

DAFTAR PUSTAKA

- Aalaa, M., Malazy, O. T., Sanjari, M., Peimani, M., & Mohajeri-Tehrani, M. (2012). Nurses' role in diabetic foot prevention and care: A review. *Journal of Diabetes & Metabolic Disorders*, 11(1), 24. <https://doi.org/10.1186/2251-6581-11-24>
- Akkol, E. K., Süntar, I., Keleş, H., Sezik, E., & Gürler, G. (2015). Bioassay-guided isolation and characterization of wound healer compounds from morus nigra l. (moraceae). *Records of Natural Products*, 9(4), 484–495.
- Alavi, A., Sibbald, R. G., Mayer, D., Goodman, L., Botros, M., Armstrong, D. G., Woo, K., Boeni, T., Ayello, E. A., & Kirsner, R. S. (2014). Diabetic foot ulcers: Part I. Pathophysiology and prevention. In *Journal of the American Academy of Dermatology* (Vol. 70, Issue 1). <https://doi.org/10.1016/j.jaad.2013.06.055>
- Alexandru, V., Gaspar, A., Toma, A., & Tatia, R. (2015). Phenolic content, antioxidant activity and effect on collagen synthesis of a traditional wound healing polyherbal formula. *Studia Universitatis "Vasile Goldis" Seria Stiintele Vietii*, 25(September), 41–46. https://www.researchgate.net/profile/Valentina_Alexandru/publication/281645225_Phenolic_content_antioxidant_activity_and_effect_on_collagen_synthesis_of_a_traditional_wound_healing_polyherbal_formula/links/55f2979d08ae0af8ee1f8f8e/Phenolic-content-antioxi
- Alshammari, M., Duff, J., & Guilhermino, M. (2019). Barriers to nurse-patient communication in Saudi Arabia: An integrative review. *BMC Nursing*, 18(1), 1–10. <https://doi.org/10.1186/s12912-019-0385-4>
- Anastasi, J. K., Chang, M., & Capili, B. (2011). Herbal supplements: Talking with your patients. *Journal for Nurse Practitioners*, 7(1), 29–35. <https://doi.org/10.1016/j.nurpra.2010.06.004>
- Anugrahwati, M., Purwaningsih, T., Rustina, Manggalarini, J. A., Alnavis, N. B., Wulandari, D. N., & Pranowo, H. D. (2016). Extraction of ethanolic extract of red betel leaves and its cytotoxicity test on HeLa cells. *Procedia Engineering*, 148, 1402–1407. <https://doi.org/10.1016/j.proeng.2016.06.569>
- Arfian, N., Ananda, W., Setyaningsih, W., Romi, M. M., Cahyani, D., & Sari, R. (2019). Heparanase upregulation from adipocyte associates with inflammation and endothelial injury in diabetic condition. *BMC Proceedings*, 13(Suppl 11), 1–8. <https://doi.org/10.1186/s12919-019-0181-x>
- Astuti, P., Wahyono, & Nababan, O. A. (2014). Antimicrobial and cytotoxic activities of endophytic fungi isolated from Piper crocatum Ruiz & Pav. *Asian Pacific Journal of Tropical Biomedicine*, 4(Suppl 2), S592–S596. <https://doi.org/10.12980/APJTB.4.2014APJTB-2014-0073>
- Ayuk, S. M., Abrahamse, H., & Houreld, N. N. (2016). The role of matrix metalloproteinases in diabetic wound healing in relation to photobiomodulation. In *Journal of Diabetes Research* (Vol. 2016). <https://doi.org/10.1155/2016/2897656>

Backer, C. H and Brink, V. B. (1965). *Flora of Java*. In *Wolters Mood Hoff N. V* (2nd ed.). Groningen, Netherlands. <https://doi.org/10.1017/CBO9781107415324.004>

Bainbridge, P. (2013). Wound healing and the role of fibroblasts. *Journal of Wound Care*, 22(8), 407–412. <https://doi.org/10.12968/jowc.2013.22.8.407>

Baltzis, D., Eleftheriadou, I., & Veves, A. (2014a). Pathogenesis and treatment of impaired wound healing in Diabetes Mellitus: New insights. In *Advances in Therapy* (Vol. 31, Issue 8, pp. 817–836). <https://doi.org/10.1007/s12325-014-0140-x>

Baltzis, D., Eleftheriadou, L., & Veves, A. (2014b). Pathogenesis and treatment of impaired wound healing in Diabetes Mellitus: New insights. *Advances in Therapy*, 31(2014), pages817–836. <https://link.springer.com/article/10.1007/s12325-014-0140-x>

Barabutis, N., Schally, A. V., & Siejka, A. (2018). P53, GHRH, inflammation and cancer. *EBioMedicine*, 37, 557–562. <https://doi.org/10.1016/j.ebiom.2018.10.034>

Berlanga-acosta, J., Schultz, G. S., López-mola, E., Guillen-nieto, G., García-siverio, M., & Herrera-martínez, L. (2013). Glucose toxic effects on granulation tissue productive cells: The diabetics' impaired healing. *BioMed Research International*, 2013. <https://doi.org/10.1155/2013/256043>

Beyeler, J., Schnyder, I., Katsaros, C., & Chiquet, M. (2014). Accelerated wound closure in vitro by fibroblasts from a subgroup of cleft lip/palate patients: Role of transforming growth factor- α . *PLoS ONE*, 9(10), 1–15. <https://doi.org/10.1371/journal.pone.0111752>

Bhan, S., Mitra, R., Arya, A. K., Pandey, H. P., & Tripathi, K. (2013). A study on evaluation of apoptosis and expression of Bcl-2-related marker in wound healing of streptozotocin-induced diabetic rats. *ISRN Dermatology*, 2013, 1–6. <https://doi.org/10.1155/2013/739054>

Blackburn, J., Ousey, K., & Stephenson, J. (2019). Nurses' education, confidence, and competence in appropriate dressing choice. *Advances in Skin and Wound Care*, 32(10), 470–476. <https://doi.org/10.1097/01.ASW.0000577132.81124.88>

Botusan, I. R., Sunkari, V. G., Savu, O., Catrina, A. I., Grünler, J., Lindberg, S., Pereira, T., Ylä-Herttuala, S., Poellinger, L., Brismar, K., & Catrina, S.-B. (2008). Stabilization of HIF-1 α is critical to improve wound healing in diabetic mice. *Proceedings of the National Academy of Sciences of the United States of America*, 105(49), 19426–19431. <https://doi.org/10.1073/pnas.0805230105>

Brem, H., & Tomic-Canic, M. (2007). Cellular and molecular basis of wound healing in diabetes. *The Journal of Clinical Investigation*, 117(5), 1219–1222. <https://doi.org/10.1172/JCI32169>

Bryer-Ash, M. (2009). *100 questions & answers diabetes*. Jones and Bartlett Publishers.

Buranasin, P., Mizutani, K., Iwasaki, K., Na, C. P., Kido, D., Takeda, K., & Izumi, Y. (2018). High glucose-induced oxidative stress impairs proliferation and migration of human gingival fibroblasts. *PLoS ONE*, 25862043, 1–19. <https://doi.org/10.1371/journal.pone.0201855> August

Caley, M. P., Martins, V. L. C., & O'Toole, E. A. (2015). Metalloproteinases and wound healing. *Advances in Wound Care*, 4(4), 225–234.

