

# MODERN MARKERS OF INFLAMMATION AND THEIR DIAGNOSTIC SIGNIFICANCE

Akhmedova Sarvinoz

Clinical Resident at the Department of Clinical Laboratory Diagnostics with a Course in Clinical Laboratory Diagnostics at Samarkand State Medical University Samarkand, Uzbekistan

## Abstract

Inflammation is a complex local vascular-mesenchymal response to tissue damage caused by various agents. Particularly extensive inflammatory processes develop after extensive thermal burns.

**Keywords:** Inflammation, adhesive molecules, extracellular matrix, soluble mediators, cytokines, fibronectin.

## Introduction

Many cells are involved in inflammation, and interaction between them is ensured by four groups of factors: adhesive molecules, extracellular matrix, soluble mediators, and oncogenes. Interactions between cells, as well as between cells and intercellular substance, are facilitated by several families of adhesive molecules: integrins, the immunoglobulin superfamily, cadherins, selectins, homing receptors, etc. All these substances ensure intercellular interactions under certain conditions.

Thus, integrins function as both cell-substrate and intercellular adhesive receptors. Integrins are integral membrane receptors that connect one cell to another or to the extracellular matrix via the cytoskeleton. The integrin receptor family determines many of the adhesive properties of cells. They act as a link between the extracellular matrix and the cytoskeleton by transmitting information generated during the interaction of the extracellular domain with extracellular matrix ligands into the cell, affecting the organization of the cytoskeleton, cell shape, and cell motility. Each integrin can transmit different information from the extracellular microenvironment, determining the morphology and physiology of the cell. Depending on the connections between the beta1, beta2, and beta3 subunits with various alpha subunits, a distinction is made between VLA (slow-reacting antigen) proteins, leukocyte integrins, and cytoadhesins.

The immunoglobulin superfamily plays an important role in embryogenesis, wound healing, and immune response. The functions of the immunoglobulin superfamily consist of binding soluble ligands and cell surface ligands. Immunoglobulin molecules also play an important role in cell activation and differentiation processes, contributing significantly to intercellular interactions. CD2 (LFA-2, E-rosette-forming receptor) with a molecular weight of 40,000 is a single-chain glycoprotein found on all T lymphocytes [14,15,16]. Selectins ensure the adhesion of leukocytes to endothelial cells. In addition, one of their most important functions is to regulate the movement of monocytes in vivo and mediate the effect of neutrophils "rolling" along the vascular wall of



the microcirculatory bed, a phenomenon known as the first “step” of leukocyte adhesion to the endothelium and their accumulation in the area of inflammation [11,12,13].

Cadherins are calcium-dependent intercellular adhesive molecules that mediate cell adhesion only in the presence of Ca ions. They ensure the structural integrity and polarity of mature tissues (especially epithelial monolayers) [8,9,10].

The extracellular matrix is involved in cell development and differentiation and, along with growth factors, cytokines, and hormones, can influence processes occurring within cells. The extracellular matrix plays a key role in organogenesis, embryogenesis, post-traumatic healing, carcinogenesis, tumor invasion, and the homing of metastatic tumor cells. A specialized form of the extracellular matrix is the basement membrane, which separates one cell layer from another [5,6,7]. It serves as a site of cell attachment and influences cell differentiation, migration, and phenotyping. The insolubility and mechanical stability of basement membranes are provided by type IV collagen molecules. The main and most constant adhesive glycoprotein of the basement membrane is laminin, followed by fibronectin, which has soluble (plasma) and insoluble (tissue) forms. Various components of the extracellular matrix are bound by a special factor called nidogen. The negative charge of the basement membrane is provided by proteoglycans [1,2,3,4]. Intercellular interactions, in addition to adhesive intercellular and cell-matrix molecules, are mediated by various soluble mediators that exert predominantly short-range local effects. These mediators include reactively oxidized metabolites, arachidonic acid metabolites, platelet-activating factor, cytokines and growth factors, proteolytic enzymes, products of local autocrine and paracrine systems (angiotensin II, endothelin, bradykinin, adenosine) and the factor that causes endothelial relaxation, nitric oxide (NO). They are called autocoid mediators. Among the numerous autocoid mediators, cytokines and growth factors play a leading role in the regulation of intercellular interactions [15,16,22].

