**Tissue damage Submodel**

**Model 1**

**Simplified ODEs**

The above model is written skipping the effect of MMP9 in collagen degradation and cell crowding from article 1 model.

**Table: List of parameters**

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Biological meaning** | **Value** |
|  | Macrophage removal rate | 0.6 day-1 |
|  | Fibroblast growth rate | 0.924 day-1 |
|  | Fibroblast apoptosis rate | 0.12 day-1 |
|  | Macrophage TGF-β production rate | 0.07 pg/cell/day |
|  | Fibroblast TGF-β production rate | 0.004 pg/cell/day |
|  | TGF-β degradation rate | 15 day-1 |
|  | Fibroblast collagen production rate | 20 μg/cell/day |

**Agent based model 1**

* Start from an immune model where tissue is not completely destroyed (faster T recruitment and faster T kill)
* When CD8+ T cell kills an infected cell that will become the source point for secretion of anti-inflammatory cytokine (source term uT)
* Anti-inflammatory cytokine will diffuse
* Recruitment of fibroblast depends on the concentration of anti-inflammatory cytokine ()
* Fibroblast chemotaxis towards the source of maximum secretion source of anti-inflammatory cytokines
* Fibroblast deposit collagen in the damages site

**Faster T recruitment:** We also increased the recruitment rate of CD8+ T cells to the tissue in response to inflammatory cytokines by reducing 𝜌min from 0.4 to 0.1, and by reducing 𝜌sat from 0.7 to 0.4

**Faster T kills:** the rate of CD8+ T cell killing was doubled by reducing the threshold contact time for cell death from 50 min to 25 min

* Anti-inflammatory cytokine
* Diffusion coefficient
* Fibroblast
* Cell migration rate along damaged tissue life in voxel: ?

Decay rate can be estimated from the ODEs

**Simulated result for μL/day**

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