

DAFTAR PUSTAKA

- Ahmad, R., Ali, A.M., Israf, D.A., Ismail, N.H., Shaari, K., Lajis, N.H., 2005. Antioxidant, radical-scavenging, anti-inflammatory, cytotoxic and antibacterial activities of methanolic extracts of some *Hedyotis species*. *Life Sci.* 76, 1953–1964.
- Alam, Z. I., Jenner, A., Daniel, S.E., Lees, A.J., Cairns, N., Marsden, C.D., Jenner, P., Halliwell, B. 1997. Oxidative DNA damage in the parkinsonian brain: an apparent selective increase in 8-hydroxyguanine levels in substantia nigra. *J. Neurochem.* 69, 1196–1203.
- Anbarasu K, Vijayalakshmi G. 2007. Improved shelf life of protein rich tofu using *Ocimum sanctum* (tulsi) extracts to benefit Indian rural population. *J Food Sci.* 72, M300-05.
- Bader, S., Klein, J., Diener, M., 2014. Choline acetyltransferase and organic cation transporters are responsible for synthesis and propionate-induced release of acetylcholine in colon epithelium. *Eur. J. Pharmacol.* 733, 23–33.
- Barnham, K.J., Masters, C.L., Bush, A.I., 2004. Neurodegenerative diseases and oxidative stress. *Nat. Rev. Drug Discov.* 3, 205–214.
- Blasco, M.A., Partridge, L., Serrano, M., Kroemer, G., Lo, C., 2013. Review The Hallmarks of Aging. *Cell.* 153, 1194–1217.
- Butterfield, D.A., Castegna, A., Lauderback, C.M., Drake, J., 2002. Evidence that amyloid beta-peptide-induced lipid peroxidation and its sequelae in Alzheimer's disease brain contribute to neuronal death. *Neurobiol. Aging.* 23, 655–64.
- Corvino, V., Marchese, E., Michetti, F., Geloso, M.C., 2013. Neuroprotective strategies in hippocampal neurodegeneration induced by the neurotoxicant trimethyltin. *Neurochem. Res.* 38, 240–253.
- Dubey, K., Anand, B.G., Shekhawat, D.S., Kar, K., 2017. Eugenol prevents amyloid formation of proteins and inhibits amyloid-induced hemolysis. *Sci. Rep.* 7, 40744.
- Ferrari, C. K. B. 2000. Free radicals, lipid peroxidation and antioxidants in apoptosis: implications in cancer, cardiovascular and neurological diseases. *Biologia.* 55, 581–590.
- ferreira-vieira, T.H., Guimaraes, I. M., Silva, F.R., dan Ribeiro, F. M. 2016. Alzheimer's Disease: Targetting the cholinergic system. *Curr. Neuropharmacol.* 14, 101-115
- Fiedorowicz, A., Figiel, I., Kamińska, B., Zaremba, M., Wilk, S., Oderfeld-Nowak, B., 2001. Dentate granule neuron apoptosis and glia activation in murine hippocampus induced by trimethyltin exposure. *Brain Res.* 912, 116–27.

