

Raja Narendralal Khan Women's College (Autonomous)

Department- Human Physiology (PG)
PAPER- PHY 403 (SPECIAL PAPER)

UNIT-37, MODULE- II: *IMMUNO-CHEMISTRY*

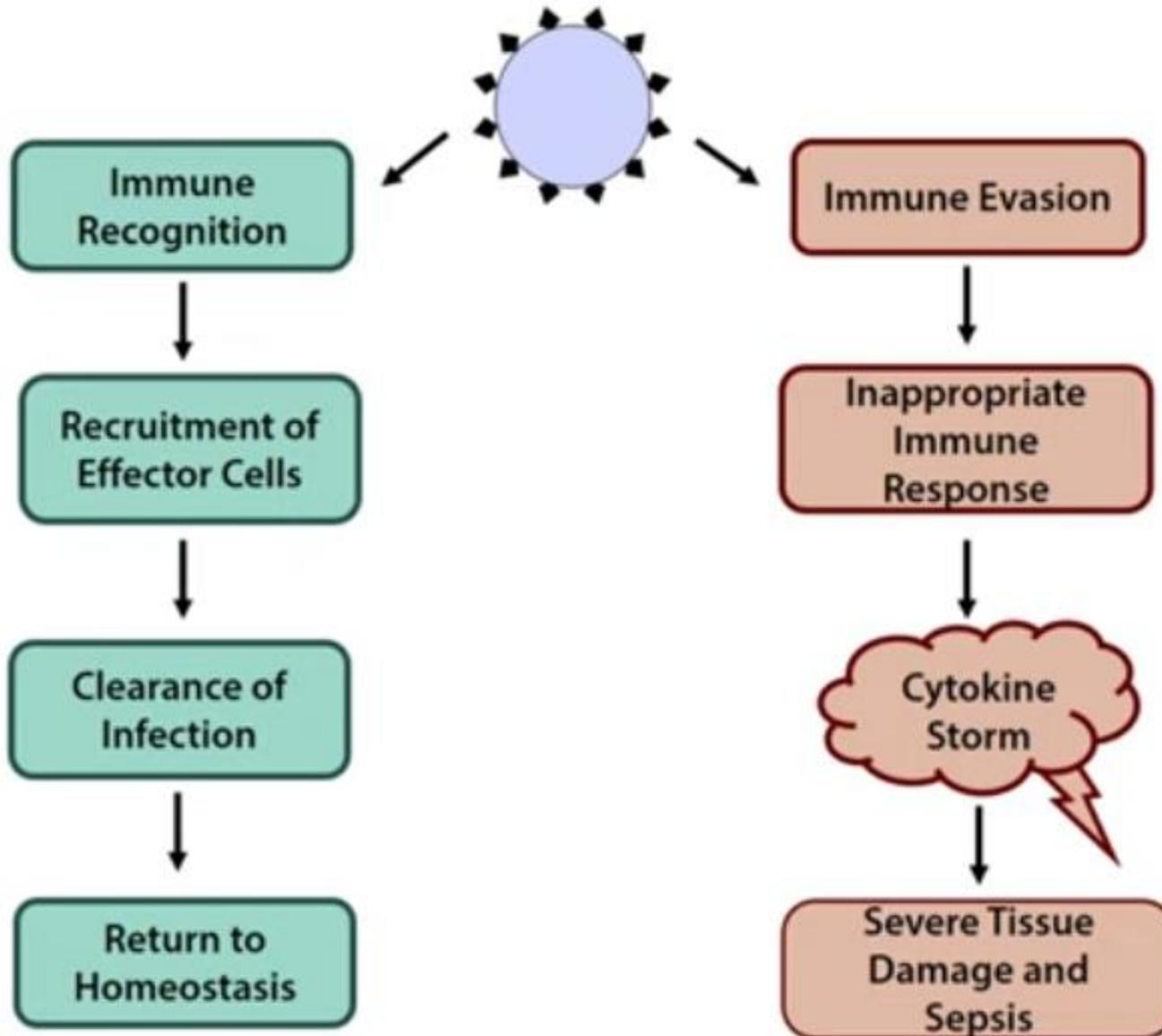
(ONLINE CLASS)

