DAFTAR PUSTAKA

Abeer, M., Trajkovic, S., dan Brayden, D., 2021. Measuring the oral bioavailability of protein hydrolysates derived from food sources: A critical review of current bioassays. *Biomedicine & Pharmacotherapy*, **144**: 112275.

Alarcón, F., Moyano, F., dan Díaz-López, M., 2002. Use of SDS-page in the assessment of protein hydrolysis by fish digestive enzymes. *Aquaculture International*, **9**: 255–267.

Aldarraji, M., 2013. Antioxidant activity and total phenolic content of earthworm paste of Lumbricus rubellus (red worm) and Eudrilus eugenia (African night crawler). *Journal of Entomology and Nematology*, **5**: 33–37.

Almeida, V.M., Bezerra, M.A., Jr., Nascimento, J.C., Amorim, L.M.F., 2019. Anticancer drug screening: Standardization of in vitro wound healing assay. *J. Bras. Patol. E Med. Lab*, **55**: 606–619.

Anton, E.S., Weskamp, G., Reichardt, L.F., dan Matthew, W.D., 1994. Nerve growth factor and its low-affinity receptor promote Schwann cell migration. *Proceedings of the National Academy of Sciences*, **91**: .

Armati, P.J., 2007. *The Biology of Schwann Cells: Development, Differentiation and Immunomodulation*. Cambridge University Press, Cambridge, UK; New York.

Augustine, D., Rao, R.S., Anbu, J., dan Murthy, K.N.C., 2017. In vitro Antiproliferative Effect of Earthworm Coelomic Fluid of Eudrilus Eugeniae, Eisenia Foetida, and Perionyx Excavatus on Squamous Cell Carcinoma-9 Cell Line: A Pilot Study. *Pharmacognosy Research*, **9**: S61.

Baehaki, A., Lestari, S.D., dan Romadhoni, A.R., 2015. Protein Hydrolysis from Catfish Prepared by Papain Enzyme and Antioxidant Activity of Hydrolyzate. *Jurnal Pengolahan Hasil Perikanan Indonesia*, **18**

Bouçanova, F. dan Chrast, R., 2020. Metabolic Interaction Between Schwann Cells and Axons Under Physiological and Disease Conditions. *Frontiers in Cellular Neuroscience*, **14**: 148.

Boulton, A.J.M., Malik, R.A., Arezzo, J.C., dan Sosenko, J.M., 2004. Diabetic Somatic Neuropathies. *Diabetes Care*, **27**: 1458–1486.

Britannica, T., 2018. Editors of Encyclopaedia. "Node of Ranvier." *Encyclopedia Britannica*, diakses pada 12 September 2021, <https://www.britannica.com/science/node-of-Ranvier>

Brown, A.M., Evans, R.D., Black, J., dan Ransom, B.R., 2012. Schwann Cell Glycogen Selectively Supports Myelinated Axon Function. *Annals of neurology*, **72**: 406–418.

Cade, W.T., 2008. Diabetes-Related Microvascular and Macrovascular Diseases in the Physical Therapy Setting. *Physical Therapy*, **88**: 1322–1335.

Cao, L., Zhu, Y.-L., Su, Z., Lv, B., Huang, Z., Mu, L., dkk., 2007. Olfactory ensheathing cells promote migration of Schwann cells by secreted nerve growth factor. *Glia*, **55**: 897–904.

Cervellini, I., Galino, J., Zhu, N., Allen, S., Birchmeier, C., dan Bennett, D.L., 2018. Sustained MAPK/ERK Activation in Adult Schwann Cells Impairs Nerve Repair. *The Journal of Neuroscience*, **38**: 679–690.

Chan, J.R., Watkins, T.A., Cosgaya, J.M., Zhang, C., Chen, L., Reichardt, L.F., dkk., 2004. NGF Controls Axonal Receptivity to Myelination by Schwann Cells or Oligodendrocytes. *Neuron*, **43**: 183–191.

Chang, Y.-M., Chi, W.-Y., Lai, T.-Y., Chen, Y.-S., Tsai, F.-J., Tsai, C.-H., dkk., 2011a. Dilong: Role in Peripheral Nerve Regeneration. *Evidence-Based Complementary and Alternative Medicine*, **2011**: 1–9.

