



## DAFTAR PUSTAKA

- Abbasifard, M., Khorramdelazad, H. 2020. The bio-mission of interleukin-6 in the pathogenesis of COVID-19: A brief look at potential therapeutic tactics. *Life Sci.*, 257:118097.
- Allahverdiyey, S., Quisi, A., Harbalioglu, H., Alici, G., Genc, O., Yildirim, A., Kurt, I.H. 2020. The Neutrophil to Lymphocyte Ratio and In-Hospital All-Cause Mortality in Patients with COVID-19. *Eur. J. Ther.*, 26(3):251–256.
- Ayanian, S., Reyes, J., Lynn, L., Teufel, K. 2020. The association between biomarkers and clinical outcomes in novel coronavirus pneumonia in a US cohort. *Biomark. Med.*, 14(12):1091–1097.
- Aziz, M., Fatima, R., Assaly, R. 2020. Elevated interleukin-6 and severe COVID-19: A meta-analysis. *J. Med. Virol.*, 92(11):2283–2285.
- Chatterjee, S.K., Saha, S., Munoz, M.N.M. 2020. Molecular Pathogenesis, Immunopathogenesis and Novel Therapeutic Strategy Against COVID-19. *Front. Mol. Biosci.*, 7(August):1–11.
- Chen, G., Wu, D., Guo, W., Cao, Y., Huang, D., Wang, H., Wang, T., Zhang, Xiaoyun, Chen, H., Yu, H., Zhang, Xiaoping, Zhang, M., Wu, S., Song, J., Chen, T., Han, M., Li, S., Luo, X., Zhao, J., et al. 2020. Clinical and immunological features of severe and moderate coronavirus disease 2019. *Am. Soc. Clin. Investig.*, 130(5):2620–2629.
- Datta, C., Bhattacharjee, A. 2020. Cytokine Storm and its Implication in Coronavirus disease 2019 (COVID-19). *J. Immunol. Sci.*, 4(3):4–21.
- Dávila-Collado, R., Jarquín-Durán, O., Solís-Vallejo, A., Nguyen, M.A., Espinoza, J.L. 2021. Elevated monocyte to lymphocyte ratio and increased mortality among patients with chronic kidney disease hospitalized for COVID-19. *J. Pers. Med.*, 11(3).
- Dinas Kesehatan Kota Yogyakarta. 2022. Profil Kesehatan Kota Yogyakarta Tahun 2022. *J. Kaji. Ilmu Adm. Negara*, 107(38):39. Available at: <https://journal.uny.ac.id/index.php/natapraja/article/view/12619>.
- Du, R.H., Liu, L.M., Yin, W., Wang, W., Guan, L.L., Yuan, M.L., Li, Y.L., Hu, Y., Li, X.Y., Sun, B., Peng, P., Shi, H.Z. 2020. Hospitalization and critical care of 109 decedents with COVID-19 pneumonia in Wuhan, China. *Ann. Am. Thorac. Soc.*, 17(7):839–846.
- Guan, W., Ni, Z., Hu, Y., Liang, W., Ou, C., He, J., Liu, L., Shan, H., Lei, C., Hui, D.S.C., Du, B., Li, L., Zeng, G., Yuen, K.Y., Chen, R., Tang, C., Wang, T., Chen, P., Xiang, J., et al. 2020. Clinical characteristics of coronavirus disease 2019 in China. *N. Engl. J. Med.*, 382(18):1708–1720.
- Gubernatorova, E.O., Gorshkova, E.A., Polinova, A.I., Drutskaya, M.S. 2020. IL-



