1 Supplementary Material

1.1 Model parameters

Table 1. Summary of key parameters and methods used in the burn wound immune response simulations [4]. **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 Compu-Cell3D
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