CLASS MODE: VIDEO CALLING, PLATFORM: WHATSAPP, TIME: 03.00 PM

Name of the Guest Lecturer- Suparna Majumder

Date: 06.05.2020

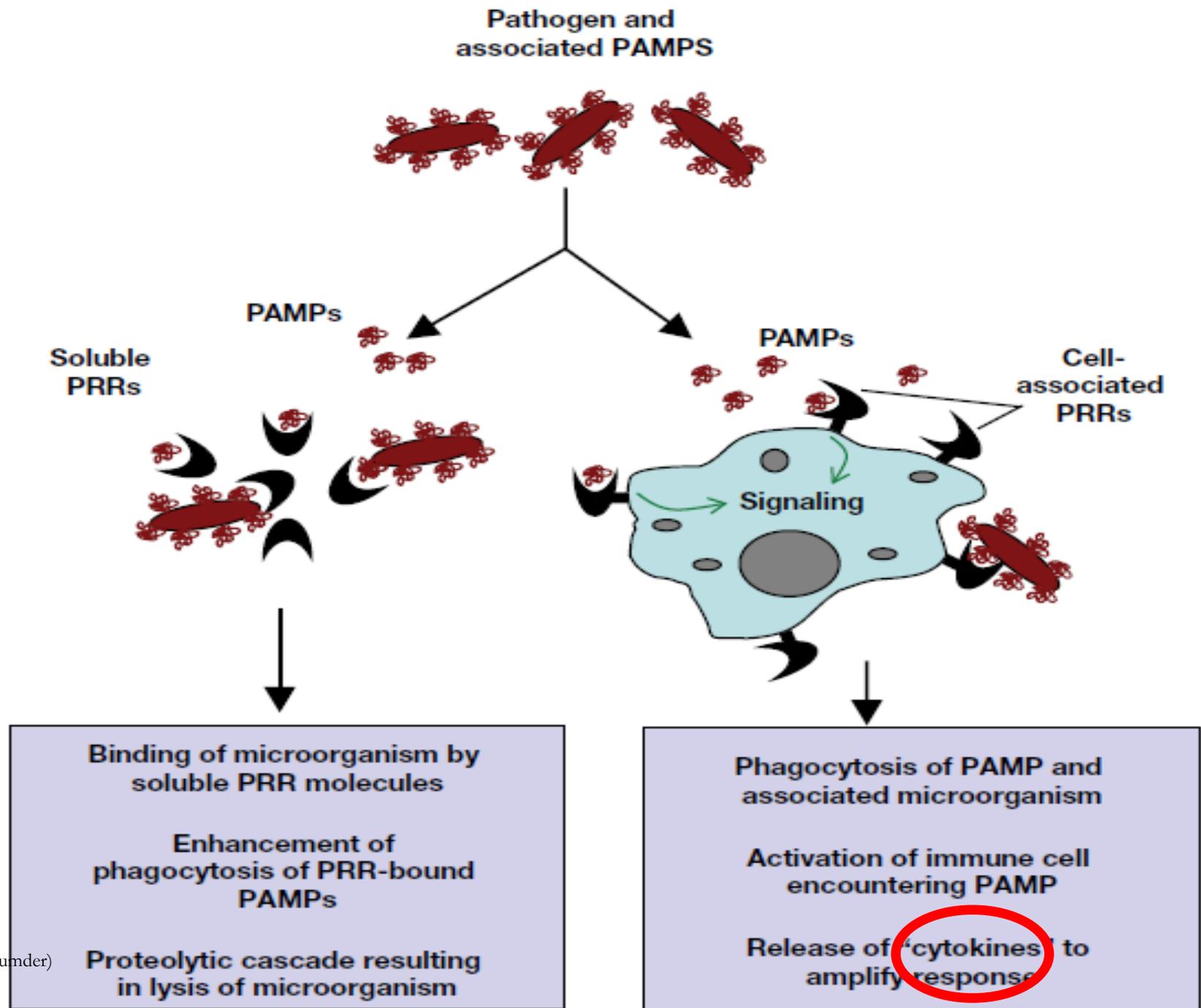
Infection with Pathogen

