

DAFTAR PUSTAKA

- Abassi, Z., Armaly, Z., Heyman, S.N., 2020. Glycocalyx Degradation in Ischemia-Reperfusion Injury. *American Journal of Pathology*. <https://doi.org/10.1016/j.ajpath.2019.08.019>
- Adil, A., Setiawan, P., Sembiring, Y.E., Budiono, 2021. Correlation between elevated $\text{tnf-}\alpha$, syndecan-1, and urine il-18 levels in acute kidney injury following on pump cardiac surgery. *Crit Care Shock* 24.
- Aldecoa, C., Llau, J. V., Nuvials, X., Artigas, A., 2020. Role of albumin in the preservation of endothelial glycocalyx integrity and the microcirculation: a review. *Ann Intensive Care*. <https://doi.org/10.1186/s13613-020-00697-1>
- Aljure, O.D., Fabbro, M., 2019. Cardiopulmonary Bypass and Inflammation: The Hidden Enemy. *J Cardiothorac Vasc Anesth*. <https://doi.org/10.1053/j.jvca.2018.05.030>
- Alphonsus, C.S., Rodseth, R.N., 2014. The endothelial glycocalyx: A review of the vascular barrier. *Anaesthesia*. <https://doi.org/10.1111/anae.12661>
- Andersson, Manjula S, Magoon R, 2017. Albumin Supplementation and Endothelial Glycocalyx Protection in Cardiac Surgery. *Annals of Thoracic Surgery* 2, 1–8.
- Arbaya, P.I., Putu Yasa, K., Widiana, I.G.R., 2018. Korelasi Durasi Cardiopulmonary Bypass dan Aorta Cross Clamp Terhadap Jumlah Pendarahan Dalam 24 jam Pasca-Operasi Jantung Terbuka di RSUP Sanglah. *Medicina (B Aires)* 49. <https://doi.org/10.15562/medicina.v49i3.203>
- Astapenko, D., Benes, J., Pouska, J., Lehmann, C., Islam, S., Cerny, V., 2019. Endothelial glycocalyx in acute care surgery - What anaesthesiologists need to know for clinical practice. *BMC Anesthesiol*. <https://doi.org/10.1186/s12871-019-0896-2>
- Banerjee, S., Mwangi, J.G., Stanley, T.K., Mitra, R., Ebong, E.E., 2021. Regeneration and Assessment of the Endothelial Glycocalyx to Address Cardiovascular Disease. *Ind Eng Chem Res*. <https://doi.org/10.1021/acs.iecr.1c03074>
- Becker, B.F., Jacob, M., Leipert, S., Salmon, A.H.J., Chappell, D., 2015. Degradation of the endothelial glycocalyx in clinical settings: Searching for the sheddases. *Br J Clin Pharmacol* 80. <https://doi.org/10.1111/bcp.12629>
- Brauer, R., Ge, L., Schlesinger, S.Y., Birkland, T.P., Huang, Y., Parimon, T., Lee, V., McKinney, B.L., McGuire, J.K., Parks, W.C., Chen, P., 2016. Syndecan-1 attenuates lung injury during influenza infection by potentiating c-met signaling to suppress epithelial apoptosis. *Am J Respir Crit Care Med* 194. <https://doi.org/10.1164/rccm.201509-1878OC>
- Brettner, F., Chappell, D., Nebelsiek, T., Hauer, D., Schelling, G., Becker, B.F., Rehm, M., Weis, F., 2019. Preinterventional hydrocortisone sustains the

- endothelial glycocalyx in cardiac surgery. *Clin Hemorheol Microcirc* 71. <https://doi.org/10.3233/CH-180384>
- Chappell, D., Bruegger, D., Potzel, J. *et al.* Hypervolemia increases release of atrial natriuretic peptide and shedding of the endothelial glycocalyx. *Crit Care* 18, 538 (2014). <https://doi.org/10.1186/s13054-014-0538-5>
- Cho, J.M., Ly, K., Ly, S., Park, S.K., Babu, P.V.A., Balagurunathan, K., Symons, J.D., 2022. Procedures to Evaluate the Role of Heparan Sulfate on the Reactivity of Resistance and Conductance Arteries Ex Vivo, in: *Methods in Molecular Biology*. https://doi.org/10.1007/978-1-0716-1398-6_40
- Cooper, S., Teoh, H., Campeau, M.A., Verma, S., Leask, R.L., 2019. Empagliflozin restores the integrity of the endothelial glycocalyx in vitro. *Mol Cell Biochem* 459. <https://doi.org/10.1007/s11010-019-03555-2>
- Cribben, N., Gonoud, D., Kevin, L.G., 2021. Cardiopulmonary bypass. *Anaesthesia and Intensive Care Medicine*. <https://doi.org/10.1016/j.mpaic.2021.02.006>
- Dahlan, S., 2020. *Statistik Untuk Kedokteran Dan Kesehatan Deskriptif, Bivariat dan Multivariat.*, Jakarta : Salemba Medika.