- Friedlander, R.M., 2003. Apoptosis and Caspases in Neurodegenerative Diseases. *N. Engl. J. Med.* 348, 1365–1375.
- Gabbita, S.P., Lovell, M.A., Markesbery, W.R., 1998. Increased nuclear DNA oxidation in the brain in Alzheimer's disease. *J. Neurochem.* 71, 2034–40.
- Geloso, M.C., Corvino, V., Michetti, F., 2011. Trimethyltin-induced hippocampal degeneration as a tool to investigate neurodegenerative processes. *Neurochem. Int.* 58, 729–738.
- Geetha, R.K., Vasudevan, D.M. 2004. Inhibition of lipid peroxidation by botanical extract of *Ocimum sanctum*: *in vivo* and *in vitro* studies. *Life Sci.* 76 (1), 21–28.
- Gorman, A.M., 2008. Neuronal cell death in neurodegenerative diseases : recurring themes around protein handling. *J. Cell. Mol. Med.* 12, 2263–2280.
- Gunasekar, P., Li, L., Prabhakaran, K., Eybl, V., Borowitz, J.L., Isom, G.E., 2001. Mechanisms of the Apoptotic and Necrotic Actions of Trimethyltin in Cerebellar Granule Cells. *Toxicol. Sci.* 64, 83–89.
- Halliwell, B., 2012. Free radicals and antioxidants: updating a personal view. *Nutr. Rev.* 70, 257–265.
- Harry, G.J., Sills, R., Schlosser, M.J., Maier, W.E., 2001. Neurodegeneration and glia response in rat hippocampus following nitro-L-arginine methyl ester (L-NAME). *Neurotox. Res.* 3, 307–19.
- Hussmann, G.P., Yasuda, R.P., Xiao, Y., Wolfe, B.B., Kellar, K.J., 2011. Endogenously expressed muscarinic receptors in HEK293 cells augment up-regulation of stably expressed $\alpha 4\beta 2$ nicotinic receptors. *J. Biol. Chem.* 286, 39726–39737.
- Ishikawa, K., Kubo, T., Shibanoki, S., Matsumoto, A., Hata, H., Asai, S., 1997. Hippocampal degeneration inducing impairment of learning in rats: model of dementia? *Behav. Brain Res.* 83, 39–44.
- Ishrat, T., Khan, M.B., Hoda, M.N., Yousuf, S., Ahmad, M., Ansari, M.A., Ahmad, A.S., Islam, F., 2006. Coenzyme Q10 modulates cognitive impairment against intracerebroventricular injection of streptozotocin in rats. *Behav. Brain Res.* 171, 9–16.
- Jenkins, S.M., Barone, S., 2004. The neurotoxicant trimethyltin induces apoptosis via caspase activation , p38 protein kinase , and oxidative stress in PC12 cells. *Toxicol. Lett.* 147, 63–72.
- Jimenez-Del-Rio, M., Velez-Pardo, C. 2012. The bad, the good, and the ugly about oxidative stress. *Oxid. Med. Cell. Longev.* 163913, 13.
- Joshi, H., Parle, M., 2006. Evaluation of nootropic potential of *Ocimum sanctum* Linn. in mice. *Indian J. Exp. Biol.* 44, 133–136.

