biostatistics Presentations by an authorized administrator of UKnowledge. For more information, please contact UKnowledge@lsv.uky.edu.

Statistical Interpretation including the APPROPRIATE Statistical Tests

Olga Vsevolozhskaya

University of Kentucky

February 16, 2016

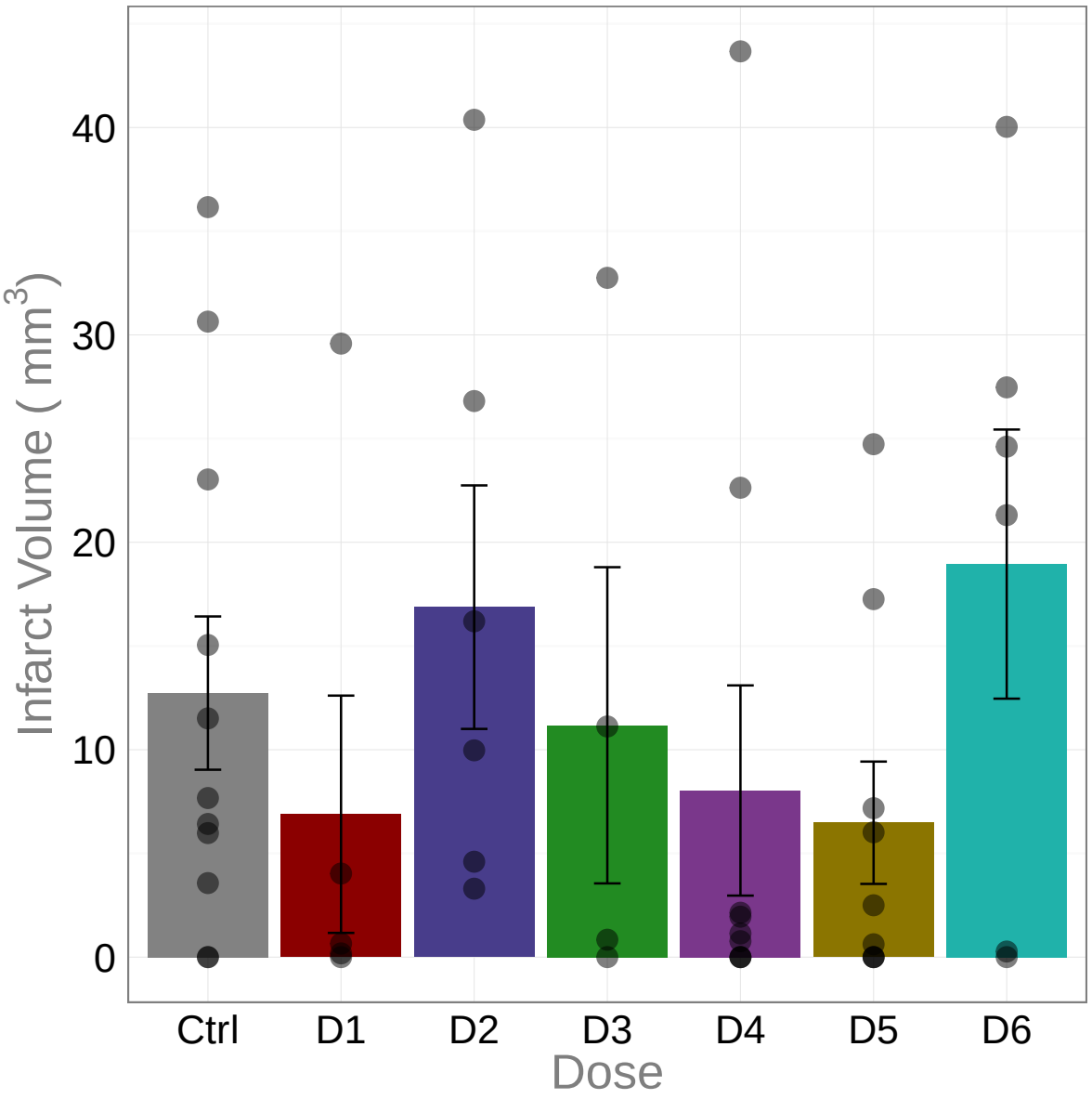
Outline

1. Evaluation of treatment's therapeutic potential after experimental stroke.
2. Post-stroke behavioral testing and functional recovery.

