

DAFTAR PUSTAKA

Ahmed, A. I., & Lucas, J. D. (2020). Spinal cord injury: pathophysiology and strategies for regeneration. *Orthopaedics and Trauma*, 1–6. <https://doi.org/10.1016/j.mporth.2020.06.003>

Alizadeh, A., Dyck, S. M., & Karimi-Abdolrezaee, S. (2019). Traumatic Spinal Cord Injury: An Overview of Pathophysiology, Models and Acute Injury Mechanisms. *Frontiers in Neurology*, 10(March), 1–25. <https://doi.org/10.3389/fneur.2019.00282>

Anwar, M. A., Al Shehabi, T. S., & Eid, A. H. (2016). Inflammogenesis of secondary spinal cord injury. *Frontiers in Cellular Neuroscience*, 10(APR), 1–24. <https://doi.org/10.3389/fncel.2016.00098>

Bartholdi, D., Rubin, B. P., & Schwab, M. E. (1997). VEGF mRNA Induction Correlates With Changes in the Vascular Architecture Upon Spinal Cord Damage in the Rat. In *European Journal of Neuroscience* (Vol. 9).

Beattie, M. S., Hermann, G. E., Rogers, R. C., & Bresnahan, J. C. (2002). Cell death in models of spinal cord injury. *Progress in Brain Research*, 137, 37–47. [https://doi.org/10.1016/S0079-6123\(02\)37006-7](https://doi.org/10.1016/S0079-6123(02)37006-7)

Bedreag, O. H., Rogobete, A. F., Sărăndan, M., Cradigati, A., Păpurică, M., Roșu, O. M., Dumbuleu, C. M., & Săndesc, D. (2014). Oxidative stress and antioxidant therapy in traumatic spinal cord injuries. *Romanian Journal of Anaesthesia and Intensive Care*, 21(2), 123–129.

Cao, F., Yang, X. feng, Liu, W. guo, Hu, W. wei, Li, G., Zheng, X. jue, Shen, F., Zhao, X. qun, & Lv, S. ting. (2008). Elevation of neuron-specific enolase and S-100 β protein level in experimental acute spinal cord injury. *Journal of Clinical Neuroscience*, 15(5), 541–544. <https://doi.org/10.1016/j.jocn.2007.05.014>

Chen, C. L. H., Anqi, Q., & Yin, T. (2013). *The NeuroAiD II (MLC901) in Vascular Cognitive Impairment Study (NEURITES)*. 35(suppl 1), 23–29. <https://doi.org/10.1159/000346234>

Cheriyian, T., Ryan, D. J., Weinreb, J. H., Cheriyian, J., Paul, J. C., Lafage, V., Kirsch, T., & Errico, T. J. (2014). Spinal cord injury models: A review. *Spinal Cord*, 52(8), 588–595. <https://doi.org/10.1038/sc.2014.91>



, H. Y., Cha, J. H., Choi, J. Y., Sang, I. P., Chang, H. J., Jeun, S. S., &). Upregulation of vascular endothelial growth factor receptors Flt- 1 and acute spinal cord contusion in rats. *Journal of Histochemistry and* 55(8), 821–830. <https://doi.org/10.1369/jhc.6A7139.2007>

Donovan, W. H. (2007). Spinal cord injury - Past, present, and future. *Journal of Spinal Cord Medicine*, 30(2), 85–100. <https://doi.org/10.1080/10790268.2007.11753918>

Doyle, K. P., Simon, R. P., & Stenzel-Poore, M. P. (2008). Mechanisms of ischemic brain damage. *Neuropharmacology*, 55(3), 310–318. <https://doi.org/10.1016/j.neuropharm.2008.01.005>

Dumont, R. J., Okonkwo, D. O., Verma, S., Hurlbert, R. J., Boulos, P. T., Ellegala, D. B., & Dumont, A. S. (2001). Acute spinal cord injury, part I: Pathophysiologic mechanisms. *Clinical Neuropharmacology*, 24(5), 254–264. <https://doi.org/10.1097/00002826-200109000-00002>