- Dahlan, S., 2018. *Langkah-langkah Membuat Proposal Penelitian Bidang Kedokteran dan Kesehatan*, 2nd ed. Jakarta : Sagung Seto.
- de Oliveira Neves, F.M., Meneses, G.C., Sousa, N.E.A., de Menezes, R.R.P.P.B., Parahyba, M.C., Martins, A.M.C., Libório, A.B., 2015. Syndecan-1 in acute decompensated heart failure - Association with renal function and mortality -. *Circulation Journal* 79. <https://doi.org/10.1253/circj.CJ-14-1195>
- De Somer, F., 2014. Gaseous microemboli: Do we finally start to comprehend how to remove them? *Journal of Extra-Corporeal Technology*. <https://doi.org/10.1051/ject/201446067>
- Dekker, N.A.M., Veerhoek, D., van Leeuwen, A.L.I., Vonk, A.B.A., van den Brom, C.E., Boer, C., 2020. Microvascular Alterations During Cardiac Surgery Using a Heparin or Phosphorylcholine-Coated Circuit. *J Cardiothorac Vasc Anesth* 34. <https://doi.org/10.1053/j.jvca.2019.10.012>
- Dellinger, R.P., Levy, M., Rhodes, A., Annane, D., Gerlach, H., Opal, S.M., Sevransky, J.E., Sprung, C.L., Douglas, I.S., Jaeschke, R., Osborn, T.M., Nunnally, M.E., Townsend, S.R., Reinhart, K., Kleinpell, R.M., Angus, D.C., Deutschman, C.S., Machado, F.R., Rubenfeld, G.D., Webb, S.A., Beale, R.J., Vincent, J.L., Moreno, R., Aitken, L., Al Rahma, H., Bernard, G.R., Biban, P., Bion, J.F., Calandra, T., Carrillo, J.A., Clemmer, T.P., Divatia, J. V., Du, B., Fujishima, S., Gando, S., Bruch, C.G., Guyatt, G., Hazelzet, J.A., Hirasawa, H., Hollenberg, S.M., Jacobi, J., Jenkins, I., Jimenez, E., Jones, A.E., Kacmarek, R.M., Kern, W., Koh, S.O., Kotani, J., Machado, F., Marini, J., Marshall, J.C., Masur, H., Mehta, S., Muscedere, J., Napolitano, L.M., Parker, M.M., Parrillo, J.E., Qiu, H., Randolph, A.G., Rello, J., Resende, E., Rivers, E.P., Schorr, C.A., Shukri, K., Silva, E., Soth, M.D., Thompson, A.E., Vender, J.S., Welte, T., Zimmerman, J.L., 2013. Surviving sepsis campaign: International

- guidelines for management of severe sepsis and septic shock, 2012. *Intensive Care Med* 39. <https://doi.org/10.1007/s00134-012-2769-8>
- Elsaadani, M., Ahmed, S.M., Jacovides, C., Lopez, A., Johnson, V.E., Kaplan, L.J., Schwab, C.W., Smith, D.H., Pascual, J.L., 2021. Antithrombin III ameliorates post-traumatic brain injury cerebral leukocyte mobilization enhancing recovery of blood brain barrier integrity. *Journal of Trauma and Acute Care Surgery* 90. <https://doi.org/10.1097/TA.0000000000003000>
- Encyclopedia of Signaling Molecules, 2018. , *Encyclopedia of Signaling Molecules*. <https://doi.org/10.1007/978-3-319-67199-4>
- Eskens, B.J.M., Zuurbier, C.J., Van Haare, J., Vink, H., Van Teeffelen, J.W.G.E., 2013. Effects of two weeks of metformin treatment on whole-body glycocalyx barrier properties in db/db mice. *Cardiovasc Diabetol* 12. <https://doi.org/10.1186/1475-2840-12-175>
- Fang, F.Q., Sun, J.H., Wu, Q.L., Feng, L.Y., Fan, Y.X., Ye, J.X., Gao, W., He, G.L., Wang, W.J., 2021. Protective effect of sevoflurane on vascular endothelial glycocalyx in patients undergoing heart valve surgery: A randomised controlled trial. *Eur J Anaesthesiol* 38. <https://doi.org/10.1097/EJA.0000000000001429>
- Feng, J., Kant, S., Sellke, F.W., 2021. Microvascular dysfunction following cardioplegic arrest and cardiopulmonary bypass. *Vessel Plus*. <https://doi.org/10.20517/2574-1209.2021.57>
- Foote, C.A., Soares, R.N., Ramirez-Perez, F.I., Ghiarone, T., Aroor, A., Manrique-Acevedo, C., Padilla, J., Martinez-Lemus, L., 2022. Endothelial Glycocalyx. *Compr Physiol* 12. <https://doi.org/10.1002/cphy.c210029>