KENTUCKY

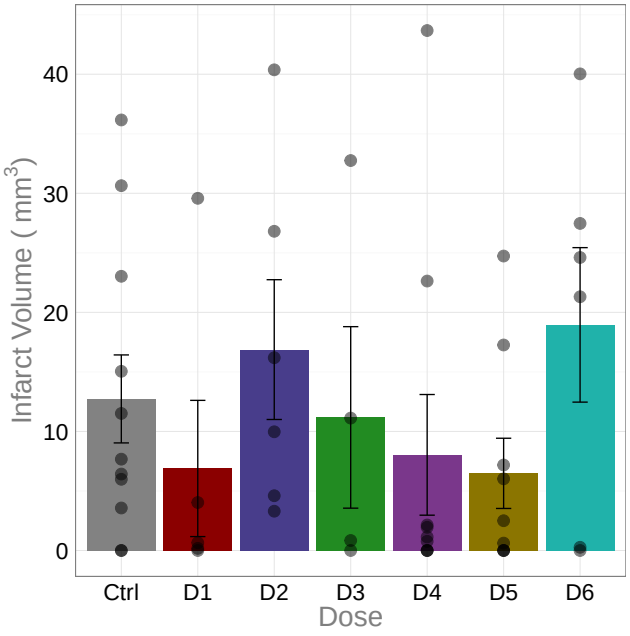
Treatment's Theraputic Potential

Olga Vsevolozhskaya



One-Way ANOVA

H_0 : all means are equal vs.
H_A : at least one mean is different

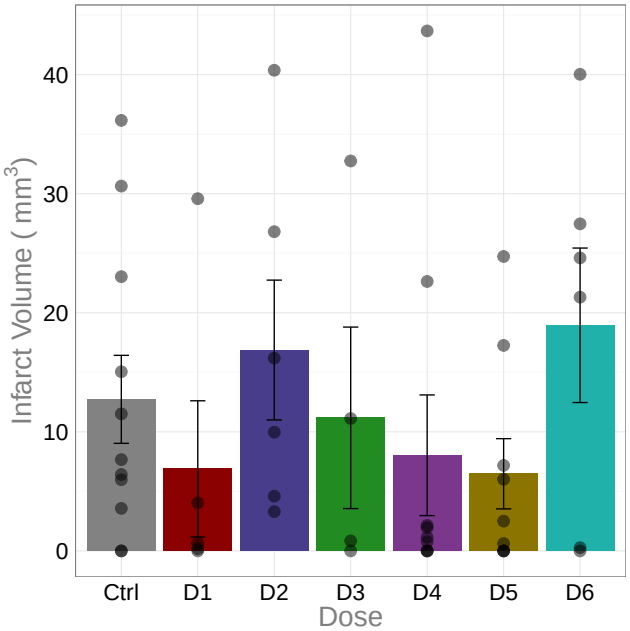


	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Dose	6	962.46	160.41	0.90	**0.5006**
Residuals	43	7624.52	177.31		

One-Way ANOVA

H_0 : all means are equal vs.
H_A : at least one mean is different

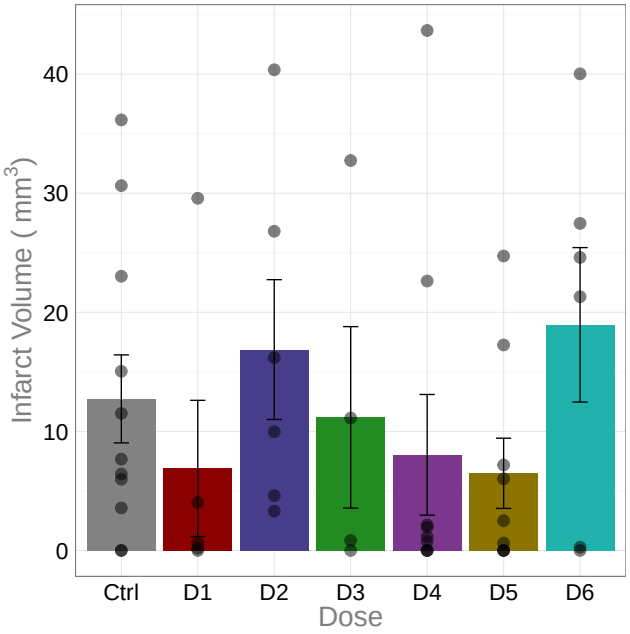
- *Constant variance across groups*
- *Samples are drawn from normally distributed populations*



