

## DAFTAR PUSTAKA

- Abe, Y., Hashimoto, S., Horie, T. (1999). Curcumin inhibition of inflammatory cytokine production by human peripheral blood monocytes and alveolar macrophages. *Pharmacol Res.* 39(1):41–47. <https://doi.org/10.1006/phrs.1998.0404>.
- Adams, J.L., Smothers, J., Srinivasan, R., Hoos, A. (2015). Big opportunities for small molecules in immuno-oncology. *Nat Rev Drug Discov.* 14 (9): 603-22. [PMID:26228631].
- Alizadeh, F, Javadi, M., Karami, A.A., Gholaminejad, F., Kavianpour, M., Haghghian, H.K. (2018). Curcumin nanomicelle improves semen parameters, oxidative stress, inflammatory biomarkers, and reproductive hormones in infertile men: a randomized clinical trial. *Phytother Res.* 32(3):514–521. doi:10.1002/ptr.5998.
- Ammon, H.P., Wahl, M.A. (1991). Pharmacology of *Curcuma longa*. *Planta Med.* 57(1):1–7. doi:10.1055/s-2006-960004.
- Ben, P., Liu, J., Lu, C., Xu, Y., Xin, Y., Fu, J., Huang, H., Zhang, Z, Gao, Y., Luo, L., Yin, Z. (2010). Curcumin promotes degradation of inducible nitric oxide synthase and suppresses its enzyme activity in RAW 264.7 cells. *International Immunopharmacology.* 11 (2011) 179–186.
- Bio-Rad Laboratories. 2012. *Real Time PCR Handbook*. Life Technologies Corporation.
- Burhans, M.S., Hagman, D.K., Kuzma, J.N., Schmidt, K.A., Kratz, M. (2018). Contribution of adipose tissue inflammation to the development of type 2 diabetes mellitus. *Compr. Physiol.* 9, 1–58.
- Boring, L., Gosling, J., Chensue, S.W. (1997). Impaired monocyte migration and reduced type 1 (Th1) cytokine responses in C-C chemokine receptor 2 knockout mice. *J Clin Invest.* 100(10):2552-2561.
- Carpentier, A., Mittelman, S.D., Bergman, R.N., Giacca, A., Lewis, G.F. (2000). *Prolonged elevation of plasma free fatty acids impairs pancreatic beta-cell function in obese nondiabetic humans but not in individuals with type 2 diabetes.* 49, 399–408.
- Chen, G., Liu, S., Pan, R., Li, G., Tang, H., Jiang, M., Xing, Y., Jin, F., Lin, L., Dong, J. (2018). Curcumin Attenuates gp120-Induced Microglial Inflammation by Inhibiting Autophagy via the PI3K Pathway. *Cell Mol Neurobiol.* 38(8):1465–1477. doi:10.1007/s10571-018-0616-3.
- Chowdhury, I., Banerjee, S., Driss, A., et al. (2019). Curcumin attenuates proangiogenic and proinflammatory factors in human eutopic endometrial stromal cells through the NF-kappaB signaling pathway. *J Cell Physiol.* 234(5):6298–6312. doi:10.1002/jcp.27360.
- Chu, H.X., Arumugam, T.V., Gelderblom, M., Magnus, T., Drummond, G. R., dan Sobey, C. G. (2014). Role of CCR2 in inflammatory conditions of the central nervous system. In *Journal of Cerebral Blood Flow and Metabolism* (Vol. 34, Issue 9, pp. 1425–1429). <https://doi.org/10.1038/jcbfm.2014.120>.

- Cologne. (2006). Germany: Institute for Quality and Efficiency in Health Care (IQWiG). How does the pancreas work? 2009 Nov 11 [Updated 2018 Sep 6]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK279306/>.
- Dansereau, M.A., Midavaine,É., Bégin-Lavallée,V., Belkouch, M., Beaudet, N., Longpré, J-M., Mélik-Parsadaniantz, S., Sarret, S. (2021). Mechanistic insights into the role of the chemokine CCL2/CCR2 axis in dorsal root ganglia to peripheral inflammation and pain hypersensitivity. *Journal of Neuroinflammation*. 18:79. <https://doi.org/10.1186/s12974-021-02125-y>.