Chang, Y.-M., Kuo, W.-H., Lai, T.-Y., Shih, Y.-T., Tsai, F.-J., Tsai, C.-H., dkk., 2011b. RSC96 Schwann Cell Proliferation and Survival Induced by Dilong through PI3K/Akt Signaling Mediated by IGF-I. *Evidence-Based Complementary and Alternative Medicine*, **2011**: 1–9.

Chang, Y.-M., Shih, Y.-T., Chen, Y.-S., Liu, C.-L., Fang, W.-K., Tsai, C.-H., dkk., 2011c. Schwann Cell Migration Induced by Earthworm Extract via Activation of PAs and MMP2/9 Mediated through ERK1/2 and p38. *Evidence-Based Complementary and Alternative Medicine*, **2011**: 1–12.

Chawla, A., Chawla, R., dan Jaggi, S., 2016. Microvasular and macrovascular complications in diabetes mellitus: Distinct or continuum? *Indian Journal of Endocrinology and Metabolism*, **20**: 546.

Cheng, Y.-C., Chu, L.-W., Chen, J.-Y., Hsieh, S.-L., Chang, Y.-C., Dai, Z.-K., dkk., 2020. Loganin Attenuates High Glucose-Induced Schwann Cells Pyroptosis by Inhibiting ROS Generation and NLRP3 Inflammasome Activation. *Cells*, **9**: 1948.

Cornejo, M., Nambi, D., Walheim, C., Somerville, M., Walker, J., Kim, L., dkk., 2010. Effect of NRG1, GDNF, EGF and NGF in the migration of a Schwann cell precursor line. *Neurochemical Research*, **35**: 1643–1651.

Csapá, J., Csapó-Kiss, Z., Wágner, L., Tálos, T., Martin, T.G., Folestad, S., dkk., 1997. Hydrolysis of proteins performed at high temperatures and for short times with reduced racemization, in order to determine the enantiomers of d- and l-amino acids. *Analytica Chimica Acta*, **339**: 99–107.

Dewanjee, S., Das, S., Das, A.K., Bhattacharjee, N., Dihingia, A., Dua, T.K., dkk., 2018. Molecular mechanism of diabetic neuropathy and its pharmacotherapeutic targets. *European Journal of Pharmacology*, **833**: 472–523.

Dey, I., Midha, N., Singh, G., Forsyth, A., Walsh, S.K., Singh, B., Kumar, R., Toth, C., Midha, R., 2013. Diabetic Schwann cells suffer from nerve growth factor and neurotrophin-3 underproduction and poor associability with axons. *Glia*, **61**:1990–1999.

Ding, W.-L., 2012. High glucose levels increase the expression of neurotrophic factors associated with p-p42/p44 MAPK in Schwann cells in vitro. *Molecular Medicine Reports*, .

Emery, B., 2013. Playing the Field: Sox10 Recruits Different Partners to Drive Central and Peripheral Myelination. *PLoS Genetics*, **9**: e1003918.

Fang, W.-K., Ko, F.-Y., Wang, H.L., Kuo, C.-H., Chen, L.-M., Tsai, F.-J., dkk., 2009. The Proliferation and Migration Effects of Huangqi on RSC96 Schwann Cells. *The American Journal of Chinese Medicine*, **37**: 945–959.

Giacco, F. dan Brownlee, M., 2010. Oxidative stress and diabetic complications. *Circulation research*, **107**: 1058–1070.

Gonçalves, N.P., Vægter, C.B., Andersen, H., Østergaard, L., Calcutt, N.A., dan Jensen, T.S., 2017. Schwann cell interactions with axons and microvessels in diabetic neuropathy. *Nature Reviews Neurology*, **13**: 135–147.

Grdisa, M., Popovic, M., dan Hrzenjak, T., 2004. Stimulation of growth factor synthesis in skin wounds using tissue extract (G-90) from the earthwormEissenia foetida. *Cell Biochemistry and Function*, **22**: 373–378.