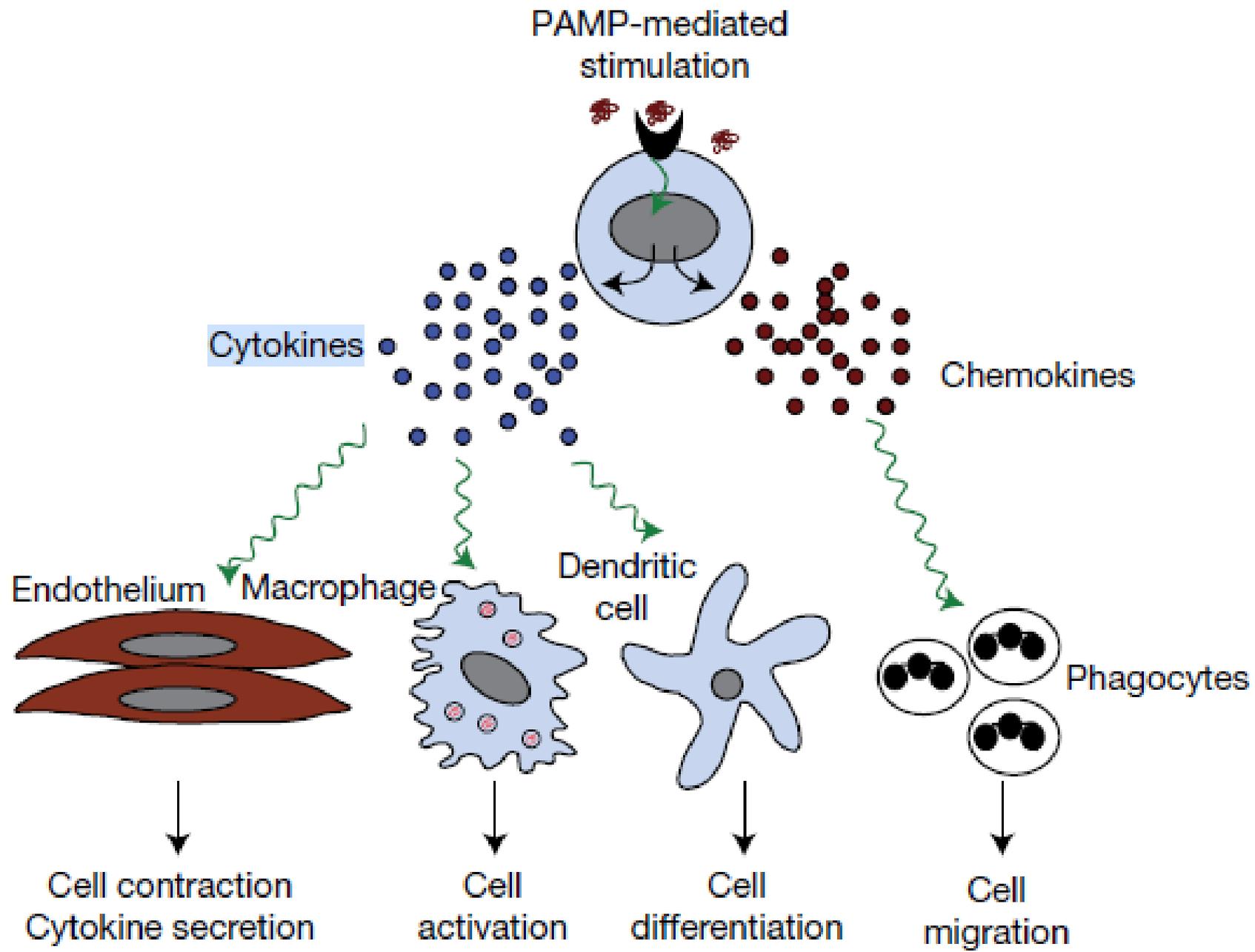


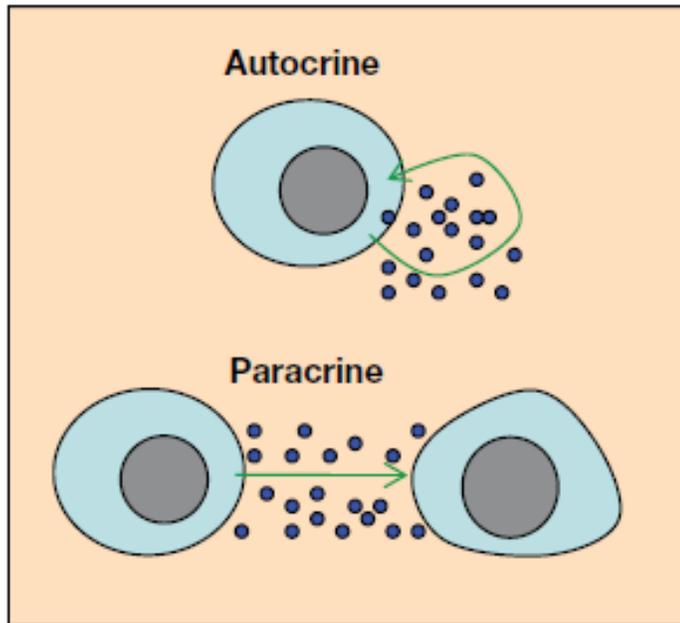
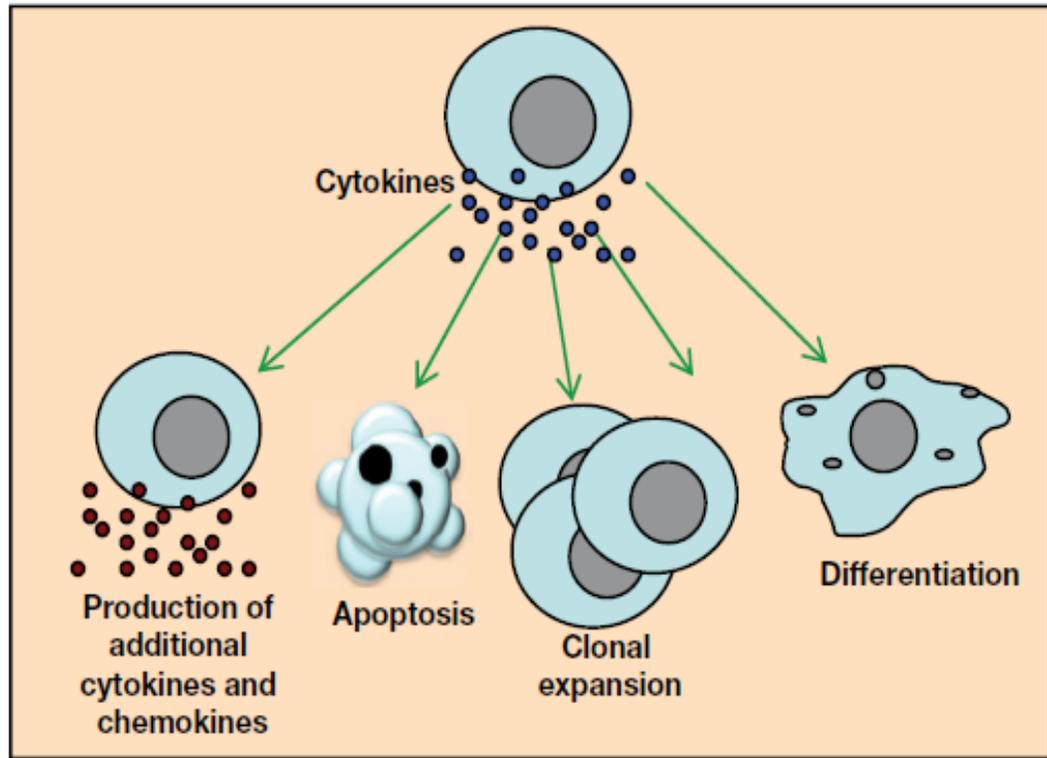
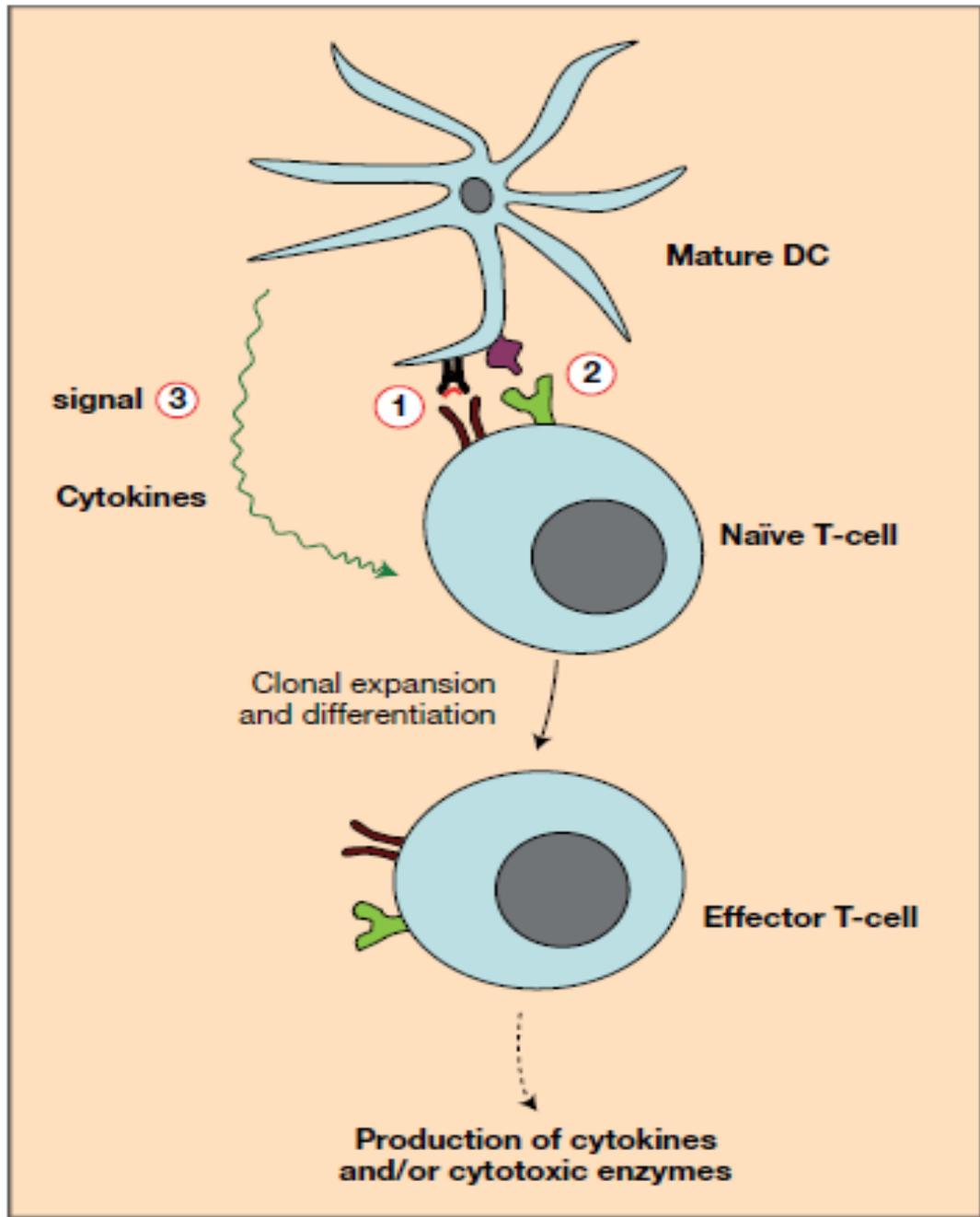
Restricted specificity of innate immune receptors:

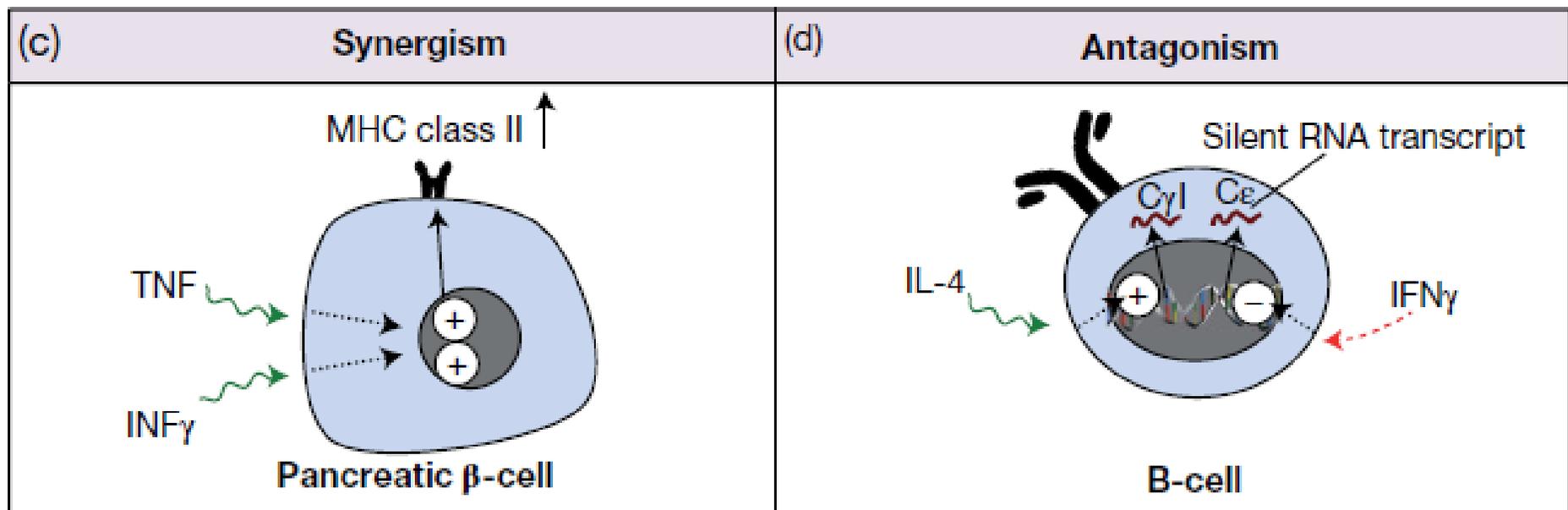
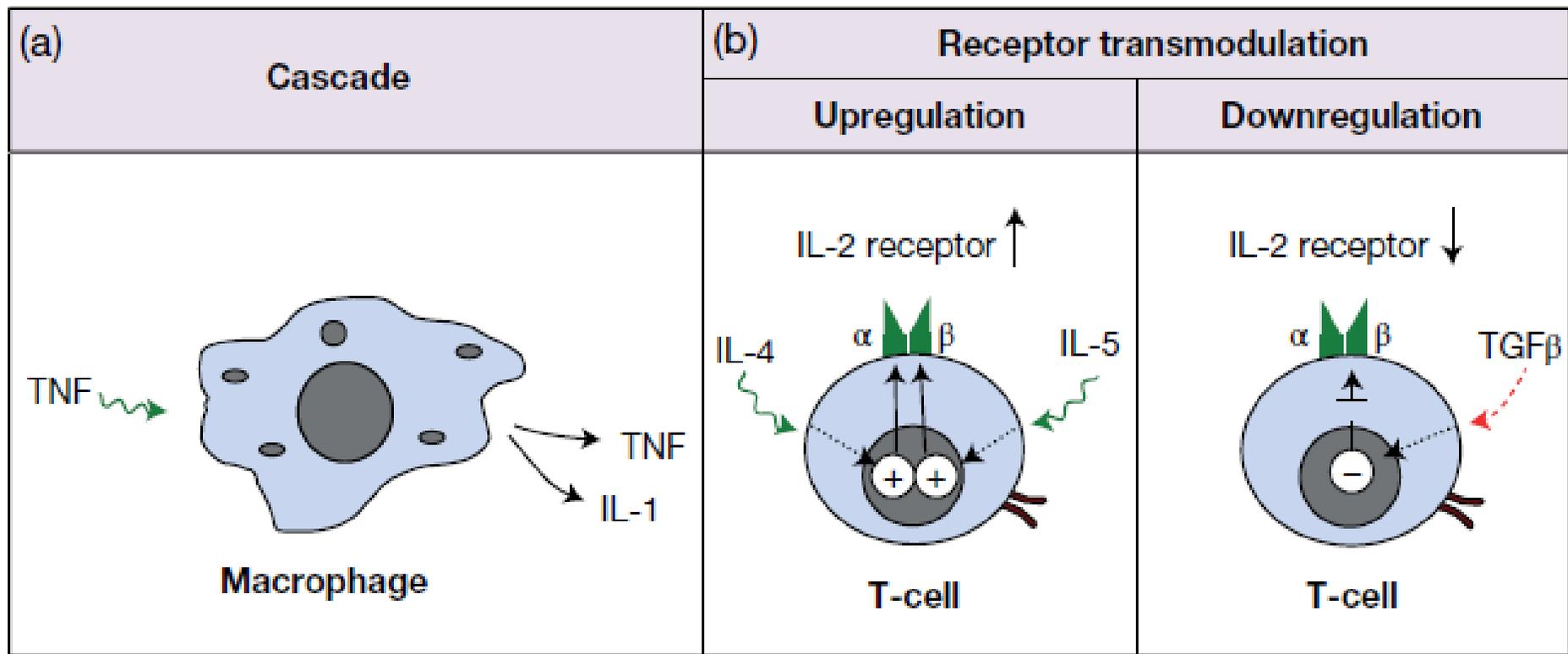
- ❑ Pathogen associated molecular patterns (PAMPS)
- ❑ Danger associated molecular patterns (DAMPS)