- Davies, L.C., Jenkins, S.J., Allen, J.E., Taylor, P.R. (2013). Tissue-resident macrophages. *Nature Immunology*. 14(10):986–995. <https://doi.org/10.1038/ni.2705>.
- Donath, M.Y. dan Shoelson, S.E. (2011). “Type 2 diabetes as an inflammatory disease,” *Nature Reviews Immunology*, 11(2), pp. 98–107.
- Drenning, J.A., Lira, V.A., Simmons, C.G., Soltow, Q.A., Sellman, J.E., Criswell, D.S., 2008, Nitric oxide facilitates NFAT-dependent transcription in mouse myotubes. *Am J Physiol Cell Physiol*. 294:C1088–C1095.
- Facchin, B.M., dos Reis, G.O., Vieira, G.N., Mohr, E.T.B., da Rosa, J.S., Kretzer, I.F., Demarchi, I.G., Dalmarco, E.M. (2022). Inflammatory biomarkers on an LPS-induced RAW 264.7 cell model: a systematic review and meta-analysis. *Inflammation Research*. 71:741-758.
- Fei, L., Ren, X., Yu, H. dan Zhan, Y. (2021). Targeting the CCL2/CCR2 Axis in Cancer Immunotherapy: One Stone, Three Birds? *Front. Immunol*. 12:771210. doi: 10.3389/fimmu.2021.771210.
- Feve, B., Bastard, J.P. (2009). The role of interleukins in insulin resistance and type 2 diabetes mellitus. *Nat Rev Endocrinol*. 5(6):305–11.
- Freshney, I. (2005). *Culture of Animal Cells: A Manual of Basic Technique*. 4th penyunt. John Wiley and Sons Incorporatio. New York.
- Fu, Y., Gao, R., Cao, Y., Guo, M., Wei, Z., Zhou, E., Li, Y., Yao, M., Yang, Z., Zhang, N. (2014). Curcumin attenuates inflammatory responses by suppressing TLR4-mediated NF-kappaB signaling pathway in lipopolysaccharide-induced mastitis in mice. *Int Immunopharmacol*. 20(1):54–58. doi:10.1016/j.intimp.2014.01.024.
- Galli, S.J., Borregaard,N., Wynn T.A. (2011). Phenotypic and functional plasticity of cells of innate immunity: macrophages, mast cells and neutrophils. *Nature Immunology*. 12(11):1035–1044. <https://doi.org/10.1038/ni.2109>.
- Gao, L., Wang, F.-Q., Li, H.-M., Yang, J.-G., Ren, J.-G., He, K.-F., Liu, B., Zhang, W., dan Zhao, Y.-F. (2016). CCL2/EGF positive feedback loop between cancer cells and macrophages promotes cell migration and invasion in head and neck squamous cell carcinoma. In *Oncotarget*. 7(52). [www.impactjournals.com/oncotarget](http://www.impactjournals.com/oncotarget).
- Geissmann, F., Jung, S., Littman, D.R. (2003). Blood monocytes consist of two principal subsets with distinct migratory properties. *Immunity*. 19:71–82.
- Gerhardt, C.C., Romero, I.A., Canello, R., Camoin, L., Strosberg, A.D. (2001). Chemokines control fat accumulation and leptin secretion by cultured human adipocytes. *Mol Cell Endocrinol*. 175(1–2):81–92.

- Haryuna, T.S.H., Riawan, W., Nasution, A., Ma'at, S., Harahap, J., Adriztina, I. (2016). Curcumin Reduces the Noise-Exposed Cochlear Fibroblasts Apoptosis. *Int Arch Otorhinolaryngol.* 20:370–376. <http://dx.doi.org/10.1055/s-0036-1579742>.
- Huang, R., Liu, Y., Xiong, Y., Wu, H., Wang, G., Sun, Z. (2016). *Curcumin protects against liver fibrosis by attenuating infiltration of Gr1hi monocytes through inhibition of monocyte chemoattractant protein-1*. *Discov Med* 21(118):447–457.
