

References

- Alatab, S., Sepanlou, S.G., Ikuta, K., Vahedi, H., Bisignano, C., et al., 2020. The global, regional, and national burden of inflammatory bowel disease in 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet Gastroenterology & Hepatology* 5, 17–30. [https://doi.org/10.1016/S2468-1253\(19\)30333-4](https://doi.org/10.1016/S2468-1253(19)30333-4)
- Alberts B, Johnson A, Lewis J, et al. *Molecular Biology of the Cell*. 4th edition. New York: Garland Science; 2002. Lymphocytes and the Cellular Basis of Adaptive Immunity. Available at : <https://www.ncbi.nlm.nih.gov/books/NBK26921/>
- Annunziata, M.L., Caviglia, R., Papparella, L.G., Cicala, M., 2012. Upper gastrointestinal involvement of Crohn's disease: a prospective study on the role of upper endoscopy in the diagnostic work-up. *Dig Dis Sci* 57, 1618–1623. <https://doi.org/10.1007/s10620-012-2072-0>
- Boyapati, R., Satsangi, J., Ho, G.-T., 2015. Pathogenesis of Crohn's disease. *F1000Prime Rep* 7. <https://doi.org/10.12703/P7-44>
- Cano RLE, Lopera HDE. Introduction to T and B lymphocytes. In: Anaya JM, Shoenfeld Y, Rojas-Villarraga A, et al., editors. *Autoimmunity: From Bench to Bedside* [Internet]. Bogota (Colombia): El Rosario University Press; 2013 Jul 18. Chapter 5. Available at : <https://www.ncbi.nlm.nih.gov/books/NBK459471/>
- Chen, X.-Q., Xue, C.-R., Hou, P., Lin, B.-Q., Zhang, J.-R., 2019. Lymphocyte-to-monocyte ratio effectively predicts survival outcome of patients with obstructive colorectal cancer. *World J Gastroenterol* 25, 4970–4984. <https://doi.org/10.3748/wjg.v25.i33.4970>
- Cherfane, C.E., Gessel, L., Cirillo, D., Zimmerman, M.B., Polyak, S., 2015. Monocytosis and a Low Lymphocyte to Monocyte ratio are effective Biomarkers of Ulcerative Colitis disease activity. *Inflamm Bowel Dis* 21, 1769–1775. <https://doi.org/10.1097/MIB.0000000000000427>
- Dave, M., Papadakis, K.A., Faubion, W.A., 2014. Immunology of Inflammatory Bowel Disease and Molecular Targets for Biologics. *Gastroenterol Clin North Am* 43, 405–424. <https://doi.org/10.1016/j.gtc.2014.05.003>
- Fakhoury, M., Negrulj, R., Mooranian, A., Al-Salami, H., 2014. Inflammatory bowel disease: clinical aspects and treatments. *J Inflamm Res* 7, 113–120. <https://doi.org/10.2147/JIR.S65979>
- Frizelle, F.A., Burt, M.J., 2001. Surgical management of ulcerative colitis, *Surgical Treatment: Evidence-Based and Problem-Oriented*. Zuckschwerdt.

