

I Meet the Marker: CD54 (ICAM-1)

Meet the Marker: CD54 (ICAM-1)

Cluster of Differentiation 54 (CD54), also known as Intercellular Adhesion Molecule 1 (ICAM-1), is a 90 kDa glycosylated transmembrane protein of the immunoglobulin superfamily. CD54 (ICAM-1) can play an important role in immunological synapse formation, T-cell activation, leukocyte migration, and numerous cellular immune responses.¹ CD54 (ICAM-1) also interacts with integrin receptors on leukocytes, such as lymphocyte function-associated antigen-1 (LFA-1), to enhance cell-cell adhesion and promote immune cell recruitment and activation. Its multifaceted role in mediating leukocyte-endothelial interactions may demonstrate its importance in various physiological and pathological processes.

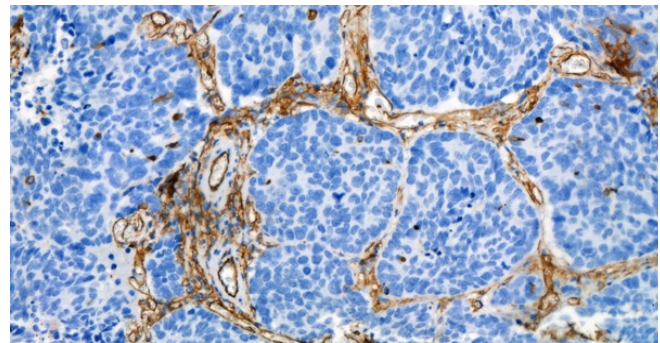
In clinical diagnostics, elevated CD54 (ICAM-1) expression is observed in various inflammatory conditions, including rheumatoid arthritis, inflammatory bowel disease, and atherosclerosis, correlating with disease severity and progression.² Its response to inflammatory cues, such as cytokines interleukin-1 (IL-1) and tumor necrosis factor-alpha (TNF- α), can be pivotal in orchestrating immune responses and may contribute to the pathogenesis of inflammatory disorders.³ In cardiovascular diseases, CD54 (ICAM-1)-mediated leukocyte recruitment to atherosclerotic plaques may promote inflammation and plaque destabilization, driving disease progression.⁴

Additionally, CD54 (ICAM-1) expression in tumor endothelium may correlate with tumor aggressiveness & metastatic potential, potentially highlighting its role in tumor angiogenesis and dissemination.⁵ While

some studies have shown that CD54 (ICAM-1) promotes tumor metastasis by regulating various signaling pathways in some cancers including colorectal, breast, lung, other studies have shown non-metastatic solid tumor to express minimal or no CD54 (ICAM-1).⁶

In conclusion, CD54 (ICAM-1) can hold pivotal clinical significance across various pathological contexts. Its role in mediating leukocyte adhesion and transendothelial migration during inflammation may show in autoimmune diseases and cancer, where its expression facilitates immune cell infiltration into target tissues and promotes tumor metastasis. Understanding CD54 (ICAM-1)'s mechanisms may offer avenues for targeted interventions in inflammatory disorders, autoimmune diseases, cardiovascular diseases, and cancer.

CD54 Illustration / Photomicrograph



CD54 (ICAM-1) [E3Q9N] IHC on Lung Cancer, stained on Biocare Medical's ONCORE Pro