- International Diabetes Federation. (2021). *IDF Diabetes Atlas 10th edition*. Belgium. [www.diabetesatlas.org](http://www.diabetesatlas.org).
- Jain, S.K., Rains, J., Croad, J., Larson, B., Jones, K. (2009). Curcumin supplementation lowers TNF-alpha, IL-6, IL-8, and MCP-1 secretion in high glucose-treated cultured monocytes and blood levels of TNF-alpha, IL-6, MCP-1, glucose, and glycosylated hemoglobin in diabetic rats. *Antioxid Redox Signal* 11(2):241–249. <https://doi.org/10.1089/ars.2008.2140>.
- Jung, H., dan Miller, R. J. (2008). Activation of the nuclear factor of activated T-cells (NFAT) mediates upregulation of CCR2 chemokine receptors in dorsal root ganglion (DRG) neurons: A possible mechanism for activity-dependent transcription in DRG neurons in association with neuropathic pain. *Molecular and Cellular Neuroscience*, 37(1), 170–177. <https://doi.org/10.1016/j.mcn.2007.09.004>.
- Kang, Y.S., Lee, M.W., Song, H.K., Ko, G.J., Kwon, O.S., Lim, T.K. Kim, S.H. Han, S.Y., Han, K.H., Lee, J.E., Han, J.Y., Kim, H.K., Cha, D.R. (2010). CCR2 antagonism improves insulin resistance, lipid metabolism, and diabetic nephropathy in type 2 diabetic mice. *Kidney International*. 78, 883–894. doi:10.1038/ki.2010.263.
- Karimian MS, Pirro M, Majeed M, Sahebkar A. (2017a). *Curcumin as a natural regulator of monocyte chemoattractant protein-1*. *Cytokine Growth Factor Rev* 33:55–63.
- Kawazoe, Y., Naka, T., Fujimoto, M., Kohzaki, H., Morita, Y., Narazaki, M., Okumura, K., Saitoh, H., Nakagawa, R., Uchiyama, Y., Akira, S., Kishimoto, T. (2001). Signal transducer and activator of transcription (STAT)-induced STAT inhibitor 1 (SSI-1)/ suppressor of cytokine signaling 1 (SOCS1) inhibits insulin signal transduction pathway through modulating insulin receptor substrate 1 (IRS-1) phosphorylation. *J Exp Med*. 193(2):263–9.
- Kliem, C., Merling, A., Giaisi, M., Köhler, R., Krammer, P. H., dan Li-Weber, M. (2012). Curcumin suppresses T cell activation by blocking Ca<sup>2+</sup> mobilization and nuclear factor of activated T cells (NFAT) activation. *Journal of Biological Chemistry*, 287(13), 10200–10209. <https://doi.org/10.1074/jbc.M111.318733>.
- Kumar, A., Gangwar, R., Ahmad Zargar, A., Kumar, R., dan Sharma, A. (2023). Prevalence of diabetes in India: A review of IDF Diabetes Atlas 10th edition. *Current diabetes reviews*, 10.2174/1573399819666230413094200. Advance online publication. <https://doi.org/10.2174/1573399819666230413094200>.

- Kurihara, T., Warr, G., Loy, J., Bravo, R. (1997). Defects in Macrophage Recruitment and Host Defense in Mice Lacking the CCR2 Chemokine Receptor. *J Exp Med.* 186(10):1757-62. doi:10.1084/jem.186.10.1757.
- Kuttikrishnan, S., Siveen, K.S., Prabhu, K.S., Khan, A.Q., Ahmed, E.I., Akhtar, S., Ali, T.A., Merhi, M., Dermime, S., Steinhoff, M., Uddin, S. (2019). Curcumin Induces Apoptotic Cell Death via Inhibition of PI3-Kinase/AKT Pathway in B-Precursor Acute Lymphoblastic Leukemia. *Front. Oncol.* 9:484. doi: 10.3389/fonc.2019.00484.
