S1 – Discretization for cell migration

The 3D7P model were applied in this study to describe cell migration in neointima. We used Euler's five-point finite difference scheme to discretize Eq. (5) and all equations about cell migration can be discretized as:

$$U_{i,j,k}^{q+1} = U_{i,j,k}^{q}P_0 + U_{i+1,j,k}^{q}P_1 + U_{i-1,j,k}^{q}P_2 + U_{i,j+1,k}^{q}P_3 + U_{i,j-1,k}^{q}P_4 + U_{i,j,k+1}^{q}P_5 + U_{i,j,k-1}^{q}P_6 \qquad (S-1)$$

where the subscripts i, j, k and the superscripts q specify the location of a individual cell on the grid and the time steps, respectively. The coefficients P_0 ~ P_6 are the probability density function to determine the movement direction of the movement, which represent stationary (P_0) or moving up (P_1), down (P_2), left (P_3), down (P_4), forward (P_5) or backward (P_6). Each of the coefficients $P_1 \sim P_6$ consists of two components: cell random movement and chemotactic effect, all of which involve functions of the local concentration of chemical factors.

In each time step, P_0~P_6 can be integrated into the cumulative distribution function and influence the cell's migration to a certain neighbor gird. A higher value of P_i means a higher probability of moving in the direction of i $(i = 0\sim 6)$. It ensures the random walk of cells in a uniform concentration field, while being able to migrate along a gradient in a non-uniform concentration field.