- 6: Relevance for immunopathology of SARS-CoV-2. *Cytokine Growth Factor Rev.*, 53:13–24.
- Gupta, K.K., Khan, M.A., Singh, S.K. 2020. Constitutive Inflammatory Cytokine Storm: A Major Threat to Human Health. *J. Interf. Cytokine Res.*, 40(1):19–23.
- Harrison, A.G., Lin, T., Wang, P. 2020. Mechanisms of SARS-CoV-2 Transmission and Pathogenesis. *Trends Immunol.*, 41(12):1100–1115.
- Herold, T., Jurinovic, V., Arnreich, C., Lipworth, B.J., Hellmuth, J.C., von Bergwelt-Bailldon, M., Klein, M., Weinberger, T. 2020. Elevated levels of IL-6 and CRP predict the need for mechanical ventilation in COVID-19. *J. Allergy Clin. Immunol.*, 146(1):128-136.e4.
- Hsu, R.-J., Yu, W.-C., Peng, G.-R., Ye, C.-H., Hu, S., Chong, P.C.T., Yap, K.Y., Lee, J.Y.C., Lin, W.-C., Yu, S.-H. 2022. The Role of Cytokines and Chemokines in Severe Acute Respiratory Syndrome Coronavirus 2 Infections. *Front. Immunol.*, 13.
- Huang, M., Wang, Y., Ye, J., Da, H., Fang, S., Chen, L. 2020. Dynamic changes of T-lymphocyte subsets and the correlations with 89 patients with coronavirus disease 2019 (COVID-19). *Ann. Transl. Med.*, 8(18):1145–1145.
- Iannetta, M., Buccisano, F., Fraboni, D., Malagnino, V., Campogiani, L., Teti, E., Spalliera, I., Rossi, B., Di Lorenzo, A., Palmieri, R., Crea, A., Zordan, M., Vitale, P., Voso, M.T., Andreoni, M., Sarmati, L. 2021. Baseline T-lymphocyte subset absolute counts can predict both outcome and severity in SARS-CoV-2 infected patients: a single center study. *Sci. Rep.*, 11(1):1–13.
- Jesenak, M., Brndiarova, M., Urbancikova, I., Rennerova, Z., Vojtkova, J., Bobcakova, A., Ostro, R., Banovcin, P. 2020. Immune Parameters and COVID-19 Infection – Associations With Clinical Severity and Disease Prognosis. *Front. Cell. Infect. Microbiol.*, 10(June):1–10.
- Jose, R.J., Manuel, A. 2020. COVID-19 cytokine storm: the interplay between inflammation and coagulation. *Lancet Respir. Med.* Lancet Publishing Group, e46–e47.
- Kerboua, K.E. 2021. NLR: A Cost-effective Nomogram to Guide Therapeutic Interventions in COVID-19. *Immunol. Invest.*, 50(1):92–100.
- Kerget, B., Kerget, F., Koçak, A.O., Kızıltunç, A., Araz, Ö., Uçar, E.Y., Akgün, M. 2020. Are Serum Interleukin 6 and Surfactant Protein D Levels Associated with the Clinical Course of COVID-19? *Lung*, 198(5):777–784.
- Kim, J.S., Lee, J.Y., Yang, J.W., Lee, K.H., Effenberger, M., Szpirt, W., Kronbichler, A., Shin, J. Il. 2021. Immunopathogenesis and treatment of cytokine storm in COVID-19. *Theranostics*, 11(1):316–329.
- Kordzadeh-Kermani, E., Khalili, H., Karimzadeh, I. 2020. Pathogenesis, clinical



manifestations and complications of coronavirus disease 2019 (COVID-19).  
*Future Microbiol.*, 15(13):1287–1305.

Li, Xun, Wang, L., Yan, S., Yang, F., Xiang, L., Zhu, J., Shen, B., Gong, Z. 2020. Clinical characteristics of 25 death cases with COVID-19: A retrospective review of medical records in a single medical center, Wuhan, China. *Int. J. Infect. Dis.*, 94(2020):128–132.

Li, Xiaowei, Geng, M., Peng, Y., Meng, L., Lu, S. 2020. Molecular immune pathogenesis and diagnosis of COVID-19. *J. Pharm. Anal.*, 10(2):102–108.

Lippi, G., Wong, J., Henry, B.M. 2020. Hypertension and its severity or mortality in Coronavirus Disease 2019 (COVID-19): a pooled analysis. *Polish Arch. Intern. Med.* [Preprint].

Liu, J., Liu, Y., Xiang, P., Pu, L., Xiong, H., Li, C., Zhang, M., Tan, J., Xu, Y., Song, R., Song, M., Wang, L., Zhang, W., Han, B., Yang, L., Wang, Xiaojing, Zhou, G., Zhang, T., Li, B., et al. 2020. Neutrophil-to-lymphocyte ratio predicts critical illness patients with 2019 coronavirus disease in the early stage. *J. Transl. Med.*, 18(1):1–12.