- Kuryłowicz, A., dan Kózniewski, K. (2020). Anti-inflammatory strategies targeting metaflammation in type 2 diabetes. In *Molecules.* 25(9). MDPI AG. <https://doi.org/10.3390/molecules25092224>
- Kuziel, W.A., Morgan, S.J., Dawson, T.C., Griffin, S., Smithies, O., Ley, K., Maeda, N. (1997). Severe Reduction in Leukocyte Adhesion and Monocyte Extravasation in Mice Deficient in CC Chemokine Receptor 2. *Proc Natl Acad Sci USA.* 94(22):12053-8. doi: 10.1073/pnas.94.22.12053.
- Lambden, S. (2019). Bench to bedside review: therapeutic modulation of nitric oxide in sepsis—an update. *Intensive Care Medicine Experimental.* 7:64.
- Lee, C.H. dan Choi, E.Y., Macrophages and Inflammation, *Journal of Rheumatic Diseases.* 25 (1):1, <https://doi.org/10.4078/jrd.2018.25.1.11>.
- Lendeckel, U., Venz, S., dan Wolke, C. (2022). Macrophages: shapes and functions. *ChemTexts,* 8(2). <https://doi.org/10.1007/s40828-022-00163-4>.
- Lestari, M.L., Indrayanto, G. (2014). Curcumin. *Profiles Drug Subst Excip Relat Methodol.* 39:113–204. doi: 10.1016/B978-0-12-800173-8.00003-9.
- Liu, T., Li, C., Sun, H., Luo, T., Tan, Y., Tian, D., Guo, Z. (2014). Curcumin inhibits monocyte chemoattractant protein-1 expression and enhances cholesterol efflux by suppressing the c-Jun N-terminal kinase pathway in macrophage. *Inflamm Res.* 63(10):841–850. <https://doi.org/10.1007/s00011-014-0758-9>.
- Medzhitov, R. (2010). Inflammation. new adventures of an old flame. *Cell.* 140(6):771–776. doi:10.1016/j.cell.2010.03.006.
- Mohammadi, A., Blesso, C.N., Barreto, G.E., Banach, M., Majeed, M., Sahebkar, A. (2019). Macrophage plasticity, polarization and function in response to curcumin, a diet-derived polyphenol, as an immunomodulatory agent. *J Nutr Biochem.* 66:1–16. <https://doi.org/10.1016/j.jnutbio.2018.12.005>.
- Murray, P.J., Allen, J.E., Biswas, S.K., Fisher, E.A., Gilroy, D.W., Goerdt, S., Gordon, S., Hamilton, J.A., Ivashkiv, L.B., Lawrence, T., Locati, M., Mantovani, A., Martinez, F. O., Mege, J.L., Mosser, D.M., Natoli, G., Saeij, J.P., Schultze, J.L., Shirey, K.A., Sica, A., Wynn, T.A. (2014). Macrophage activation and polarization: nomenclature and experimental guidelines. *Immunity.* 41(1):14–20. <https://doi.org/10.1016/j.immuni.2014.06.008>.
- Meng, Z., Yan, C., Deng, Q., Gao, D.F., Niu, X.L. (2013). Curcumin inhibits LPS-induced inflammation in rat vascular smooth muscle cells in vitro via ROS-related TLR4-MAPK/NF-kappaB pathways. *Acta Pharmacol Sin.* 34(7):901–911. doi:10.1038/aps.2013.24.

- Mills, C., Kincaid, K., Alt, J., Heilman, M. dan Hill, A. (2000). M-1/M-2 macrophages and the Th1/Th2 paradigm. *J. Immunol.* 164 (12):6166-6173. doi: 10.4049/jimmunol.164.12.6166.
- Nie, Y., Zhai, X., Li, J., Sun, A., Che, H., Christman, J.W., Chai, G., Peng Zhao, P., Karpurapu, M. (2023). NFATc3 Promotes Pulmonary Inflammation and Fibrosis by Regulating Production of CCL2 and CXCL2 in Macrophages. *Aging and Disease.* 14(4):1441-1457. <https://dx.doi.org/10.14336/AD.2022.1202>.
- Pan, Y., Zhu, G., Wang, Y., Cai, L., Cai, Y., Hu, J. et al. (2013b). Attenuation of high-glucose-induced inflammatory response by a novel curcumin derivative B06 contributes to its protection from diabetic pathogenic changes in rat kidney and heart. *J Nutr Biochem.* 24(1):146–155. <https://doi.org/10.1016/j.jnutbio.2012.03.012>.