	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Dose	6	962.46	160.41	0.90	**0.5006**
Residuals	43	7624.52	177.31		

Welch Correction

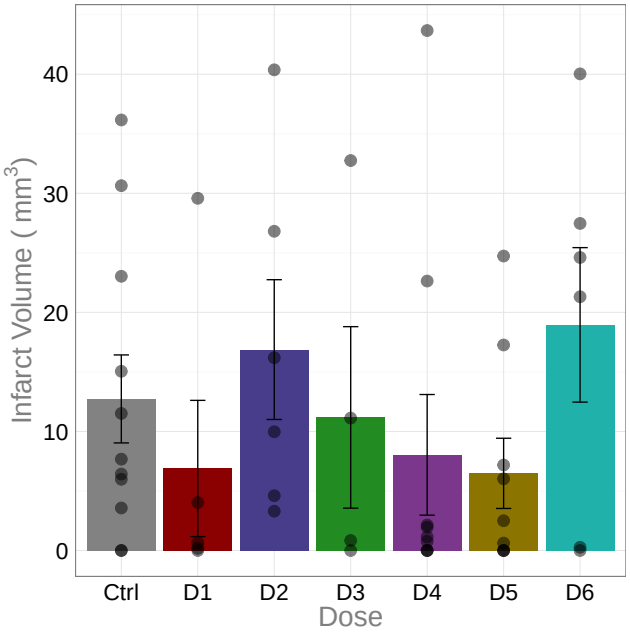
Welch's ANOVA provides similar results.



data: Vol and Dose		
F = 0.77992	num df = 6.000	denom df = 15.194
p-value = **0.5982**		

Weighted Least Squares

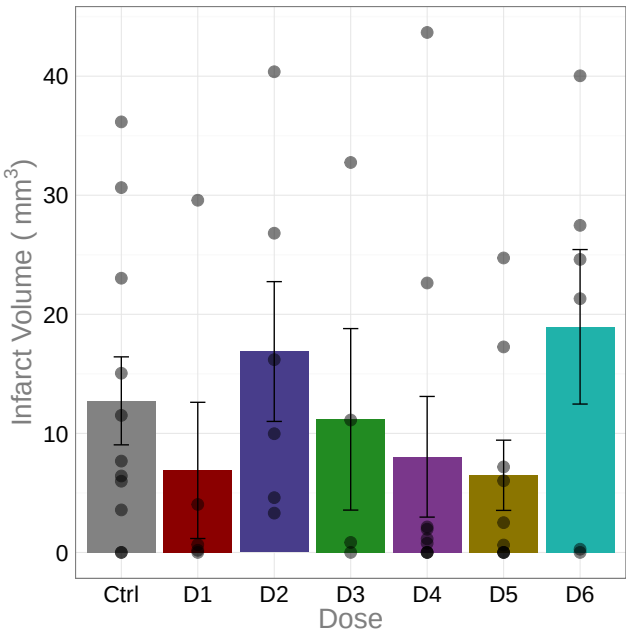
Each observation is weighted by the inverse of group's variance. Once again, results are similar to One-Way ANOVA.