- Gren, S.T., Grip, O., 2016. Role of Monocytes and Intestinal Macrophages in Crohn's Disease and Ulcerative Colitis. *Inflamm Bowel Dis* 22, 1992–1998. <https://doi.org/10.1097/MIB.0000000000000824>
- Hendrickson, B.A., Gokhale, R., Cho, J.H., 2002. Clinical Aspects and Pathophysiology of Inflammatory Bowel Disease. *Clin Microbiol Rev* 15, 79–94. <https://doi.org/10.1128/CMR.15.1.79-94.2002>
- Herbinger, K.-H., Hanus, I., Beissner, M., Berens-Riha, N., Kroidl, I., von Sonnenburg, F., Löschner, T., Hoelscher, M., Nothdurft, H.D., Schunk, M., 2016. Lymphocytosis and Lymphopenia Induced by Imported Infectious Diseases: A Controlled Cross-Sectional Study of 17,229 Diseased German Travelers Returning from the Tropics and Subtropics. *Am J Trop Med Hyg* 94, 1385–1391. <https://doi.org/10.4269/ajtmh.15-0920>
- Holleran, G., Lopetuso, L., Petito, V., Graziani, C., Ianiro, G., McNamara, D., Gasbarrini, A., Scaldaferri, F., 2017. The Innate and Adaptive Immune System as Targets for Biologic Therapies in Inflammatory Bowel Disease. *Int J Mol Sci* 18. <https://doi.org/10.3390/ijms18102020>
- Karlmark, K.R., Tacke, F., Dunay, I.R., 2012. Monocytes in health and disease – Minireview. *Eur J Microbiol Immunol (Bp)* 2, 97–102. <https://doi.org/10.1556/EuJMI.2.2012.2.1>
- Ko, C.W., Singh, S., Feuerstein, J.D., Falck-Ytter, C., Falck-Ytter, Y., Cross, R.K., Crockett, S., Falck-Ytter, Y., Feuerstein, J., Flamm, S., Inadomi, J., Ko, C., Muniraj, T., O'Shea, R., Pandolfino, J., Patel, A., Sharaf, R., Siddique, S., Su, G., Wang, K., Weizman, A., 2019. AGA Clinical Practice Guidelines on the Management of Mild-to-Moderate Ulcerative Colitis. *Gastroenterology* 156, 748–764. <https://doi.org/10.1053/j.gastro.2018.12.009>
- Kratofil Rachel M., Kubes Paul, Deniset Justin F., 2017. Monocyte Conversion During Inflammation and Injury. *Arteriosclerosis, Thrombosis, and Vascular Biology* 37, 35–42. <https://doi.org/10.1161/ATVBAHA.116.308198>
- Larmonier, C.B., Shehab, K.W., Ghishan, F.K., Kiela, P.R., 2015. T Lymphocyte Dynamics in Inflammatory Bowel Diseases: Role of the Microbiome. *Biomed Res Int* 2015. <https://doi.org/10.1155/2015/504638>
- Lee, J.S., Kim, N.Y., Na, S.H., Youn, Y.H., Shin, C.S., 2018. Reference values of neutrophil-lymphocyte ratio, lymphocyte-monocyte ratio, platelet-lymphocyte ratio, and mean platelet volume in healthy adults in South Korea. *Medicine (Baltimore)* 97. <https://doi.org/10.1097/MD.00000000000011138>
- Lichtenstein, G.R., Loftus, E.V., Isaacs, K.L., Regueiro, M.D., Gerson, L.B., Sands, B.E., 2018. ACG Clinical Guideline: Management of Crohn's Disease in Adults. *Official journal of the American College of Gastroenterology | ACG* 113, 481–517. <https://doi.org/10.1038/ajg.2018.27>