- Casqueiro, J., Casqueiro, J., & Alves, C. (2012). Infections in patients with diabetes mellitus: A review of pathogenesis. *Indian Journal of Endocrinology and Metabolism*, 16, S27-36. <https://doi.org/10.4103/2230-8210.94253>
- Cavanagh, P., Attinger, C., Abbas, Z., Bal, A., Rojas, N., & Xu, Z.-R. (2012). Cost of treating diabetic foot ulcers in five different countries. *Diabetes/Metabolism Research and Reviews*, 28(Suppl 1), 107–111. <https://doi.org/10.1002/dmrr>
- Chan, S. M., Khoo, K. S., & Sit, N. W. (2015). Interactions between plant extracts and cell viability indicators during cytotoxicity testing: implications for ethnopharmacological studies. *Tropical Journal of Pharmaceutical Research*, 14(November), 1991–1998. <https://doi.org/10.4314/tjpr.v14i11.6>
- Chang, C.-D., Phillips, P., Lipson, K. E., Crisfalos, V. J., & Baserga, R. (1991). Senescent human fibroblasts have a post-transcriptional block in the expression of the proliferating cell nuclear antigen gene. *The Journal of Biological Chemistry*, 266(40), 8663–8666.
- Chatterjee, S., & Davies, M. J. (2015). Current management of diabetes mellitus and future directions in care. *Postgraduate Medical Journal*, 91(1081), 612–621. <https://doi.org/10.1136/postgradmedj-2014-133200>
- Chaurasia, S. S., Kaur, H., de Medeiros, F. W., Smith, S. D., & Wilson, S. E. (2009). Dynamics of the expression of intermediate filaments vimentin and desmin during myofibroblast differentiation after corneal injury. *Experimental Eye Research*, 89(2), 133–139. <https://doi.org/10.1016/j.exer.2009.02.022>
- Chawla, A., Chawla, R., & Jaggi, S. (2016). Microvascular and macrovascular complications in diabetes mellitus: Distinct or continuum? *Indian Journal of Endocrinology and Metabolism*, 20(4), 546. <https://doi.org/10.4103/2230-8210.183480>
- Chen, C., Yang, S., Zhang, M., Zhang, Z., Zhang, B., Han, D., Ma, J., Wang, X., Hong, J., Guo, Y., & Zhang, L. (2013). In vitro Sirius Red collagen assay measures the pattern shift from soluble to deposited collagen. *XXXIV Oxygen Transport to Tissue*, 47–53. https://link.springer.com/chapter/10.1007/978-1-4614-4989-8_7
- Chen, K. C., Peng, C. C., Peng, C. H., Hsieh, C. L., & Peng, R. Y. (2011). The aqueous soluble polyphenolic fraction of Psidium guajava leaves exhibits potent anti-angiogenesis and anti-migration actions on DU145 cells. *Evidence-Based Complementary and Alternative Medicine*, 2011. <https://doi.org/10.1093/ecam/neq005>
- Chen, L., Tuo, B., & Dong, H. (2016). Regulation of intestinal glucose absorption by ion channels and transporters. In *Nutrients* (Vol. 8, Issue 1). <https://doi.org/10.3390/nu8010043>
- Cheng, K., Lin, Z., Cheng, Y., Chiu, H., Yeh, N.-L., Wu, T.-K., & Wu, J.-S. (2018). Wound healing in streptozotocin- induced diabetic rats using atmospheric-pressure argon plasma jet. *Scientific Reports*, 8(July), 1–15. <https://doi.org/10.1038/s41598-018-30597-1>
- Churgin, S. S., Callaghan, M., Galiano, R., Blechman, K., Ceradini, D., & Gurtner, G. (2005). Therapeutic administration of superoxide healing in diabetic mice. *Journal of the American College of Surgeons*, 201(3).

- Clayton, W., & Elasy, T. A. (2009). A review of the pathophysiology, classification, and treatment of foot ulcers in diabetic patients. *Clinical Diabetes*, 27(2), 52–58. <https://doi.org/10.2337/diaclin.27.2.52>
- Cohen, D. J., Gloerich, M., & Nelson, W. J. (2016). Epithelial self-healing is recapitulated by a 3D biomimetic E-cadherin junction. *Proceedings of the National Academy of Sciences of the United States of America*, 113(51), 14698–14703. <https://doi.org/10.1073/pnas.1612208113>
- Corbett, L. Q., & Ennis, W. J. (2014). What do patients want? patient preference in wound care. *Advances in Wound Care*, 3(8), 537–543. <https://doi.org/10.1089/wound.2013.0458>
- Cotran, R., Kumar, V., Robbins, S., Abbas, A. K., Aster, J. C., & Aster, J. C. (2015). Robbins and Cotran pathologic basis of disease. In *Philadelphia, PA: Saunders, Ipswich, MA* (9th ed.). Elsevier Ltd.
- Crawford, M., & Dagnino, L. (2018). Cadherins as central modulators of wound repair. *Wound Healing: Stem Cells Repair and Restorations, Basic and Clinical Aspects*, 15–30. <https://doi.org/10.1002/9781119282518.ch2>
- Damir, A. (2011). Why diabetic foot ulcers do not heal? *Journal International Medical Sciences Academy*, 24(4), 205–206.
- Darby, I. A., Laverdet, B., Bonté, F., & Desmoulière, A. (2014). Fibroblasts and myofibroblasts in wound healing. *Clinical, Cosmetic and Investigational Dermatology*, 7, 301–311. <https://doi.org/10.2147/CCID.S50046>
- Demaria, M., Ohtani, N., Youssef, S. A., Rodier, F., Toussaint, W., Mitchell, J. R., Laberge, R. M., Vijg, J., VanSteeg, H., Dollé, M. E. T., Hoeijmakers, J. H. J., deBruin, A., Hara, E., & Campisi, J. (2014). An essential role for senescent cells in optimal wound healing through secretion of PDGF-AA. In *Developmental Cell* (Vol. 31, Issue 6, pp. 722–733). <https://doi.org/10.1016/j.devcel.2014.11.012>
- Deng, L., Du, C., Song, P., Chen, T., Rui, S., Armstrong, D. G., & Deng, W. (2021). Molecular mechanisms of dietary bioactive compounds in redox balance and metabolic disorders. *Oxidative Medicine and Cellular Longevity*, 2021(Figure 1), 1–11.
- Deursen, J. M. Van, & van Deursen, J. M. (2014). The role of senescent cells in aging. *Nature*, 509(7501), 439–446. <https://doi.org/10.1038/nature13193>
- Dewi, D., Chairinnisa, E., Sujuti, H., Lirawati, D., & Hernowati, T. (2018). α SMA expression increased over cell passages and decreased by exogenous TGF- β 1, in vitro studies on myofibroblast derived from orbital socket contracture. *Journal of Tropical Life Science*, 8(2), 200–205. <https://doi.org/10.11594/jtls.08.02.15>
- Dewi, Y. F., Anthara, M. S., & Dharmayudha, A. A. G. O. (2014). Effectiveness of red betel leaf extracts (Piper on blood glucose level decreased white male rats (*Rattus novergicus*) induced alloxan. *Buletin Veteriner Udayana*, 6(2). <https://ocs.unud.ac.id/index.php/buletinvet/article/view/8899/6693>
- Dhawan, D., & Gupta, J. (2016). Comparison of different solvents for phytochemical extraction potential from *Datura metel* plant leaves. *International Journal of Biological Chemistry*, 11(1), 17–22. <https://doi.org/10.3923/ijbc.2017.17.22>