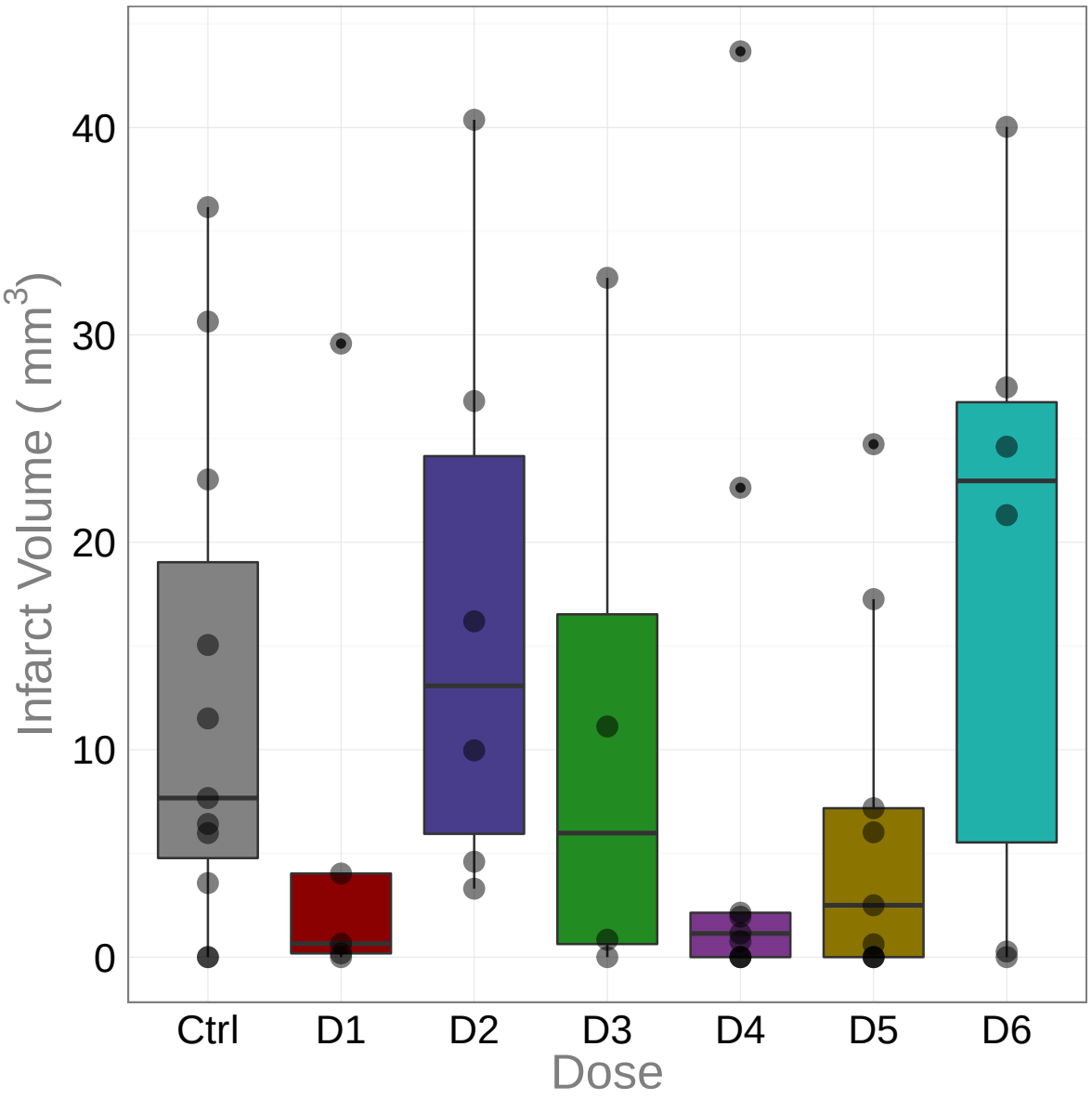
	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Dose	6	5.71	0.95	0.95	**0.4693**
Residuals	43	43.00	1.00		

