

DAFTAR PUSTAKA

- Arslan, F., Lai, R.C., Smeets, M.B., Akeroyd, L., Choo, A., Agur, E.N.E., Timmers, L., van Rijen, H. V., Doevendans, P.A., Pasterkamp, G., Lim, S.K., de Kleijn, D.P., 2013. Mesenchymal stem cell-derived exosomes increase ATP levels, decrease oxidative stress and activate PI3K/Akt pathway to enhance myocardial viability and prevent adverse remodeling after myocardial ischemia/reperfusion injury. *Stem Cell Res.* 10, 301–312. <https://doi.org/10.1016/j.scr.2013.01.002>
- Asahara, T., Kawamoto, A., Masuda, H., 2011. Concise Review: Circulating Endothelial Progenitor Cells for Vascular Medicine. *Stem Cells* 29, 1650–1655. <https://doi.org/10.1002/stem.745>
- Bagno, L., Hatzistergos, K.E., Balkan, W., Hare, J.M., 2018. Mesenchymal Stem Cell-Based Therapy for Cardiovascular Disease : Progress and Challenges. *Mol. Ther.* 26, 1–14. <https://doi.org/10.1016/j.ymthe.2018.05.009>
- Benjamin, E.J., Muntner, P., Alonso, A., Bittencourt, M.S., Callaway, C.W., Carson, A.P., Chamberlain, A.M., Chang, A.R., Cheng, S., Das, S.R., Delling, F.N., Djousse, L., Elkind, M.S.V., Ferguson, J.F., Fornage, M., Jordan, L.C., Khan, S.S., Kissela, B.M., Knutson, K.L., Kwan, T.W., Lackland, D.T., Lewis, T.T., Lichtman, J.H., Longenecker, C.T., Loop, M.S., Lutsey, P.L., Martin, S.S., Matsushita, K., Moran, A.E., Mussolino, M.E., O’Flaherty, M., Pandey, A., Perak, A.M., Rosamond, W.D., Roth, G.A., Sampson, U.K.A., Satou, G.M., Schroeder, E.B., Shah, S.H., Spartano, N.L., Stokes, A., Tirschwell, D.L., Tsao, C.W., Turakhia, M.P., VanWagner, L.B., Wilkins, J.T., Wong, S.S., Virani, S.S., 2019. Heart Disease and Stroke Statistics—2019 Update: A Report From the American Heart Association. *Circulation* 139. <https://doi.org/10.1161/CIR.0000000000000659>
- Chen, L., Ding, M.L., Wu, F., He, W., Li, J., Zhang, X.Y., Xie, W.L., Duan, S.Z., Xia, W.H., Tao, J., 2016. Impaired Endothelial Repair Capacity of Early Endothelial Progenitor Cells in Hypertensive Patients with Primary Hyperaldosteronemia: Role of 5,6,7,8-Tetrahydrobiopterin Oxidation and Endothelial Nitric Oxide Synthase Uncoupling. *Hypertension* 67, 430–439. <https://doi.org/10.1161/HYPERTENSIONAHA.115.06597>
- Chen, Z., Chen, L., Zeng, C., Wang, W.E., 2018. Functionally improved mesenchymal stem cells to better treat myocardial infarction. *Stem Cells Int.* 2018. <https://doi.org/10.1155/2018/7045245>
- Cheng, K., Sainsbury, P., Fisher, M., Silva, R. de, 2016. Management of Refractory Angina Pectoris. *Eur. Cardiol. Rev.* 11, 69. <https://doi.org/10.15420/ecr.2016:26:1>
- Chopra, H., Hung, M.K., Kwong, D.L., Zhang, C.F., Pow, E.H.N., 2018. Insights into Endothelial Progenitor Cells: Origin, Classification, Potentials, and Prospects. *Stem Cells Int.* 2018, 1–24. <https://doi.org/10.1155/2018/9847015>
- Cunningham, C.J., Redondo-castro, E., Allan, S.M., 2018. The therapeutic potential of the mesenchymal stem cell secretome in ischaemic stroke.

- <https://doi.org/10.1177/0271678X18776802>
- Dai, G., Xu, Q., Luo, R., Gao, J., Chen, H., Deng, Y., Li, Y., Wang, Y., Yuan, W., Wu, X., 2015. Atorvastatin treatment improves effects of implanted mesenchymal stem cells: Meta-analysis of animal models with acute myocardial infarction. *BMC Cardiovasc. Disord.* 15, 1–6.
<https://doi.org/10.1186/s12872-015-0162-6>
- Davignon, J., 2004. Beneficial Cardiovascular Pleiotropic Effects of Statins. *Circulation* 109, III-39-III-43.