Fehlings, M. G., & Perrin, R. G. (2006). The timing of surgical intervention in the treatment of spinal cord injury: A systematic review of recent clinical evidence. *Spine*, 31(11 SUPPL.), 28–35. <https://doi.org/10.1097/01.brs.0000217973.11402.7f>

Fehlings, M. G., Tetreault, L. A., Wilson, J. R., Kwon, B. K., Burns, A. S., Martin, A. R., Hawryluk, G., & Harrop, J. S. (2017). A Clinical Practice Guideline for the Management of Acute Spinal Cord Injury: Introduction, Rationale, and Scope. *Global Spine Journal*, 7(3_supplement), 84S-94S. <https://doi.org/10.1177/2192568217703387>

Fehlings, M. G., Vaccaro, A., Wilson, J. R., Singh, A., Cadotte, D. W., Harrop, J. S., Aarabi, B., Shaffrey, C., Dvorak, M., Fisher, C., Arnold, P., Massicotte, E. M., Lewis, S., & Rampersaud, R. (2012). Early versus delayed decompression for traumatic cervical spinal cord injury: Results of the surgical timing in acute spinal cord injury study (STASCIS). *PLoS ONE*, 7(2). <https://doi.org/10.1371/journal.pone.0032037>

Forgione, N., Karadimas, S. K., Foltz, W. D., Satkunendrarajah, K., Lip, A., & Fehlings, M. G. (2014). Bilateral contusion-compression model of incomplete traumatic cervical spinal cord injury. *Journal of Neurotrauma*, 31(21), 1776–1788. <https://doi.org/10.1089/neu.2014.3388>

Fouad, K., Ng, C., & Basso, D. M. (2020). Behavioral testing in animal models of spinal cord injury. *Experimental Neurology*, 333(July). <https://doi.org/10.1016/j.expneurol.2020.113410>

Gandin, C., Widmann, C., Lazdunski, M., & Heurteaux, C. (2016). MLC901 Favors Angiogenesis and Associated Recovery after Ischemic Stroke in Mice. *Cerebrovascular Diseases*, 42(1–2), 139–154. <https://doi.org/10.1159/000444810>



one, M., Matzelle, D., Cox, A., & Banik, N. L. (2017). Targeting Enolase secondary Damage in Acute Spinal Cord Injury in Rats. *Neurochemical Journal*, 2777–2787. <https://doi.org/10.1007/s11064-017-2291-z>

Haque, A., Polcyn, R., Matzelle, D., & Banik, N. L. (2018). New insights into the role of neuron-specific enolase in neuro-inflammation, neurodegeneration, and neuroprotection. *Brain Sciences*, 8(2). <https://doi.org/10.3390/brainsci8020033>

Haque, A., Ray, S. K., Cox, A., & Banik, N. L. (2016a). Neuron specific enolase: a promising therapeutic target in acute spinal cord injury. *Metabolic Brain Disease*, 31(3), 487–495. <https://doi.org/10.1007/s11011-016-9801-6>

Hausmann, O. N. (2003). Post-traumatic inflammation following spinal cord injury. *Spinal Cord*, 41(7), 369–378. <https://doi.org/10.1038/sj.sc.3101483>

Hawryluk, G. W. J., Hiroaki Nakashima, & Fehlings, M. G. (2017). Pathophysiology and Treatment of Spinal Cord Injury. In *Youmans and Winn Neurological Surgery, 4- Volume Set* (seven, pp. 2292–2307). Elsevier.

Herrera, J. J., Nestic, O., & Narayana, P. A. (2009). Reduced Vascular Endothelial Growth Factor Expression in Contusive Spinal Cord Injury. *J Neurotrauma*.

Heurteaux, C., Gandin, C., Borsotto, M., Widmann, C., Brau, F., Lhuillier, M., Onteniente, B., & Lazdunski, M. (2010). Neuroprotective and neuroproliferative activities of NeuroAid (MLC601, MLC901), a Chinese medicine, in vitro and in vivo. *Neuropharmacology*, 58(7), 987–1001. <https://doi.org/10.1016/j.neuropharm.2010.01.001>

Heurteaux, C., Widmann, C., Moha Ou Maati, H., Quintard, H., Gandin, C., Borsotto, M., Veysiere, J., Onteniente, B., & Lazdunski, M. (2013). NeuroAid: Properties for neuroprotection and neurorepair. *Cerebrovascular Diseases*, 35(SUPPL.1), 1–7. <https://doi.org/10.1159/000346228>

