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Statistical Interpretation including the APPROPRIATE Statistical Tests

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Statistical
Interpretation
including the
APPROPRIATE
Statistical Tests

Olga
Vsevolozhkaya

Statistical Interpretation including the **APPROPRIATE** Statistical Tests

Olga Vsevolozhkaya

University of Kentucky

February 16, 2016



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Outline

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

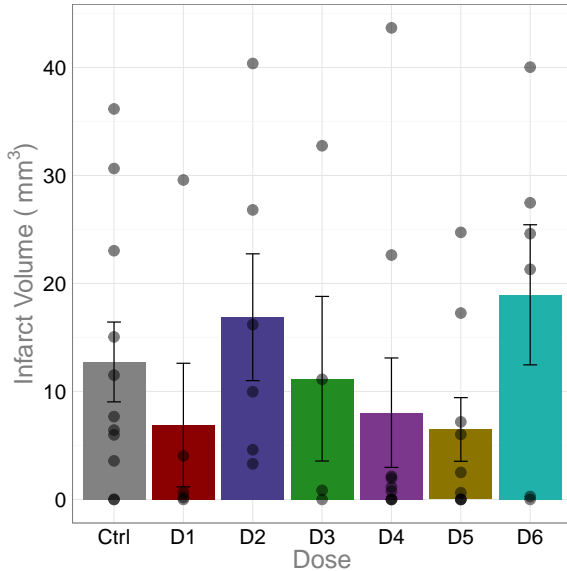


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Treatment's Therapeutic Potential

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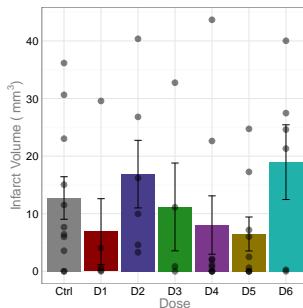
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One-Way ANOVA

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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		



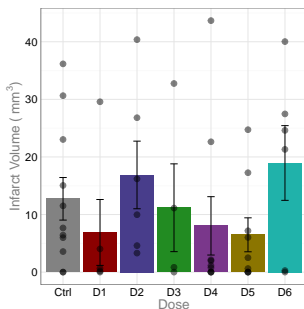
One-Way ANOVA

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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		



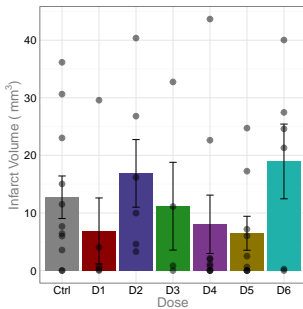
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Welch Correction

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Welch's ANOVA provides similar results.



data: Vol and Dose

F = 0.77992

num df = 6.000

denom df = 15.194

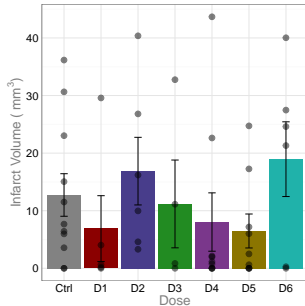
p-value = **0.5982**

Weighted Least Squares

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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		



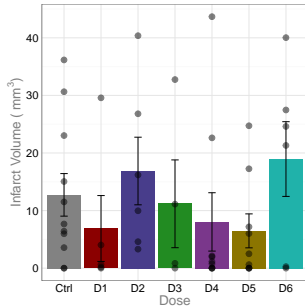
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Bootstrapping

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Bootstrap p-value = **0.5178**



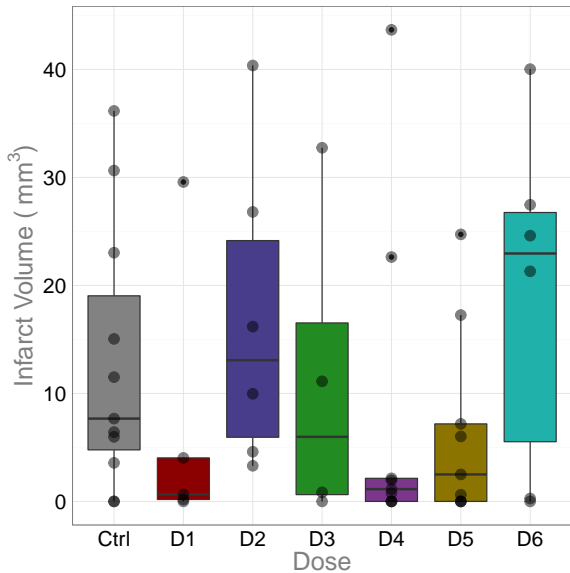


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Difference in Medians?