<https://doi.org/10.1161/01.CIR.0000131517.20177.5a>
- Dimmeler, S., Aicher, A., Vasa, M., Mildner-rihm, C., Adler, K., Tiemann, M., Rütten, H., Fichtlscherer, S., Martin, H., Zeiher, A.M., 2001. Statins increase endothelial progenitor cells via the PI 3-kinase / Akt pathway. *J. Clin. Invest.* 108, 365–366. <https://doi.org/10.1172/JCI200113152>. Introduction
- Fadini, G.P., Agostini, C., Sartore, S., Avogaro, A., 2007. Endothelial progenitor cells in the natural history of atherosclerosis. *Atherosclerosis* 194, 46–54.
<https://doi.org/10.1016/j.atherosclerosis.2007.03.046>
- Fleissner, F., Thum, T., 2011. Critical role of the nitric oxide/reactive oxygen species balance in endothelial progenitor dysfunction. *Antioxidants Redox Signal.* 15, 933–948. <https://doi.org/10.1089/ars.2010.3502>
- Gallina, C., Turinetto, V., Giachino, C., 2015. A New Paradigm in Cardiac Regeneration : The Mesenchymal Stem Cell Secretome. *Stem Cells Int.* 2015. <https://doi.org/10.1155/2015/765846>
- George, A.L., Bangalore-Prakash, P., Rajoria, S., Suriano, R., Shanmugam, A., Mittelman, A., Tiwari, R.K., 2011. Endothelial progenitor cell biology in disease and tissue regeneration. *J. Hematol. Oncol.* 4, 24.
<https://doi.org/10.1186/1756-8722-4-24>
- Gnecchi, M., Zhang, Z., Ni, A., Dzau, V.J., 2008. Paracrine mechanisms in adult stem cell signaling and therapy. *Circ. Res.* 103, 1204–1219.
<https://doi.org/10.1161/CIRCRESAHA.108.176826>
- Hamed, S., Brenner, B., Roguin, A., 2011. Nitric oxide: A key factor behind the dysfunctionality of endothelial progenitor cells in diabetes mellitus type-2. *Cardiovasc. Res.* 91, 9–15. <https://doi.org/10.1093/cvr/cvq412>
- Hristov, M., Erl, W., Weber, P.C., 2003. Endothelial progenitor cells: Mobilization, differentiation, and homing. *Arterioscler. Thromb. Vasc. Biol.* 23, 1185–1189. <https://doi.org/10.1161/01.ATV.0000073832.49290.B5>
- Huang, P., Wang, L., Li, Q., Tian, X., Xu, Jun, Xu, Junyan, Xiong, Y., Chen, G., Qian, H., Jin, C., Yu, Y., Cheng, K., Qian, L., Yang, Y., 2020. Atorvastatin enhances the therapeutic efficacy of mesenchymal stem cells-derived exosomes in acute myocardial infarction via up-regulating long non-coding RNA H19. *Cardiovasc. Res.* 116, 353–367.
<https://doi.org/10.1093/cvr/cvz139>
- Jin, H., Bae, Y., Kim, M., Kwon, S., Jeon, H., Choi, S., Kim, S., Yang, Y., Oh, W., Chang, J., 2013. Comparative Analysis of Human Mesenchymal Stem Cells from Bone Marrow, Adipose Tissue, and Umbilical Cord Blood as Sources of Cell Therapy. *Int. J. Mol. Sci.* 14, 17986–18001.
<https://doi.org/10.3390/ijms140917986>

- Kamprom, W., Kheolamai, P., U-Pratya, Y., Supokawej, A., Wattanapanitch, M., Laowtammathron, C., Issaragrisil, S., 2016a. Effects of mesenchymal stem cell-derived cytokines on the functional properties of endothelial progenitor cells. *Eur. J. Cell Biol.* 95, 153–163.
<https://doi.org/10.1016/j.ejcb.2016.02.001>
- Kamprom, W., Kheolamai, P., U-Pratya, Y., Supokawej, A., Wattanapanitch, M., Laowtammathron, C., Roytrakul, S., Issaragrisil, S., 2016b. Endothelial Progenitor Cell Migration-Enhancing Factors in the Secretome of Placental-Derived Mesenchymal Stem Cells. *Stem Cells Int.* 2016, 1–13.
<https://doi.org/10.1155/2016/2514326>
- Konala, V.B.R., Mamidi, M.K., Bhonde, R., Das, A.K., Pochampally, R., Pal, R., 2016. The current landscape of the mesenchymal stromal cell secretome: A new paradigm for cell-free regeneration. *Cytotherapy* 18, 13–24.
