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Modeling macrophage polarization during the inflammatory phase of wound healing

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Modeling macrophage polarization during the inflammatory phase of wound healing

Normal wound healing is a process driven, in part, by phagocytic cells and cytokine mediators. In the inflammatory phase, debris, pathogen, and apoptotic cells are cleared from the wound by macrophages and neutrophils and the activation of these cells is modulated by anti- and pro-inflammatory cytokines. Macrophages can be activated to a more inflammatory M1 phenotype or to an M2-like phenotype which promotes the resolution of inflammation. Problems with this phenotype switch can result in the accumulation of too many of either type and lead to chronic wounds or disease. We have developed an ordinary differential equation model that includes both macrophage phenotypes to better understand the system dynamics and ultimately explore points of intervention that can lead to homeostasis.