Bootstrapping

Bootstrap p-value = **0.5178**

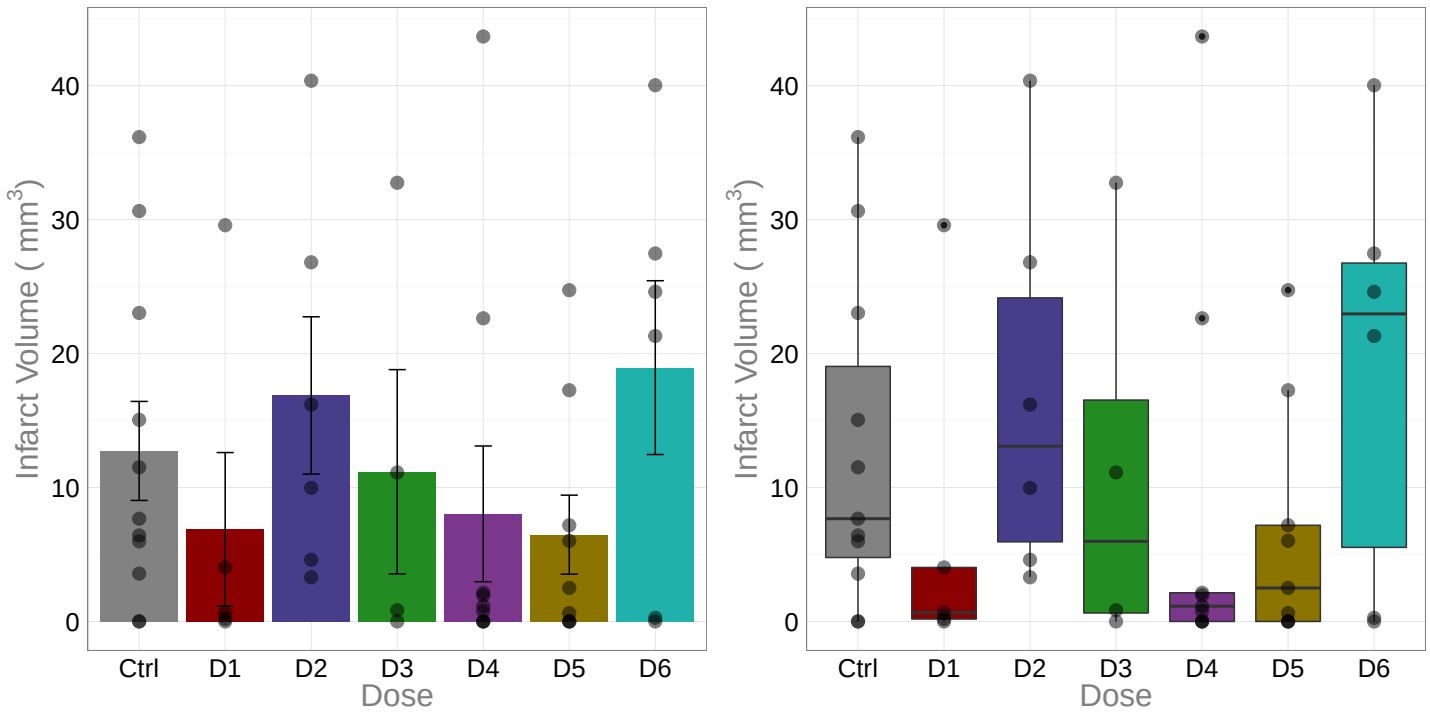


Difference in Medians?



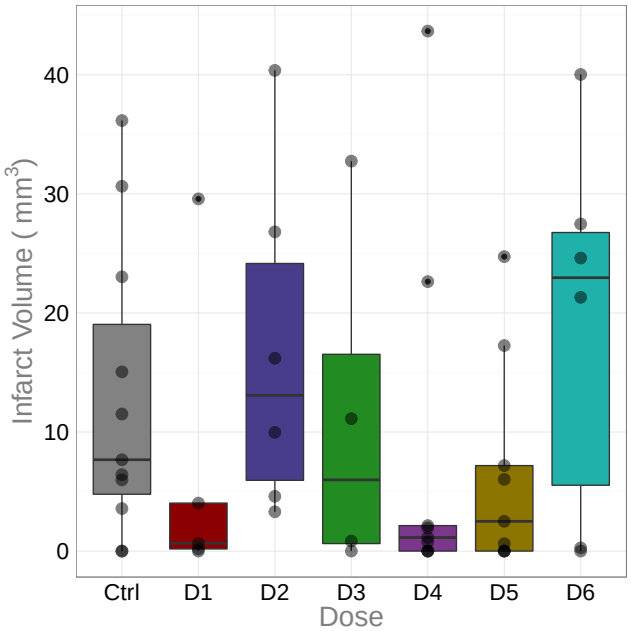
Difference in Medians?

"*Think of how stupid the average person is, and realize half of them are stupider than that.*" – George Carlin.