Gumy, L.F., Bampton, E.T.W., dan Tolkovsky, A.M., 2008. Hyperglycaemia inhibits Schwann cell proliferation and migration and restricts regeneration of axons and Schwann cells from adult murine DRG. *Molecular and Cellular Neuroscience*, **37**: 298–311.

Han, J., Tan, P., Li, Z., Wu, Y., Li, C., Wang, Y., dkk., 2014. Fuzi Attenuates Diabetic Neuropathy in Rats and Protects Schwann Cells from Apoptosis Induced by High Glucose. *PLOS ONE*, **9**: e86539.

Hao, W., Tashiro, S., Hasegawa, T., Sato, Y., Kobayashi, T., Tando, T., dkk., 2015. Hyperglycemia Promotes Schwann Cell De-differentiation and De-myelination via Sorbitol Accumulation and Igf1 Protein Down-regulation. *Journal of Biological Chemistry*, **290**: 17106–17115.

Hidayat, N., Nugrahany, Y.D., Permatasari, V.R., dan Nurika, I., 2021. Optimization of dissolved proteins in extracts of earthworm (Lumbricus rubellus) with factor adding concentration of papain enzyme and earthworms. *IOP Conference Series: Earth and Environmental Science*, **924**: 012076.

Hu, J., Piao, F., Schaffer, S.W., Idrissi, A.E., dan Wu, J.-Y., 2019. *Taurine 11*. Springer Nature.

IDF, 2019. IDF DIABETES ATLAS (9th ed.). BELGIUM: International Diabetes federation. Diakses pada 1 September 2021, <https://www.diabetesatlas.org/en/resources/>

Jessen, K.R., Mirsky, R., dan Lloyd, A.C., 2015. Schwann Cells: Development and Role in Nerve Repair. *Cold Spring Harbor Perspectives in Biology*, **7**: a020487.

Jiang, Z., Bian, M., Wu, J., Li, D., Ding, L., dan Zeng, Q., 2020. Oltipraz Prevents High Glucose-Induced Oxidative Stress and Apoptosis in RSC96 Cells through the Nrf2/NQO1 Signalling Pathway. *BioMed Research International*, **2020**: 1–8.

Jiang, Z., Bian, M., Wu, J., Li, D., Ding, L., dan Zeng, Q., 2020. Oltipraz Prevents High Glucose-Induced Oxidative Stress and Apoptosis in RSC96 Cells through the Nrf2/NQO1 Signalling Pathway. *BioMed Research International*, **2020**: 1–8.

Jung, J., Ryu, S., Ki, I.A., Woo, H.A., dan Lee, K., 2018. Some Biological Consequences of the Inhibition of Na,K-ATPase by Translationally Controlled Tumor Protein (TCTP). *International Journal of Molecular Sciences*, **19**: 1657.

Karsono, A.H., Tjandrawinata, R.R., dan Suhartono, M.T., 2018. *Lumbricus rubellus* Protein Fraction DLBS1033N Increases Nerve Growth Factor Expression via Tyrosine Kinase Activation. *American Journal of Biochemistry and Biotechnology*, **14**: 29–38.

Krishnan, A., 2013. Neuregulin-1 Type I: A Hidden Power Within Schwann Cells or Triggering Peripheral Nerve Remyelination. *Science Signaling*, **6**

Kruger, N., 2002. The Bradford Method For Protein Quantitation. hal. 15–21.

Latorres, J.M., Rios, D.G., Saggiomo, G., Wasielesky, W., dan Prentice-Hernandez, C., 2018. Functional and antioxidant properties of protein hydrolysates obtained from white shrimp (Litopenaeus vannamei). *Journal of Food Science and Technology*, **55**: 721–729.

Le, N., 2021. Optimization of SDS PAGE Analysis of Parvalbumin Protein in Fish **1**: 84–95.

Li, R., Li, D., Zhang, H., Wang, J., Li, X., dan Xiao, J., 2020. Growth factors-based therapeutic strategies and their underlying signaling mechanisms for peripheral nerve regeneration. *Acta Pharmacologica Sinica*, **41**: 1289–1300.