- Pandit, B.K., Sarkar, A., Sinha, B. (2016). Solution thermodynamics of sodium pyruvate in aqueous glycine solutions at T 296.15-313.15 K. *Journal of the Serbian Chemical Society.* 81 (11) 1283–1294.
- Peng, Y., Ao, M., Dong, B., Jiang, Y., Yu, L., Chen, Z., Hu, C., dan Xu, R. (2021). Anti-inflammatory effects of curcumin in the inflammatory diseases: Status, limitations and countermeasures. In *Drug Design, Development and Therapy.* 15:4503–4525. <https://doi.org/10.2147/DDDT.S327378>.
- Rehman, K., dan Akash, M. S. H. (2016). Mechanisms of inflammatory responses and development of insulin resistance: How are they interlinked? *Journal of Biomedical Science*, 23(1). <https://doi.org/10.1186/s12929-016-0303-y>.
- Sadeghi, A., Rostamirad, A., Seyyedebrahimi, S., Meshkani, R. (2018). Curcumin ameliorates palmitate-induced inflammation in skeletal muscle cells by regulating JNK/NF- $\kappa$ B pathway and ROS production. *Inflammopharmacology.* 26(5):1265–1272. doi:10.1007/s10787-018-0466-0.
- Sadeghi, M., Dehnavi, S., Asadirad, A., Xu, S., Majeed, M., Jamialahmadi, T., Johnston, T.P., Sahebkar, A. (2023). Curcumin and chemokines: mechanism of action and therapeutic potential in inflammatory diseases. *Inflammopharmacology.* 31:1069–1093.
- Seyedzadeh, M.H., Safari, Z., Zare, A., Gholizadeh, N.J., Razavi, S.A., Kardar, G.A. (2014). Study of curcumin immunomodulatory effects on reactive astrocyte cell function. *Int Immunopharmacol.* 22(1):230–235. <https://doi.org/10.1016/j.intimp.2014.06.035>.
- Shapiro, H., Lutaty, A., Ariel, A. (2011). Macrophages, meta-inflammation, and immuno-metabolism. *Sci World J.* 11:2509–29.
- Shi, C., Pamer, T.G. (2011). Monocyte Recruitment During Infection and Inflammation. *Nat Rev Immunol.* 11(11):762-74. Doi : 10.1038/nri3070.
- Singh, A., Ghai, N., Mohinder, P., dan Bedi, S. (2022). *Molecular Mechanisms Involved in Insulin Resistance: Recent Updates and Future Challenges.* [www.intechopen.com](http://www.intechopen.com).
- Si, Y., Tsou, C.L., Croft, K., Charo, I.F. (2010). CCR2 Mediates Hematopoietic Stem and Progenitor Cell Trafficking to Sites of Inflammation in Mice. *J Clin Invest.* 120(4):1192-203. doi: 10.1172/JCI40310.

- Taciak, B., Białasek, M., Braniewska, A., Sas, Z., Sawicka, P., Kiraga, Ł., Rygiel, T., Kroń, M. (2018). Evaluation of phenotypic and functional stability of RAW 264.7 cell line through serial passages. *PLoS ONE*. 13(6):e0198943. <https://doi.org/10.1371/journal.pone.0198943>.
- Tang, P., Wang, J.M. (2018). Chemokines: the past, the present and the future. *Cell Mol Immunol*. 15(4):295-298.
- Thiébaud, D., DeFronzo, R.A., Jacot, E., Golay, A., Acheson, K., Maeder, E., Jéquier, E., Felber, J.P. (1982). Effect of long-chain triglyceride infusion on glucose metabolism in man. *Metabolism*, 31, 1128–1136. [CrossRef].
- Tsikas, D. (2006). Analysis of nitrite and nitrate in biological fluids by assays based on the Griess reaction: Appraisal of the Griess reaction in the L-arginine/nitric oxide area of research. *J. Chromatogr. B*. 851, 51-70.