Doughty, D. B. (2008). Levin and O'Neal's the diabetic foot. In *Levin and O'Neal's The Diabetic Foot*. <https://doi.org/10.1016/B978-0-323-04145-4.50034-X>

Duarte, S., Kato, H., Ho, M., Busuttil, R., & Coito, A. (2013). *TIMP-1 deficiency promotes p53 pathway and impairs hepatocyte proliferation in liver ischemi*. American Transplant Congress. <https://atcmeetingabstracts.com/abstract/timp-1-deficiency-promotes-p53-pathway-and-impairs-hepatocyte-proliferation-in-liver-ischemia-reperfusion-injury/>

Dunnill, C., Patton, T., Brennan, J., Barrett, J., Dryden, M., Cooke, J., Leaper, D., & Georgopoulos, N. T. (2017). Reactive oxygen species (ROS) and wound healing: the functional role of ROS and emerging ROS-modulating technologies for augmentation of the healing process. *International Wound Journal*, 14(1), 89–96. <https://doi.org/10.1111/iwj.12557>

Eming, S. A., Martin, P., & Tomic-Canic, M. (2014). Wound repair and regeneration: Mechanisms, signaling, and translation. In *Science Translational Medicine* (Vol. 6, Issue 265). <https://doi.org/10.1126/scitranslmed.3009337>

Emrizal, Fernando, A., Yuliandari, R., Rullah, K., Indrayani, N. R., Susanty, A., Yerti, R., Ahmad, F., Sirat, H. M., & Arbain, D. (2014). Cytotoxic activities of fractions and two isolated compounds from sirih merah (Indonesian red betel), Piper crocatum Ruiz & Pav. *Procedia Chemistry*, 13, 79–84. <https://doi.org/10.1016/j.proche.2014.12.009>

Enriquez-Ochoa, D., Robles-Ovalle, P., Mayolo-Deloisa, K., & Brunck, M. E. G. (2020). Immobilization of growth factors for cell therapy manufacturing. *Frontiers in Bioengineering and Biotechnology*, 8(June), 1–20. <https://doi.org/10.3389/fbioe.2020.00620>

Eruygur, N., Yilmaz, G., Kutsal, O., Yücel, G., & Üstün, O. (2016). Bioassay-guided isolation of wound healing active compounds from Echium species growing in Turkey. *Journal of Ethnopharmacology*, 185, 370–376. <https://doi.org/10.1016/j.jep.2016.02.045>

Fatmawaty, Anggreni, N. G. M., Fadhil, N., & Prasasty, V. D. (2019). Potential in vitro and in vivo antioxidant activities from Piper crocatum and Persea americana leaf extracts. *Biomedical and Pharmacology Journal*, 12(2), 661–667. <https://doi.org/10.13005/bpj/1686>

Fithriyah, N., Arifin, S., & Santi, E. (2013). Lumatan daun sirih merah (Piper crocatum) terhadap lama penyembuhan luka bakar derajat II pada kulit kelinci (Cavia cobaya). *DK*, 01(01), 24–31. <https://ppjp.ulm.ac.id/journal/index.php/JDK/article/view/1650>

Fitriyani, A., Winarti, L., Muslichah, S., & Nuri, N. (2011). Anti-inflammatory activity of Piper crocatum Ruiz & Pav. leaves methanolic extract in rats. *Traditional Medicine Journal*, 16(1), 34–42. <https://doi.org/10.22146/tradmedj.8020>

Flores, I., & Blasco, M. A. (2009). A p53-dependent response limits epidermal stem cell functionality and organismal size in mice with short telomeres. *PLoS ONE*, 4(3). <https://doi.org/10.1371/journal.pone.0004934>

Foresman, E. L., & Miller, F. J. (2013). Extracellular but not cytosolic superoxide dismutase protects against oxidant-mediated endothelial dysfunction. *Redox Biology*, 1(1), 292–296. <https://doi.org/10.1016/j.redox.2013.04.003>

- Foster, D. S., Jones, R. E., Ransom, R. C., Longaker, M. T., & Norton, J. A. (2018). The evolving relationship of wound healing and tumor stroma. *JCI Insight*, 3(18), 1–17. <https://doi.org/10.1172/jci.insight.99911>
- Frykberg, R. G., & Banks, J. (2015). Challenges in the treatment of chronic wounds. *Advances in Wound Care*, 4(9), 560–582. <https://doi.org/10.1089/wound.2015.0635>
- Fujiwara, T., Duscher, D., Rustad, K. C., Kosajaru, R., Rodrigues, M., Whittam, A. J., Januszyk, M., Maan, Z. N., & Gurtner, G. C. (2016). Extracellular superoxide dismutase deficiency impairs wound healing in advanced age by reducing neovascularization and fibroblast function. *Exp Dermatol*, 25(3), 206–211. <https://doi.org/10.1111/exd.12909>
- Galkowska, H., Olszewski, W. L., Wojewodzka, U., Mijal, J., & Filipiuk, E. (2003). Expression of apoptosis-and cell cycle-related proteins in epidermis of venous leg and diabetic foot ulcers. *Surgery*, 134(2), 213–220. <https://doi.org/10.1067/msy.2003.223>
- Gaol, Y. E. L., Erly, E., & Sy, E. (2017). Pola resistensi bakteri aerob pada ulkus diabetik terhadap beberapa antibiotika di laboratorium mikrobiologi RSUP Dr. M. Djamil Padang tahun 2011 - 2013. *Jurnal Kesehatan Andalas*, 6(1), 164. <https://doi.org/10.25077/jka.v6i1.664>
- Gasca-lozano, L. E., Lucano-landeros, S., Ruiz-mercado, H., Salazar-montes, A., Sandoval-rodríguez, A., Garcia-bañuelos, J., Santos-garcia, A., Davila-rodriguez, J. R., Navarro-partida, J., Bojórquez-sepúlveda, H., Castañeda-gomez, J., Domínguez-rosales, J., Ruiz-arcos, M. A., Sánchez-parada, M. G., & Armendariz-borunda, J. (2017). Pirfenidone accelerates wound healing in chronic diabetic foot ulcers: a randomized, double-blind controlled trial. *Journal of Diabetes Research*, 2017. <https://doi.org/10.1155/2017/3159798>
- Giacco, F., & Brownlee, M. (2010). Oxidative stress and diabetic complications. In *Circulation Research* (Vol. 107, Issue 9, pp. 1058–1070). <https://doi.org/10.1161/CIRCRESAHA.110.223545>
- Gill, S. E., & Parks, W. C. (2008). Metalloproteinases and their inhibitors: Regulators of wound healing. In *International Journal of Biochemistry and Cell Biology* (Vol. 40, Issues 6–7, pp. 1334–1347). <https://doi.org/10.1016/j.biocel.2007.10.024>
- Ginting, C. N., Lister, I. N. E., Girsang, E., Widowati, W., Yusepany, D. T., Azizah, A. M., & Kusuma, H. S. W. (2021). Hepatotoxicity prevention in Acetaminophen-induced HepG2 cells by red betel (Piper crocatum Ruiz and Pav) extract from Indonesia via antioxidant, anti-inflammatory, and anti-necrotic. *Heliyon*, 7(1). <https://doi.org/10.1016/j.heliyon.2020.e05620>
- Gould, L., & Li, W. W. (2019). Defining complete wound closure: closing the gap in clinical trials and practice. *Wound Repair and Regeneration*, 27(3), 201–224. <https://doi.org/10.1111/wrr.12707>
- Goulding, V. (2015). The effects of diabetes on collagen within wound healing. *The Diabetic Foot Journal*, 18(2), 75–80.
- Gu, Y., Mohammad, I. S., & Liu, Z. (2020). Overview of the STAT-3 signaling pathway in cancer and the development of specific inhibitors (Review). *Oncology Letters*, 19(4),

