# Tumor Cell Growth Mathematical Model

# Abstract

A defining hallmark of cancer is aberrant cell proliferation. Efforts to understand the generative properties of cancer cells span all biological scales: from genetic deviations and alterations of metabolic pathways, to physical stresses due to overcrowding, as well as the effects of therapeutics and the immune system. While these factors have long been studied in the laboratory, mathematical and computational techniques are being increasingly applied to help understand and forecast tumor.

# Mathematical Model

Exponential Model :

Initial formula : $dV/dt = a0\ V$

Integrating both sides and simplification, Final formula : $V(t) = V0\ e^{at}$

Where:

- V is the total volume of the tumor
- V0 is the volume at t = 0
- a0 is equal to the fraction of proliferative cells multiplied by ln 2/TC
- where TC is the constant or mean cell cycle duration

# Assumptions

In this version, we anticipate that every one cell are improved through a regular cell cycle length TC.

This affects exponential growth, which is likewise authentic in instances in which a regular fraction of the extent is proliferating or in which the cell cycle period is a random variable with exponential distribution.

# Assumptions

**Logistic regression does not make many of the key assumptions of linear regression however , some other assumptions still apply**

First, binary logistic regression requires the dependent variable to be binary and ordinal logistic regression requires the dependent variable to be ordinal.

Second, logistic regression requires the observations to be independent of each other.

Third, the independent variables should not be too highly correlated with each other.

Finally, logistic regression typically requires a large sample size For example, if you have 5 independent variables and the expected probability of your least frequent outcome is .10, then you would need a minimum sample size of 500 (10*5 / .10).

# Tumor growth in presence of chemotherapy

We determine how chemotherapy alters the dynamics of every of the boom fashions the use of the simplifying assumption of consistent drug concentration. We once more use balance evaluation to evaluate the long-time period predictions made with the aid of using every of the fashions. Each of the fashions once more predicts that there are feasible constant points, certainly considered one among that is zero. The different constant factor represents the most feasible tumor length withinside the presence of chemotherapy. In this case, handiest one model (exponential) predicts that the tumor will keep growing indefinitely even withinside the presence of chemotherapy. The ultimate fashions all expect that the chemotherapy will preserve the tumor to a few most length. Unfortunately, it's miles once more hard to evaluate the relative sizes of the expected most length while not having values for parameters.

# Solution

Resolvins are produced while the frame metabolizes omega-three fatty acids, which can be located certainly in fish oil and vegetable oil.

In what has been known as the tumor boom paradox killing off most cancer cells can on occasion motivate extra most cancer cells to spread. This takes place due to the fact the mobile particles this is left at the back trigger an inflammatory reaction from our immune system, which, in turn, can stimulate the manufacturing of extra cancer cells. But researchers may also now have located a manner out of this conundrum. A new take a look has located that resolvins — compounds certainly secreted via way of means of our frame with a view to forestall the inflammatory reaction — can forestall tumors from developing while such boom is caused via way of means of mobile waste.