<https://doi.org/10.1016/j.jcyt.2015.10.008>
- Kwon, H.M., Hur, S.M., Park, K.Y., Kim, C.K., Kim, Yong Man, Kim, H.S., Shin, H.C., Won, M.H., Ha, K.S., Kwon, Y.G., Lee, D.H., Kim, Young Myeong, 2014. Multiple paracrine factors secreted by mesenchymal stem cells contribute to angiogenesis. *Vascul. Pharmacol.* 63, 19–28.
<https://doi.org/10.1016/j.vph.2014.06.004>
- Kwon, Y.W., Heo, S.C., Jeong, G.O., Yoon, J.W., Mo, W.M., Lee, M.J., Jang, I.H., Kwon, S.M., Lee, J.S., Kim, J.H., 2013. Tumor necrosis factor- α -activated mesenchymal stem cells promote endothelial progenitor cell homing and angiogenesis. *Biochim. Biophys. Acta - Mol. Basis Dis.* 1832, 2136–2144. <https://doi.org/10.1016/j.bbadis.2013.08.002>
- Lai, R.C., Arslan, F., Lee, M.M., Sze, N.S.K., Choo, A., Chen, T.S., Salto-Tellez, M., Timmers, L., Lee, C.N., El Oakley, R.M., Pasterkamp, G., de Kleijn, D.P.V., Lim, S.K., 2010. Exosome secreted by MSC reduces myocardial ischemia/reperfusion injury. *Stem Cell Res.* 4, 214–222.
<https://doi.org/10.1016/j.scr.2009.12.003>
- Lee, B.C., Kim, H.S., Shin, T.H., Kang, I., Lee, J.Y., Kim, J.J., Kang, H.K., Seo, Y., Lee, S., Yu, K.R., Choi, S.W., Kang, K.S., 2016. PGE 2 maintains self-renewal of human adult stem cells via EP2-mediated autocrine signaling and its production is regulated by cell-to-cell contact. *Sci. Rep.* 6, 1–12.
<https://doi.org/10.1038/srep26298>
- Lee, K.H., Tseng, W.C., Yang, C.Y., Tarng, D.C., 2019. The Anti-Inflammatory, Anti-Oxidative, and Anti-Apoptotic Benefits of Stem Cells in Acute Ischemic Kidney Injury. *Int. J. Mol. Sci.* 20.
<https://doi.org/10.3390/ijms20143529>
- Lee, P.S.S., 2014. Endothelial progenitor cells in cardiovascular diseases. *World J. Stem Cells* 6, 355. <https://doi.org/10.4252/wjsc.v6.i3.355>
- Leone, A.M., Valgimigli, M., Giannico, M.B., Zacccone, V., Perfetti, M., Amario, D.D., Rebuzzi, A.G., Crea, F., D'Amario, D., Rebuzzi, A.G., Crea, F., 2009. From bone marrow to the arterial wall: The ongoing tale of endothelial progenitor cells. *Eur. Heart J.* 30, 890–899.
<https://doi.org/10.1093/eurheartj/ehp078>
- Llevadot, J., Murasawa, S., Kureishi, Y., Uchida, S., Masuda, H., Kawamoto, A.,

- Walsh, K., Isner, J.M., Asahara, T., 2001. HMG-CoA reductase inhibitor mobilizes bone marrow-derived endothelial progenitor cells. *J. Clin. Invest.* 108, 399–405. <https://doi.org/10.1172/JCI200113131>
- Maacha, S., Sidahmed, H., Jacob, S., Gentilcore, G., Calzone, R., Grivel, J.C., Cugno, C., 2020. Paracrine Mechanisms of Mesenchymal Stromal Cells in Angiogenesis. *Stem Cells Int.* 2020. <https://doi.org/10.1155/2020/4356359>
- Meuthia, F., Oktaviono, Y.H., Soemantri, D., 2017. Effects of Statins on Endothelial Progenitor Cell Proliferation from Peripheral Blood of Stable Coronary Artery Disease Patient. *J. Kardiol. Indones.* 38, 6–12.
- Oktaviono, Y.H., Sargowo, D., Widodo, M.A., Dirgantara, Y., Chouw, A., Sandra, F., 2014. Proliferation of Peripheral Blood-derived Endothelial Progenitor Cells from Stable Angina Subjects. *Indones. Biomed. J.* 6, 91–96.