- Gumel, A. M., Razaif-Mazinah, M. R. M., Anis, S. N. S., & Annuar, M. S. M. (2015). Poly (3-hydroxyalkanoates)-co-(6-hydroxyhexanoate) hydrogel promotes angiogenesis and collagen deposition during cutaneous wound healing in rats. *Biomedical Materials*, 10(4). <https://iopscience.iop.org/article/10.1088/1748-6041/10/4/045001/meta>
- Guo, S., & Dipietro, L. A. (2010). Factors affecting wound healing. *Journal of Dental Research*, 89(3), 219–229. <https://doi.org/10.1177/0022034509359125>
- Han, Y. P., Tuan, T. L., Wu, H., Hughes, M., & Garner, W. L. (2001). TNF-alpha stimulates activation of pro-MMP2 in human skin through NF-(kappa)B mediated induction of MT1-MMP. *Journal of Cell Science*, 114(Pt 1), 131–139. <https://doi.org/10.1016/j.bbi.2008.05.010>
- Harding, K. G., Moore, K., & Phillips, T. J. (2005). Wound chronicity and fibroblast senescence--implications for treatment. *International Wound Journal*, 2(4), 364–368. <https://doi.org/10.1111/j.1742-4801.2005.00149.x>
- Hartini, Y. S., Widyarini, S., & Nugroho, L. H. (2018). The comparison of two neolignans isolated from red betel leaf and its extract against macrophage phagocytic activity, the level of AST, and histopathological features of the liver in mice. *Oriental Pharmacy and Experimental Medicine*, 18(4), 325–333. <https://doi.org/10.1007/s13596-018-0326-x>
- Helgason, C. D., Miller, C. L., & Helgason, C. D. (2005). *Basil cell culture protocols* (3rd ed., Vol. 290). Humana Press.
- Hendryani, R., Lutfi, M., & Hawa, L. C. (2015). Antioxidant extraction from dried red Betel Leaf (*Piper crocatum*) using Ultrasonic Assisted Extraction as pre-treatment (study comparative of solvent and extraction time). *Jurnal Bioproses Komoditas Tropis*, 3(2), 33–38. <https://www.jbkt.ub.ac.id/index.php/jbkt/article/view/178/162>
- Holman, R. R., Paul, S. K., Bethel, M. A., Matthews, D. R., & Neil, H. A. W. (2008). 10-year follow-up of intensive glucose control in type 2 diabetes. *The New England Journal of Medicine*, 359(15), 1577–1589. <https://doi.org/10.1056/NEJMoa0806470>
- Holt, T., & Kumar, S. (2010). *ABC of diabetes* (6th ed.). Wiley-Publishing.
- Hourelid, N. N., Ayuk, S. M., & Abrahamse, H. (2018). Cell adhesion molecules are mediated by photobiomodulation at 660 nm in diabetic wounded fibroblast cells. *Cells*, 7(13), 1–17. <https://doi.org/10.3390/cells7040030>
- Huang, X., Meng, B., Iqbal, J., Ding, B. B., Perry, A. M., Cao, W., Smith, L. M., Bi, C., Jiang, C., Greiner, T. C., Weisenburger, D. D., Rimsza, L., Rosenwald, A., Ott, G., Delabie, J., Campo, E., Braziel, R. M., Gascoyne, R. D., Cook, J. R., ... Fu, K. (2013). Activation of the STAT3 signaling pathway is associated with poor survival in diffuse large B-cell lymphoma treated with R-CHOP. *Journal of Clinical Oncology*, 31(36). <https://doi.org/10.1200/JCO.2012.45.6004>
- Huma, K., Mehboob, K., Rashid, A., & Majeed, A. (2021). A comparative analysis of superoxide dismutase 1 level in diabetics with and without neuropathy. *Journal of the College of Physicians and Surgeons Pakistan* 2021, 31(07), 765–769.
- Hunter, M. V., Lee, D. M., Harris, T. J. C., & Fernandez-Gonzalez, R. (2015). Polarized E-

- International Best Practice. (2014). Best practice guidelines: Wound management. *Wounds International*, 5(2), 27.
- Iraj, B., Khorvash, F., Ebneshahidi, A., & Askari, G. (2013). Prevention of diabetic foot ulcer. *International Journal of Preventive Medicine*, 4(3), 373–376.
- Jelinek, H. F., Osman, W. M., Khandoker, A. H., Khalaf, K., Lee, S., Almahmeed, W., & Alsafar, H. S. (2017). Clinical profiles, comorbidities and complications of type 2 diabetes mellitus in patients from United Arab Emirates. *BMJ Open Diabetes Research & Care*, 5(1), e000427. <https://doi.org/10.1136/bmjdr-2017-000427>
- Jeon, B. J., Choi, H. J., Kang, J. S., Tak, M. S., & Park, E. S. (2017). Comparison of five systems of classification of diabetic foot ulcers and predictive factors for amputation. *International Wound Journal*, 14(3), 537–545. <https://doi.org/10.1111/iwj.12642>
- Jiang, D., de Vries, J. C., Muschhammer, J., Schatz, S., Ye, H., Hein, T., Fidan, M., Romanov, V. S., Rinkevich, Y., & Scharffetter-Kochanek, K. (2020). Local and transient inhibition of p21 expression ameliorates age-related delayed wound healing. *Wound Repair and Regeneration*, 28(1), 49–60. <https://doi.org/10.1111/wrr.12763>
- Jiang, Y., Zhang, G., Yan, D., Yang, H., Ye, Z., & Ma, T. (2017). Bioactivity-guided fractionation of the traditional Chinese medicine Resina draconis reveals loureirin B as a PAI-1 inhibitor. *Evidence-Based Complementary and Alternative Medicine*, 2017, 1–8. <https://doi.org/10.1155/2017/9425963>
- Joshi, M. S., Williams, D., Horlock, D., Samarasinghe, T., Andrews, K. L., Jefferis, A.-M., Berger, P. J., Chin-Dusting, J. P., & Kaye, D. M. (2015). Role of mitochondrial dysfunction in hyperglycaemia-induced coronary microvascular dysfunction: Protective role of resveratrol. *Diabetes and Vascular Disease Research*, 1–9. <https://doi.org/10.1177/1479164114565629>
- Juliantina, F., Citra, D. A., Nirwani, B., Nurmasitoh, T., Bowo, E. T., & Gnijk. (2008). Bakteri gram positif dan gram negatif. *Jurnal Kedokteran Dan Kesehatan Indonesia*, 10, 10.
- Junker, J. P. E., Kamel, R. A., Caterson, E. J., & Eriksson, E. (2013). Clinical impact upon wound healing and inflammation in moist, wet, and dry environments. *Advances in Wound Care*, 2(7), 348–356. <https://doi.org/10.1089/wound.2012.0412>
- Kakudo, N., Minakata, T., Mitsui, T., Kushida, S., Notodihardjo, F. Z., & Kusumoto, K. (2008). Proliferation-promoting effect of platelet-rich plasma on human adipose-derived stem cells and human dermal fibroblasts. *Plastic and Reconstructive Surgery*, 122(5), 1352–1360. <https://doi.org/10.1097/PRS.0b013e3181882046>
- Kaur, S., Pandhi, P., & Dutta, P. (2011). Painful diabetic neuropathy: An update. *Annals of Neurosciences*, 18(4), 168–175. <https://doi.org/10.5214/ans.0972.7531.1118409>
- Kavitha, K. V. (2014). Choice of wound care in diabetic foot ulcer: A practical approach. *World Journal of Diabetes*, 5(4), 546. <https://doi.org/10.4239/wjd.v5.i4.546>
- Kelly, A. (2020). *Endocrinology and metabolism clinics of North America*. Elsevier. [https://doi.org/10.1016/S0889-8529\(20\)30051-7](https://doi.org/10.1016/S0889-8529(20)30051-7)

Kendran, A. A. S., Gelgel, K. T. P., Pertiwi, N. W. L., Anthara, M. S., Dharmayuda, A. A. G. O., & Anggreni, L. D. (2013). Toxicity of red betel extract in diabetic white red. *Jurnal Veteriner*, 14(4), 527–533.