- Li, N., Shi, R.-H., 2018. Updated review on immune factors in pathogenesis of Crohn's disease. *World J Gastroenterol* 24, 15–22. <https://doi.org/10.3748/wjg.v24.i1.15>
- Matricon, J., Barnich, N., Ardid, D., 2010. Immunopathogenesis of inflammatory bowel disease. *Self Nonself* 1, 299–309. <https://doi.org/10.4161/self.1.4.13560>
- McDowell, C., Farooq, U., Haseeb, M., 2020. Inflammatory Bowel Disease, in: StatPearls. StatPearls Publishing, Treasure Island (FL).
- Mims, M.P., 2018. Lymphocytosis, Lymphocytopenia, Hypergammaglobulinemia, and Hypogammaglobulinemia. *Hematology* 682–690. <https://doi.org/10.1016/B978-0-323-35762-3.00049-4>
- Moosazadeh, M., Maleki, I., Alizadeh-Navaei, R., Kheradmand, M., Hedayatzadeh-Omran, A., Shamshirian, A., Barzegar, A., 2019. Normal values of neutrophil-to-lymphocyte ratio, lymphocyte-to-monocyte ratio and platelet-to-lymphocyte ratio among Iranian population: Results of Tabari cohort. *Caspian J Intern Med* 10, 320–325. <https://doi.org/10.22088/cjim.10.3.320>
- Naeim, F., Rao, N., Song, S., Phan, R., 2018. Histiocytic Disorders, in: Atlas of Hematopathology (Second Edition). pp. 829–849. <https://doi.org/10.1016/B978-0-12-809843-1.00061-9>
- Nazir, T., Taha, N., Islam, A., Abraham, S., Mahmood, A., Mustafa, M., 2016. Monocytopenia; Induction by Vinorelbine, Cisplatin and Doxorubicin in Breast, Non-Small Cell Lung and Cervix Cancer Patients. *Int J Health Sci (Qassim)* 10, 542–547.
- Neubauer, K., Woźniak-Stolarska, B., Krzystek-Korpacka, M., 2018. Peripheral Lymphocytes of Patients with Inflammatory Bowel Disease Have Altered Concentrations of Key Apoptosis Players: Preliminary Results. *Biomed Res Int* 2018. <https://doi.org/10.1155/2018/4961753>
- Ng, Siew .C., 2015. Emerging leadership lecture: Inflammatory bowel disease in Asia: emergence of a “Western” disease. *J Gastroenterol Hepatol* 30, 440–445. <https://doi.org/10.1111/jgh.12859>
- Ng, Siew.C., Tang, W., Leong, R.W., Chen, M., Ko, Y., et.al. Asia-Pacific Crohn's and Colitis Epidemiology Study ACCESS Group, 2015. Environmental risk factors in inflammatory bowel disease: a population-based case-control study in Asia-Pacific. *Gut* 64, 1063–1071. <https://doi.org/10.1136/gutjnl-2014-307410>
- Okba, A.M., Amin, M.M., Abdelmoaty, A.S., Ebada, H.E., kamel, A.H., Allam, A.S., Sobhy, O.M., 2019. Neutrophil/lymphocyte ratio and lymphocyte/monocyte ratio in ulcerative colitis as non-invasive biomarkers

- of disease activity and severity. *Auto Immun Highlights* 10. <https://doi.org/10.1186/s13317-019-0114-8>
- Pabla, B.S., Schwartz, D.A., 2020. Assessing Severity of Disease in Patients with Ulcerative Colitis. *Gastroenterol Clin North Am* 49, 671–688. <https://doi.org/10.1016/j.gtc.2020.08.003>
- Peyrin-Biroulet, L., Panés, J., Sandborn, W.J., Vermeire, S., Danese, S., Feagan, B.G., Colombel, J.-F., Hanauer, S.B., Rycroft, B., 2016. Defining Disease Severity in Inflammatory Bowel Diseases: Current and Future Directions. *Clinical Gastroenterology and Hepatology* 14, 348-354.e17. <https://doi.org/10.1016/j.cgh.2015.06.001>
- Pimentel, M., Chang, M., Chow, E.J., Tabibzadeh, S., Kirit-Kiriak, V., Targan, S.R., Lin, H.C., 2000. Identification of A Prodromal Period in Crohn's Disease But Not Ulcerative Colitis. *Official journal of the American College of Gastroenterology | ACG* 95, 3458–3462. <https://doi.org/10.1111/j.1572-0241.2000.03361.x>
- Piotrowski, D., Sączewska-Piotrowska, A., Jaroszewicz, J., Boroń-Kaczmarek, A., 2020. Lymphocyte-To-Monocyte Ratio as the Best Simple Predictor of Bacterial Infection in Patients with Liver Cirrhosis. *Int J Environ Res Public Health* 17. <https://doi.org/10.3390/ijerph17051727>
- Piovani, D., Danese, S., Peyrin-Biroulet, L., Nikolopoulos, G.K., Lytras, T., Bonovas, S., 2019. Environmental Risk Factors for Inflammatory Bowel Diseases: An Umbrella Review of Meta-analyses. *Gastroenterology* 157, 647-659.e4. <https://doi.org/10.1053/j.gastro.2019.04.016>
- Porter, R.J., Kalla, R., Ho, G.-T., 2020. Ulcerative colitis: Recent advances in the understanding of disease pathogenesis. *F1000Res* 9. <https://doi.org/10.12688/f1000research.20805.1>
- Rubin, D.T., Ananthakrishnan, A.N., Siegel, C.A., Sauer, B.G., Long, M.D., 2019. ACG Clinical Guideline: Ulcerative Colitis in Adults. *Am J Gastroenterol* 114, 384–413. <https://doi.org/10.14309/ajg.0000000000000152>
- Sandborn, W.J., 2014. Crohn's disease evaluation and treatment: clinical decision tool. *Gastroenterology* 147, 702–705. <https://doi.org/10.1053/j.gastro.2014.07.022>
- Schwartz, D.A., Loftus, E.V., Tremaine, W.J., Panaccione, R., Harmsen, W.S., Zinsmeister, A.R., Sandborn, W.J., 2002. The natural history of fistulizing Crohn's disease in Olmsted County, Minnesota. *Gastroenterology* 122, 875–880. <https://doi.org/10.1053/gast.2002.32362>
- Seyedian, S.S., Nokhostin, F., Malamir, M.D., 2019. A review of the diagnosis, prevention, and treatment methods of inflammatory bowel disease. *J Med Life* 12, 113–122. <https://doi.org/10.25122/jml-2018-0075>

