CONFINED CELL MIGRATION BY AN AGENT-BASED MODEL

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SUMMARY

Cell migration is a pivotal process in the development and treatment of many types of cancer. To delve deeper into this phenomenon, we have designed an Off-Lattice Agent-Based Model (AMB) that allows for simulating cell deformation during migration rough experimental data.

To achieve this, we have employed Physicell (cf. [1]), an open-source 3D simulator for multicellular systems. However, Physicell adopts a center-based ABM, where each particle represents a single cell. Given its inherent lack of precision in showing cells deformation, we have modified the program to obtain a Subcellular ABM, wherein each cell is defined by a variable number of particles based on the precision requirements of the simulation, so that it allows the computational cost reduction in certain simulations.

Specifically, we have simulated the migration of the cell through different sizes microtubes, since it has been observed that migration velocity remains constant for diameters of 4, 6 and 8 m and it diminish for a 2 m diameter. The model aims to establish the influence of the different cellular parts stiffness on the cells migration.

Keywords: Cell Migration, Agent-Based Models, Celluar Deformation...

AMS Classification: 70-08

References

[1] A. Ghaffarizadeh, R. Heiland, S. H. Friedman, S.H. Mumenthaler, P. Macklin. An open source physics-based cell simulator for 3-D multicellular systems. *PLoS Comput Biol.* **14**(2), 167–198 page, 2018.

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