- Oktaviono, Y.H., Savitri, T.V.R., Soemantri, D., 2019. Rosuvastatin is Superior Compared to Simvastatin and Atorvastatin to Induce Endothelial Progenitor Cells Migration. *J. Clin. Diagnostic Res.* 1077, 5–8. <https://doi.org/10.7860/JCDR/2019/41485.12841>
- Ranganath, S.H., Levy, O., Inamdar, M.S., Karp, J.M., 2012. Harnessing the Mesenchymal Stem Cell Secretome for the Treatment of Cardiovascular Disease. *Cell Stem Cell* 10, 244–258. <https://doi.org/10.1016/j.stem.2012.02.005>
- Sainsbury, P.A., Fisher, M., De Silva, R., 2017. Alternative interventions for refractory angina. *Heart* 103, 1911–1922. <https://doi.org/10.1136/heartjnl-2015-308564>
- Sandra, F., Oktaviono, Y.H., Widodo, M.A., Dirgantara, Y., Chouw, A., Sargowo, D., 2014. Endothelial progenitor cells proliferated via MEK-dependent p42 MAPK signaling pathway. *Mol. Cell. Biochem.* 400, 201–206. <https://doi.org/10.1007/s11010-014-2276-z>
- Schachter, M., 2005. Chemical, pharmacokinetic and pharmacodynamic properties of statins: An update. *Fundam. Clin. Pharmacol.* 19, 117–125. <https://doi.org/10.1111/j.1472-8206.2004.00299.x>
- Schmidt, A., Brixius, K., Bloch, W., 2007. Endothelial precursor cell migration during vasculogenesis. *Circ. Res.* 101, 125–136. <https://doi.org/10.1161/CIRCRESAHA.107.148932>
- Shantsila, E., Watson, T., Lip, G.Y.H.H., 2007. Endothelial Progenitor Cells in Cardiovascular Disorders. *J. Am. Coll. Cardiol.* 49, 741–752. <https://doi.org/10.1016/j.jacc.2006.09.050>
- Shao, H., Tan, Y., Eton, D., Yang, Z., Uberti, M.G., Li, S., Schulick, A., Yu, H., 2008. Statin and Stromal Cell-Derived Factor-1 Additively Promote Angiogenesis by Enhancement of Progenitor Cells Incorporation into New Vessels. *Stem Cells* 26, 1376–1384. <https://doi.org/10.1634/stemcells.2007-0785>
- Shi, Y., Wang, Yu, Li, Q., Liu, K., Hou, J., Shao, C., Wang, Ying, 2018. Immunoregulatory mechanisms of mesenchymal stem and stromal cells in inflammatory diseases. *Nat. Rev. Nephrol.* 14, 493–507. <https://doi.org/10.1038/s41581-018-0023-5>
- Sibov, T.T., Severino, P., Marti, L.C., Pavon, L.F., Oliveira, D.M., Tobo, P.R.,

- Campos, A.H., Paes, A.T., Amaro, E., Gamarra, L.F., Moreira-Filho, C.A., 2012. Mesenchymal stem cells from umbilical cord blood: Parameters for isolation, characterization and adipogenic differentiation. *Cytotechnology* 64, 511–521. <https://doi.org/10.1007/s10616-012-9428-3>
- Song, L., Yang, Y.J., Dong, Q.T., Qian, H.Y., Gao, R.L., Qiao, S. Bin, Shen, R., He, Z.X., Lu, M.J., Zhao, S.H., Geng, Y.J., Gersh, B.J., 2013. Atorvastatin Enhance Efficacy of Mesenchymal Stem Cells Treatment for Swine Myocardial Infarction via Activation of Nitric Oxide Synthase. *PLoS One* 8, 1–12. <https://doi.org/10.1371/journal.pone.0065702>
- Sufen, G., Xianghong, Y., Yongxia, C., Qian, P., 2011. bFGF and PDGF-BB have a synergistic effect on the proliferation, migration and VEGF release of endothelial progenitor cells. *Cell Biol. Int.* 35, 545–551. <https://doi.org/10.1042/cbi20100401>
- Tian, X.Q., Yang, Y.J., Li, Q., Xu, J., Huang, P. Sen, Xiong, Y.Y., Li, X.D., Jin, C., Qi, K., Jiang, L.P., Chen, G.H., Qian, L., Liu, J., Geng, Y.J., 2019. Combined therapy with atorvastatin and atorvastatin-pretreated mesenchymal stem cells enhances cardiac performance after acute myocardial infarction by activating SDF-1/CXCR4 axis. *Am. J. Transl. Res.* 11, 4214–4231.