Keshri, G. K., Gupta, A., Yadav, A., Sharma, S. K., & Singh, S. B. (2016). Photobiomodulation with pulsed and continuous wave near-infrared laser (810 nm, Al-Ga-As) augments dermal wound healing in immunosuppressed rats. *PLoS ONE*, 11(11), 1–21. <https://doi.org/10.1371/journal.pone.0166705>

Khanna, S., Biswas, S., Shang, Y., Collard, E., Azad, A., Kauh, C., Bhasker, V., Gordillo, G. M., Sen, C. K., & Roy, S. (2010). Macrophage dysfunction impairs resolution of inflammation in the wounds of diabetic mice. *PLoS ONE*, 5(3). <https://doi.org/10.1371/journal.pone.0009539>

Kim, H., Anggradita, L. D., Lee, S. J., Hur, S. S., Bae, J., Hwang, N. S. Y., Nam, S. M., & Hwang, Y. (2021). Ameliorating fibrotic phenotypes of keloid dermal fibroblasts through an epidermal growth factor-mediated extracellular matrix remodeling. *International Journal of Molecular Sciences*, 22(4), 1–17. <https://doi.org/10.3390/ijms22042198>

Kim, I. Y., Yong, H. Y., Kang, K. W., & Moon, A. (2009). Overexpression of ErbB2 induces invasion of MCF10A human breast epithelial cells via MMP-9. *Cancer Letters*, 275(2), 227–233. <https://doi.org/10.1016/j.canlet.2008.10.013>

Ko, K. S., Arora, P. D., Bhide, V., Chen, A., & McCulloch, C. A. G. (2001). Cell-cell adhesion in human fibroblasts requires calcium signaling. *Journal of Cell Science*, 114(6), 1155–1167. <https://doi.org/10.1242/jcs.114.6.1155>

Kumar, S., & Pandey, A. K. (2013). Chemistry and biological activities of flavonoids: an overview. *The Scientific World Journal*, 2013, 1–16. <https://doi.org/10.1155/2013/162750>

Kurahashi, T., & Fujii, J. (2015). Roles of antioxidative enzymes in wound healing. *Journal of Developmental Biology*, 3, 57–70. <https://doi.org/10.3390/jdb3020057>

Kusuma, S., Mita, S., & Mutiara, A. (2017). Antimicrobial lotion containing red Piper betle leaf (*Piper crocatum* Ruiz and Pav) ethanolic extract for topical application. *National Journal of Physiology, Pharmacy and Pharmacology*, 8(1), 1. <https://doi.org/10.5455/njppp.2018.8.1042115112017>

Kuwahara, M., Hatoko, M., Tada, H., & Tanaka, A. (2001). E-cadherin expression in wound healing of mouse skin. *Journal of Cutaneous Pathology*, 28, 191–199. <https://doi.org/10.1034/j.1600-0560.2001.028004191.x>

Laksmitawati, D. R., Widyastuti, A., Karami, N., Afifah, E., Rihibiha, D. D., Nufus, H. H., & Widowati, W. (2017). Anti-inflammatory effects of *Anredera cordifolia* and piper crocatum extracts on lipopolysaccharide-stimulated macrophage cell line. *Bangladesh Journal of Pharmacology*, 12(1), 35–40. <https://doi.org/10.3329/bjp.v12i1.28714>

Landén, N. X., Li, D., & Ståhle, M. (2016). Transition from inflammation to proliferation: a critical step during wound healing. In *Cellular and Molecular Life Sciences* (Vol. 73, Issue 20, pp. 3861–3885). <https://doi.org/10.1007/s00018-016-2268-0>

Lee, Y. J., Cho, H. N., Soh, J. W., Jhon, G. J., Cho, C. K., Chung, H. Y., Bae, S., Lee, S. J., & Lee, Y. S. (2003). Oxidative stress-induced apoptosis is mediated by ERK1/2

- Li, H. X., Widowati, W., Azis, R., Yangg, S. Y., Kim, Y. H., & Li, W. (2019). Chemical constituents of the Piper crocatum leaves and their chemotaxonomic significance. *Biochemical Systematics and Ecology*, 86(March), 103905. <https://doi.org/10.1016/j.bse.2019.05.013>
- Li, J., Chou, H., Li, L., Li, H., & Cui, Z. (2020). Wound healing activity of neferine in experimental diabetic rats through the inhibition of inflammatory cytokines and nrf-2 pathway. *Artificial Cells, Nanomedicine, and Biotechnology*, 48(1), 96–106. <https://doi.org/10.1080/21691401.2019.1699814>
- Li, M. O., Wan, Y. Y., Sanjabi, S., Robertson, A.-K. L., & Flavell, R. a. (2006). Transforming growth factor-beta regulation of immune responses. *Annual Review of Immunology*, 24, 99–146. <https://doi.org/10.1146/annurev.immunol.24.021605.090737>
- Li, Z., Guo, S., Yao, F., Zhang, Y., & Li, T. (2013). Increased ratio of serum matrix metalloproteinase-9 against TIMP-1 predicts poor wound healing in diabetic foot ulcers. *Journal of Diabetes and Its Complications*, 27(4), 380–382. <https://doi.org/10.1016/j.jdiacomp.2012.12.007>
- Liang, G., Ding, M., Lu, H., Cao, N., Niu, Y., Gao, Y., & Lu, J. (2015). Metformin upregulates E-cadherin and inhibits B16F10 cell motility, invasion and migration. *Oncology Letters*, 10(3), 1527–1532. <https://doi.org/10.3892/ol.2015.3475>
- Lister, I. N. E., Ginting, C. N., Girsang, E., Nataya, E. D., Azizah, A. M., & Widowati, W. (2020). Hepatoprotective properties of red betel (Piper crocatum Ruiz and Pav) leaves extract towards H2O2-induced HepG2 cells via anti-inflammatory, antinecrotic, antioxidant potency. *Saudi Pharmaceutical Journal*, 28(10), 1182–1189. <https://doi.org/10.1016/j.jsps.2020.08.007>
- Lodhi, S., & Singhai, A. K. (2013). Wound healing effect of flavonoid rich fraction and luteolin isolated from Martynia annua Linn. on streptozotocin induced diabetic rats. *Asian Pacific Journal of Tropical Medicine*, 6(4), 253–259. [https://doi.org/10.1016/S1995-7645\(13\)60053-X](https://doi.org/10.1016/S1995-7645(13)60053-X)
- Lodovici, M., Bigagli, E., Luceri, C., Mannucci, E., Rotella, C. M., & Raimondi, L. (2015). Gender-related drug effect on several markers of oxidation stress in diabetes patients with and without complications. *European Journal of Pharmacology*, 766(2015), 86–90. <https://doi.org/10.1016/j.ejphar.2015.09.041>
- Luis Herrera, Y. M.-M. (2013). Histological and transcriptional expression differences between diabetic foot and pressure ulcers. *Journal of Diabetes & Metabolism*, 04(8). <https://doi.org/10.4172/2155-6156.1000296>
- Maître, J. L., & Heisenberg, C. P. (2013). Three functions of cadherins in cell adhesion. *Current Biology*, 23(14), 626–633. <https://doi.org/10.1016/j.cub.2013.06.019>
- Malini, D. M., Madinah, M., Kamilawati, F., Ratningsih, N., Alipin, K., & Iskandar, J. (2017). Topical treatment of ointment containing ethanol extract of Archidendron pauciflorum fruit peel on the wound healing in streptozotocin-induced diabetic mice. *Nusantara Bioscience*, 9(3), 306–311. <https://doi.org/10.13057/nusbiosci/n090311>