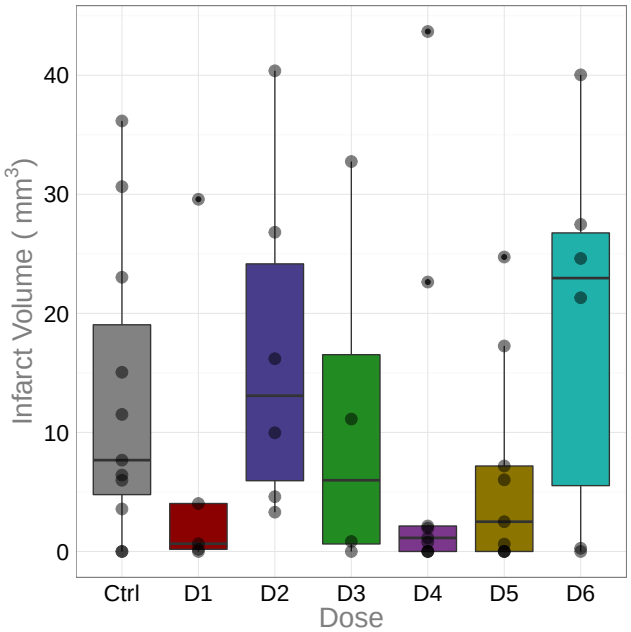
Quantile Regression

Coefficients:	coefficients	lower bd	upper bd
Ctrl	7.67	5.28	17.34617
Dose1	-7.02	-11.46	16.30
Dose2	2.30	-5.91	18.41
Dose3	3.45	-11.14	16.95
Dose4	-6.53	-11.38	-4.31
Dose5	-5.17	-14.13	0.0028
Dose6	13.64	-8.82	20.72



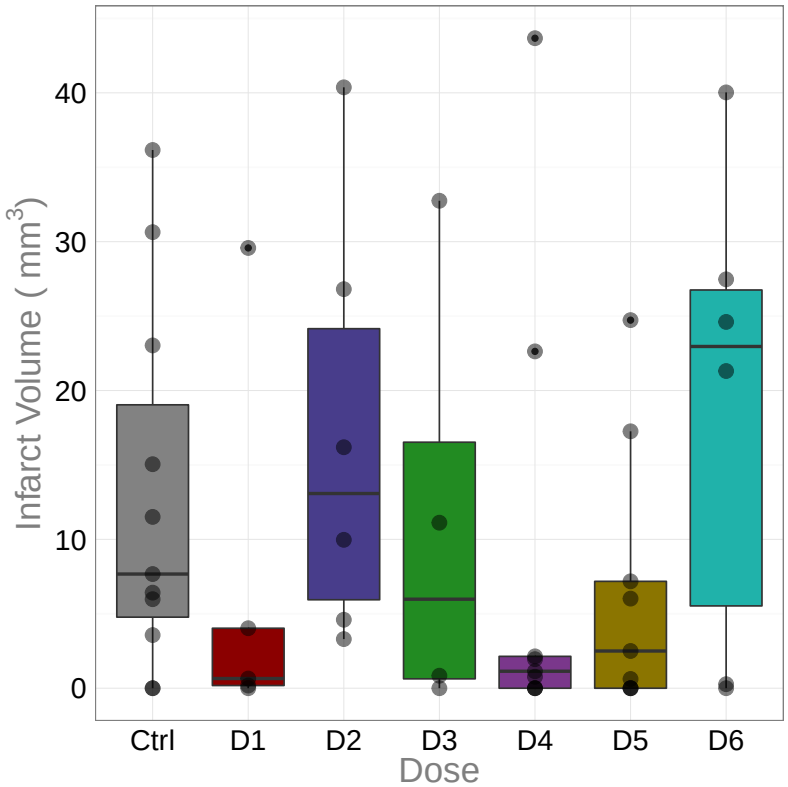
Robust Regression with IQR Weights

Estimate	Std. Error	t value	Pr(> |t|)	
Ctrl	10.39	4.519	2.301	0.0263
Dose1	-9.21	4.54	-2.02	0.0491
Dose2	4.21	7.21	0.58	0.5621
Dose3	-2.72	8.01	-0.34	0.7354
Dose4	-9.54	4.52	-2.10	0.0409
Dose5	-6.20	4.41	-1.40	0.1667
Dose6	9.37	9.76	0.96	0.3422