- Kása, P., Rakonczay, Z., Gulya, K., 1997. The cholinergic system in Alzheimer's disease. *Prog. Neurobiol.* 52, 511–535.
- Kim, D.J., Kim, Y.S., 2016. Magnolol protects against trimethyltin-induced neuronal damage and glial activation *in vitro* and *in vivo*. *Neurotox.* 53, 173–185.
- Koh, E.-J., Seo, Y.-J., Choi, J., Lee, H.Y., Kang, D.-H., Kim, K.-J., Lee, B.-Y., 2017. Spirulina maxima extract prevents neurotoxicity via promoting activation of BDNF/CREB signaling pathways in neuronal cells and mice. *Molecules.* 22, 1363.
- Kovesdi, I., Hedley, S.J., 2010. Adenoviral producer cells. *Viruses.* 2, 1681–1703.
- Kusindarta, D.L., Wihadmadyatami, H., Haryanto, A., 2016. *Ocimum sanctum* Linn. stimulate the expression of choline acetyltransferase on the human cerebral microvascular endothelial cells. *Vet. World.* 9, 1348–1354.
- Kusindarta, D.L., Wihadmadyatami, H., Jadi, A.R., Karnati, S., Lochnit, G., Hening, P., Haryanto, A., Auriva, M.B., Purwaningrum, M., 2018. Ethanolic extract *Ocimum sanctum* . Enhances cognitive ability from young adulthood to middle aged mediated by increasing choline acetyl transferase activity in rat model. *Res. Vet. Sci.* 118, 431–438.
- Lin, Y.-C., Boone, M., Meuris, L., Lemmens, I., Roy, N. Van, Soete, A., Reumers, J., Moisse, M., Plaisance, S., Drmanac, R., Chen, J., Speleman, F., Lambrechts, D., Peer, Y. Van de, Tavernier, J., Callewaert, N., 2014. Genome dynamics of the human embryonic kidney 293 lineage in response to cell biology manipulations. *Nat. Commun.* 5, 4767.
- Lips, K.S., Lührmann, A., Tschernig, T., Stoeger, T., Alessandrini, F., Grau, V., Haberberger, R. V., Koepsell, H., Pabst, R., Kummer, W., 2007. Down-regulation of the non-neuronal acetylcholine synthesis and release machinery in acute allergic airway inflammation of rat and mouse. *Life Sci.* 80, 2263–2269.
- Mansouri, M.T., Farbood, Y., Sameri, M.J., Sarkaki, A., Naghizadeh, B., Rafeirad, M., 2013. Neuroprotective effects of oral gallic acid against oxidative stress induced by 6-hydroxydopamine in rats. *Food Chem.* 138, 1028–1033.
- Martín, S., González-Burgos, E., Carretero, M.E., Gómez-Serranillos, M.P., 2011. Neuroprotective properties of Spanish red wine and its isolated polyphenols on astrocytes. *Food Chem.* 128, 40–48.
- Mattson, M.P., 2000. Apoptosis in Neurodegenerative Disorders. *Nat. Rev. Mol. Cell Biol.* 1, 120–129.
- Mattson, M.P., Chan, S.L., Duan, W., 2002. Modification of Brain Aging and Neurodegenerative Disorders by Genes, Diet, and Behavior. *Physiol. Rev.* 82, 637–672.

- Maurice, T., Phan, V.-L., Noda, Y., Yamada, K., Privat, A., Nabeshima, T., 1999. The attenuation of learning impairments induced after exposure to CO or trimethyltin in mice by sigma (σ) receptor ligands involves both σ_1 and σ_2 sites. *Br. J. Pharmacol.* 127, 335–342.
- Morita, M., Imai, H., Liu, Y., Xu, X., Sadamatsu, M., Nakagami, R., Shirakawa, T., Nakano, K., Kita, Y., Yoshida, K., Tsunashima, K., Kato, N., 2008. FK506-protective effects against trimethyltin neurotoxicity in rats: Hippocampal expression analyses reveal the involvement of periarterial osteopontin. *Neurosci.* 153, 1135–1145.
- Mundy, W., Freudenrich, T., 2006. Apoptosis of cerebellar granule cells induced by organotin compounds found in drinking water: Involvement of MAP kinases. *Neurotox.* 27, 71–81.
- Nieoullon, A., 2011. Neurodegenerative diseases and neuroprotection: current views and prospects. *J. Appl. Biomed.* 9, 173–183.
- Nikam, S., Nikam, P., Ahaley, S.K., Sontakke, A. V, 2009. Oxidative stress in Parkinson's disease. *Indian J. Clin. Biochem.* 24, 98–101.
- Nunes-Tavares, N., Santos, L.E., Stutz, B., Brito-Moreira, J., Klein, W.L., Ferreira, S.T., De Mello, F.G., 2012. Inhibition of choline acetyltransferase as a mechanism for cholinergic dysfunction induced by amyloid-?? peptide oligomers. *J. Biol. Chem.* 287, 19377–19385.
- Oda, Y., 1999. Choline acetyltransferase: The structure, distribution and pathologic changes in the central nervous system. *Pathol. Int.* 49, 921–937.
- Ono, K., Hasegawa, K., Naiki, H., Yamada, M., 2004. Curcumin has potent anti-amyloidogenic effects for Alzheimer's beta-amyloid fibrils *in vitro*. *J. Neurosci. Res.* 75, 742–750.
- Park, D., Yang, Y., Kwon, D., Hee, S., Yang, G., Kyung, J., Kim, D., Choi, E., Won, S., Hyung, G., Tae, J., Choi, K., Jun, H., Kim, S.U., Kim, Y., 2013. Neurobiology of Aging Improvement of cognitive function and physical activity of aging mice by human neural stem cells over-expressing choline acetyltransferase. *Neurobiol. Aging* 1–8.
- Pattanayak, P., Behera, P., Das, D., Panda, S., 2010. *Ocimum sanctum* Linn. A reservoir plant for therapeutic applications: An overview. *Pharmacogn. Rev.* 4, 95.
- Pedersen, W.A., Fu, W., Keller, J.N., Markesbery, W.R., Appel, S., Smith, R.G., Kasarskis, E., Mattson, M.P., 1998. Protein modification by the lipid peroxidation product 4-hydroxynonenal in the spinal cords of amyotrophic lateral sclerosis patients. *Ann. Neurol.* 44, 819–824.
- Qing, Y., Liang, Y., Du, Q., Fan, P., Xu, H., Xu, Y., Shi, N., 2013. Apoptosis induced by Trimethyltin chloride in human neuroblastoma cells SY5Y is regulated by a balance and cross-talk between NF- κ B and MAPKs signaling

