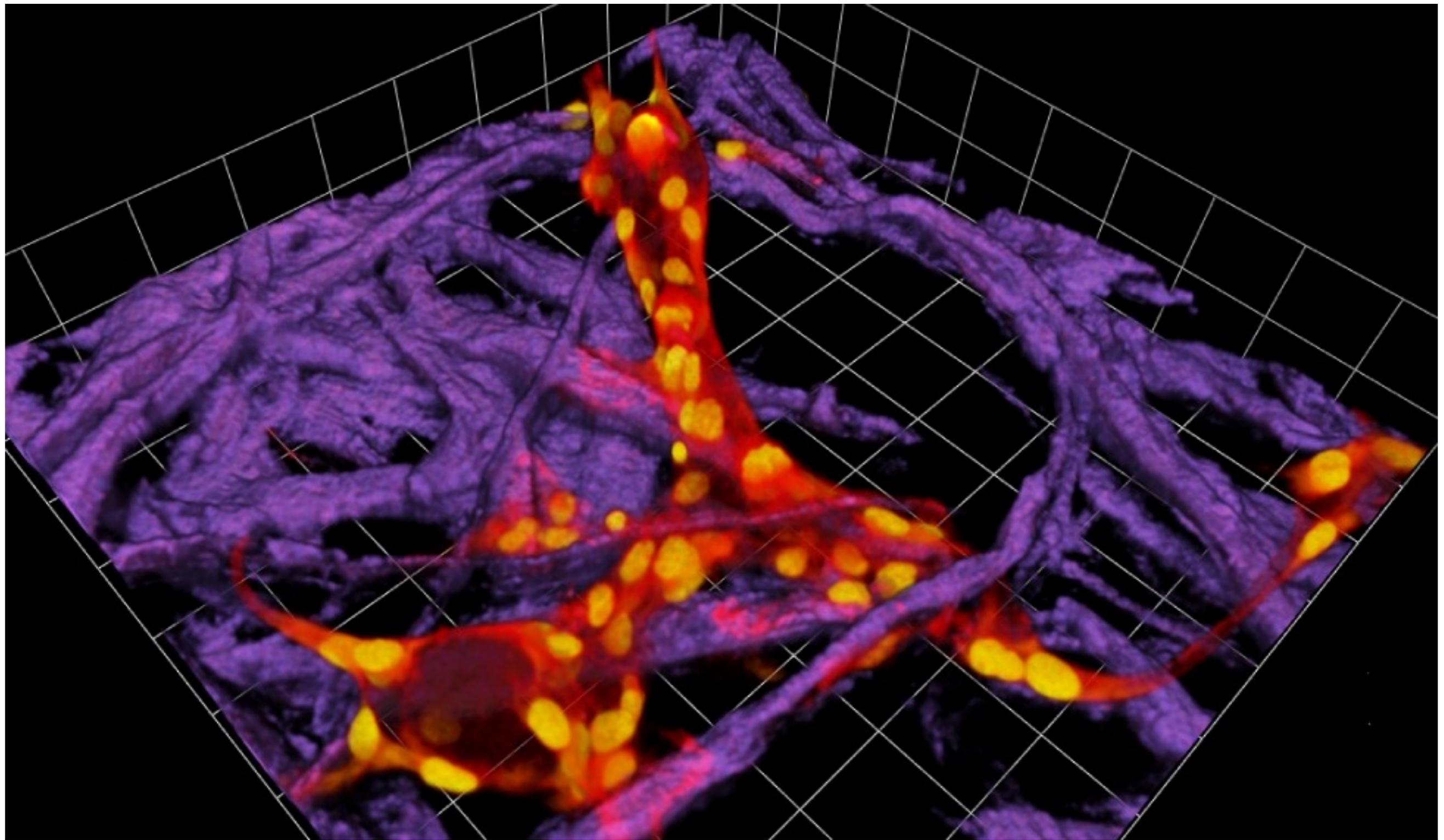


cellular Potts model

cellular-automaton-based Monte- Carlo method



confocal microscopy image of humane endothelial cells (HUVEC) growing inside paper permeated with Matrigel. cells form a hollow blood-vessel like structure.
Purple: cellulose, red: F-actin, yellow: nucleus