Loeffelholz, M.J., Tang, Y. 2020. Laboratory diagnosis of emerging human coronavirus infections – the state of the art, 1751.

Lombardi, A., Trombetta, E., Cattaneo, A., Castelli, V., Palomba, E., Tirone, M., Mangioni, D., Lamorte, G., Manunta, M., Prati, D., Ceriotti, F., Gualtierotti, R., Costantino, G., Aliberti, S., Scaravilli, V., Grasselli, G., Gori, A., Porretti, L., Bandera, A., et al. 2020. Early Phases of COVID-19 Are Characterized by a Reduction in Lymphocyte Populations and the Presence of Atypical Monocytes. *Front. Immunol.*, 11(December):1–9.

Luiz Boechat, A., Mella Soares Pessoa, B., Eduardo Colares Soares, C., Barroso, T., José Conceição Vila, D., Maria Lima Barbosa, E., de Araújo, I., Victor Oliveira de Melo, J., Neves Becil, J., Polyanna Rebouças, M., Vieira Rodrigues, M., Henrique Aquino Gil de Freitas, P., Bustamante Rocha, R., Farias Rodrigues, T., Ribeiro Ferreira, V., Duran Ubiera, R., Cristina Dos-, M., Cristina dos Santos, M. 2020. SARS-CoV-2 and Covid-19 Immunopathogenesis. *Nature*, 1(August):1–38.

Messina, G., Polito, R., Monda, V., Cipolloni, L., Di Nunno, N., Di Mizio, G., Murabito, P., Carotenuto, M., Messina, A., Pisanelli, D., Valenzano, A., Cibelli, G., Scarinci, A., Monda, M., Sessa, F. 2020. Functional Role of Dietary Intervention to Improve the Outcome of COVID-19: A Hypothesis of Work. *Int. J. Mol. Sci.*, 21(9):3104.

Mojtabavi, H., Saghzadeh, A., Rezaei, N. 2020. Interleukin-6 and severe COVID-19: a systematic review and meta-analysis. *Eur. Cytokine Netw.*, 31(2):44–49.

PDPI, PERKI, PAPDI, PERDATIN, IDAI. 2020. *Pedoman tatalaksana COVID-19 Edisi 3 Desember 2020. Pedoman Tatalaksana COVID-19*.