- Malviya, N., Col-, S., & Malviya, S. (2017). Bioassay guided fractionation-an emerging technique influence the isolation, identification and characterization of lead phytomolecules. *International Journal of Hospital Pharmacy (IJHP) Review IJHP*, 11(15), 1–6.
- Martinelli-Kläy, C. P., Lunardi, L. O., Martinelli, C. R., Lombardi, T., Soares, E. G., & Martinelli, C. (2014). Modulation of MCP-1, TGF-B1, and A-SMA expressions in granulation tissue of cutaneous wounds treated with local vitamin B complex: An experimental study. *Dermatopathology*, 1(2), 98–107. <https://doi.org/10.1159/000369163>
- Matsuyoshi, N., & Imamura, S. (1997). Multiple cadherins are expressed in human fibroblasts. *Biochemical and Biophysical Research Communications*, 235(2), 355–358. <https://doi.org/10.1006/bbrc.1997.6707>
- Matthijs Blankesteijn, W. (2015). Has the search for a marker of activated fibroblasts finally come to an end? *Journal of Molecular and Cellular Cardiology*, 88, 120–123. <https://doi.org/10.1016/j.yjmcc.2015.10.005>
- McCaffrey, R., & Reinoso, H. (2016). Transformational leadership. *Jouyrnal of Holistic Nursing*, XX(X), 1–8. <https://doi.org/10.1177/0898010116685242>
- McCormack, J. P., Allan, G. M., & Virani, A. S. (2011). Is bigger better? An argument for very low starting doses. *Cmaj*, 183(1), 65–69. <https://doi.org/10.1503/cmaj.091481>
- McCulloch, David, M. (2015). Clinical presentation and diagnosis of diabetes mellitus in adults. *UptoDate*, 1–14.
- Mensah, A. Y., Sampson, J., Houghton, P. J., Hylands, P. J., Westbrook, J., Dunn, M., Hughes, M. A., & Cherry, G. W. (2001). Effects of Buddleja globosa leaf and its constituents relevant to wound healing. *Journal of Ethnopharmacology*. [https://doi.org/10.1016/S0378-8741\(01\)00297-5](https://doi.org/10.1016/S0378-8741(01)00297-5)
- Mercut, R., Clurea, M., Mărgăritescu, C., Popescu, S., Crăitoiu, M., Cotoi, O., & Voinescu, D. (2014). Expression of p53, D2-40 and α -smooth muscle actin in different histological subtypes of facial basal cell carcinoma. *Romanian Journal of Morphology and Embryology = Revue Roumaine de Morphologie et Embryologie.*, 55(2), 263–272. <http://europepmc.org/article/med/24969973>
- Mirza, R., & Koh, T. J. (2011). Dysregulation of monocyte/macrophage phenotype in wounds of diabetic mice. *Cytokine*, 56(2), 256–264. <https://doi.org/10.1016/j.cyto.2011.06.016>
- Mohammed, S. I., Mikhael, E. M., Ahmed, F. T., Al-Tukmagi, H. F., & Jasim, A. L. (2016). Risk factors for occurrence and recurrence of diabetic foot ulcers among Iraqi diabetic patients. *Diabetic Foot and Ankle*, 7(May 2017). <https://doi.org/10.3402/dfa.v7.29605>
- Muhammad, A. A., Pauzi, N. A. S., Arulselvan, P., Abas, F., & Fakurazi, S. (2013). In vitro wound healing potential and identification of bioactive compounds from Moringa oleifera Lam. *BioMed Research International*. <https://doi.org/10.1155/2013/974580>
- Mulia, K., Hasan, A. E. Z., & Suryani. (2016). Total phenolic , anticancer and antioxidant activity of ethanol extract of Piper retrofractum Vahl from Pamekasan and Karang Asem. *Current Biochemistry*, 3(2), 80–90. <https://jurnal.ipb.ac.id/index.php/cbj/article/view/18239>

- Muralidhar, A., & Babu, K. (2013). Wound healing activity of flavonoid fraction isolated from the stem bark of *Butea monosperma* (Lam) in albino wistar rats. In *European Journal of Experimental Biology* (Vol. 3, Issue 6, pp. 1–6).
- Murini, T., Wahyuningsih, M. S. H., Satoto, T. B. T., Fudholi, A., & Hanafi, M. (2018). Isolation and identification of naturally occurring larvicidal compound isolated from zingiber zerumbet (L). *Asian Journal of Pharmaceutical and Clinical Research*, 11(2), 189–193. <https://doi.org/10.22159/ajpcr.2018.v11i2.21703>
- Murphy, P. S., & Evans, G. R. D. (2012). Advances in wound healing: A review of current wound healing products. *Plastic Surgery International*, 2012, 1–8. <https://doi.org/10.1155/2012/190436>
- Nagori, B. P., & Solanki, R. (2011). Role of medicinal plants in wound healing. In *Research Journal of Medicinal Plant* (Vol. 5, Issue 4, pp. 392–405). <https://doi.org/10.3923/rjmp.2011.392.405>
- Naibaho, O. H., Yamlean, P. V. Y., & Wiyono, W. (2013). Pengaruh basis salep terhadap formulasi sediaan salep ekstrak daun kemangi (*Ocimum sanctum* L.) pada kulit punggung kelinci yang dibuat infeksi *Staphylococcus aureus*. *Jurnal Ilmiah Farmasi-UNSRAT*, 2(02), 27–34.
- Naruskaitė, D., Vydmantaitė, G., Rusteikaitė, J., Sampath, R., Rudaitytė, A., Stašytė, G., Aparicio Calvente, M. I., & Jekabsone, A. (2021). Extracellular vesicles in skin wound healing. *Pharmaceuticals*, 14(8), 811. <https://doi.org/10.3390/ph14080811>
- Nasi, L. S., Kairupan, C. F., & Lintong, P. M. (2015). Efek daun sirih merah (*Piper Crocatum*) terhadap kadar gula darah dan gambaran morfologi endokrin pankreas tikus wistar (*Rattus Novergicus*). *Jurnal E-Biomedik (EBm)*, 3(3), 821–826. <https://ejournal.unsrat.ac.id/index.php/ebiomedik/article/view/10151/9737>
- Nathan, D. M., Cleary, P. A., Backlund, J.-Y. C., Genuth, S. M., Lachin, J. M., Orchard, T. J., Raskin, P., & Zinman, B. (2005). Intensive diabetes treatment and cardiovascular disease in patients with type 1 diabetes. *The New England Journal of Medicine*, 353(25), 2643–2653. <https://doi.org/10.1056/NEJMoa052187>
- Nathan, D. M., & Wolfsdorf, J. I. (2016). Classification of diabetes mellitus and genetic diabetic syndromes. *UpToDate*, 2, 24. <https://doi.org/http://www.uptodate.com/contents/classification-of-diabetes-mellitus-and-genetic-diabetic-syndromes>
- Nguyen, P. D., Tutela, J. P., Thanik, V. D., Knobel, D., Allen, R. J., Chang, C. C., Levine, J. P., Warren, S. M., & Saadeh, P. B. (2010). Improved diabetic wound healing through topical silencing of p53 is associated with augmented vasculogenic mediators. *Wound Repair and Regeneration*, 18(6), 553–559. <https://doi.org/10.1111/j.1524-475X.2010.00638.x>
- Noor, S., Zubair, M., & Ahmad, J. (2015). Diabetic foot ulcer - A review on pathophysiology, classification and microbial etiology. In *Diabetes and Metabolic Syndrome: Clinical Research and Reviews* (Vol. 9, Issue 3, pp. 192–199). <https://doi.org/10.1016/j.dsx.2015.04.007>
- Olczyk, P., Mencner, Ł., & Komosinska-Vassev, K. (2014). The role of the extracellular matrix

