

Stochastic model of contact inhibition and the proliferation of melanoma *in situ*

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Contact inhibition is a central feature orchestrating cell proliferation in culture experiments; its loss is associated with malignant transformation and tumorigenesis. We performed a co-culture experiment with human metastatic melanoma cell line (SK-MEL-147) and immortalized keratinocyte cells (HaCaT). After 8 days a spatial pattern was detected, characterized by the formation of clusters of melanoma cells surrounded by keratinocytes constraining their proliferation. In addition, we observed that the proportion of melanoma cells within the total population has increased. To explain our results we propose a spatial stochastic model (following a philosophy of the Widom-Rowlinson model from Statistical Physics and Molecular Chemistry) which considers cell proliferation, death, migration,

and cell-to-cell interaction through contact inhibition. Our numerical simulations demonstrate that loss of contact inhibition is a sufficient mechanism, appropriate for an explanation of the increase in the proportion of tumor cells and generation of spatial patterns established in the conducted experiments.

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References

- [1] MORAIS, M. C. AND STUHL, I. AND SABINO, A. U. AND LAUTENSCHLAGER, W. W. AND QUEIROGA, A. S. AND TORTELLI JR., T. C. AND CHAMMAS, R. AND SUHOV, Y AND RAMOS, A. F., *Stochastic model of contact inhibition and proliferation of melanoma in situ*, Scientific Reports, 2017, **7**: 8026.