- Fuernau, G., Jung, C., Muench, P., Desch, S., Eitel, I., Schuler, G., Adams, V., Figulla, H.R., Thiele, H., 2014. Abstract 18417: Syndecan-1 and Heparan Sulfate in Acute Myocardial Infarction Complicated by Cardiogenic Shock - A Biomarker Substudy of the IABP-SHOCK II-Trial. *Circulation* 130, A18417–A18417. https://doi.org/10.1161/circ.130.suppl_2.18417
- Giacinto, O., Satriano, U., Nenna, A., Spadaccio, C., Lusini, M., Mastroianni, C., Nappi, F., Chello, M., 2019. Inflammatory Response and Endothelial Dysfunction Following Cardiopulmonary Bypass: Pathophysiology and Pharmacological Targets. *Recent Pat Inflamm Allergy Drug Discov* 13. <https://doi.org/10.2174/1872213x13666190724112644>
- Goncharov, N. V., Nadeev, A.D., Jenkins, R.O., Avdonin, P. V., 2017. Markers and Biomarkers of Endothelium: When Something Is Rotten in the State. *Oxid Med Cell Longev*. <https://doi.org/10.1155/2017/9759735>
- Gopal, S., 2020. Syndecans in Inflammation at a Glance. *Front Immunol*. <https://doi.org/10.3389/fimmu.2020.00227>
- Grigorov, B., Reungoat, E., Gentil dit Maurin, A., Varbanov, M., Blaising, J., Michelet, M., Manuel, R., Parent, R., Bartosch, B., Zoulim, F., Ruggiero, F., Pécheur, E.I., 2017. Hepatitis C virus infection propagates through interactions between Syndecan-1 and CD81 and impacts the hepatocyte glycocalyx. *Cell Microbiol* 19. <https://doi.org/10.1111/cmi.12711>

- Hayakawa, M., Kudo, D., Saito, S., Uchino, S., Yamakawa, K., Iizuka, Y., Sanui, M., Takimoto, K., Mayumi, T., Ono, K., Azuhata, T., Ito, F., Yoshihiro, S., Hayakawa, K., Nakashima, T., Ogura, T., Noda, E., Nakamura, Y., Sekine, R., Yoshikawa, Y., Sekino, M., Ueno, K., Okuda, Y., Watanabe, M., Tampo, A., Saito, N., Kitai, Y., Takahashi, Hiroki, Kobayashi, I., Kondo, Y., Matsunaga, W., Nachi, S., Miike, T., Takahashi, Hiroshi, Takauji, S., Umakoshi, K., Todaka, T., Kodaira, H., Andoh, K., Kasai, T., Iwashita, Y., Arai, H., Murata, M., Yamane, M., Shiga, K., Hori, N., 2016. Antithrombin supplementation and mortality in sepsis-induced disseminated intravascular coagulation: A multicenter retrospective observational study. *Shock* 46. <https://doi.org/10.1097/SHK.0000000000000727>
- He, Guoliang, Gao, Y., Feng, L., He, Guodong, Wu, Q., Gao, W., Lin, L., Wang, W., 2020. Correlation Between Wall Shear Stress and Acute Degradation of the Endothelial Glycocalyx During Cardiopulmonary Bypass. *J Cardiovasc Transl Res* 13, 1024–1032. <https://doi.org/10.1007/s12265-020-10027-2>
- He, Z., Du, X., Wu, Y., Hua, L., Wan, L., Yan, N., 2019. Simvastatin promotes endothelial dysfunction by activating the Wnt/ β -catenin pathway under oxidative stress. *Int J Mol Med* 44. <https://doi.org/10.3892/ijmm.2019.4310>
- Hess, N., Sultan, I., Wang, Y., Thoma, F., Kilic, A., 2021. Outcomes of Cardiac Surgery with Very Prolonged Cardiopulmonary Bypass Times. <https://doi.org/10.22541/au.161486705.54871224/v1>
- Hippensteel, J.A., Uchimido, R., Tyler, P.D., Burke, R.C., Han, X., Zhang, F., McMurtry, S.A., Colbert, J.F., Lindsell, C.J., Angus, D.C., Kellum, J.A., Yealy, D.M., Linhardt, R.J., Shapiro, N.I., Schmidt, E.P., 2019. Intravenous fluid resuscitation is associated with septic endothelial glycocalyx degradation. *Crit Care* 23. <https://doi.org/10.1186/s13054-019-2534-2>
- Hoppensteadt, D.A., Fareed, J., 2014. Pharmacological profile of sulodexide. *International Angiology*.