	pseudoDf	Test.Stat	Df	Pr(>chisq)
1	43			
2	49	14.02	6	0.0295

Kruskal-Wallis

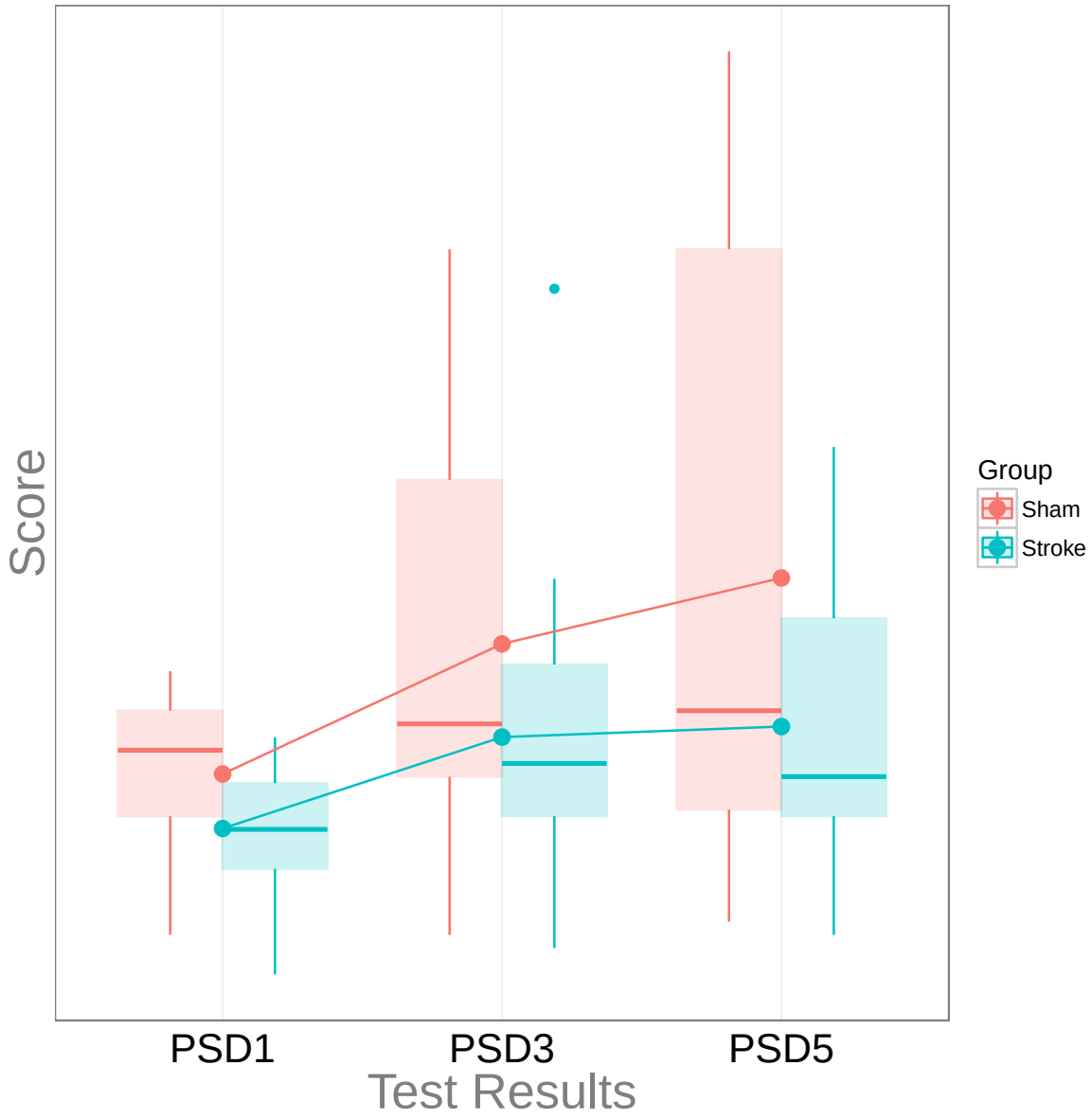


data: Vol by Dose

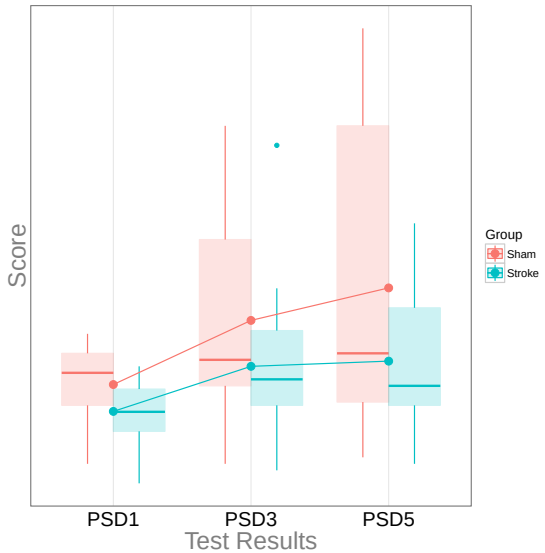
Kruskal-Wallis chi-squared = 6.571 df = 6 p-value = **0.3623**

Behavioral Testing

Behavioral Measurements

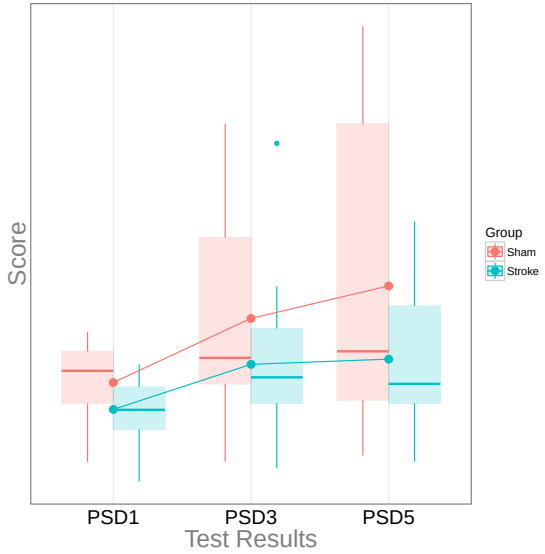


Two-Way ANOVA



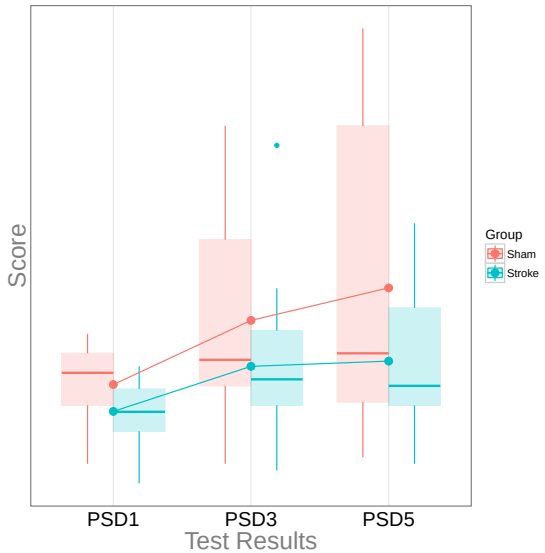
	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Group	1	1261.88	1261.88	6.57	0.0121
time	2	2066.60	1033.30	5.38	0.0063
Group:time	2	192.82	96.41	0.50	0.6070
Residuals	84	16127.60	192.00		

Repeated-measures ANOVA



	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Group	1	70	70.4	0.707	0.403
time	2	2067	1033.3	10.383	9.45×10^{-5}
Group:time	2	193	96.4	0.969	0.384
Residuals	83	8260	99.5		

Sphericity Assumption



	numDF	F-value	p-value
(Intercept)	1	6952.09	0.00
Group	1	3.01	0.09
time	2	10.85	0.00
Group:time	2	0.83	0.44

Between PSD comparison

	Value	Std.Error	t-value	p-value
(Intercept)	95.20000	1.645844	57.84267	0.0000
GroupStroke	-4.13333	2.327575	-1.77581	0.0794
time2	9.86667	2.850323	3.46160	0.0008
time3	14.86667	3.923131	3.78949	0.0003
GroupStroke:time2	-2.93333	4.030965	-0.72770	0.4688
GroupStroke:time3	-7.13333	5.548145	-1.28572	0.2021

THANK YOU!