- Orasanu, G., & Plutzky, J. (2009). The pathologic continuum of diabetic vascular disease. In *Journal of the American College of Cardiology* (Vol. 53, Issue 5 SUPPL.).
<https://doi.org/10.1016/j.jacc.2008.09.055>
- Ozaki, T., & Nakagawara, A. (2011). Role of p53 in cell death and human cancers. *Cancers*, 3(1), 994–1013. <https://doi.org/10.3390/cancers3010994>
- Ozougwu, J., Obimba, K., Belonwu, C., & Unakalamba, C. (2013). The pathogenesis and pathophysiology of type 1 and type 2 diabetes mellitus. *Journal of Physiology and Pathophysiology*, 4(4), 46–57. <https://doi.org/10.5897/JPAP2013.0001>
- Palmer, A. K., Tchkonina, T., LeBrasseur, N. K., Chini, E. N., Xu, M., & Kirkland, J. L. (2015). Cellular senescence in type 2 diabetes: A therapeutic opportunity. *Diabetes*, 64(7), 2289–2298. <https://doi.org/10.2337/db14-1820>
- Paloma, E., Ovidio, C., Jessica, R., Francisca, S. A., Isabel, M., & Maravillas, G. (2014). Phytotherapy management: a new intervention for Nursing Intervention Classification. *Holistic Nursing Practice*, 28(6), 381–385. <https://doi.org/10.1097/HNP.0000000000000053>
- Pan, S. C., Li, C. Y., Kuo, C. Y., Kuo, Y. Z., Fang, W. Y., Huang, Y. H., Hsieh, T. C., Kao, H. Y., Kuo, Y., Kang, Y. R., Tsai, W. C., Tsai, S. T., & Wu, L. W. (2018). The p53-S100A2 positive feedback loop negatively regulates epithelialization in cutaneous wound healing. *Scientific Reports*, 8(1), 1–12. <https://doi.org/10.1038/s41598-018-23697-5>
- Pang, L., Wang, Y., Zheng, M., Wang, Q., Lin, H., Zhang, L., & Wu, L. (2016). Transcriptomic study of high-glucose effects on human skin fibroblast cells. *Molecular Medicine Reports*, 2016, 2627–2634. <https://doi.org/10.3892/mmr.2016.4822>
- Pang, Y., Wang, D., Hu, X., Wang, H., Fu, W., Fan, Z., Chen, X., & Yu, F. (2014). Effect of volatile oil from *Blumea Balsamifera* (L.) DC. leaves on wound healing in mice. *Journal of Traditional Chinese Medicine*, 34(6), 716–724.
- Papathanasiou, I. V., & Kourkouta, L. (2013). Holistic nursing care: theories and perspectives. *American Journal of Nursing Science*, 2(1), 1. <https://doi.org/10.11648/j.ajns.20130201.11>
- Park, J. H., Elpers, C., Reunert, J., McCormick, M. L., Mohr, J., Biskup, S., Schwartz, O., Rust, S., Grüneberg, M., Seelhöfer, A., Schara, U., Boltshauser, E., Spitz, D. R., & Marquardt, T. (2019). SOD1 deficiency: A novel syndrome distinct from amyotrophic lateral sclerosis. *Brain*, 142(8), 2230–2237. <https://doi.org/10.1093/brain/awz182>
- Patrick E Simon. (2014). *Skin Wound Healing: Overview, Hemostasis, Inflammatory Phase* (pp. 1–8).
- Permadi, T., Widjiastuti, I., & Setyabudi. (2016). Biocompatibility of Red Betel Leaf extract (Piper crocatum) and 0,2 Chlorhexidine Gluconat toward BHK-21 fibroblast. *Conservative Dentistry Journal*, 4(1), 6–11. https://www.researchgate.net/profile/Ira_Widjiastuti3/publication/311843495_Biocompatibility_of_Red_Betel_Leaf_extract_Piper_crocatum_and_02_Chlorhexidine_Gluconat_

- Peteva, R. (2016). A cross section of nursing research: Journal articles for discussion and evaluation. In *A Cross Section of Nursing Research: Journal Articles for Discussion and Evaluation* (6th ed.). Roudledge. <https://doi.org/10.4324/9781315266862>
- Pradhan, L., Cai, X., Wu, S., Andersen, N. D., Martin, M., Malek, J., Guthrie, P., Veves, A., & Logerfo, F. W. (2011). Gene expression of pro-inflammatory cytokines and neuropeptides in diabetic wound healing. *Journal of Surgical Research*, 167(2), 336–342. <https://doi.org/10.1016/j.jss.2009.09.012>
- Prayitno, S. A., Kusnadi, J. K., & Murtini, E. S. (2018). Karakteristik (total flavonoid, total fenol, aktivitas antioksidan) ekstrak serbuk daun sirih merah (Piper crocatum Ruiz & Pav.). *Foodscitech*, 1(2), 26. <https://doi.org/10.25139/fst.v1i2.1355>
- Puspita, P. J., Safithri, M., & Sugiharti, N. P. (2019). Antibacterial activities of sirih merah (Piper crocatum) leaf extracts. *Current Biochemistry*, 5(3), 1–10. <http://biokimia.ipb.ac.id>
- Putra, A., Alif, I., Hamra, N., Santosa, O., Kustiyah, A., Muhar, A., & Lukman, K. (2020). MSC-released TGF- β regulate α SMA expression of myofibroblast during wound healing. *Journal Stem Cells and Regenerative Medicine*, 16(2), 73–79. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7772809/pdf/jsrm_16_73.pdf
- Qu, J., Cheng, T., Shi, C., Lin, Y., & Ran, X. (2004). A study on the activity of fibroblast cells in connection with tissue recovery in the wounds of skin injury after whole-body irradiation. *J Radiat Res (Tokyo)*, 45(2), 341–344. [https://doi.org/JST.JSTAGE/jrr/45.341\[pil\]](https://doi.org/JST.JSTAGE/jrr/45.341[pil])
- Rafehi, H., El-Osta, A., & Karagiannis, T. C. (2012). Epigenetic mechanisms in the pathogenesis of diabetic foot ulcers. *Journal of Diabetes and Its Complications*, 26(6), 554–561. <https://doi.org/10.1016/j.jdiacomp.2012.05.015>
- Reinke, J. M., & Sorg, H. (2012). Wound repair and regeneration. *European Surgical Research*, 49(1), 35–43. <https://doi.org/10.1159/000339613>
- Rinanda, T., Zulfitri, & Alga, D. M. (2012). Antibacterial activity of red betel (Piper crocatum) leaf methanolic extracts against methicillin resistant Staphylococcus aureus. In Z. A. Muchlisin, Darmawi, & Supardan (Eds.), *Proceedings of The 2nd Annual International Conference Syiah Kuala University 2012 & The 8th IMT-GT Uninet Biosciences Conference* (Vol. 2, Issue 1, pp. 22–24). Universitas Syiah Kuala. <http://www.jurnal.unsyiah.ac.id/AICS-SciEng/article/view/1781/1678>
- Rizzi, E. S., Dourado, D. M., Matias, R., Muller, J. A. I., Guilhermino, J. F., Guerrero, A. T. G., Moreira, D. L., Silva, B. A. K., & Barbosa-Ferreira, M. (2017). Potencial cicatrizante da pomada de Sebastiania hispida (mart.) pax (euphorbiaceae) comparado ao laser de baixa potência. *Brazilian Journal of Biology*, 77(3), 480–489. <https://doi.org/10.1590/1519-6984.16115>
- Rodrigues, M., Kosaric, N., Bonham, C. A., & Gurtner, G. C. (2019). Wound healing: A cellular perspective. *Physiological Reviews*, 99(1), 665–706. <https://doi.org/10.1152/physrev.00067.2017>