Jia, Z., Zhu, H., Li, J., Wang, X., Misra, H., & Li, Y. (2012). Oxidative stress in spinal cord injury and antioxidant-based intervention. *Spinal Cord*, 50(4), 264–274. <https://doi.org/10.1038/sc.2011.111>

Kigerl, K. A., Gensel, J. C., Ankeny, D. P., Alexander, J. K., Donnelly, D. J., & Popovich, P. G. (2009). Identification of two distinct macrophage subsets with divergent effects causing either neurotoxicity or regeneration in the injured mouse spinal cord. *Journal of Neuroscience*, 29(43), 13435–13444. <https://doi.org/10.1523/JNEUROSCI.3257-09.2009>

Kirshblum, S. C., Waring, W., Biering-Sorensen, F., Burns, S. P., Johansen, M., Schmidt-Read, M., Donovan, W., Graves, D., Jha, A., Jones, L., Mulcahey, M. J., & Krassioukov, A. (2011). Reference for the 2011 revision of the International Standards for Neurological Spinal Cord Injury. *Journal of Spinal Cord Medicine*, 34(6), 547–554. <https://doi.org/10.1179/107902611X13186000420242>



Kong, X., & Gao, J. (2017). Macrophage polarization: a key event in the secondary phase of acute spinal cord injury. *Journal of Cellular and Molecular Medicine*, 21(5), 941–954. <https://doi.org/10.1111/jcmm.13034>

Krueger, H., Noonan, V. K., Trenaman, L. M., Joshi, P., & Rivers, C. S. (2013). The economic burden of traumatic spinal cord injury in Canada. *Chronic Diseases and Injuries in Canada*, 33(3), 113–122.

Kumar, R., Htwe, O., Baharudin, A., Ariffin, M. H., Abdul Rhani, S., Ibrahim, K., Rustam, A., & Gan, R. (2016). Spinal Cord Injury—Assessing Tolerability and Use of Combined Rehabilitation and NeuroAiD (SATURN Study): Protocol of An Exploratory Study In Assessing the Safety and Efficacy of NeuroAiD Amongst People Who Sustain Severe Spinal Cord Injury. *JMIR Research Protocols*, 5(4), e230. <https://doi.org/10.2196/resprot.6275>

Kwon, B. K., Tetzlaff, W., Grauer, J. N., Beiner, J., & Vaccaro, A. R. (2004). Pathophysiology and pharmacologic treatment of acute spinal cord injury. *Spine Journal*, 4(4), 451–464. <https://doi.org/10.1016/j.spinee.2003.07.007>

Lange, C., Storkebaum, E., de Almodóvar, C. R., Dewerchin, M., & Carmeliet, P. (2016). Vascular endothelial growth factor: A neurovascular target in neurological diseases. In *Nature Reviews Neurology* (Vol. 12, Issue 8, pp. 439–454). Nature Publishing Group. <https://doi.org/10.1038/nrneurol.2016.88>

Li, J., Chen, S., Zhao, Z., Luo, Y., Hou, Y., Li, H., He, L., Zhou, L., & Wu, W. (2017). Effect of VEGF on inflammatory regulation, neural survival, and functional improvement in rats following a complete spinal cord transection. *Frontiers in Cellular Neuroscience*, 11(November). <https://doi.org/10.3389/fncel.2017.00381>

Long, H. Q., Li, G. S., Cheng, X., Xu, J. H., & Li, F. B. (2015). Role of hypoxia-induced VEGF in blood-spinal cord barrier disruption in chronic spinal cord injury. In *Chinese Journal of Traumatology - English Edition* (Vol. 18, Issue 5, pp. 293–295). Elsevier B.V. <https://doi.org/10.1016/j.cjtee.2015.08.004>

Loy, D. N., Sroufe, A. E., Pelt, J. L., Burke, D. A., Cao, Q. L., Talbott, J. F., & Whittemore, S. R. (2005). Serum biomarkers for experimental acute spinal cord injury: Rapid elevation of neuron-specific enolase and S-100 β . *Neurosurgery*, 56(2), 391–396. <https://doi.org/10.1227/01.NEU.0000148906.83616.D2>