vascular endothelial cells chemotactically attract each other

Modeling the cells individually

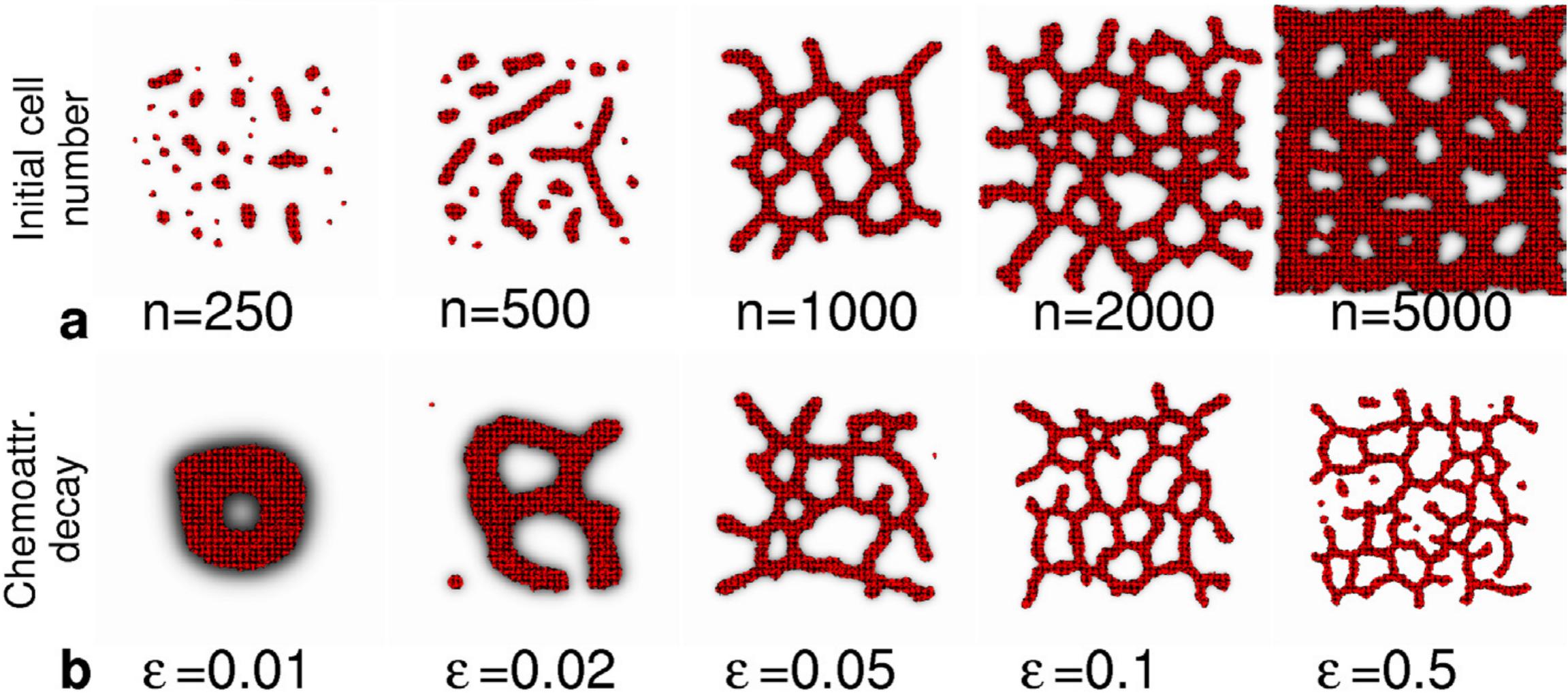
intercellular adhesion

adhesion to matrix

cell shape

chemoattractant concentration

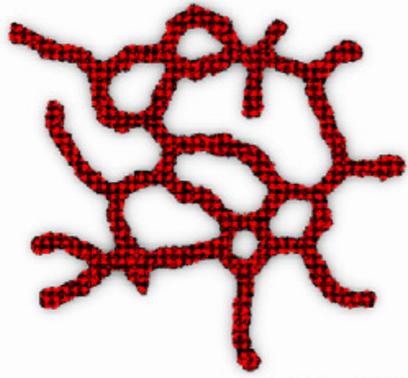
initial numbers



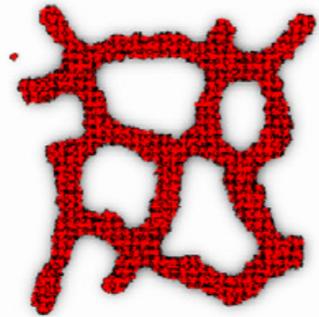
chemo decay

cell adhesion γ_{cM}

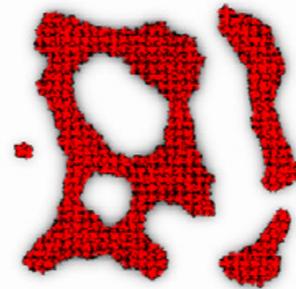
c Cell adhesion



$$\gamma_{cM} = 19.5$$



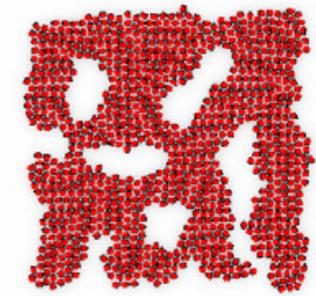
$$\gamma_{cM} = 15$$



$$\gamma_{cM} = 10$$

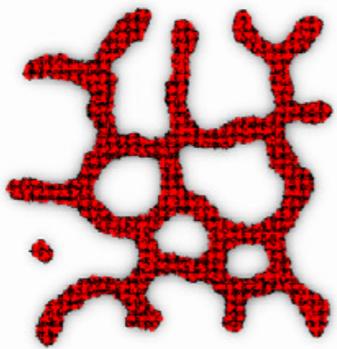


