Pymaceuticals Analysis: Evaluation of Capomulin

This analysis seeks to evaluate the performance of Capomulin against a placebo and eight (8) other drugs in the shrinkage of tumors in mice.

The following is the top-level information needed to establish a context for the conclusions or recommendations for further study presented herein:

- 248 mice (125 Males and 123 Females) were part of the evaluation.
- Tumor volume measurements ($mm^3$) were taken every five days for each mouse up to 45 days.
- Mice weight was also recorded throughout the process.

Key Observations:

| | Tumor_Volume_mm3 | | | | | |
|---|---|---|---|---|---|---|
| **Drug_Regimen** | **count** | **mean** | **median** | **var** | **std** | **sem** |
| **Capomulin** | 25 | 36.668 | 38.125 | 32.663 | 5.715 | 1.143 |
| **Ceftamin** | 25 | 57.754 | 59.852 | 69.983 | 8.366 | 1.673 |
| **Infubinol** | 25 | 58.178 | 60.165 | 74.011 | 8.603 | 1.721 |
| **Ketapril** | 25 | 62.806 | 64.488 | 98.921 | 9.946 | 1.989 |
| **Naftisol** | 25 | 61.206 | 63.283 | 106.03 | 10.297 | 2.059 |
| **Placebo** | 25 | 60.508 | 62.031 | 78.76 | 8.875 | 1.775 |
| **Propriva** | 24 | 56.494 | 55.592 | 70.823 | 8.416 | 1.718 |
| **Ramicane** | 25 | 36.191 | 36.562 | 32.166 | 5.672 | 1.134 |
| **Stelasyn** | 24 | 61.002 | 62.192 | 90.332 | 9.504 | 1.94 |
| **Zoniferol** | 25 | 59.181 | 61.84 | 76.862 | 8.767 | 1.753 |

The table above summarizes the tumor volume for all mice at their **last evaluation timepoint**. Mice treated with Capomulin had a significantly smaller tumor volume at the end of their timeline than all other drug regimen except for Ramicane. Additional analyses are needed to establish if a statistically significant difference exists between these two drugs. These analyses should compare the following:

- Descriptive statistics of the amount of shrinkage at time =0 and the last timepoint for each mouse for all drug regimens.
- Sensitivity analysis across gender
- Sensitivity analysis across weight

Comparison of the box and whisker plots for all drug regimens clearly depict a tighter and more predictive outcome for Capomulin than Ramicane, Infunimol, and Ceftamin. Additional analyses must be completed to establish the level of statistically differentiation across the four regimens.

This table depicts descriptive statistics across the entire evaluation period.

| Tumor_Volume_mm3 Across All Timepoints | | | | | | |
|---|---|---|---|---|---|---|
| **Drug_Regimen** | **# Measurements** | **Average** | **Median** | **Variance** | **StDev** | **SEM** |
| **Capomulin** | 230 | 40.676 | 41.558 | 24.948 | 4.995 | 0.329 |
| **Ceftamin** | 178 | 52.591 | 51.776 | 39.29 | 6.268 | 0.47 |
| **Infubinol** | 178 | 52.885 | 51.821 | 43.129 | 6.567 | 0.492 |
| **Ketapril** | 188 | 55.236 | 53.699 | 68.554 | 8.28 | 0.604 |
| **Naftisol** | 186 | 54.332 | 52.509 | 66.173 | 8.135 | 0.596 |
| **Placebo** | 181 | 54.034 | 52.289 | 61.168 | 7.821 | 0.581 |
| **Propriva** | 148 | 52.321 | 50.446 | 43.852 | 6.622 | 0.544 |
| **Ramicane** | 228 | 40.217 | 40.673 | 23.487 | 4.846 | 0.321 |
| **Stelasyn** | 181 | 54.233 | 52.432 | 59.451 | 7.71 | 0.573 |
| **Zoniferol** | 182 | 53.237 | 51.818 | 48.533 | 6.967 | 0.516 |

Presumably, the greater the number of measurements, the longest was the lifecycle of each mouse in the treatment. Additional analysis needs to be done to confirm this presumption. Nevertheless, based on this count, Capomulin seems to have prolonged the life of the mice more than any other drugs.