- Ikonomidis, I., Pavlidis, G., Katsimbri, P., Lambadiari, V., Parissis, J., Andreadou, I., Tsoumani, M., Boumpas, D., Kouretas, D., Iliodromitis, E., 2020. Tocilizumab improves oxidative stress and endothelial glycocalyx: A mechanism that may explain the effects of biological treatment on COVID-19. *Food and Chemical Toxicology* 145. <https://doi.org/10.1016/j.fct.2020.111694>
- Imaniar, I.R., Pratomo, B.Y., Jufan, A.Y., 2023. Hubungan Antara Durasi Cardiopulmonary Bypass dengan Kejadian Gagal Ginjal Akut Pasca Operasi pada Pasien yang Menjalani Operasi Bedah Jantung di RSUP Dr Sardjito. *UGM Repository*.
- Jamil DD, Baram A, Saqat BH. 2020. Impact of prolonged cardiopulmonary bypass and operative exposure time on the incidence of surgical site infections in patients undergoing open heart surgery: Single center case

- series. *International Journal of Surgery Open* (22):52-56. <https://doi.org/10.1016/j.ijso.2019.12.001>
- Kakutani, Y., Morioka, T., Yamazaki, Y., Ochi, A., Fukumoto, S., 2023. 433-P: Syndecan-1, a Marker of Endothelial Glycocalyx Degradation, Is Associated with Albuminuria in Type 2 Diabetes. *Diabetes* 72. <https://doi.org/10.2337/db23-433-P>
- Kant, S., Banerjee, D., Sabe, S.A., Sellke, F., Feng, J., 2023. Microvascular dysfunction following cardiopulmonary bypass plays a central role in postoperative organ dysfunction. *Front Med* (Lausanne). <https://doi.org/10.3389/fmed.2023.1110532>
- Kaur, G., Harris, N.R., 2023. Endothelial glycocalyx in retina, hyperglycemia, and diabetic retinopathy. *Am J Physiol Cell Physiol*. <https://doi.org/10.1152/ajpcell.00188.2022>
- Kim, H.J., Kim, E., Baek, S.H., Kim, H.Y., Kim, J.Y., Park, J., Choi, E.J., 2018. Sevoflurane did not show better protective effect on endothelial glycocalyx layer compared to propofol during lung resection surgery with one lung ventilation. *J Thorac Dis* 10. <https://doi.org/10.21037/jtd.2018.03.44>
- Kim, N.Y., Kim, K.J., Lee, K.Y., Shin, H.J., Cho, J., Nam, D.J., Kim, S.Y., 2021. Effect of volatile and total intravenous anesthesia on syndecan-1 shedding after minimally invasive gastrectomy: a randomized trial. *Sci Rep* 11. <https://doi.org/10.1038/s41598-021-81012-1>
- Knežević, D., Ćurko-Cofek, B., Batinac, T., Laškarin, G., Rakić, M., Šoštarić, M., Zdravković, M., Šustić, A., Sotošek, V., Batičić, L., 2023. Endothelial Dysfunction in Patients Undergoing Cardiac Surgery: A Narrative Review and Clinical Implications. *J Cardiovasc Dev Dis*. <https://doi.org/10.3390/jcdd10050213>
- Krichevsky, L.A., Rybakov, V.Y., Dvoryadkin, A.A., Protsenko, D.N., 2021. Systemic inflammatory response in cardiac surgery. *Russian Journal of Anesthesiology and Reanimatology /Anesteziologiya i Reanimatologiya*. <https://doi.org/10.17116/anaesthesiology202103194>
- Kusuzawa K, Suzuki K, Okada H, Suzuki K, Takada C, Nagaya S, Yasuda R, Okamoto H, Ishihara T, Tomita H, Kawasaki Y, Minamiyama T, Nishio A, Fukuda H, Shimada T, Tamaoki Y, Yoshida T, Nakashima Y, Chiba N, Yoshimura G, Kamidani R, Miura T, Oiwa H, Yamaji F, Mizuno Y, Miyake T, Kitagawa Y, Fukuta T, Doi T, Suzuki A, Yoshida T, Tetsuka N, Yoshida S and Ogura S (2021) Measuring the Concentration of Serum Syndecan-1 to Assess Vascular Endothelial Glycocalyx Injury During Hemodialysis. *Front. Med.* 8:791309. doi: 10.3389/fmed.2021.791309