- Silva, F.A.R., Rodrigues, B.L., Ayrizono, M. de L.S., Leal, R.F., 2016. The Immunological Basis of Inflammatory Bowel Disease [WWW Document]. Gastroenterology Research and Practice. <https://doi.org/10.1155/2016/2097274>
- Silverberg, M.S., Satsangi, J., Ahmad, T., Arnott, I.D.R., Bernstein, C.N., Brant, S.R., Caprilli, R., Colombel, J.-F., Gasche, C., Geboes, K., Jewell, D.P., Karban, A., Loftus, E.V., Peña, A.S., Riddell, R.H., Sachar, D.B., Schreiber, S., Steinhart, A.H., Targan, S.R., Vermeire, S., Warren, B.F., 2005. Toward an integrated clinical, molecular and serological classification of inflammatory bowel disease: report of a Working Party of the 2005 Montreal World Congress of Gastroenterology. Can J Gastroenterol 19 Suppl A, 5A-36A. <https://doi.org/10.1155/2005/269076>
- Stein, D.J., Shaker, R. (Eds.), 2015. Inflammatory Bowel Disease: A Point of Care Clinical Guide. Springer International Publishing. <https://doi.org/10.1007/978-3-319-14072-8>
- Tian, Y., Zhang, Y., Zhu, W.-Q., Chen, X.-L., Zhou, H.-B., Chen, W.-M., 2018. Peripheral Blood Lymphocyte-to-Monocyte Ratio as a Useful Prognostic Factor in Newly Diagnosed Multiple Myeloma [WWW Document]. BioMed Research International. <https://doi.org/10.1155/2018/9434637>
- Vermeire, S., Van Assche, G., Rutgeerts, P., 2004. C-Reactive Protein as a Marker for Inflammatory Bowel Disease. Inflammatory Bowel Diseases 10, 661–665. <https://doi.org/10.1097/00054725-200409000-00026>
- Watanabe, S., Alexander, M., Misharin, A.V., Budinger, G.R.S., 2019. The role of macrophages in the resolution of inflammation. The Journal of Clinical Investigation 129, 2619–2628. <https://doi.org/10.1172/JCI124615>
- Xie, T., Zhang, T., Ding, C., Dai, X., Li, Y., Guo, Z., Wei, Y., Gong, J., Zhu, W., Li, J., 2018. Ulcerative Colitis Endoscopic Index of Severity (UCEIS) versus Mayo Endoscopic Score (MES) in guiding the need for colectomy in patients with acute severe colitis. Gastroenterology Report 6, 38–44. <https://doi.org/10.1093/gastro/gox016>
- Xu, M., et al. 2019, Correlation between Serological Biomarkers and Disease Activity in Patients with Inflammatory Bowel Disease. Hindawi. <https://doi.org/10.1155/2019/6517549>
- Yamamoto-Furusho, J.K., Bosques-Padilla, F., de-Paula, J., Galiano, M.T., Ibañez, P., Juliao, F., Kotze, P.G., Rocha, J.L., Steinwurz, F., Veitia, G., Zaltman, C., 2017. Diagnosis and treatment of inflammatory bowel disease: First Latin American Consensus of the Pan American Crohn's and Colitis Organisation. Revista de Gastroenterología de México (English Edition) 82, 46–84. <https://doi.org/10.1016/j.rgm xen.2016.07.003>



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APPEARANCE**

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