Li, R., Ma, J., Wu, Y., Nangle, M., Zou, S., Li, Y., dkk., 2017. Dual Delivery of NGF and bFGF Coacervater Ameliorates Diabetic Peripheral Neuropathy via Inhibiting Schwann Cells Apoptosis. *International Journal of Biological Sciences*, **13**: 640–651.

Liang, C.-C., Park, A.Y., dan Guan, J.-L., 2007. In vitro scratch assay: a convenient and inexpensive method for analysis of cell migration in vitro. Nature Protocols, 2: 329–333.

Liu, D., Liang, X., dan Zhang, H., 2016. Effects of High Glucose on Cell Viability and Differentiation in Primary Cultured Schwann Cells: Potential Role of ERK Signaling Pathway. *Neurochemical Research*, **41**: 1281–1290.

Liu, F., Chen, Y., Zhao, S., Li, M., Luo, F., dan Tang, C., 2021. Insulin Receptor Substrate p53 Ameliorates High-Glucose-Induced Activation of NF-κB and Impaired Mobility of HUVECs. *BioMed Research International*, **2021**: e3210586.

Liu, Y., Shao, S., dan Guo, H., 2020. Schwann cells apoptosis is induced by high glucose in diabetic peripheral neuropathy. *Life Sciences*, **248**: 117459.

Lv, J., Sun, X., Ma, J., Ma, X., Zhang, Y., Li, F., dkk., 2015. Netrin-1 induces the migration of Schwann cells via p38 MAPK and PI3K-Akt signaling pathway mediated by the UNC5B receptor. *Biochemical and Biophysical Research Communications*, **464**: 263–268.

M.A., A., D., K., Liew, P.S., M., S.M., dan Sarbon, N.M., 2019. Effect of heat treatment and enzymatic protein hydrolysis on the degree ofhydrolysis and physicochemical properties of edible bird's nest. *Food Research*, 664–677.

Maffei, A., Lembo, G., dan Carnevale, D., 2018. PI3Kinases in Diabetes Mellitus and Its Related Complications. *International Journal of Molecular Sciences*, **19**: 4098.

Manole, E., Bastian, A.E., Oproiu, A.M., Neagu, M.T., Constantin, C., dan Isvoranu, G., 2020. *Schwann Cell Plasticity in Peripheral Nerve Regeneration after Injury*. IntechOpen.

Mazumder, S., DuPree, E.L., dan Almasan, A., 2004. A Dual Role of Cyclin E in Cell Proliferation and Apotosis May Provide a Target for Cancer Therapy. *Current cancer drug targets*, **4**: 65–75.

Mizisin, A.P., 2014. Mechanisms of diabetic neuropathy, dalam: *Handbook of Clinical Neurology*. Elsevier, hal. 401–428.

Ogata, T., 2004. Opposing Extracellular Signal-Regulated Kinase and Akt Pathways Control Schwann Cell Myelination. *Journal of Neuroscience*, **24**: 6724–6732.

Palungkun, R., 2010, *Usaha Ternak Cacing Tanah Lumbricus rubellus*, Penebar Swadaya, Jakarta, Indonesia.

Park, Joong Hyun, Park, Jae Hyeon, dan Won, J.C., 2019. Associations of nerve conduction study variables with clinical symptom scores in patients with type 2 diabetes. *Annals of Clinical Neurophysiology*, **21**: 36–43.

Park, K., Shin, Y., Lee, G., Park, H., dan Choi, Y., 2021. Dabrafenib Promotes Schwann Cell Differentiation by Inhibition of the MEK-ERK Pathway. *Molecules*, **26**: 2141.

Parkinson, D.B., Bhaskaran, A., Arthur-Farraj, P., Noon, L.A., Woodhoo, A., Lloyd, A.C., dkk., 2008. c-Jun is a negative regulator of myelination. *The Journal of Cell Biology*, **181**: 625–637.

Pereira, J.A., Lebrun-Julien, F., dan Suter, U., 2012. Molecular mechanisms regulating myelination in the peripheral nervous system. *Trends in Neurosciences*, **35**: 123–134.

Pittenger, G. dan Vinik, A., 2003. Nerve Growth Factor and Diabetic Neuropathy **4**: 271–285.