- Li, J., Yuan, T., Zhao, X., Lv, G.Y., Liu, H.Q., 2016. Protective effects of sevoflurane in hepatic ischemia-reperfusion injury. *Int J Immunopathol Pharmacol* 29. <https://doi.org/10.1177/0394632016638346>
- Lipowsky, H.H., Lescanic, A., 2017. Inhibition of inflammation induced shedding of the endothelial glycocalyx with low molecular weight heparin. *Microvasc Res* 112. <https://doi.org/10.1016/j.mvr.2017.03.007>

- Liu, D., Liu, B., Liang, Z., Yang, Z., Ma, F., Yang, Y., Hu, W., 2021. Acute Kidney Injury following Cardiopulmonary Bypass: A Challenging Picture. *Oxid Med Cell Longev*. <https://doi.org/10.1155/2021/8873581>
- Madhavan, S., Chan, S.P., Tan, W.C., Eng, J., Li, B., Luo, H.D., Teoh, L.K.K., 2018. Cardiopulmonary bypass time: Every minute counts. *Journal of Cardiovascular Surgery* 59. <https://doi.org/10.23736/S0021-9509.17.09864-0>
- Magoon R, Makhija N. Endothelial Glycocalyx and Cardiac Surgery : Newer Insights. *Journal of Cardiothoracic and Vascular Anesthesia* (34) : <https://doi.org/10.1053/j.jcva.2019.07.003>. P310-311
- Miftode, R.S., Şerban, I.L., Timpau, A.S., Miftode, I.L., Ion, A., Buburuz, A.M., Costache, A.D., Costache, I.I., 2019. Syndecan-1: A Review on Its Role in Heart Failure and Chronic Liver Disease Patients' Assessment. *Cardiol Res Pract* 2019. <https://doi.org/10.1155/2019/4750580>
- Miftode, R.-S.; Costache, I.-I.; Constantinescu, D.; Mitu, O.; Timpau, A.-S.; Hancianu, M.; Leca, D.-A.; Miftode, I.-L.; Jigoranu, R.-A.; Oancea, A.-F.; et al. Syndecan-1: From a Promising Novel Cardiac Biomarker to a Surrogate Early Predictor of Kidney and Liver Injury in Patients with Acute Heart Failure. *Life*. 2023,13,898. <https://doi.org/10.3390/life13040898>
- Mork, C., Gahl, B., Eckstein, F., Berdajs, D.A., 2023. Prolonged cardiopulmonary bypass time as predictive factor for bloodstream infection. *Heliyon* 9. <https://doi.org/10.1016/j.heliyon.2023.e17310>
- Motta, P., Walker, S.P., 2022. Cardiopulmonary Bypass, in: *Cardiac Anesthesia and Postoperative Care in the 21st Century*. Springer International Publishing, pp. 107–121. https://doi.org/10.1007/978-3-030-79721-8_8
- Myers, G.J., Wegner, J., 2017. Endothelial glycocalyx and cardiopulmonary bypass. *Journal of Extra-Corporeal Technology*. <https://doi.org/10.1051/ject/201749174>
- Najmaii, S., Redford, D., Larson, D.F., 2006. Hyperglycemia as an effect of cardiopulmonary bypass: Intra-operative glucose management. *Journal of Extra-Corporeal Technology*. <https://doi.org/10.1051/ject/200638168>
- Nam, E.J., Ham, J.Y., Song, K.E., Won, D. Il, Lee, N.Y., 2021. Age-related variation of syndecan-1 levels in saliva and plasma of healthy individuals. *Clin Lab* 67. <https://doi.org/10.7754/Clin.Lab.2021.210113>
- Oda, K., Okada, H., Suzuki, A., Tomita, H., Kobayashi, R., Sumi, K., Suzuki, Kodai, Takada, C., Ishihara, T., Suzuki, Keiko, Kano, S., Kondo, K., Iwashita, Y., Yano, H., Zaikokuji, R., Sampei, S., Fukuta, T., Kitagawa, Y., Okamoto, H., Watanabe, T., Kawaguchi, T., Kojima, T., Deguchi, F., Miyazaki, N., Yamada, N., Doi, T., Yoshida, T., Ushikoshi, H., Yoshida, S., Takemura, G., Ogura, S., 2019. Factors enhancing serum syndecan-1 concentrations: A large-scale comprehensive medical examination. *J Clin Med* 8. <https://doi.org/10.3390/jcm8091320>