Malhotra, S. L. C. M., Bhatoe, B. H. S., & Sudambrekar, C. S. M. (2010). Spinal cord injuries. *Medical Journal Armed Forces India*, 66(4), 325–328. [https://doi.org/10.1016/s0377-1237\(10\)80009-7](https://doi.org/10.1016/s0377-1237(10)80009-7)



I., & Tsirikos, A. I. (2016). Spinal cord trauma: pathophysiology, spinal cord injury syndromes, treatment principles and controversies. *World Journal of Trauma*, 30(5), 440–449. <https://doi.org/10.1016/j.mporth.2016.07.006>

Mattson, M. P. (2019). Excitotoxicity. *Stress: Physiology, Biochemistry, and Pathology*, 125–134. <https://doi.org/10.1016/b978-0-12-813146-6.00011-4>

McDonough, A., Monterrubio, A., Ariza, J., & Martínez-Cerdeño, V. (2015). Calibrated forceps model of spinal cord compression injury. *Journal of Visualized Experiments*, 2015(98), 1–6. <https://doi.org/10.3791/52318>

Moha Ou Maati, H., Borsotto, M., Chatelain, F., Widmann, C., Lazdunski, M., & Heurteaux, C. (2012). Activation of ATP-sensitive potassium channels as an element of the neuroprotective effects of the Traditional Chinese Medicine MLC901 against oxygen glucose deprivation. *Neuropharmacology*, 63(4), 692–700. <https://doi.org/10.1016/j.neuropharm.2012.05.035>

Muhammad Faris. (2020). Pengaruh Pemberian ACTH4-10PRO8GLY9PRO10 Terhadap Mediator Proinflamasi TLR, NF-Kb, IL-8, TNF- α , DAN Neutrofil pada Jaringan Spinal Cord yang Mengalami Cedera Kompresi Akut (Studi Eksperimental pada Tikus Sprague-Dawley Model Spinal Cord Injury) .

Ning, G. Z., Wu, Q., Li, Y. L., & Feng, S. Q. (2012). Epidemiology of traumatic spinal cord injury in Asia: A systematic review. *Journal of Spinal Cord Medicine*, 35(4), 229–239. <https://doi.org/10.1179/2045772312Y.0000000021>

Pakdaman, H., Harandi, A. A., Gharagozli, K., Abbasi, M., Ghaffarpour, M., Ashrafi, F., Kasmaei, H. D., & Harandi, A. A. (2017). MLC601 in vascular dementia: An efficacy and safety pilot study. *Neuropsychiatric Disease and Treatment*, 13, 2551– 2557. <https://doi.org/10.2147/NDT.S145047>

Park, E., Velumian, A. A., & Fehlings, M. G. (2004). The role of excitotoxicity in secondary mechanisms of spinal cord injury: A review with an emphasis on the implications for white matter degeneration. *Journal of Neurotrauma*, 21(6), 754– 774. <https://doi.org/10.1089/0897715041269641>

Patek, M., & Stewart, M. (2020). Spinal cord injury. *Anaesthesia and Intensive Care Medicine*, 1–6. <https://doi.org/10.1016/j.mpaic.2020.05.006>

Paterniti, I., Esposito, E., & Cuzzocrea, S. (2016). Role of the Neuroinflammation in the Degree of Spinal Cord Injury: New Therapeutic Strategies. *Recovery of Motor Function Following Spinal Cord Injury*. <https://doi.org/10.5772/63222>

Polcyn, R., Capone, M., Hossain, A., Matzelle, D., Banik, N. L., Haque, A., & Haque, A. (2017). ~~English~~ and Acute Spinal Cord Injury. *Journal of Clinical & Cellular Immunology*, <https://doi.org/10.4172/2155-9899.1000536>



pta, D., Shoichet, M. S., & Tator, C. H. (2007). Clip compression model for traumatic spinal cord injuries: Histologic and functional correlates. *Spine*, 32(15), 159. <https://doi.org/10.1097/BRS.0b013e31815b7e6b>

