Computing the One-Way ANCOVA

Continuing with our diabetes treatment example, let's assume that you want to examine whether the new diabetes treatment remains significantly different from the old treatment and control groups after controlling for participants' GH levels. In order to test this, you must perform a one-way ANCOVA. Note the data when the new variable, general health, is included.

General Linear Model: HeartRate versus Treatment

```
Factor     Type   Levels  Values
Treatment  fixed       3  DiabetesControl, DiabetesNew, DiabetesOld
```

```
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Treatment  fixed       3  DiabetesControl, DiabetesNew, DiabetesOld


Analysis of Variance for HeartRate, using Adjusted SS for Tests

Source          DF   Seq SS   Adj SS  Adj MS      F      P
GeneralHealth    1   2026.8   3981.4  3981.4  17.37  0.000
Treatment        2   4057.2   4057.2  2028.6   8.85  0.000
Error           56  12835.2  12835.2   229.2
Total           59  18919.3

S = 15.1393   R-Sq = 32.16%   R-Sq(adj) = 28.52%


Term             Coef  SE Coef      T      P
Constant      115.113    8.707  13.22  0.000
GeneralHealt  -1.5386   0.3692  -4.17  0.000
```

The text that has been selected contains the information relevant to the overall ANCOVA test. Here, you see that the covariate (GeneralHealth) is a significant covariate with an *F* of 17.37 and a *p*-value of less than .01. You also see that even though the covariate is a significant one, there is still a significant main effect of the independent variable (Treatment), with an *F* of 8.85 and a *p*-value of less than 01.

Scrolling down, you see the results of the post hoc test using the Tukey method.

```
Term             Coef  SE Coef      T      P
Constant      115.113    8.707  13.22  0.000
GeneralHealt  -1.5386   0.3692  -4.17  0.000


Unusual Observations for HeartRate

Obs  HeartRate     Fit  SE Fit  Residual  St Resid
 11     45.000  81.169   3.427   -36.169     -2.45 R

R denotes an observation with a large standardized residual.


Grouping Information Using Tukey Method and 95.0% Confidence

Treatment         N   Mean  Grouping
DiabetesNew      20  93.50  A
DiabetesControl  20  75.24     B
DiabetesOld      20  70.50     B

Means that do not share a letter are significantly different.
```

Here, you see that only the new treatment is significantly different from the other groups. Your write-up of this analysis should look something like this:

A one-way ANCOVA was run to examine the effect of treatment type on heart rate after controlling for participants' GH levels. Results revealed that general health was a significant covariate in the analysis (F [1, 56] = 17.37, $p < .01$). Despite the significance of the covariate, there was a main effect of treatment type (F [2, 56] = 8.85, $p < .01$).

Post hoc tests using the Tukey method indicate that those in the new diabetes treatment program had significantly lower heart rates (M = 93.5) compared to both those in the old treatment (M = 75.24) and those in the control group (M =70.50). No other groups were significantly different.