Cytokines belong to the class of signaling molecules, along with neurotransmitters, hormones, and autocides. Cytokines are grouped into five classes, united by their dominant biological action: 1) inflammatory, 2) anti-inflammatory, 3) factors that cause lymphocyte growth and differentiation, 4) hematopoietic colony-stimulating factors, 5) factors that cause mesenchymal cell growth [19].

Growth factors are produced by unspecialized cells found in all tissues and have endocrine, paracrine, and autocrine effects. There are epidermal, platelet, nerve, heparin-binding, and other growth factors. Cell proliferation is controlled mainly by proto-oncogenes. The joint expression of oncogenes and anti-oncogenes, cytokines and growth factors, as well as various adhesive molecules, determines the behavior of cells in normal and pathological conditions [17,18,20].

Cytokines and growth factors are highly potent proteins (active in picomolar concentrations) that exert a wide range of biological effects. Unlike hormones, which maintain homeostatic balance, cytokines and growth factors provide a response to foreign body invasion, immune damage, inflammation, repair, and regeneration. They form a network of communication signals between immune system cells and cells of other organs and tissues. These proteins promote the development of inflammation and immune responses, but their secretion may be in response to other stimuli (microorganisms, their waste products). In addition to secretion, cytokines can be expressed on the surface of stimulated cells. They bind to specific receptors on target cells.



Similar to hormones, cytokines act on target cells indirectly, altering their behavior through secondary messengers. Cytokines can exert their effects on the producing cell (autocrine action), on cells adjacent to the producing cell (paracrine action), or, like hormones, on distant cells in organs and tissues (endocrine action). One cytokine often triggers the secretion of a second cytokine by the target cell (cytokine cascade). A cell's own cytokines often alter the nature of the interaction of other cytokines on the same cell. Such interactions can be synergistic, additive, inhibitory, or even lead to the formation of a new effect unknown to any single cytokine in the cell [12,21,22,23,24].

### References

1. Abduhakimov B. A. et al. Bolalar va o'smirlarda birlamchi tuberkulyozning o'ziga xos kechish xususiyatlari va klinik-laboratoriya usullari //Ta'lim innovatsiyasi va integratsiyasi. – 2024. – T. 32. – №. 3. – С. 139-143.
2. Бердиярова Ш. Ш. и др. Клинико-лабораторная диагностика фолиевой кислотодефицитной анемии //TADQIQOTLAR. UZ. – 2024. – Т. 49. – №. 3. – С. 46-53.
3. Umarova T. A., Kudratova Z. E., Axmadova P. Role of conditionally pathogenic microflora in human life activities //Web of Medicine: Journal of Medicine, Practice and Nursing. – 2024. – Т. 2. – №. 11. – С. 29-32.
4. Muhamadiyeva L. A., Kudratova Z. E., Sirojeddinova S. Pastki nafas yo'llari patologiyasining rivojlanishida atipik mikrofloraning roli va zamonaviy diagnostikasi //Tadqiqotlar. Uz. – 2024. – Т. 37. – №. 3. – С. 135-139.
5. Umarova T. A., Kudratova Z. E., Norboyeva F. Modern aspects of etiology and epidemiology of giardias //Web of Medicine: Journal of Medicine, Practice and Nursing. – 2024. – Т. 2. – №. 11. – С. 25-28.
6. Isomadinova L. K., Daminov F. A. Glomerulonefrit kasalligida sitokinlar ahamiyati //Journal of new century innovations. – 2024. – Т. 49. – №. 2. – С. 117-120.
7. Umarova T. A., Kudratova Z. E., Maxmudova H. Mechanisms of infection by echinococcosis //Web of Medicine: Journal of Medicine, Practice and Nursing. – 2024. – Т. 2. – №. 11. – С. 18-21.
8. Даминов Ф. А., Исомадинова Л. К., Рашидов А. Этиопатогенгетические и клинико-лабораторные особенности сальмонеллиоза //TADQIQOTLAR. UZ. – 2024. – Т. 49. – №. 3. – С. 61-67.
9. Umarova T. A., Kudratova Z. E., Vaxromova M. Autoimmune diseases: new solutions in modern laboratory diagnostics //International Conference on Modern Science and Scientific Studies. – 2024. – С. 78-81.
10. Бердиярова Ш. Ш. и др. Узловой зоб и его клинико-лабораторная диагностика //TADQIQOTLAR. UZ. – 2024. – Т. 49. – №. 3. – С. 38-45.
11. Umarova T. A., Kudratova Z. E., Muhsinovna R. M. The main purpose of laboratory diagnosis in rheumatic diseases //International Conference on Modern Science and Scientific Studies. – 2024. – С. 82-85.
12. Umarova T. A., Kudratova Z. E., Ruxshona X. Contemporary concepts of chronic pancryatitis //International Conference on Modern Science and Scientific Studies. – 2024. – С. 11-15.