Qin, Z., Chen, H., Bin, M., Tiansi, T., & Huilin, Y. (2014). Changes in autophagy proteins in a rat model of spinal cord injury. *Chinese Journal of Traumatology - English Edition*, 17(4), 193–197. <https://doi.org/10.3760/cma.j.issn.1008-1275.2014.04.002>

Quintard, H., Borsotto, M., Veysiere, J., Gandin, C., Labbal, F., Widmann, C., Lazdunski, M., & Heurteaux, C. (2011). MLC901, a Traditional Chinese Medicine protects the brain against global ischemia. *Neuropharmacology*, 61(4), 622–631. <https://doi.org/10.1016/j.neuropharm.2011.05.003>

Quintard, H., Lorivel, T., Gandin, C., Lazdunski, M., & Heurteaux, C. (2014a). MLC901, a Traditional Chinese Medicine induces neuroprotective and neuroregenerative benefits after traumatic brain injury in rats. *Neuroscience*, 277, 72–86. <https://doi.org/10.1016/j.neuroscience.2014.06.047>

Quintard, H., Lorivel, T., Gandin, C., Lazdunski, M., & Heurteaux, C. (2014b). MLC901, a Traditional Chinese Medicine induces neuroprotective and neuroregenerative benefits after traumatic brain injury in rats. *Neuroscience*, 277, 72–86. <https://doi.org/10.1016/j.neuroscience.2014.06.047>

Raineteau, O., & Schwab, M. E. (2001). Plasticity of motor systems after incomplete spinal cord injury. *Nature Reviews Neuroscience*, 2(4), 263–273. <https://doi.org/10.1038/35067570>

Ranuh, I. G. M. A. R., Sari, G. M., Utomo, B., Suroto, N. S., & Fauzi, A. al. (2021). Systematic Review and Meta-Analysis of the Efficacy of MLC901 (NeuroAiD IITM) for Acute Ischemic Brain Injury in Animal Models. In *Journal of Evidence- Based Integrative Medicine* (Vol. 26). SAGE Publications Ltd. <https://doi.org/10.1177/2515690X211039219>

Rodrigues, L. F., Moura-Neto, V., & e Spohr, T. C. L. de S. (2018). Biomarkers in Spinal Cord Injury: from Prognosis to Treatment. *Molecular Neurobiology*, 55(8), 6436–6448. <https://doi.org/10.1007/s12035-017-0858-y>

Rowland, J. W., Hawryluk, G. W. J., Kwon, B., & Fehlings, M. G. (2008). Current status of acute spinal cord injury pathophysiology and emerging therapies: Promise on the horizon. *Neurosurgical Focus*, 25(5), 1–3. <https://doi.org/10.3171/FOC.2008.25.11.E2>

Rust, R., & Kaiser, J. (2017). Insights into the dual role of inflammation after spinal cord injury. *Journal of Neuroscience*, 37(18), 4658–4660. <https://doi.org/10.1523/JNEUROSCI.0498-17.2017>



Saucier, D. A., & Cain, M. E. (2002). A statistical method for analyzing a: The BBB locomotor score. *Journal of Neurotrauma*, 19(10), 1251–1260. <https://doi.org/10.1089/08977150260338038>

Shaik, A. J., Reddy, K., Mohammed, N., Tandra, S. R., Rukmini mridula kandadai, & Baba KSS, S. (2019). Neuron specific enolase as a marker of seizure related neuronal injury. *Neurochemistry International*, 131. <https://doi.org/10.1016/j.neuint.2019.104509>

Sharif-Alhoseini, M., & Rahimi-Movaghar, V. (2014). Animal Models in Traumatic Spinal Cord Injury. *Topics in Paraplegia*. <https://doi.org/10.5772/57189>

Silva, N. A., Sousa, N., Reis, R. L., & Salgado, A. J. (2014). From basics to clinical: A comprehensive review on spinal cord injury. *Progress in Neurobiology*, 114, 25–57. <https://doi.org/10.1016/j.pneurobio.2013.11.002>

