1 Supplementary Material

1.1 Model parameters

Table 1. Summary of key parameters and methods used in the burn wound immune response simulations [3]. **Most significant parameters for our optimization process** .

Parameter/Method	**Description**	**Details/Values**
cc3d processors	Number of processors used for the simulation	**4**
Simulation Domain	Squared 2D grid	$2.5x10^5$ grids
Cell Type	Number of different cells	9, where 1 (endothelial cells) is static
Cytokines	Number of different cytokines	6
Modeling Framework	Glazier-Graner-Hogeweg (GGH)	Implemented using CompuCell3D
Numerical Solver	Finite volume solver (FiPy) for Partial differential Equations	LinearGMRESSolver
Simulation Timeframe	Inflammatory phase	10^6 Monte Carlo steps
Chemotaxis Plugin	Movement based on cytokine gradients	Parameter λ controls chemotaxis strength
Key Parameter Explored	Endothelial cell number	**10, 100, 500, 1000, 2000, 3000, 4000, 5000**
Key Findings	Role of endothelial cells in inflammation	Higher counts lead to faster inflammation resolution

1.2 Additional Figures

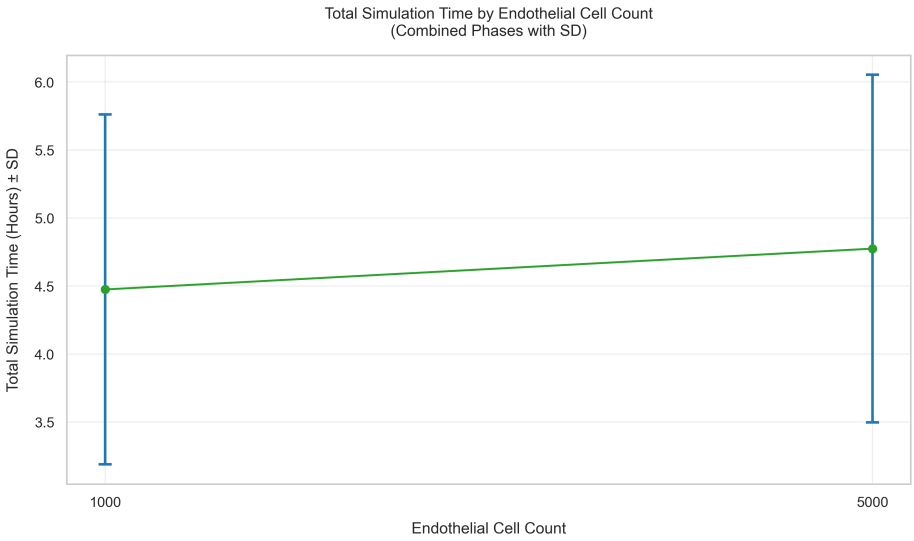

Fig. 1. Total simulation time combined by endothelial cell count. The plot shows the linear difference in simulation time across simulations between using endothelial cell count 1000 and 5000(in green) in the parallelized simulations. Total simulation time in hours on the Y-axis and endothelial cell count on the X-axis. Standard deviation is shown in blue.