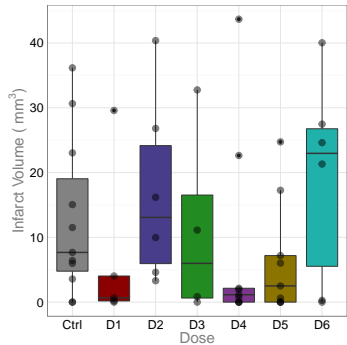
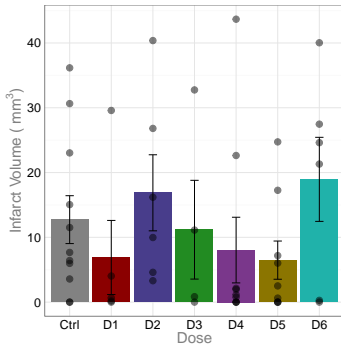
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Difference in Medians?

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





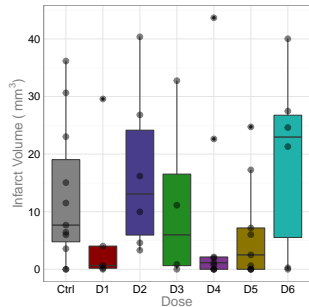
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Quantile Regression

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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





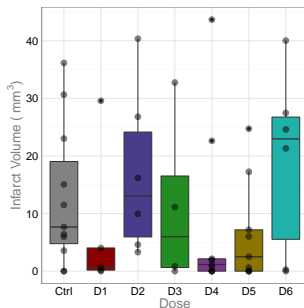
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Robust Regression with IQR Weights

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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

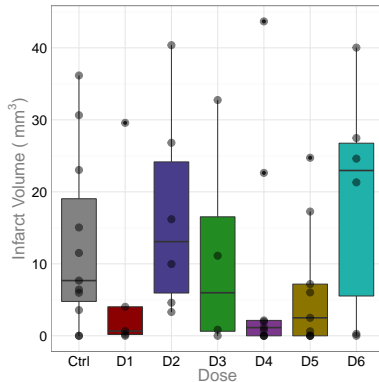


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Kruskal-Wallis

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data: Vol by Dose

Kruskal-Wallis

chi-squared = 6.571

df = 6

p-value = **0.3623**



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Behavioral Testing

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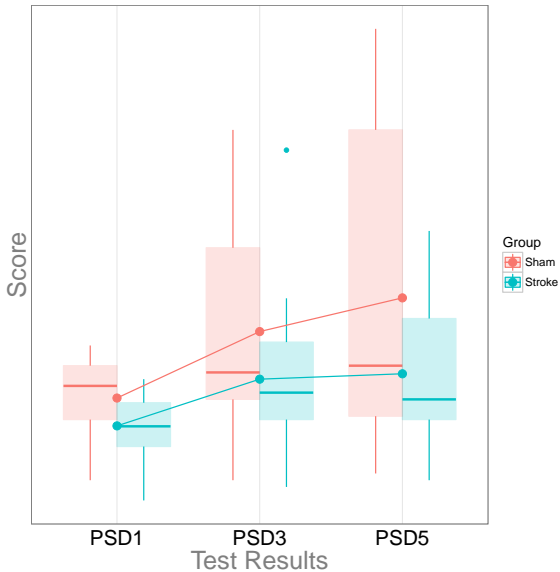


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Behavioral Measurements

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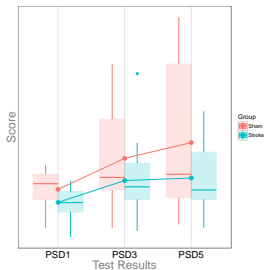


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Two-Way ANOVA

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	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		

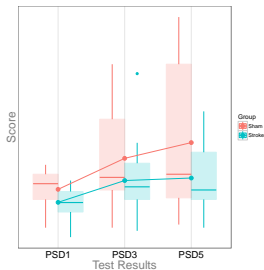


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Repeated-measures ANOVA

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	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		

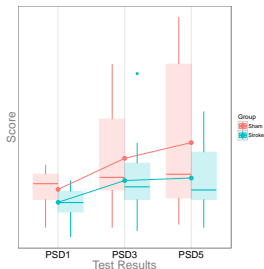


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Sphericity Assumption

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	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



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Between PSD comparison

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	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



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THANK YOU!