- Oiwa, H., Okada, H., Suzuki, K. et al. Investigation of the relationship between intradialytic hypotension during hemodialysis and serum

- syndecan-1 concentration. *Sci Rep* 13, 16753 (2023). <https://doi.org/10.1038/s41598-023-44094-7>
- Ostrowski, S.R., Pedersen, S.H., Jensen, J.S., Mogelvang, R., Johansson, P.I., 2013. Acute myocardial infarction is associated with endothelial glycocalyx and cell damage and a parallel increase in circulating catecholamines. *Crit Care* 17. <https://doi.org/10.1186/cc12532>
- Palomba, H., Treml, R.E., Caldonazo, T., Katayama, H.T., Gomes, B.C., Malbouisson, L.M.S., Silva Junior, J.M., 2022. Intraoperative fluid balance and cardiac surgery-associated acute kidney injury: a multicenter prospective study. *Brazilian Journal of Anesthesiology* (English Edition) 72. <https://doi.org/10.1016/j.bjane.2022.07.006>
- Passov A, Schramko A, Salminen U-S, Aittoma'ki J, Andersson S, Pesonen E (2021) Endothelial glycocalyx during early reperfusion in patients undergoing cardiac surgery. *PLoS ONE* 16(5): e0251747. <https://doi.org/10.1371/journal.pone.0251747>
- Pesonen, E., Passov, A., Andersson, S., Suojaranta, R., Niemi, T., Raivio, P., Salmenperä, M., Schramko, A., 2019. Glycocalyx Degradation and Inflammation in Cardiac Surgery. *J Cardiothorac Vasc Anesth* 33. <https://doi.org/10.1053/j.jvca.2018.04.007>
- Pudjiadi, A.H., Saidah, F., Alatas, F.S., 2022. Correlation between syndecan-1 level and PELOD-2 score and mortality in pediatric sepsis. *Rev Bras Ter Intensiva*. 2021;33(4):549-556 33.
- Qu, J., Cheng, Y., Wu, W., Yuan, L., Liu, X., 2021. Glycocalyx Impairment in Vascular Disease: Focus on Inflammation. *Front Cell Dev Biol*. <https://doi.org/10.3389/fcell.2021.730621>
- Rasmussen, G., Smego, D., Selzman, C., Pereira, S., 2022. Duration of Cardiopulmonary Bypass in the Modern Era: 240 is Now Safe. *American Association of Thoracic Surgery* 1, 1–10.
- Regös, E., Karászi, K., Reszegi, A., Kiss, A., Schaff, Z., Baghy, K., Kovalszky, I., 2020. Syndecan-1 in Liver Diseases. *Pathology and Oncology Research* 26. <https://doi.org/10.1007/s12253-019-00617-0>
- Robich, M., Ryzhov, S., Kacer, D., Palmeri, M., Peterson, S.M., Quinn, R.D., Carter, D., Sheppard, F., Hayes, T., Sawyer, D.B., Rappold, J., Prudovsky, I., Kramer, R.S., 2020. Prolonged Cardiopulmonary Bypass is Associated With Endothelial Glycocalyx Degradation. *Journal of Surgical Research* 251. <https://doi.org/10.1016/j.jss.2020.02.011>
- Rodriguez, G.E., Ostrowski, S.R., Cardenas, J.C., Baer, L.A., Tomasek, J.S., Henriksen, H.H., Stensballe, J., Cotton, B.A., Holcomb, J.B., Johansson, P.I., Wade, C.E., 2017. Syndecan-1: A Quantitative Marker for the Endotheliopathy of Trauma. *J Am Coll Surg* 225. <https://doi.org/10.1016/j.jamcollsurg.2017.05.012>
- Rossi, Shawn L, Laurance W, 2014. Hypoalbuminemia and Endothelial Glycocalyx Degradation in Cardiac Surgery Patients. *European Journal of Cardio-thoracic Surgery* 1, 234–245.