13. Хамидов З. З., Амонова Г. У., Исаев Х. Ж. Некоторые аспекты патоморфологии неспецифических язвенных колитов // Молодежь и медицинская наука в XXI веке. – 2019. – С. 76-76.
14. Umarova T. A., Kudratova Z. E., Muminova G. Instrumental diagnostic studies in chronic pancreatitis // International Conference on Modern Science and Scientific Studies. – 2024. – С. 16-20.
15. Атамурадовна М.Л., Рустамовна Р.Г., Эркиновна К.З. Роль современных биомаркеров в изучении различных поражений головного мозга // Достижения науки и образования. – 2020. – №. 10 (64). – С. 88-90.
16. Рустамова Г. Р., Мухамадиева Л. А. Современные аспекты клинико-лабораторных методов исследования острой ревматической лихорадки // International scientific review. – 2020. – №. LXVI. – С. 106-110.
17. Кудратова З.Е. и др. Роль цитокиновой регуляции при обструктивном синдроме атипичного генеза у детей // Анналы Румынского общества клеточной биологии. – 2021. – Т. 25. – №. 1. – С. 6279-6291.
18. Erkinovna K. Z. et al. Bronchial obstruction syndrome in young children with respiratory infections of different etiology: features of clinical manifestations and immune response // Проблемы науки. – 2021. – №. 1 (60). – С. 60-62.
19. Кудратова З.Е. и др. Хламидийные инфекции (внутриклеточная инфекция) в развитии бронхита // TJE-Tematics journal of Education ISSN. – 2021. – С. 2249-9822.
20. Kudratova Z. E. et al. Principles of therapy of chlamydial and mycoplasma infections at the present stage // Вопросы науки и образования. – 2021. – №. 28 (153). – С. 23-26.
21. Rustamova G. R., Kudratova Z. E. Chronic endometritis old issues new possibilities // Western European Journal of Medicine and Medical Science. – 2024. – Т. 2. – №. 5. – С. 12-14.
22. Erkinovna K. Z., Rustamovna R. G., Suratovna H. F. Laboratory markers of perinatal hypoxic damage to the central nervous system in newborns // Наука, техника и образование. – 2020. – №. 10 (74). – С. 102-104.
23. Mukhamadiev L. A., Rustamova G. R., Kudratova Z. E. Immediate results of complex treatment of children with chronic tonsillitis and chronic adenoiditis associated with CMV and EBV // Western European Journal of Medicine and Medical Science. – 2024. – Т. 2. – №. 5. – С. 20-24.
24. Umarova T. A., Kudratova Z. E., Norxujayeva A. Etiopathogenesis and modern laboratory diagnosis of prostatitis // International Conference on Modern Science and Scientific Studies. – 2024. – С. 6-10.