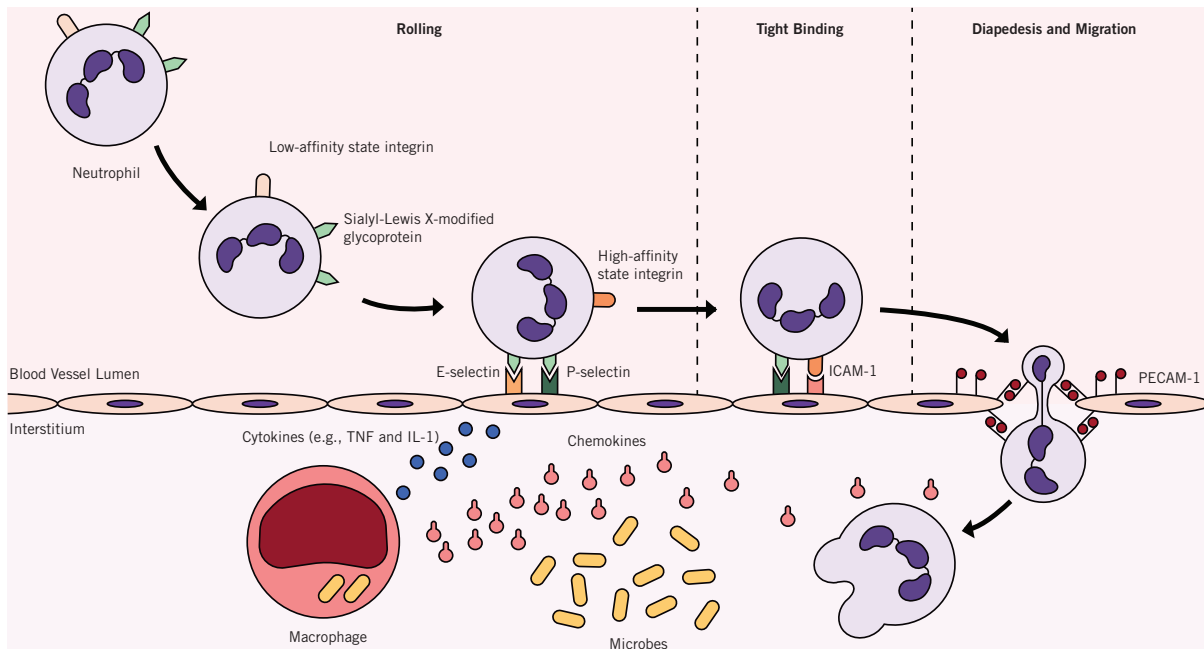


Image showing the process of leukocytes extravasation from blood vessels to tissue.⁷

To learn more about the markers listed above, please visit our website at biocare.net or call 1-800-799-9499, option #3

1. Tsai ST, Wang PJ, Liou NJ, et al. ICAM1 Is a Potential Cancer Stem Cell Marker of Esophageal Squamous Cell Carcinoma. *PLoS One*. 2015 Nov 2. Cybulsky MI, Gimbrone Jr. MA. Endothelial expression of a mononuclear leukocyte adhesion molecule during atherogenesis. *Science*. 1991;251(4995):788-791. 3. Carlos TM, Harlan JM. Leukocyte-endothelial adhesion molecules. *Blood*. 1994;84(7):2068-2101. 4. Mauersberger C, Hinterdobler J, Schunkert H, Kessler T, Sager HB. Where the Action Is-Leukocyte Recruitment in Atherosclerosis. *Front Cardiovasc Med*. 2022 Jan 11;8:813984. doi: 10.3389/fcvm.2021.813984. PMID: 35087886; PMCID: PMC8787128. Voura EB, Ramjessingh RA, Montgomery AM, Siu CH. Involvement of integrin alpha(v)beta(3) and cell adhesion molecule L1 in transendothelial migration of melanoma cells. *Mol Biol Cell*. 2001;12(9):2699-2710. 5. Lim EJ, Kang JH, Kim YJ, Kim S, Lee SJ. ICAM-1 promotes cancer progression by regulating SRC activity as an adapter protein in colorectal cancer. *Cell Death Dis*. 2022 Apr 29;13(4):417. doi: 10.1038/s41419-022-04862-1. Erratum in: *Cell Death Dis*. 2022 Nov 18;13(11):968. PMID: 35487888; PMCID: PMC9054780. 6. <https://step1.medbullets.com/pathology/106005/leukocyte-extravasation>