- Rovas, A., Seidel, L.M., Vink, H., Pohlkötter, T., Pavenstädt, H., Ertmer, C., Hessler, M., Kümpers, P., 2019. Association of sublingual

- microcirculation parameters and endothelial glycocalyx dimensions in resuscitated sepsis. *Crit Care* 23. <https://doi.org/10.1186/s13054-019-2542-2>
- Salsano, A., Giacobbe, D.R., Sportelli, E., Olivieri, G.M., Natali, R., Prevosto, M., Del Bono, V., Viscoli, C., Santini, F., 2018. Aortic cross-clamp time and cardiopulmonary bypass time: Prognostic implications in patients operated on for infective endocarditis. *Interact Cardiovasc Thorac Surg* 27. <https://doi.org/10.1093/icvts/ivy085>
- Santangelo, G.; Bursi, F.; Faggiano, A.; Moscardelli, S.; Simeoli, P.S.; Guazzi, M.; Lorusso, R.; Carugo, S.; Faggiano, P. The Global Burden of Valvular Heart Disease: From Clinical Epidemiology to Management. *J. Clin. Med.* 2023,12,2178. <https://doi.org/10.3390/jcm12062178>
- Sardu, C., Paolisso, P., Sacra, C., Mauro, C., Minicucci, F., Portoghese, M., Rizzo, M.R., Barbieri, M., Sasso, F.C., D'Onofrio, N., Balestrieri, M.L., Calabrò, P., Paolisso, G., Marfella, R., 2019. Effects of metformin therapy on coronary endothelial dysfunction in patients with prediabetes with stable angina and nonobstructive coronary artery stenosis: The codyce multicenter prospective study. *Diabetes Care* 42. <https://doi.org/10.2337/dc18-2356>
- Schött, U., Solomon, C., Fries, D., Bentzer, P., 2016. The endothelial glycocalyx and its disruption, protection and regeneration: A narrative review. *Scand J Trauma Resusc Emerg Med.* <https://doi.org/10.1186/s13049-016-0239-y>
- Seo, E.H., Park, H.J., Piao, L.Y., Lee, J.Y., Oh, C.S., Kim, S.H., 2020. Immune response in fluid therapy with crystalloids of different ratios or colloid for rats in haemorrhagic shock. *Sci Rep* 10. <https://doi.org/10.1038/s41598-020-65063-4>
- Shet, N., Shetty, Dr.Sukanya., V.Rao, Dr.Ashalatha., 2014. Syndecan-1 Levels In Type2 Diabetes Mellitus. *IOSR Journal of Dental and Medical Sciences* 13, 37–40. <https://doi.org/10.9790/0853-13223740>
- Sieve, I., Münster-Kühnel, A.K., Hilfiker-Kleiner, D., 2018. Regulation and function of endothelial glycocalyx layer in vascular diseases. *Vascul Pharmacol.* <https://doi.org/10.1016/j.vph.2017.09.002>
- Singh, A., Ramnath, R.D., Foster, R.R., Wylie, E.C., Fridén, V., Dasgupta, I., Haraldsson, B., Welsh, G.I., Mathieson, P.W., Satchell, S.C., 2013. Reactive Oxygen Species Modulate the Barrier Function of the Human Glomerular Endothelial Glycocalyx. *PLoS One* 8. <https://doi.org/10.1371/journal.pone.0055852>
- Sloop, G.D., Weidman, J.J., St Cyr, J.A., 2018. Perspective: interesterified triglycerides, the recent increase in deaths from heart disease, and elevated blood viscosity. *Ther Adv Cardiovasc Dis.* <https://doi.org/10.1177/1753944717745507>
- Sobolewski, P., Kandel, J., Eckmann, D.M., 2013. Air Bubble Contact with Endothelial Cells Causes a Calcium-Independent Loss in Mitochondrial Membrane Potential. *Biophys J* 104, 215a–216a. <https://doi.org/10.1016/j.bpj.2012.11.1218>

- Song, J.W., Zullo, J.A., Liveris, D., Dragovich, M., Zhang, X.F., Goligorsky, M.S., 2017. Therapeutic restoration of endothelial glycocalyx in sepsis. *Journal of Pharmacology and Experimental Therapeutics* 361. <https://doi.org/10.1124/jpet.116.239509>
- Strilakou, A., Perelas, A., Lazaris, A., Papavdi, A., Karkalousos, P., Giannopoulou, I., Kriebardis, A., Panayiotides, I., Liapi, C., 2016. Immunohistochemical determination of the extracellular matrix modulation in a rat model of choline-deprived myocardium: The effects of carnitine. *Fundam Clin Pharmacol* 30. <https://doi.org/10.1111/fcp.12163>
- Sullivan, R.C., Rockstrom, M.D., Schmidt, E.P., Hippensteel, J.A., 2021. Endothelial glycocalyx degradation during sepsis: Causes and consequences. *Matrix Biol Plus* 12. <https://doi.org/10.1016/j.mbplus.2021.100094>
- Sun, T., Wang, Y., Wu, X., Cai, Y., Zhai, T., Zhan, Q., 2022. Prognostic Value of Syndecan-1 in the Prediction of Sepsis-Related Complications and Mortality: A Meta-Analysis. *Front Public Health*. <https://doi.org/10.3389/fpubh.2022.870065>
- Supandji, M., Redjeki, I.S., 2016. Mikrosirkulasi. *Anesthesia & Critical Care* 34.
