GranSim - A Computational Model of Granuloma Simulation (2D & 3D)

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OVERVIEW

- GranSim 2D and 3D Models Available
- First released 2004, continually updated
- Substantial Publication History

BACKGROUND

GranSim, the Agent-based model (ABM) describing tuberculosis (TB) granuloma formation and function in the lung, was developed based on four basic concepts: an environment (section of the lung parenchyma), agents (immune cells), ABM rules that govern the agents and their interactions, and the time-step used to update events. The attached documentation illustrates the details of how each of these features have been implemented in the form of a pseudocode. The model was first published in 2004 but has been continually updated to include the latest biological information and technological advances.

GranSim is a hybrid agent-based computational model (ABM) that describes the formation and function of a granuloma during Mycobacterium tuberculosis infection in the lung. Although granulomas are 3D entities, due to the high computational costs associated to simulate a 3D version, GranSim has been developed and curated since 2004 only in 2D. This website and the recent manuscript [hyperlink here] illustrate our first attempt to simulate a 3D TB granuloma in the lung.

References

1. Segovia-Juarez J, Ganguli S, and Kirschner D. , Identifying control mechanisms of granuloma formation during M. tuberculosis infection using an agent-based model. J Theor Biol . 2004 Dec 7;231(3):357-76. doi: 10.1016/j.jtbi.2004.06.031.