- ❖ *Non specific receptors*
- ❖ *Inflammasome (Nucleotide binding domain Leucine rich Repeats-NLR)*
- ❖ *Retinoic Acid-inducible Gene –I like Receptors (RLR)*
- ❖ *C-type Lectin Receptors (CLR)*
- ❖ *Toll like receptors (TLR)*

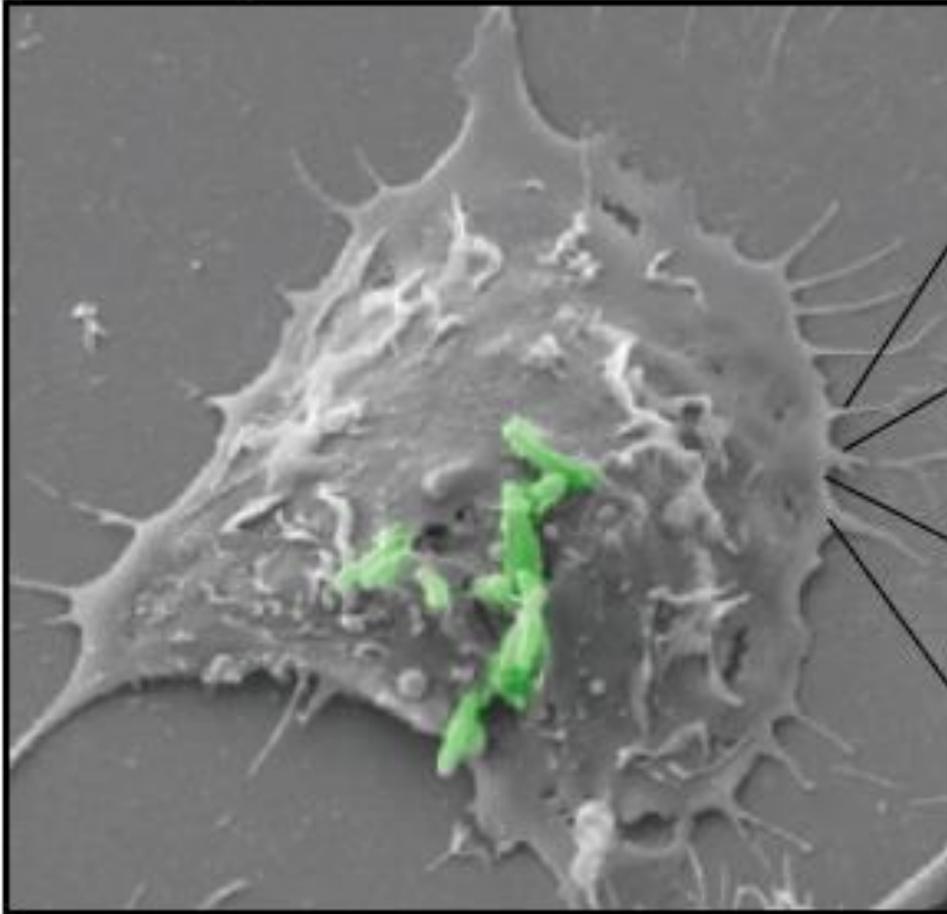






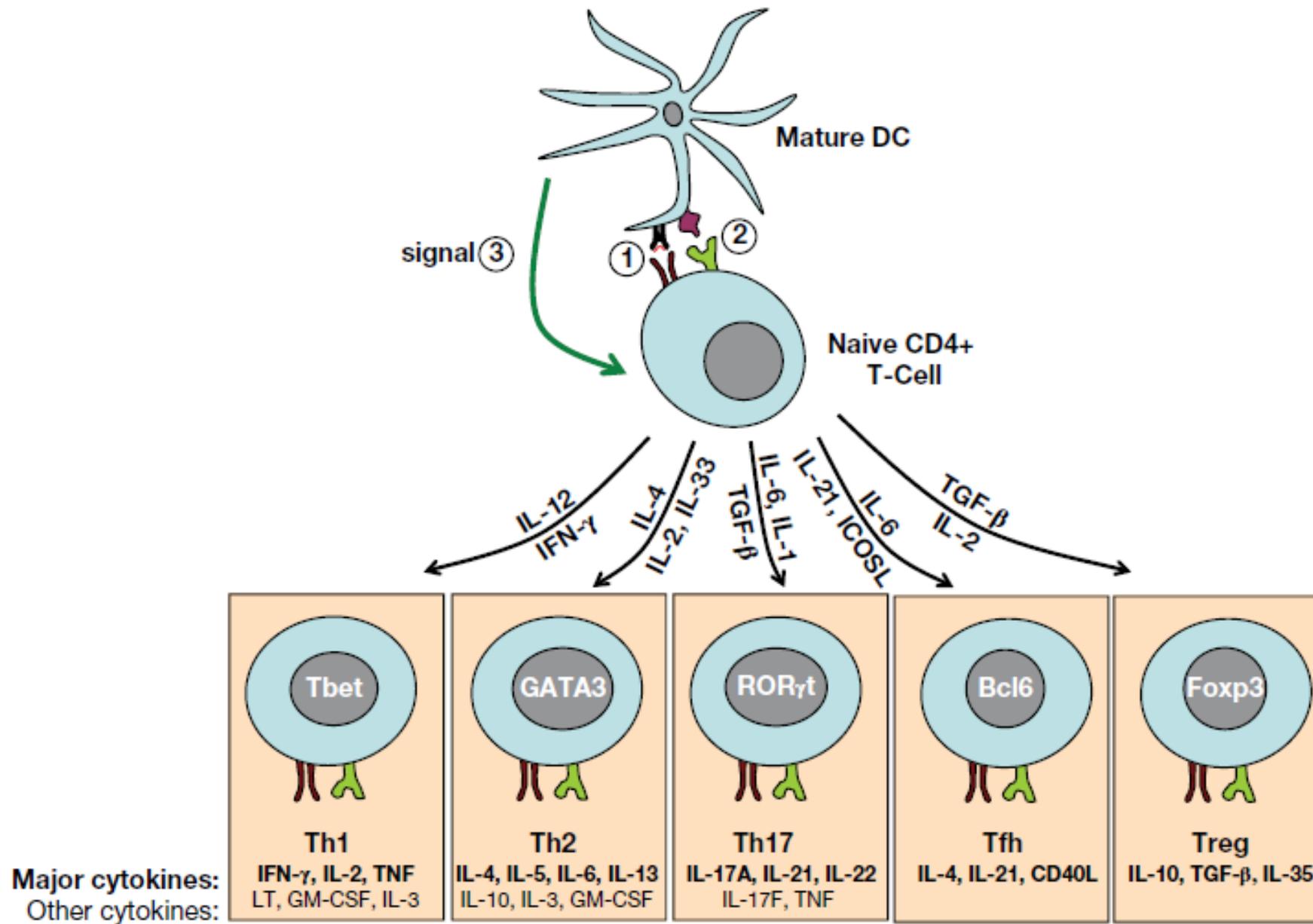


**Activated macrophages
produce numerous
cytokines and chemokines**

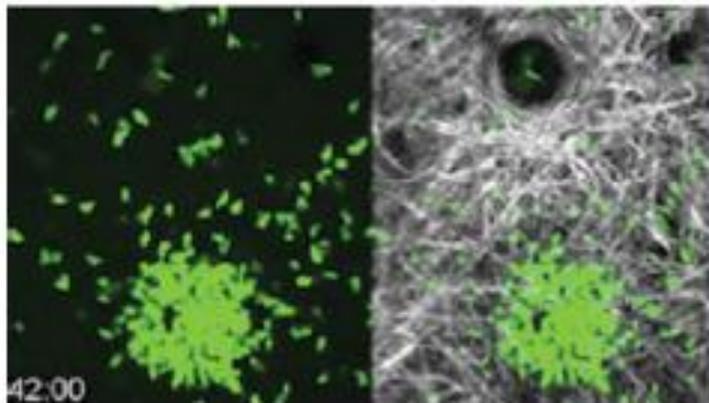
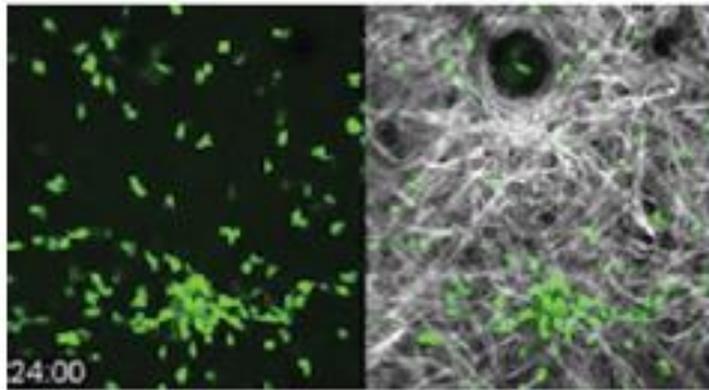
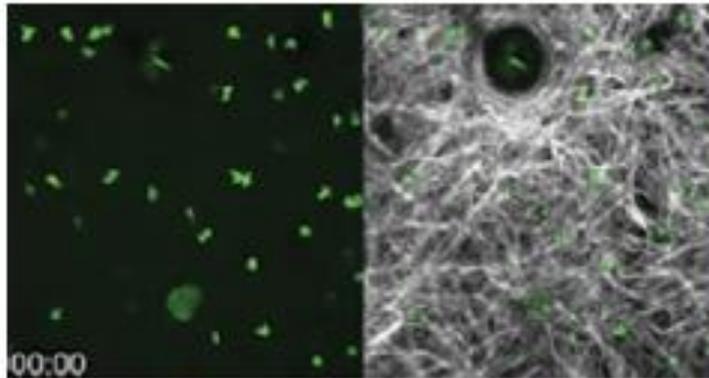


TNF	Activation of local endothelium; initiation of cytokine production; upregulation of adhesion molecules
IL-6	Triggers production of acute phase proteins from liver; enhances antibody production from B-cells; induces T-cell polarization
IL-8	Triggering of neutrophil chemotaxis; also chemotactic for basophils and T-cells; activation of neutrophils; promotes angiogenesis
IL-12	Activation of NK cells; polarization of T-cells to T helper cells

Cytokine	Source	Functions
IL-1	Macrophages	Activates helper T cells, causes fever
IL-2	Th-1 cells	Activates helper, cytotoxic T cells and B cells
IL-3	Th cells, NK, and mast cells	Supports growth and differentiation, stimulates histamine release
IL-4	Th-2 cells	Stimulates B-cell growth, increases isotype switching and IgE, up-regulates class II MHC expression
IL-5	Th-2 cells	Stimulates B-cell differentiation, increases eosinophils and IgA
Interferon- α	Leukocytes	Inhibits viral replication
Interferon- β	Fibroblasts	Inhibits viral replication
Interferon- γ	Th-1, Tc, and NK cells	Inhibits viral replication, increases expression of class I and II MHC, stimulates phagocytosis and killing by macrophages and NK cells
Tumor necrosis factor	Macrophages	Activates neutrophils and increases their adhesion to endothelial cells, mediates septic shock, causes necrosis of tumors, lipolysis, wasting, antiviral and antiparasitic effects
Transforming growth factor- β	Platelets, mast cells, and lymphocytes	Induces increased IL-1 production, induces class switch to IgA, limits inflammatory response, and promotes wound healing