- Suzuki, A., Tomita, H., Okada, H., 2022. Form follows function: The endothelial glycocalyx. *Translational Research*. <https://doi.org/10.1016/j.trsl.2022.03.014>
- Svennevig, K., Hoel, T.N., Thiara, A.S., Kolset, S.O., Castelheim, A., Mollnes, T.E., Brosstad, F., Fosse, E., Svennevig, J.L., 2008. Syndecan-1 plasma levels during coronary artery bypass surgery with and without cardiopulmonary bypass. *Perfusion* 23. <https://doi.org/10.1177/0267659108098215>
- Targosz-Korecka, M., Malek-Zietek, K.E., Kloska, D., Rajfur, Z., Stepień, E.Ł., Grochot-Przeczek, A., Szymonski, M., 2020. Metformin attenuates adhesion between cancer and endothelial cells in chronic hyperglycemia by recovery of the endothelial glycocalyx barrier. *Biochim Biophys Acta Gen Subj* 1864. <https://doi.org/10.1016/j.bbagen.2020.129533>
- Triantafyllou, C., Nikolaou, M., Ikonomidis, I., Bamias, G., Kouretas, D., Andreadou, I., Tsoumani, M., Thymis, J., Papaconstantinou, I., 2021. Effects of anti-inflammatory treatment and surgical intervention on endothelial glycocalyx, peripheral and coronary microcirculatory function and myocardial deformation in inflammatory bowel disease patients: A two-arms two-stage clinical trial. *Diagnostics* 11. <https://doi.org/10.3390/diagnostics11060993>
- Tromp, J., Van Der Pol, A., Klip, I.T., De Boer, R.A., Jaarsma, T., Van Gilst, W.H., Voors, A.A., Van Veldhuisen, D.J., Van Der Meer, P., 2014. Fibrosis marker syndecan-1 and outcome in patients with heart failure with reduced and preserved ejection fraction. *Circ Heart Fail* 7. <https://doi.org/10.1161/CIRCHEARTFAILURE.113.000846>

- Weinbaum, S., Cancel, L.M., Fu, B.M., Tarbell, J.M., 2021. The Glycocalyx and Its Role in Vascular Physiology and Vascular Related Diseases. *Cardiovasc Eng Technol* 12. <https://doi.org/10.1007/s13239-020-00485-9>
- Weinberg L, Yanase F, Tosif S, Riedel B, Bellomo R, Hahn RG. Trajectory of plasma syndecan-1 and heparan sulphate during major surgery: A retrospective observational study. *Acta Anaesthesiol Scand*. 2023 Jan;67(1):4-11. doi: 10.1111/aas.14150. Epub 2022 Sep 27. PMID: 36112130; PMCID: PMC10087164.
- Wiguna, Y.W., Setiawan, P., Semedi, B.P., Purwanto, B., 2021. Syndecan-1 Laktat dan Profil Lipid sebagai Faktor Risiko Keparahan dan Mortalitas Sepsis. *Jurnal Anestesi Perioperatif* 9. <https://doi.org/10.15851/jap.v9n1.2251>
- Wu Q, Gao W, Zhou J, He G, Ye J, Fang F, Luo J, Wang M, Xu H, Wang W. Correlation between acute degradation of the endothelial glycocalyx and microcirculation dysfunction during cardiopulmonary bypass in cardiac surgery. *Microvasc Res*. 2019 Jul;124:37-42. doi: 10.1016/j.mvr.2019.02.004. Epub 2019 Mar 10. PMID: 30867134.
- Xiong, X., Chen, D., Cai, S., Qiu, L., Shi, J., 2023. Association of intraoperative hyperglycemia with postoperative composite infection after cardiac surgery with cardiopulmonary bypass: A retrospective cohort study. *Front Cardiovasc Med* 9. <https://doi.org/10.3389/fcvm.2022.1060283>
- Yini, S., Heng, Z., Xin, A., Xiaochun, M., 2015. Effect of unfractionated heparin on endothelial glycocalyx in a septic shock model. *Acta Anaesthesiol Scand* 59. <https://doi.org/10.1111/aas.12418>
- Zeng, Y., Liu, X.H., Tarbell, J., Fu, B., 2015. Sphingosine 1-phosphate induced synthesis of glycocalyx on endothelial cells. *Exp Cell Res* 339. <https://doi.org/10.1016/j.yexcr.2015.08.013>