Pymaceuticals Data Analysis by Diane Scherpereel 9/23/2019

Observation 1

From looking at the raw data, I added the drug Ramicane to my graphs because Ramicane and Capomulin are effective for decreasing tumor volume and also have better survival rates than Infubinol, Ketapril, or any of the other drugs. As with most scientific testing, a placebo is included so that we can compare “doing nothing” (and any psychological biases) to the rest of the drugs we’re testing. None were more hopeful than Capomulin or Ramicane, so I didn’t add those additional drugs to my graphs.

Observation 2

Between the two best drugs, Capomulin and Ramicane, Ramicane has a slightly better tumor volume reduction after 45 days (better response to treatment), having dropped from 45 mm3 to 34.96 mm3 compared to Capomulin’s 36.24 mm3. Another way to express that data is by using percent change in tumor volume. At the end of the 45 days compared to the starting tumor volume, Ramicane had a percent tumor volume decrease of 22% compared to Capomulin’s 19%.

The standard error on tumor volume for Ramicane is slightly higher (1.27) than for Capomulin (1.22), which means there is a slightly higher variation from the mean for Ramicane (not as consistent).

When we look at the metastatic spread during treatment, which we want to be as low as possible, Ramicane shines as the #1 drug with the lowest spread at 1.25, and Capomulin comes in 2nd at 1.48. In this case, Ramicane also has the lowest standard error for metastatic spread, at 0.19 with Capomulin in 2nd place at 0.20.

Things reverse between those 2 drugs slightly when we consider the survival rates. After 45 days, Ramicane lost one more mouse compared to Capomulin, giving Ramicane an 80% survival rate; whereas Capomulin has an 84% survival rate. The next closest drug (Zoniferol) only had 14 mice remaining after 45 days, a 56% survival rate, convincing us again that with all the metrics we have, Ramicane and Capomulin, are the best 2 drugs.

Observation 3

My final conclusion is to compare Capomulin with Ramicane with the pros of each:

Ramicane is best when we consider tumor volume reduction, metastatic spread and the standard error for metastatic spread.

Capomulin is best when we consider the tumor volume standard error (more consistent) and the survival rate.

My advice to the scientists would be to look at the pros and cons of each and decide which factors are most important in the effectiveness of the drug. For example, with what we hope to accomplish with this drug, is it more valuable to have a better survival rate (we want the least death possible), or are we willing to give up a potential life to gain better tumor volume reduction in those that survive? There could be other factors which would affect that choice, for example, if we can’t eliminate the tumor completely, will the mouse die anyway? Collecting data after 45 days might add insight to these remaining questions, but at least for further testing, I would continue only with Capomulin and Ramicane.