Pop-Busui, R., Boulton, A.J.M., Feldman, E.L., Bril, V., Freeman, R., Malik, R.A., dkk., 2017. Diabetic Neuropathy: A Position Statement by the American Diabetes Association. *Diabetes Care*, **40**: 136–154.

Promega, 2012. CellTiter 96® Aqueous One Solution Cell Proliferation Assay (MTS), Diakses pada 10 September 2021, <https://worldwide.promega.com/products/cell-health-assays/cell-viability-and-cytotoxicity-assays/>

Rodrigues, M., Carlesso, W.M., Kuhn, D., Altmayer, T., Martini, M.C., Tamiosso, C.D., dkk., 2017. Enzymatic hydrolysis of the *Eisenia andrei* earthworm: Characterization and evaluation of its properties. *Biocatalysis and Biotransformation*, **35**: 110–119.

Said, G., 2007. Diabetic neuropathy—a review. *Nature Clinical Practice Neurology*, **3**: 331–340.

Salzer, J.L., 2015. Schwann Cell Myelination. *Cold Spring Harbor Perspectives in Biology*, **7**: a020529.

Sango, K. dan Yamauchi, J. (Editor), 2014. *Schwann Cell Development and Pathology*. Springer Japan, Tokyo.

Sango, K., Yamauchi, J., Ogata, T., dan Susuki, K. (Editor), 2019. *Myelin: Basic and Clinical Advances*, Advances in Experimental Medicine and Biology. Springer Singapore, Singapore.

Schreiber, A.K., 2015. Diabetic neuropathic pain: Physiopathology and treatment. *World Journal of Diabetes*, **6**: 432.

Sun, Z. dan Jiang, H., 2017. *Nutritive Evaluation of Earthworms as Human Food*, Future Foods. IntechOpen.

Takaku, S., Tsukamoto, M., Niimi, N., Yako, H., dan Sango, K., 2021. Exendin-4 Promotes Schwann Cell Survival/Migration and Myelination In Vitro. *International Journal of Molecular Sciences*, **22**: 2971.

Takaku, S., Tsukamoto, M., Niimi, N., Yako, H., dan Sango, K., 2021. Exendin-4 Promotes Schwann Cell Survival/Migration and Myelination In Vitro. *International Journal of Molecular Sciences*, **22**: 2971.

Taveggia, C., 2016. Schwann cells–axon interaction in myelination. *Current Opinion in Neurobiology*, **39**: 24–29.

Tiong, Y.L., Ng, K.Y., Koh, R.Y., Ponnudurai, G., dan Chye, S.M., 2019. Melatonin Prevents Oxidative Stress-Induced Mitochondrial Dysfunction

and Apoptosis in High Glucose-Treated Schwann Cells via Upregulation of Bcl2, NF-κB, mTOR, Wnt Signalling Pathways. *Antioxidants*, **8**: 198.

Topilko, P., Schneider-Maunoury, S., Levi, G., Baron-Van Evercooren, A., Chennoufi, A.B.Y., Seitanidou, T., dkk., 1994. Krox-20 controls myelination in the peripheral nervous system. *Nature*, **371**: 796–799.

Tosaki, T., Kamiya, H., Yasuda, Y., Naruse, K., Kato, K., Kozakae, M., dkk., 2008. Reduced NGF secretion by Schwann cells under the high glucose condition decreases neurite outgrowth of DRG neurons. *Experimental Neurology*, **213**: 381–387.

Trisina, J., F. Sunardi, M.T. Suhartono and R.R. Tjandrawinata, 2011. DLBS1033, a protein extract from Lumbricus rubellus, possesses antithrombotic and thrombolytic activities. *J. Biomed. Biotechnol.*, 2017: 1-17.

Vasko, R., Koziolek, M., Ikehata, M., Rastaldi, M.P., Jung, K., Schmid, H., dkk., 2009. Role of basic fibroblast growth factor (FGF-2) in diabetic nephropathy and mechanisms of its induction by hyperglycemia in human renal fibroblasts. *American Journal of Physiology-Renal Physiology*, **296**: F1452–F1463.

