The purpose of the report is to provide analysis on the performance of Capomulin in cancer treatment. The report is based on the data set from animal study on 249 mice who were identified with SCC tumors received treatment with ten drug regimens. Over the course of 45 days, tumor development was observed and measured.

To provide more accurate, in the animal study the gender effect on treatment is minimized, as the number of male and female mice is almost same (51% male mice, and 49% female). Additionally, the total observed mouse timepoints for each drug regimen is above 150, except for Propriva which is close to 150.

A graph of number of mice

Description automatically generated

With ten drugs treatment, we measured the tumor volume for each mouse. From below summary table, the average tumor size for mice with Capomulin and with Ramicane is smaller than other drugs.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | mean | median | variance | standard\_deviation | SEM |
| Drug Regimen |  |  |  |  |  |
| Capomulin | 40.675741 | 41.557809 | 24.947764 | 4.994774 | 0.329346 |
| Ceftamin | 52.591172 | 51.776157 | 39.290177 | 6.268188 | 0.469821 |
| Infubinol | 52.884795 | 51.820584 | 43.128684 | 6.567243 | 0.492236 |
| Ketapril | 55.235638 | 53.698743 | 68.553577 | 8.279709 | 0.603860 |
| Naftisol | 54.331565 | 52.509285 | 66.173479 | 8.134708 | 0.596466 |
| Placebo | 54.033581 | 52.288934 | 61.168083 | 7.821003 | 0.581331 |
| Propriva | 52.320930 | 50.446266 | 43.852013 | 6.622085 | 0.544332 |
| Ramicane | 40.216745 | 40.673236 | 23.486704 | 4.846308 | 0.320955 |
| Stelasyn | 54.233149 | 52.431737 | 59.450562 | 7.710419 | 0.573111 |
| Zoniferol | 53.236507 | 51.818479 | 48.533355 | 6.966589 | 0.516398 |

With the closer look of the average Tumor size by drug treaments. I select four drugs Capomulin, Ramicane, Infubinol, and Ceftamin and getting the last (greatest) timepoint for each mouse generate the distribution of the tumor volume for each treatment group. From the boxplot, we can see mice with Capomulin the final tumor size is between 26. 71mm3 to 55.97 mm3, and half of the tumor size is within the range from 37.69 mm3 to 45 mm3. Compared with other three drugs, the average the tumor size with Capomulin treatment group is not skewed by outliners.

A graph of a number of cancer patients

Description automatically generated with medium confidence

Furthermore, I randomly select a mouse with Capomulin treatment to study the tumor size with the time change. From below line graph, we can see the tumor size drops significantly after day 20 till day 34, during the drop we also see a little bumps back, and after day 34 the tumor size start to gradually increases again.

We can see it takes long time for Capomulin to take effect, and it indeed can reduce tumor size, but the tumor develops again after about a month.