pathways. *Arch. Toxicol.* 87, 1273–1285.

- Ramesh, B., Satakopan, V.N., 2010. Antioxidant activities of hydroalcoholic extract of *ocimum sanctum* against cadmium induced toxicity in rats. *Indian J. Clin. Biochem.* 25, 307–310.
- Resende, R.R., Adhikari, A., 2009. Cholinergic receptor pathways involved in apoptosis, cell proliferation and neuronal differentiation. *Cell Commun. Signal.* 7, 20.
- Russell, W.C., Graham, F.L., Smiley, J., Nairn, R., 1977. Characteristics of a Human Cell Line Transformed by DNA from Human Adenovirus Type 5. *J. Gen. Virol.* 36, 59–72.
- Said, M.M., Rabo, M.M.A., 2017. Neuroprotective effects of eugenol against aluminium-induced toxicity in the rat brain. *Arh. Hig. Rada Toksikol.* 68, 27–37.
- Schirmer, S., 2011. Expression profile of components of the acetylcholine - system in rat testicular tissue and function in non - germ cell populations. *Reproduction Online.* 142, 157-166.
- Schliebs, R., Arendt, T., 2011. The cholinergic system in aging and neuronal degeneration. *Behav. Brain Res.* 221, 555–563.
- Selley, M.L., Close, D.R., Stern, S.E., 2002. The effect of increased concentrations of homocysteine on the concentration of (E)-4-hydroxy-2-nonenal in the plasma and cerebrospinal fluid of patients with Alzheimer's disease. *Neurobiol. Aging.* 23, 383–8.
- Shaw, G., Morse, S., Ararat, M., Graham, F.L., 2002. Preferential transformation of human neuronal cells by human adenoviruses and the origin of HEK 293 cells. *FASEB J. Off. Publ. Fed. Am. Soc. Exp. Biol.* 16, 869–871.
- Shin, E.-J., Suh, S.K., Lim, Y.K., Jhoo, W.-K., Hjelle, O.P., Ottersen, O.P., Shin, C.Y., Ko, K.H., Kim, W.-K., Kim, D.S., Chun, W., Ali, S., Kim, H.-C., 2005. Ascorbate attenuates trimethyltin-induced oxidative burden and neuronal degeneration in the rat hippocampus by maintaining glutathione homeostasis. *Neurosci.* 133, 715–727.
- Shuto, M., Seko, K., Kuramoto, N., Sugiyama, C., Kawada, K., Yoneyama, M., Nagashima, R., Ogita, K., 2009. Activation of c-Jun N-terminal kinase cascades is involved in part of the neuronal degeneration induced by trimethyltin in cortical neurons of mice. *J. Pharmacol. Sci.* 109, 60–70.
- Sisakhtnezhad, S., Heidari, M., Bidmeshkipour, A., 2018. Eugenol enhances proliferation and migration of mouse bone marrow-derived mesenchymal stem cells *in vitro*. *Environ. Toxicol. Pharmacol.* 57, 166–174.
- Tata, A.M., Angelo, C.D., Tata, A.M., Velluto, L., Angelo, C.D., Reale, M., 2014. Cholinergic System Dysfunction and Neurodegenerative Diseases: Cause or

Effect? *CNS Neurol. Disord. - Drug Targets*. 13, 000–000.