- Peckham, H., de Gruijter, N.M., Raine, C., Radziszewska, A., Ciurtin, C., Wedderburn, L.R., Rosser, E.C., Webb, K., Deakin, C.T. 2020. Male sex identified by global {COVID}-19 meta-analysis as a risk factor for death and {ITU} admission. *Nat. Commun.*, 11(1):6317.
- Pelaia, C., Tinello, C., Varella, A., De Sarro, G., Pelaia, G. 2020. Lung under attack by COVID-19-induced cytokine storm: pathogenic mechanisms and therapeutic implications. *Ther. Adv. Respir. Dis.*, 14:175346662093350.
- Rando, H.M., MacLean, A.L., Lee, A.J., Lordan, R., Ray, S., Bansal, V., Skelly, A.N., Sell, E., Dziak, J.J., Shinholster, L., D'Agostino McGowan, L., Ben Guebila, M., Wellhausen, N., Knyazev, S., Boca, S.M., Capone, S., Qi, Y., Park, Y., Mai, D., et al. 2021. Pathogenesis, Symptomatology, and Transmission of SARS-CoV-2 through Analysis of Viral Genomics and Structure. *mSystems*. Edited by J.A. Gilbert, 6(5):1–32.
- Rose-John, S., Winthrop, K., Calabrese, L. 2017. The role of IL-6 in host defence against infections: immunobiology and clinical implications. *Nat. Rev. Rheumatol.*, 13(7):399–409.
- Rothan, H.A., Byrareddy, S.N. 2020. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *J. Autoimmun.*, 109(February):102433.
- Sabaka, P., Koščálová, A., Straka, I., Hodosy, J., Lipták, R., Kmotorková, B., Kachlíková, M., Kušnírová, A. 2021. Role of interleukin 6 as a predictive factor for a severe course of Covid-19: retrospective data analysis of patients from a long-term care facility during Covid-19 outbreak. *BMC Infect. Dis.*, 21(1):308.
- Santa Cruz, A., Mendes-Frias, A., Oliveira, A.I., Dias, L., Matos, A.R., Carvalho, A., Capela, C., Pedrosa, J., Castro, A.G., Silvestre, R. 2021. Interleukin-6 Is a Biomarker for the Development of Fatal Severe Acute Respiratory Syndrome Coronavirus 2 Pneumonia. *Front. Immunol.*, 12.
- Satgas COVID-19. 2022. Update Percepatan Penanganan COVID-19 di Indonesia.pdf.
- Sayah, W., Berkane, I., Guermache, I., Sabri, M., Zahra Lakhali, F., Yasmine Rahali, S., Djidjeli, A., mahammad Lamara, L., Merah, F., Belaid, B., Berkani, L., Zhor Lazli, N., Kheddouci, L., Kadi, A., Ouali, M., Khellafi, R., Mekideche, D., Kheliouen, A., Malek Hamidi, R., et al. 2021. Interleukin-6, procalcitonin and neutrophil-to-lymphocyte ratio: Potential immune-inflammatory parameters to identify severe and fatal forms of COVID-19. *Cytokine*, 141(September 2020):155428.
- Sharma, H.N., Latimore, C.O.D., Matthews, Q.L. 2021. Biology and pathogenesis of SARS-COV-2: Understandings for therapeutic developments against COVID-19. *Pathogens*, 10(9):1–27.
- Shi, Y., Wang, Y., Shao, C., Huang, J., Gan, J., Huang, X., Bucci, E., Piacentini,



- M., Ippolito, G., Melino, G. 2020. COVID-19 infection: the perspectives on immune responses. *Cell Death Differ.*, 27(5):1451–1454.
- Song, H., Seddighzadeh, B., Cooperberg, M.R., W., F., Huang. 2020. Expression of ACE2, the SARS-CoV-2 receptor, and TMPRSS2 in prostate epithelial cells. *Am J Res Crit. Care Med*, 8(2):851–868.
- Sun, H., Guo, P., Zhang, L., Wang, F. 2020. Serum Interleukin-6 Concentrations and the Severity of COVID-19 Pneumonia: A Retrospective Study at a Single Center in Bengbu City, Anhui Province, China, in January and February 2020. *Med. Sci. Monit.*, 26.
- Tan, L., Wang, Qi, Zhang, D., Ding, J., Huang, Q., Tang, Y.Q., Wang, Qiongshu, Miao, H. 2020. Lymphopenia predicts disease severity of COVID-19: a descriptive and predictive study. *Signal Transduct. Target. Ther.*, 5(1):16–18.
- Tanaka, T., Narazaki, M., Masuda, K., Kishimoto, T. 2013. Interleukin-6; pathogenesis and treatment of autoimmune inflammatory diseases. *Inflamm. Regen.*, 33(1):054–065.
- Tanaka, T., Kishimoto, T. 2012. Targeting interleukin-6: All the way to treat autoimmune and inflammatory diseases. *Int. J. Biol. Sci.*, 8(9):1227–1236.
- Tanaka, T., Narazaki, M., Kishimoto, T. 2014. IL-6 in Inflammation, Immunity, and Disease. *Cold Spring Harb. Perspect. Biol.*, 6(10):a016295–a016295.
- Tay, M.Z., Poh, C.M., Rénia, L., MacAry, P.A., Ng, L.F.P. 2020. The trinity of COVID-19: immunity, inflammation and intervention. *Nat. Rev. Immunol.*, 20(6):363–374.
- Tufan, A., Avanoğlu Güler, A., Matucci-Cerinic, M. 2020. Covid-19, immune system response, hyperinflammation and repurposinatirheumatic drugs. *Turkish J. Med. Sci.*, 50(SI-1):620–632.
- Velavan, T.P., Meyer, C.G. 2020. Mild versus severe COVID-19: Laboratory markers. *Int. J. Infect. Dis.*, 95:304–307.
- Villar-Fincheira, P., Sanhueza-Olivares, F., Norambuena-Soto, I., Cancino-Arenas, N., Hernandez-Vargas, F., Troncoso, R., Gabrielli, L., Chiong, M. 2021. Role of Interleukin-6 in Vascular Health and Disease. *Front. Mol. Biosci.*, 8(March):1–11.
- Wang, F., Nie, J., Wang, H., Zhao, Q., Xiong, Y., Deng, L., Song, S., Ma, Z., Mo, P., Zhang, Y. 2020. Characteristics of peripheral lymphocyte subset alteration in covid-19 pneumonia. *J. Infect. Dis.*, 221(11):1762–1769.
- Wang, X., Li, X., Shang, Y., Wang, J., Zhang, X., Su, D., Zhao, S., Wang, Q., Liu, L., Li, Y., Chen, H. 2020. Ratios of Neutrophil-to-Lymphocyte and Platelet-to-Lymphocyte Predict All-Cause Mortality in Inpatients with Coronavirus Disease 2019 (COVID-19): A Retrospective Cohort Study in A Single