**Neutrophil migration
to a wound site**

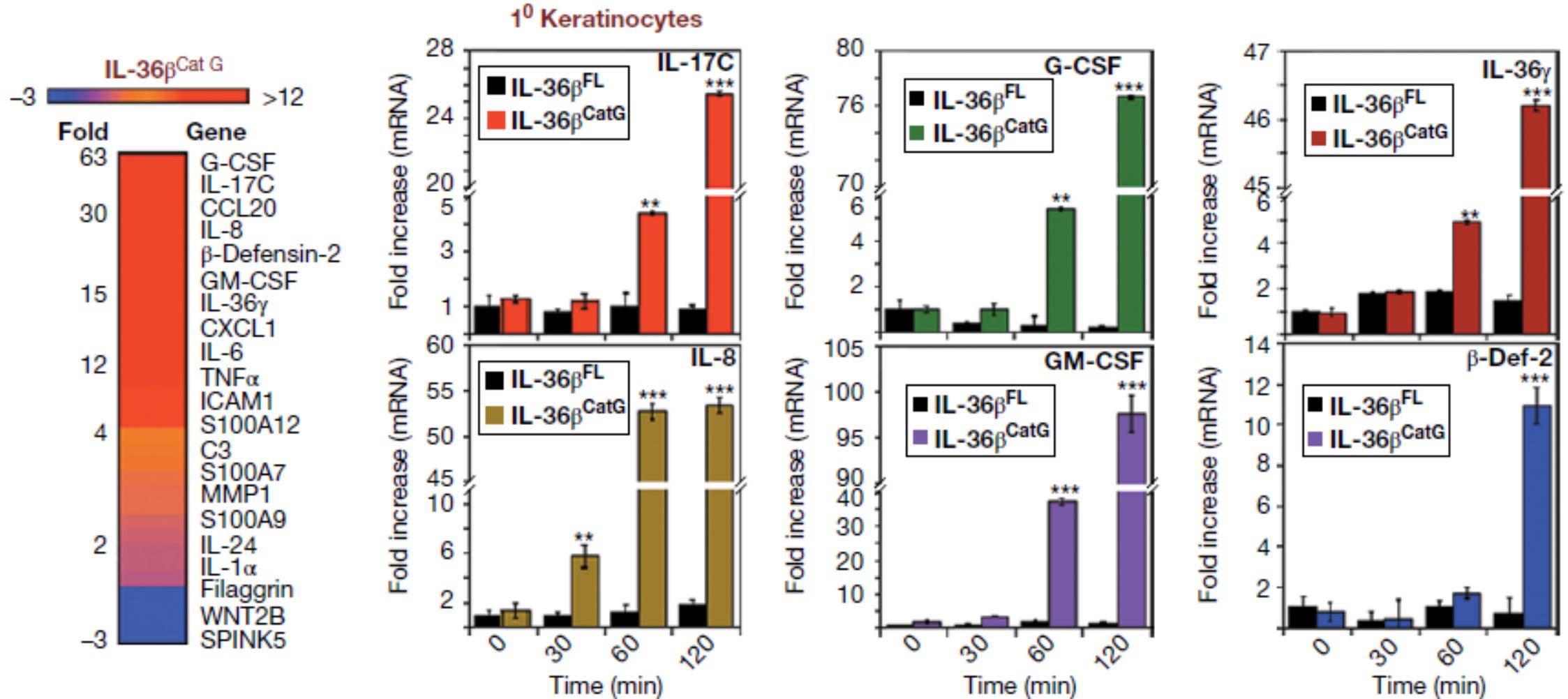


**0 min after
wounding**

**24 min after
wounding**

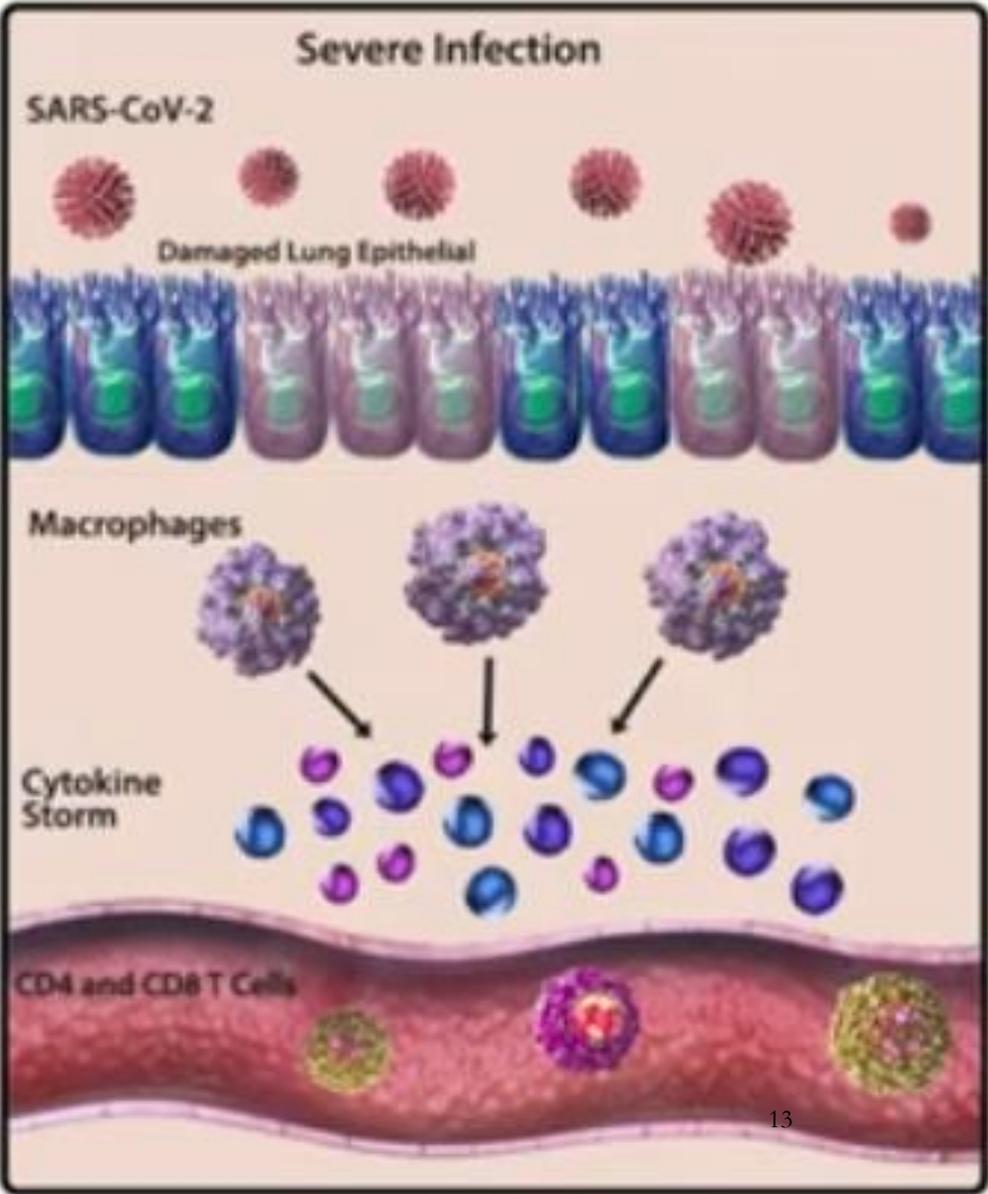
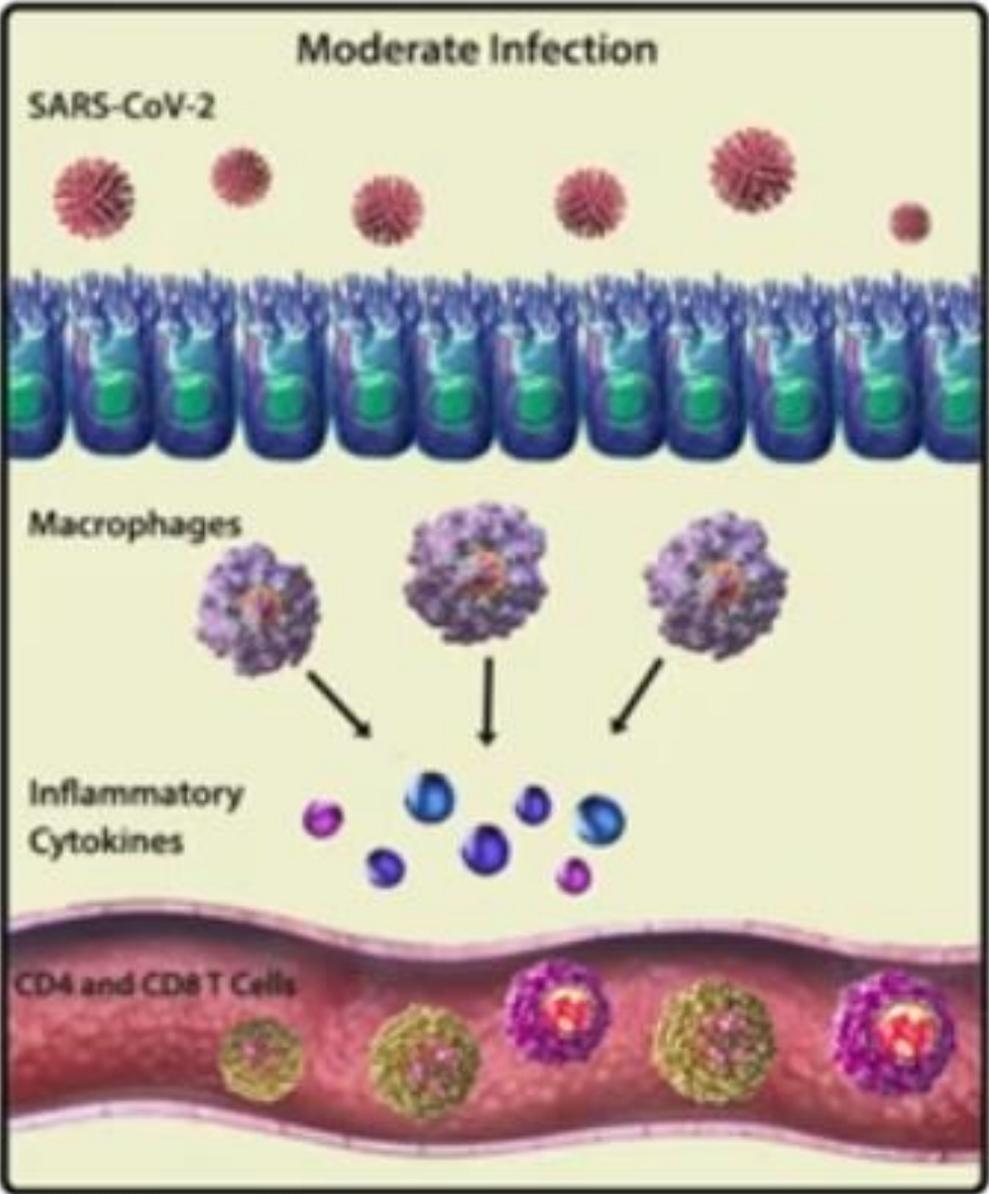
**42 min after
wounding**