- Tousoulis, D., Andreou, I., Antoniadis, C., Tentolouris, C., Stefanadis, C., 2008. Role of inflammation and oxidative stress in endothelial progenitor cell function and mobilization: Therapeutic implications for cardiovascular diseases. *Atherosclerosis* 201, 236–247. <https://doi.org/10.1016/j.atherosclerosis.2008.05.034>
- Urbich, C., Dimmeler, S., 2004. Endothelial progenitor cells: Characterization and role in vascular biology. *Circ. Res.* 95, 343–353. <https://doi.org/10.1161/01.RES.0000137877.89448.78>
- Van Der Spoel, T.I.G., Jansen Of Lorkeers, S.J., Agostoni, P., Van Belle, E., Gyngysi, M., Sluijter, J.P.G., Cramer, M.J., Doevendans, P.A., Chamuleau, S.A.J., 2011. Human relevance of pre-clinical studies in stem cell therapy: Systematic review and meta-analysis of large animal models of ischaemic heart disease. *Cardiovasc. Res.* 91, 649–658. <https://doi.org/10.1093/cvr/cvr113>
- Vasa, M., Fichtlscherer, S., Adler, K., Aicher, A., Martin, H., Zeiher, A.M., Dimmeler, S., 2001. Clinical Investigation and Reports Increase in Circulating Endothelial Progenitor Cells by Statin Therapy in Patients With Stable Coronary Artery Disease. *Circulation* 2001.
- Vizoso, F., Eiro, N., Cid, S., Schneider, J., Perez-Fernandez, R., 2017. Mesenchymal Stem Cell Secretome: Toward Cell-Free Therapeutic Strategies in Regenerative Medicine. *Int. J. Mol. Sci.* 18, 1852. <https://doi.org/10.3390/ijms18091852>
- Wang, C.Y., Liu, P.Y., Liao, J.K., 2008. Pleiotropic effects of statin therapy: molecular mechanisms and clinical results. *Trends Mol. Med.* 14, 37–44. <https://doi.org/10.1016/j.molmed.2007.11.004>
- Wang, H., Yin, Y., Li, W., Zhao, X., Yu, Y., Zhu, J., Qin, Z., Wang, Q., Wang, K., Lu, W., Liu, J., Huang, L., 2012. Over-expression of PDGFR- β promotes PDGF-induced proliferation, migration, and angiogenesis of EPCs through

- PI3K/Akt signaling pathway. *PLoS One* 7.
<https://doi.org/10.1371/journal.pone.0030503>
- Wang, M., Yang, Y., Yang, D., Luo, F., Liang, W., Guo, S., Xu, J., 2009. The immunomodulatory activity of human umbilical cord blood-derived mesenchymal stem cells in vitro. *Immunology* 126, 220–232.
<https://doi.org/10.1111/j.1365-2567.2008.02891.x>
- Wu, M., Zhang, R., Zou, Q., Chen, Y., Zhou, M., Li, X., Ran, R., Chen, Q., 2018. Comparison of the Biological Characteristics of Mesenchymal Stem Cells Derived from the Human Placenta and Umbilical Cord. *Sci. Rep.* 8, 1–9.
<https://doi.org/10.1038/s41598-018-23396-1>
- Wyler von Ballmoos, M., Yang, Z., Vözlmann, J., Baumgartner, I., Kalka, C., Di Santo, S., 2010. Endothelial Progenitor Cells Induce a Phenotype Shift in Differentiated Endothelial Cells towards PDGF/PDGFR β axis-mediated angiogenesis. *PLoS One* 5, 1–10.
<https://doi.org/10.1371/journal.pone.0014107>
- Yu, H., Feng, Y., 2008. The potential of statin and stromal cell-derived factor-1 to promote angiogenesis. *Cell Adh. Migr.* 2, 254–257.
- Zhao, Y., Sun, X., Cao, W., Ma, J., Sun, L., Qian, H., Zhu, W., Xu, W., 2015. Exosomes Derived from Human Umbilical Cord Mesenchymal Stem Cells Relieve Acute Myocardial Ischemic Injury. *Stem Cells Int.* 2015.
<https://doi.org/10.1155/2015/761643>
- Zheng, H., Fu, G., Dai, T., Huang, H., 2007. Migration of Endothelial Progenitor Cells Mediated. *J. Cardiovasc. Pharmacol.* 50, 274–280.
- Zhou, L.L., Liu, W., Wu, Y.M., Sun, W.L., Dörfer, C.E., Fawzy El-Sayed, K.M., 2020. Oral Mesenchymal Stem/Progenitor Cells: The Immunomodulatory Masters. *Stem Cells Int.* 2020. <https://doi.org/10.1155/2020/1327405>