Medical Center. *Epidemiol. Infect.* [Preprint].

World Health Organization. 2020a. Laboratory testing for 2019 novel coronavirus (2019-nCoV) in suspected human cases. *WHO - Interim Guid.*, 2019(January):1–7.

World Health Organization. 2020b. *Naming the coronavirus disease (COVID-19) and the virus that causes it.*

Yang, L., Liu, S., Liu, J., Zhang, Z., Wan, X., Huang, B., Chen, Y., Zhang, Y. 2020. COVID-19: immunopathogenesis and Immunotherapeutics. *Signal Transduct. Target. Ther.*, 5(1):1–8.

Yang, X., Yu, Y., Xu, J., Shu, H., Xia, J., Liu, H., Wu, Y., Zhang, L., Yu, Z., Fang, M., Yu, T., Wang, Y., Pan, S., Zou, X., Yuan, S., Shang, Y. 2020. Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study. *Lancet Respir. Med.*, 8(5):475–481.

Zhang, C., Wu, Z., Li, J.-W., Zhao, H., Wang, G.-Q. 2020. Cytokine release syndrome in severe COVID-19: interleukin-6 receptor antagonist tocilizumab may be the key to reduce mortality. *Int. J. Antimicrob. Agents*, 55(5):105954.

Zhao, K., Li, R., Wu, X., Zhao, Y., Wang, T., Zheng, Z., Zeng, S., Ding, X., Nie, H. 2020. Clinical features in 52 patients with COVID-19 who have increased leukocyte count: a retrospective analysis. *Eur. J. Clin. Microbiol. Infect. Dis.*, 39(12):2279–2287.

Zhao, Y., Zhao, Z., Wang, Y., Zhou, Y., Ma, Y., Zuo, W. 2020. Single-Cell RNA Expression Profiling of ACE2, the Receptor of SARS-CoV-2. *Am. J. Respir. Crit. Care Med.*, 202(5):756–759.

Zhu, L., She, Z.G., Cheng, X., Qin, J.J., Zhang, X.J., Cai, J., Lei, F., Wang, H., Xie, J., Wang, W., Li, Haomiao, Zhang, P., Song, X., Chen, X., Xiang, M., Zhang, Chaozheng, Bai, L., Xiang, D., Chen, M.M., et al. 2020. Association of Blood Glucose Control and Outcomes in Patients with COVID-19 and Pre-existing Type 2 Diabetes. *Cell Metab.*, 31(6):1068-1077.e3.

Zhu, Z., Cai, T., Fan, L., Lou, K., Hua, X., Huang, Z., Gao, G. 2020a. Clinical value of immune-inflammatory parameters to assess the severity of coronavirus disease 2019. *Int. J. Infect. Dis.*, 95:332–339.

Zhu, Z., Cai, T., Fan, L., Lou, K., Hua, X., Huang, Z., Gao, G. 2020b. Clinical value of immune-inflammatory parameters to assess the severity of coronavirus disease 2019. *Int. J. Infect. Dis.*, 95:332–339.