- Tu, C.T., Han, B., Liu, H.C., Zhang, S.C. (2011). Curcumin protects mice against concanavalin A-induced hepatitis by inhibiting intrahepatic intercellular adhesion molecule-1 (ICAM-1) and CXCL10 expression. *Mol Cell Biochem* 358(1–2):53–60. <https://doi.org/10.1007/s11010-011-0920-4>.
- Wang, X., Liao, Z., Zhao, G., Dong, W., Huang, X., Zhou, X. (2023). Curcumin nanocrystals self-stabilized Pickering emulsion freeze-dried powder: Development, characterization, and suppression of airway inflammation, *International Journal of Biological Macromolecules* 245. <https://doi.org/10.1016/j.ijbiomac.2023.125493>.
- Watanabe, S., Misharin, A.V., Budinger, G.R.S. (2019), The role of macrophages in the resolution of inflammation, *The Journal of Clinical Investigation*, 129(7):2619-2628.
- Wells, B.G., DiPiro, J.T., Schwinghammer, T.L., dan DiPiro, C.V. (2015). *Pharmacotherapy Handbook: Ninth Edition*.
- Wilcox, G. (2005). Insulin and Insulin Resistance. In *Clin Biochem Rev* (Vol. 26).
- Woo, C.Y., Jang, J.E., Lee, S.E., Koh, E.H., Lee, K.U. (2019). Mitochondrial dysfunction in adipocytes as a primary cause of adipose tissue inflammation. *Diabetes Metab. J*, 43, 247–256. [CrossRef].
- Wynn, T.A., Chawla, A., Pollard J.W. (2013). Origins and hallmarks of macrophages: development, homeostasis, and disease. *Nature*. 496(7446):445–455. <https://doi.org/10.1038/nature12034>.
- Xu, M., Wang, Y., Xia, R., Wei, Y., Wei X. (2021). Role of the CCL2-CCR2 signalling axis in cancer: Mechanisms and therapeutic targeting, *Cell Prolif*. 54:e13115. <https://doi.org/10.1111/cpr.13115>.
- Yang, H., Zhang, Q., Xu, M. (2020). CCL2-CCR2 axis recruits tumor associated macrophages to induce immune evasion through PD-1 signaling in esophageal carcinogenesis. *Mol Cancer*. 19: 41.
- Ye J. (2012). Role of Insulin in the Pathogenesis of Free Fatty Acid-Induced Insulin Resistance in Skeletal Muscle. *Endocrine, Metab Immune Disord Targets*. 7(1):65–74.
- Young, N.A., Bruss, M.S., Gardner, M., Willis, W.L., Mo, X., Valiente, G.R. (2014). Oral administration of nano-emulsion curcumin in mice suppresses inflammatory-induced NFκB signaling and macrophage migration. *PLoS ONE* 9(11):e111559. <https://doi.org/10.1371/journal.pone.0111559>.

- Zeng, Z., Zhan, L., Liao, H., Chen, L., Lv, X. Curcumin improves TNBS-induced colitis in rats by inhibiting IL-27 expression via the TLR4/NF-kappaB signaling pathway. *Planta Med.* 2013;79 (2):102–109.
- Zhao, F., Gong, Y., Hu, Y., Lu, M., Wang, J., Dong, J., Chen, D., Chen, L., Fu, F., Qiu, F. (2014). Curcumin and its major metabolites inhibit the inflammatory response induced by lipopolysaccharide: Translocation of nuclear factor- $\kappa$ B as potential target. *MOLECULAR MEDICINE REPORTS*. 11: 3087-3093.
- Zheng Y, Qin L, Zacarías NV, de Vries H, Han GW, Gustavsson M, Dabros M, Zhao C, Cherney RJ, Carter P et al.. (2016) Structure of CC chemokine receptor 2 with orthosteric and allosteric antagonists. *Nature*. 540 (7633): 458-461. [PMID:27926736].
- Zhong, Y., Liu, T., Lai, W., Tan, Y., Tian, D., Guo, Z. (2013). Heme oxygenase-1-mediated reactive oxygen species reduction is involved in the inhibitory effect of curcumin on lipopolysaccharide-induced monocyte chemoattractant protein-1 production in RAW264.7 macrophages. *Mol Med Rep.* 7(1):242–246. <https://doi.org/10.3892/mmr.2012.1138>.