

Table 1: Immune Cells and Cytokines in Synovium and Lymph Nodes

Immune Cells	Cytokines Released	Cytokines Acting On Them and Their Functions
MLS	TNF- α , IL-1 β , IL-6, TGF- β , IL-8, CCL-2	TNF- α : Activates MLS to adapt M1 phenotype and promotes release of TNF- α , IL-1 β , IL-6. IL-6: Sustains survival and enhances cytokine release. IL-1 β : Activates MLS to release TNF- α and IL-6. IL-17: Enhances pro-inflammatory cytokine production (TNF- α , IL-1 β , IL-6). IFN- γ : Activates MLS to M1 phenotype and enhances MHC II expression. GM-CSF: Promotes survival and expansion. TGF- β : Shifts MLS to M2 phenotype. IL-10: Suppresses M1 phenotype and promotes tissue repair.
Recruited Macrophages	TNF- α , IL-1 β , IL-6, IL-12, IL-23, IL-8, CCL2, RANKL	TNF- α : Activates M1 phenotype and induces pro-inflammatory cytokines (TNF- α , IL-1 β , IL-6). IL-6: Sustains survival and cytokine release. IL-1 β : Promotes differentiation of osteoclast precursors and release of TNF- α , IL-6. IL-17: Synergizes

		<p>to enhance TNF-α, IL-1β, IL-6 production. IFN-γ: Activates M1 phenotype and enhances MHC II expression. GM-CSF: Promotes survival and expansion. IL-10: Suppresses M1 phenotype and promotes tissue repair. TGF-β: Shifts macrophages to M2 phenotype. RANKL: Induces osteoclast differentiation with M-CSF. M-CSF: Essential for macrophage differentiation and osteoclast precursor response to RANKL.</p>
Treg Cells	TGF- β	<p>TGF-β: Promotes Treg cell differentiation and proliferation in low IL-6, IL-1β conditions. IL-6, TNF-α: Decrease Treg differentiation.</p>
Osteoclast Cells	—	<p>TNF-α: Amplifies osteoclast differentiation and prolongs survival. IL-1β: Potentiates RANKL/RANK signaling for differentiation. RANKL: Initiates differentiation from precursors. M-CSF: Prepares precursors for RANKL signaling and promotes survival and proliferation.</p>

FLS (Fibroblast-like Synoviocytes)	IL-6, IL-8, IL-1 β , CXCL12, CXCL9, CXCL10, CXCL11, VEGF, GM-CSF, M-CSF, RANKL	TNF- α : Promotes proliferation. IL-1 β : Triggers MMP production, proliferation, and migration. IL-6: Enhances survival and resistance to apoptosis. IL-17: Synergizes with TNF- α for proliferation. TGF- β : Promotes differentiation from progenitor cells.
Th17 Cells	IL-17, IL-22, GM-CSF, TNF- α , IFN- γ	TGF- β : Critical for differentiation in presence of IL-6 or IL-1 β . IL-6, TGF- β : Required for production. IL-23: Promotes survival and proliferation. IL-1 β : Enhances pathogenicity and survival. IL-12: Converts to Th1-like phenotype. IFN- γ : Promotes plasticity and transition to Th1-like phenotype.

Table 2: Cytokines and Cells That Release Them

Cytokine/Chemokine	Cells That Release It
TNF- α	MLS, Recruited Macrophages, Th17 Cells
IL-1 β	MLS, Recruited Macrophages, FLS
IL-6	MLS, Recruited Macrophages, FLS
TGF- β	MLS, Treg Cells
IL-8	MLS, Recruited Macrophages, FLS
CCL-2	MLS, Recruited Macrophages
IL-12	Recruited Macrophages
IL-23	Recruited Macrophages
RANKL	Recruited Macrophages, FLS, Osteoblasts, Synovial Fibroblasts, T Cells, B Cells

GM-CSF	MLS, FLS, Th17 Cells
M-CSF	FLS
IL-17	Th17 Cells
IL-22	Th17 Cells
IFN- γ	Th17 Cells
CXCL12	FLS
CXCL9	FLS, Th17 Cells
CXCL10	FLS, Th17 Cells
CXCL11	FLS, Th17 Cells
VEGF	FLS
CCL20	Th17 Cells

This tabular arrangement consolidates your collected data, categorizing cytokines/chemokines with the immune cells that release them and interact with them. Functions for each cytokine have been specified to aid in differential equation modeling.