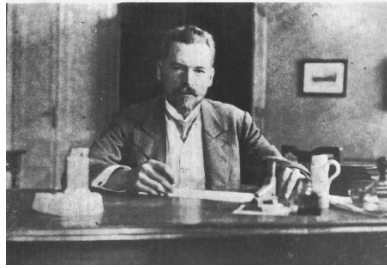


# 36th M. Smoluchowski Symposium on Statistical Physics: Soft Matter, Information Processing and Nonequilibrium Fluctuations



Contribution ID: 50

Type: **Poster**

## Modeling tumor growth with the Allee effect

*Tuesday, 26 September 2023 16:35 (1 minute)*

To describe the growth of a cell colony, processes such as cell division, cell death and cell movement must be taken into account. All of these mechanisms can have multiple contributing factors, and one of them is the density of cells in the surroundings.

It is often assumed that the growth of cancer cell colonies is characterized by an exponential increase in the number of cells, and a decrease in the rate of colony growth is only considered in large populations when cells have limited access to resources such as nutrients, oxygen or space. However, studies indicate that in small populations of cancer cells the Allee effect can be observed [1]. The Allee effect is a phenomenon that is characterized by the per-capita growth rate of a population being low or even negative at small population sizes.

To describe tumor growth at the initial stages, a stochastic model was proposed, that took into account the effect of local cell density on cell division. The model results in slower growth in the initial stages of colony development, as described in the literature.

[1] Johnson, Kaitlyn E., et al. "Cancer cell population growth kinetics at low densities deviate from the exponential growth model and suggest an Allee effect." *PLoS biology* 17.8 (2019): e3000399.

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**Session Classification:** Poster Session