Wang, H., Qu, F., Xin, T., Sun, W., He, H., dan Du, L., 2021. Ginsenoside Compound K Promotes Proliferation, Migration and Differentiation of Schwann Cells via the Activation of MEK/ERK1/2 and PI3K/AKT Pathways. *Neurochemical Research*, **46**: 1400–1409.

Wang, W., Hao, Y., dan Li, F., 2019. Notoginsenoside R1 alleviates high glucose-evoked damage in RSC96 cells through down-regulation of miR-503. *Artificial Cells, Nanomedicine, and Biotechnology*, **47**: 3947–3954.

Wang, Y., Teng, H.-L., dan Huang, Z., 2012. Intrinsic Migratory Properties of Cultured Schwann Cells Based on Single-Cell Migration Assay. *PLoS ONE*, **7**: e51824.

Wang, Y., Zhang, W., dan Ouyang, Z., 2020. Fast protein analysis enabled by high-temperature hydrolysis. *Chemical Science*, **11**: 10506–10516.

Werner, H., dan Nave, K.-A. (n.d.). Glial Cells and Myelination. *Encyclopedic Reference of Genomics and Proteomics in Molecular Medicine*, 699–701.

Wisuthiphaet, N., Kongruang, S., dan Chamcheun, C., 2015. Production of Fish Protein Hydrolysates by Acid and Enzymatic Hydrolysis. *Journal of Medical and Bioengineering*, **4**: 466–470.

Wu, Y., Xue, B., Li, X., dan Liu, H., 2012. Puerarin prevents high glucose-induced apoptosis of Schwann cells by inhibiting oxidative stress. *Neural Regeneration Research.*, **7**: 2583–2591.

Xiaogang, L., Zhe, Z., Rui, W., Xinxin, X., Yonghui, L., dan Lianqing, S., 2017. Ginsenoside Rb1 prevents high glucose-induced Schwann cell injury through the mitochondrial apoptosis pathway. *Journal of Traditional Chinese Medicine*, **37**: 746–755.

Xu, C., Hou, B., He, P., Ma, P., Yang, Xinyu, Yang, Xiuying, dkk., 2020. Neuroprotective Effect of Salvianolic Acid A against Diabetic Peripheral Neuropathy through Modulation of Nrf2. *Oxidative Medicine and Cellular Longevity*, **2020**: 1–22.

Yan, L.-J., 2014. Pathogenesis of Chronic Hyperglycemia: From Reductive Stress to Oxidative Stress. *Journal of Diabetes Research*, **2014**: 137919.

Yang, K., Hitomi, M., dan Stacey, D.W., 2006. Variations in cyclin D1 levels through the cell cycle determine the proliferative fate of a cell. *Cell Division*, **1**: 32.

Yang, X., Yao, W., Liu, H., Gao, Y., Liu, R., dan Xu, L., 2017. Tangluoning, a traditional Chinese medicine, attenuates in vivo and in vitro diabetic peripheral neuropathy through modulation of PERK/Nrf2 pathway. *Scientific Reports*, **7**: 1014.

Young, T.K, Mustard, C.A., 2001. Undiagnosed diabetes: does it matter?. *CMAJ*, **164**: 24-28.

Zenker, J., Ziegler, D., dan Chrast, R., 2013. Novel pathogenic pathways in diabetic neuropathy. *Trends in Neurosciences*, **36**: 439–449.

Zhang, L., Yu, C., Vasquez, F.E., Galeva, N., Onyango, I., Swerdlow, R.H., dkk., 2010. Hyperglycemia Alters the Schwann Cell Mitochondrial Proteome and Decreases Coupled Respiration in the Absence of Superoxide Production. *Journal of Proteome Research*, **9**: 458–471.

Zhang, L., Zhou, F., dan ten Dijke, P., 2013. Signaling interplay between transforming growth factor-β receptor and PI3K/AKT pathways in cancer. *Trends in Biochemical Sciences*, **38**: 612–620.

Zhao, Y.-G., Li, H., Xu, W., Luo, J., dan Xu, R.-A., 2010. An Overview of the Fibrinolytic Enzyme from Earth-worm: An Overview of the Fibrinolytic Enzyme from Earth-worm. *Chinese Journal of Natural Medicines*, **8**: 301–308.