- Terry Jr, A.V., Buccafusco, J.J., 2003. The Cholinergic Hypothesis of Age and Alzheimer's Disease- Related Cognitive Deficits: Recent Challenges and Their Implications for Novel Drug Development. *J. Pharmacol. Exp. Ther.* 306, 821–827.
- Thomas, P., Smart, T.G., 2005. HEK293 cell line: A vehicle for the expression of recombinant proteins. *J. Pharmacol. Toxicol. Methods*. 51, 187–200.
- Thompson, T.A., Lewis, J.M., Dejneka, N.S., Severs, W.B., Polavarapu, R., Billingsley, M.L., 1996. Induction of apoptosis by organotin compounds *in vitro*: neuronal protection with antisense oligonucleotides directed against stannin. *J. Pharmacol. Exp. Ther.* 276, 1201–16.
- USDA. 2013. Classification for Kingdom Plantae Down to Genus *Ocimum* L. United States Departement of Agriculture. <http://plants.usda.gov/java/ClassificationServlet?source=display&classid=OCIMU> (diakses 7 Agustus 2017).
- Venuprasad, M.P., Kandikattu, H.K., Khanum, F., 2013. Neuroprotective Effects of Hydroalcoholic Extract of *Ocimum sanctum* Against H₂O₂ Induced Neuronal Cell Damage in SH-SY5Y Cells via Its Antioxidative Defence Mechanism. *Neurochem Res*. 38, 2190–2200.
- Venuprasad, M.P., Kumar, H., Razack, S., Amruta, N., Khanum, F., 2017. Chemical composition of *Ocimum sanctum* by LC-ESI – MS / MS analysis and its protective effects against smoke induced lung and neuronal tissue damage in rats. *Biomed. Pharmacother.* 91, 1–12.
- Vijayaraghavan, S., Karami, A., Aeinehband, S., Behbahani, H., Grandien, A., 2013. Regulated Extracellular Choline Acetyltransferase Activity — The Plausible Missing Link of the Distant Action of Acetylcholine in the Cholinergic Anti-Inflammatory Pathway. *PLoS One*. 8, e65936.
- Viviani, B., Corsini, E., Pesenti, M., Galli, C.L., Marinovich, M., 2001. Trimethyltin-Activated Cyclooxygenase Stimulates Tumor Necrosis Factor- α Release from Glial Cells through Reactive Oxygen Species. *Toxicol. Appl. Pharmacol.* 172, 93–97.
- WHO. 2002. WHO Monographs on Selected Medicinal Plants. Volume 2. World Health Organization, Geneva.
- Winblad, B., 2004. Mild cognitive impairment—beyond controversies, toward a consensus: report of the National Working Group on Mild Cognitive Impairment. *J Intern Med*. 256(3):240-6.
- Zhang, L., Li, L., Prabhakaran, K., Borowitz, J., Isom, G., 2006. Trimethyltin-induced apoptosis is associated with upregulation of inducible nitric oxide synthase and Bax in a hippocampal cell line. *Toxicol. Appl. Pharmacol.* 216, 34–43.

Zhang, L., Li, L., Prabhakaran, K., Borowitz, J., Isom, G., 2006. Trimethyltin-induced apoptosis is associated with upregulation of inducible nitric oxide synthase and Bax in a hippocampal cell line. *Toxicol. Appl. Pharmacol.* 216, 34–43.