Sköld, M., Cullheim, S., Hammarberg, H., Piehl, F., Suneson, A., Lake, S., Sjögren, A., Walum, E., & Risling, M. (2000). Induction of VEGF and VEGF receptors in the spinal cord after mechanical spinal injury and prostaglandin administration. *European Journal of Neuroscience*, 12(10). <https://doi.org/10.1046/j.1460-9568.2000.00263.x>

Storkebaum, E., Lambrechts, D., & Carmeliet, P. (2004). VEGF: Once regarded as a specific angiogenic factor, now implicated in neuroprotection. *BioEssays*, 26(9), 943–954. <https://doi.org/10.1002/bies.20092>

Suwanwela, N. C., Chen, C. L. H., Lee, C. F., Young, S. H., Tay, S. S., Umapathi, T., Lao, A. Y., Gan, H. H., Baroque, A. C., Navarro, J. C., Chang, H. M., Advincula, J. M., Muengtawepongsa, S., Chan, B. P. L., Chua, C. L., Wijekoon, N., De Silva, H. A., Hiyadan, J. H. B., Wong, K. S. L., ... Ranawake, U. (2018). Effect of Combined Treatment with MLC601 (NeuroAiD™) and Rehabilitation on Post-Stroke Recovery: The CHIMES and CHIMES-E Studies. *Cerebrovascular Diseases*, 46(1–2), 82–88. <https://doi.org/10.1159/000492625>

Taghva, A., Hoh, D. J., & Laurysen, C. L. (2012). Advances in the management of spinal cord and spinal column injuries. In *Handbook of Clinical Neurology* (1st ed., Vol. 109). Elsevier B.V. <https://doi.org/10.1016/B978-0-444-52137-8.00007-3>

Tator, C. H., & Poon, P. (2009). Acute Clip Impact-Compression Model. In *Animal Models of Acute Neurological Injuries* (pp. 449–460). Humana press.

Theadom, A., Barker-Collo, S., Jones, K. M., Parmar, P., Bhattacharjee, R., & Feigin, V. L. (2018). MLC901 (NeuroAiD II™) for cognition after traumatic brain injury: a pilot randomized clinical trial. *European Journal of Neurology*, 25(8), 1055-e82. <https://doi.org/10.1111/ene.13653>

Walker, M. J., & Xu, X. M. (2018). Pleiotropic Role of VEGF and Its Application for Spinal Cord Injury. In *Annals of Spine Research* (Vol. 1, Issue 1).

Wang, Y., Li, D., Liu, Z., Zhao, Z., Han, D., Yuan, Y., Bi, J., & Mei, X. (2015). The inflammation in spinal cord injury through activation of autophagy.



Biochemical and Biophysical Research Communications, 464(2), 453– 458.
<https://doi.org/10.1016/j.bbrc.2015.06.146>

Widmann, C., Gandin, C., Lazdunski, M., & Heurteaux, C. (2018). The Traditional Chinese Medicine MLC901 inhibits inflammation processes after focal cerebral ischemia. *Scientific Reports*, March, 1–15. <https://doi.org/10.1038/s41598-018-36138-0>

Wilson, J. R., & Fehlings, M. G. (2011). Emerging Approaches to the Surgical Management of Acute Traumatic Spinal Cord Injury. *Neurotherapeutics*, 8(2), 187– 194.
<https://doi.org/10.1007/s13311-011-0027-3>

Xm, X., & Mj, W. (2018). *Annals of Spine Research Pleiotropic Role of VEGF and Its Application for Traumatic*. 1(1).

Yokobori, S., Zhang, Z., Moghieb, A., Mondello, S., Gajavelli, S., Dietrich, W. D., Bramlett, H., Hayes, R. L., Wang, M., Wang, K. K. W., & Bullock, M. R. (2015). Acute diagnostic biomarkers for spinal cord injury: Review of the literature and preliminary research report. In *World Neurosurgery* (Vol. 83, Issue 5, pp. 867–878). Elsevier Inc.
<https://doi.org/10.1016/j.wneu.2013.03.012>

Zhang, B., Bailey, W. M., McVicar, A. L., & Gensel, J. C. (2016). Age increases reactive oxygen species production in macrophages and potentiates oxidative damage after spinal cord injury. *Neurobiology of Aging*, 47, 157–167.
<https://doi.org/10.1016/j.neurobiolaging.2016.07.029>