$$\gamma_{cM} = 0$$

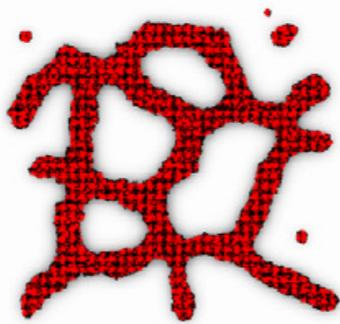


$$\gamma_{cM} = -30$$

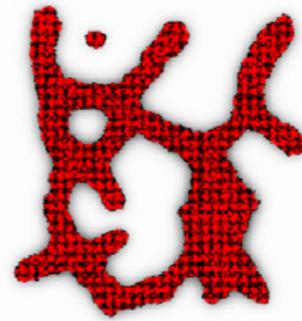
d Receptor saturation



$$s = 0.05$$



$$s = 0.1$$



$$s = 0.2$$



$$s = 0.3$$

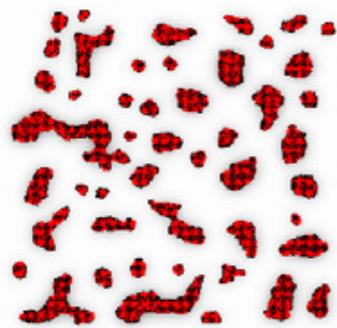


$$s = 0.5$$

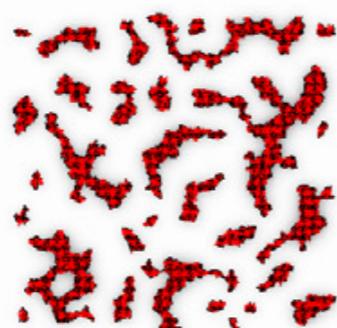
Saturation of Chemotaxis

cell elongation

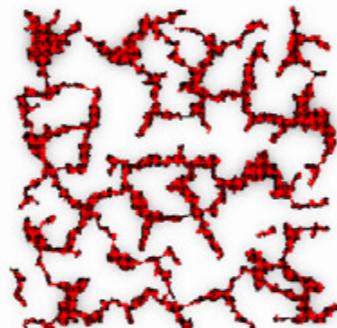
Target
length



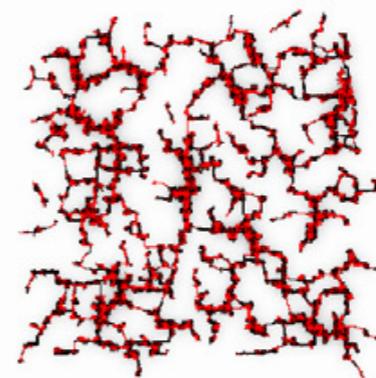
e L=50



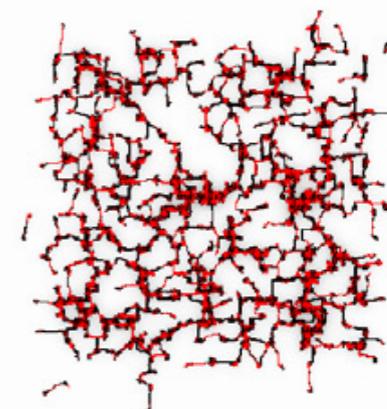
L=100



L=150



L=200



L=250