Cytokines can trigger batteries of new gene expression



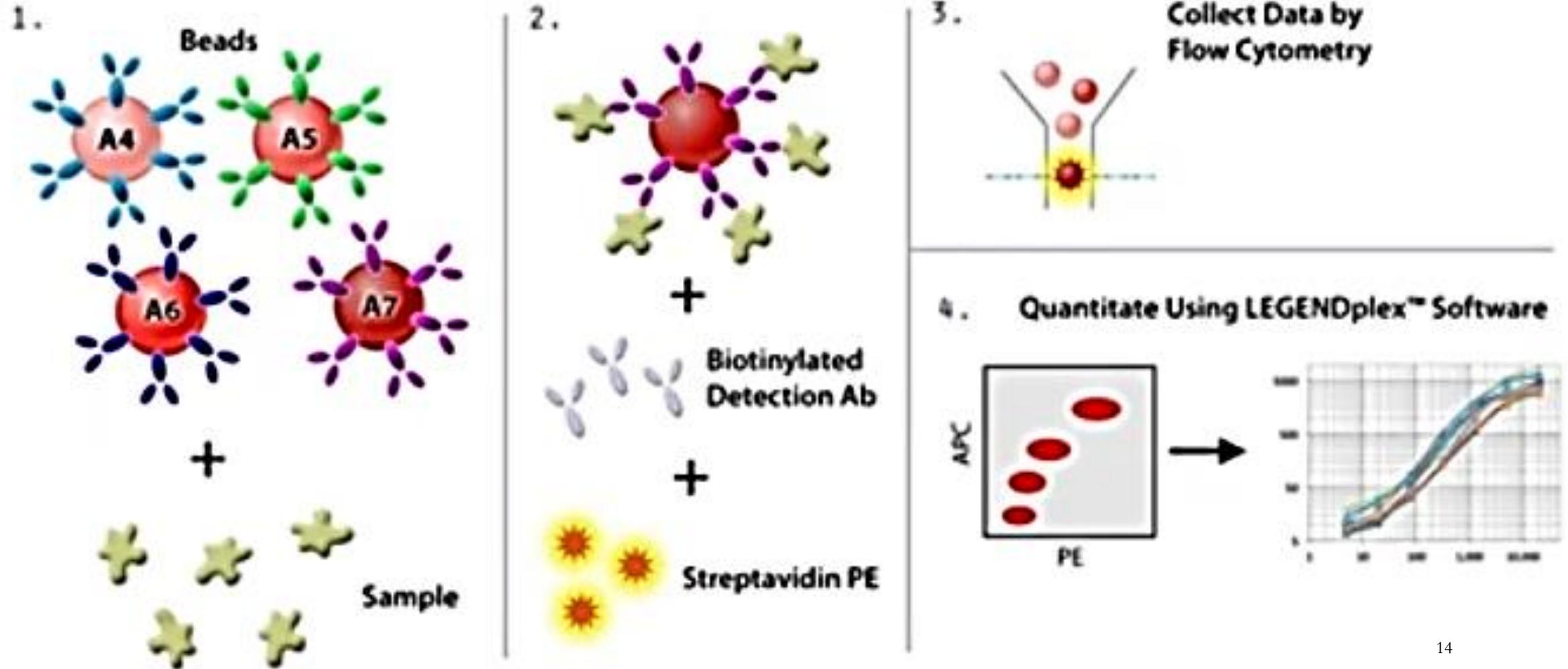
CYTOKINES	EXAMPLES
Mediators affecting lymphocytes	IL-1,2,4,5,6,10,12,13, TGF-β
Mediators affecting macrophages and monocytes.	CHEMOKINES
Mediators affecting polymorphonuclear leukocytes.	TNF-α, CHEMOKINES, LEUCOCYTE INHIBITING FACTOR (LIF)
Mediators affecting stem cells.	IL-3, GM-CSF, G-CSF
Mediators produced by macrophages that affect other cells.	TNF-α, Macrophage migration inhibiting factor (MIF)

CYTOKINE STORM IN COVID-19

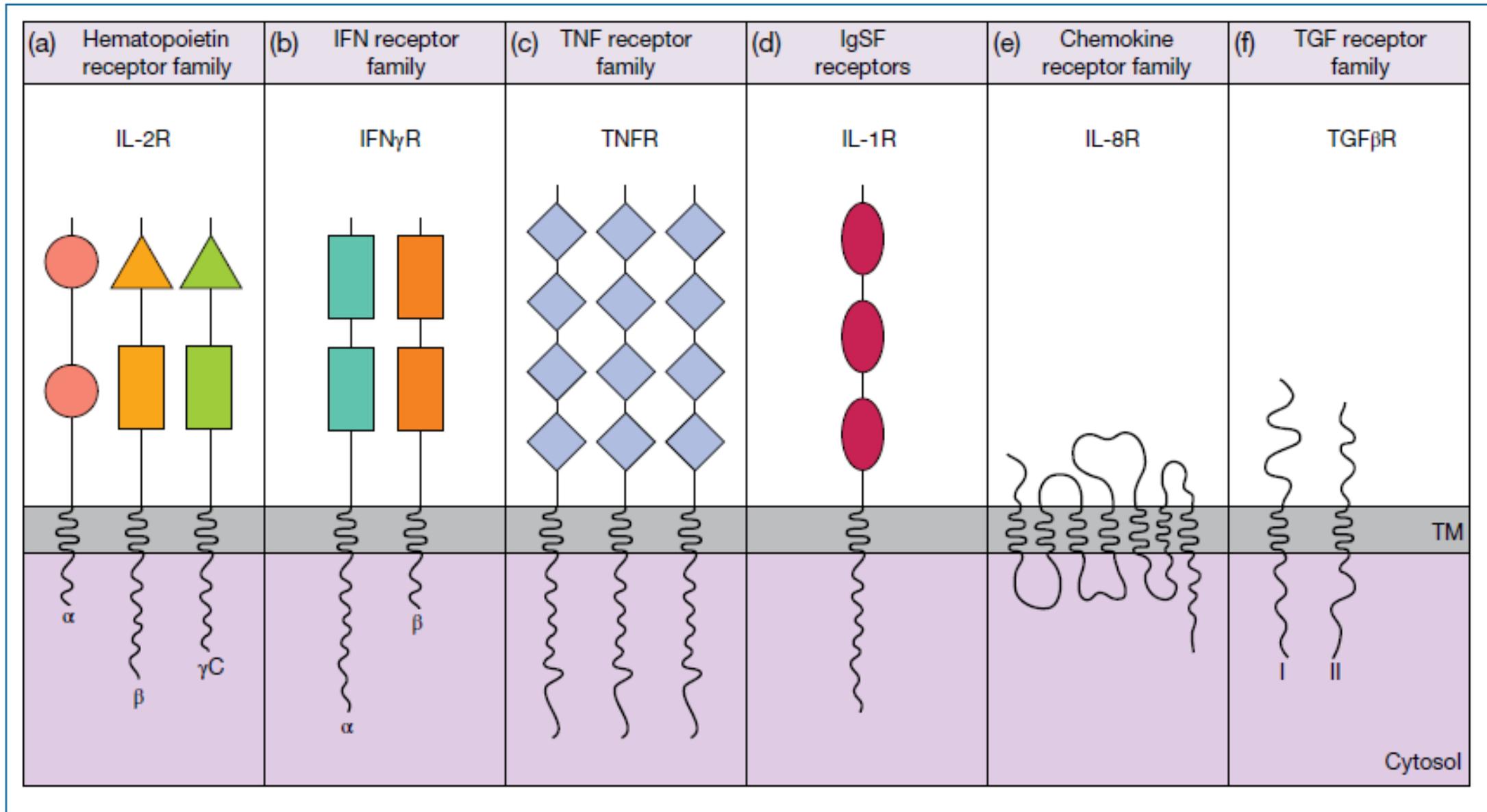


CYTOKINE PROFILING:

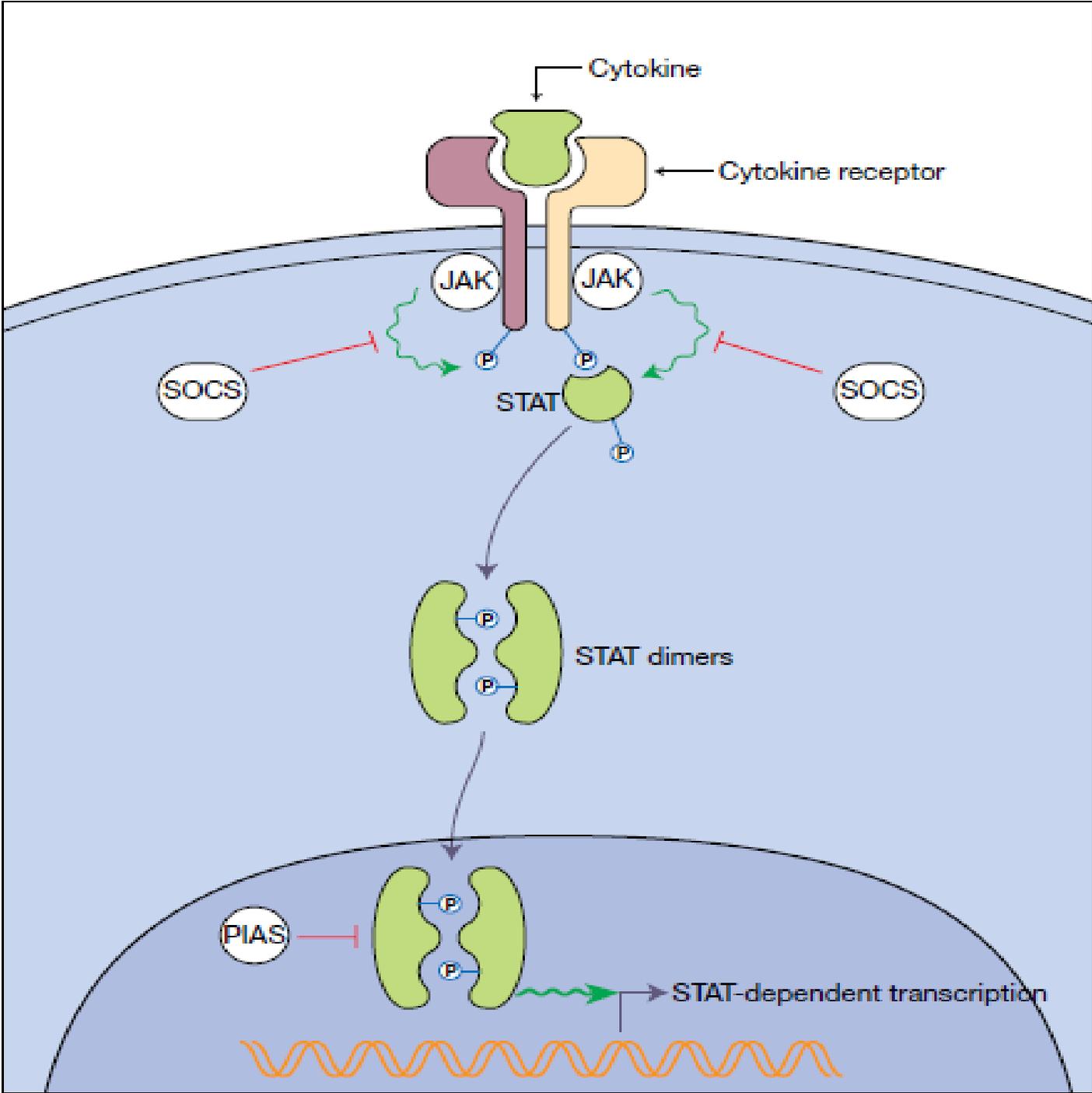
PRINCIPLE OF THE ASSAY



CYTOKINE RECEPTOR FAMILY:



CYTOKINE SIGNALLING:



CHEMOKINES

WHAT IT IS?

To date, 52 chemokines and 20 chemokine receptors have been described.

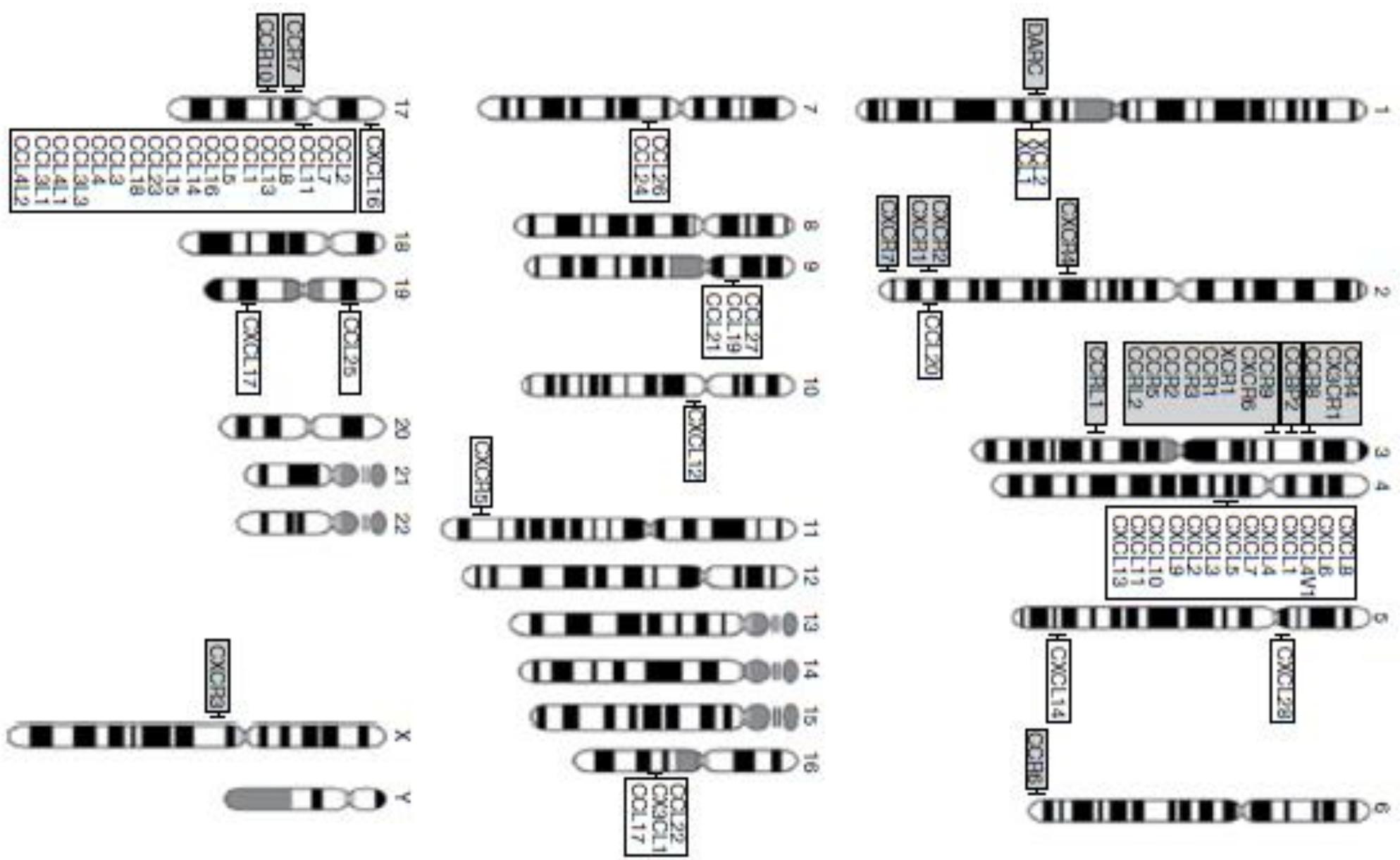
They play important roles in-----

- inflammation,
- lymphoid organ development,
- Cell trafficking,
- cellular compartmentalization within lymphoid tissues,
- angiogenesis, and
- wound healing.

More than 50 chemokines varying in size from 68 to 120 amino acids have been identified.

- The alpha-chemokines, such as IL-8 are produced by activated mononuclear cells, which attract neutrophils.
- The beta-chemokines, such as RANTES (regulated upon activation, normal T-cell expressed and secreted) and
- MCAF (monocyte chemotactic and activating factor), are produced by activated T cells and attract macrophages and monocytes.

Inflammatory chemokines and homeostatic chemokines,



CLINICAL RELEVANCE:

Chemokine/chemokine receptor involvement in human disease

Chemokine/chemokine receptor	Disease
CCR5, CCL3L1, CCL4L1, CXCR4	HIV/AIDS
CXCR4	WHIM syndrome
CX3CR1, CX3CL1, CXCL1, CXCL8, CXCR2, CCL2	Atherosclerosis
CCL2, CCL5, CCL7, CCL11, CXCL8	Asthma, allergic diseases
CXCR4, CXCL1, CXCL12	Cancer metastases
CXCL4	Heparin-induced thrombocytopenia
CCL26	Eosinophilic esophagitis
CCR5	Rheumatoid arthritis
CCR5	Renal allograft rejection
CCR5	West Nile virus infection
Duffy antigen receptor for chemokines	Malaria (<i>Plasmodium vivax</i> infection)

WHIM, Warts, hypogammaglobulinemia, infection, and myelokathexis.

DOUBTS?