- Sa, Y., Li, C., Li, H., & Guo, H. (2015). TIMP-1 induces α -smooth muscle actin in fibroblasts to promote urethral scar formation. *Cellular Physiology and Biochemistry*, 35(6), 2233–2243. <https://doi.org/10.1159/000374028>
- Safithri, M., & Fahma, F. (2008). Potency of Piper crocatum decoction as an antihyperglycemia in rat strain Sprague dawley. *Institut Pertanian Bogor*, 15(1), 45–48. <https://doi.org/10.4308/hjb.15.1.45>
- Sahoo, N., Manchikanti, P., & Dey, S. (2010). Herbal drugs: Standards and regulation. In *Fitoterapia* (Vol. 81, Issue 6, pp. 462–471). <https://doi.org/10.1016/j.fitote.2010.02.001>
- Santos, C. G., Nascimento, M. F., Oliveira, C. R., Melo, G. C., Cardoso, J. C., Padilha, F. F., Lima, S. O., & Albuquerque-Junior, R. L. (2013). Bioassay-guided evaluation of wound healing effect of fatty acids-incorporated collagen-based films. *Acta Cir Bras*, 28(5), 346–352. <https://doi.org/10.1590/S0102-86502013000500005>
- Saputra, M. R., Yuniarti, E., & Sumarmin, R. (2018a). Pengaruh ekstrak daun sirih merah (Piper crocatum Ruiz & Pav.) terhadap glukosa darah mencit (Mus musculus L.) jantan yang diinduksi sukrosa. *EKSAKTA*, 19(1). <https://ocs.unud.ac.id/index.php/buletinvet/article/view/8899/6693>
- Saputra, M. R., Yuniarti, E., & Sumarmin, R. (2018b). Pengaruh ekstrak daun sirih merah (Piper Crocatum Ruiz & Pav.) terhadap glukosa darah mencit (Mus Musculus L.) jantan yang diinduksi sukrosa. *EKSAKTA*, 19(1), 43–55. <http://eksakta.pppj.unp.ac.id/index.php/eksakta/article/view/124>
- Scanlon, V. M., Teixeira, A. M., Tyagi, T., Zou, S., Zhang, P. X., Booth, C. J., Kowalska, M. A., Bao, J., Hwa, J., Hayes, V., Marks, M. S., Poncz, M., & Krause, D. S. (2019). Epithelial (E)-cadherin is a novel mediator of platelet aggregation and clot stability. *Thrombosis and Haemostasis*, 119(5), 744–757. <https://doi.org/10.1055/s-0039-1679908>
- Schreml, S., Szeimies, R.-M., Prantl, L., Landthaler, M., & Babilas, P. (2010). Wound healing in the 21st century. *Journal of the American Academy of Dermatology*, 63(5), 866–881. <https://doi.org/10.1016/j.jaad.2009.10.048>
- Serra, R., Grande, R., Buffone, G., Molinari, V., Perri, P., Perri, A., Amato, B., Colosimo, M., & de Francis, S. (2016). Extracellular matrix assessment of infected chronic venous leg ulcers: Role of metalloproteinases and inflammatory cytokines. *International Wound Journal*, 13(1), 53–58. <https://doi.org/10.1111/iwj.12225>
- Setyowati, E. N. U. R. (2009). *Studi komparatif komponen kimia penyusun minyak atsiri daun sirih merah, sirih hijau, lada dan kemukus*. Universitas Sebelas Maret.
- Sharififar, F., Dehghn-nudeh, G., & Mirtajaldini, M. (2009). Major flavonoids with antioxidant activity from Teucrium polium L. *Food Chemistry*, 112, 885–888. <https://doi.org/10.1016/j.foodchem.2008.06.064>
- Sharma, Yoges, Jeyabalan, G., & Singh, R. (2013). Potential wound healing agents from medicinal plants: A review. *Pharmacologia*, 4(5), 349358. <https://doi.org/10.5567/pharmacologia.2013.349.358>
- Sharma, Yogesh, Jeyabalan, G., & Singh, R. (2013). Potential wound healing agents from medicinal plants: A review. In *Pharmacologia* (Vol. 4, Issue 5, pp. 349–358).

- Shavandi, A., Bekhit, A. E. D. A., Saeedi, P., Izadifar, Z., Bekhit, A. A., & Khademhosseini, A. (2018). Polyphenol uses in biomaterials engineering. *Biomaterials*, 167, 91–106. <https://doi.org/10.1016/j.biomaterials.2018.03.018>
- Sherma, J., & Waksmundzka-Hajnos, M. (2010). High performance liquid chromatography in phytochemical analysis. In *Chromatographic Science Series* (Vol. 8).
- Shinde, A. V., Humeres, C., & Frangogiannis, N. G. (2017). The role of α -smooth muscle actin in fibroblast-mediated matrix contraction and remodeling. *Arti. Biochim Biophys Acta*, 1863(1), 298–309. <https://doi.org/10.1016/j.bbadis.2016.11.006>
- Shinta, D. Y., & Sudyanto. (2016). Pemberian air rebusan daun sirih merah (Piper crocatum Ruiz & Pav) terhadap kadar glukosa dan kolesterol. *Journal of Sainstek*, 8(2), 180–185. <http://ecampus.iainbatusangkar.ac.id/ojs/index.php/sainstek/article/view/480/485>
- Siagian, N. A., Wahyuni, E. S., Ariani, P., & Manalu', A. B. (2020). The effect of giving red betel leaves (Piper crocatum) on healing of perineum woes in postpartum women in Desa Tanjung Jati Kecamatan Binjai Kabupaten Langkat. *Journal of Community Health*, 6(3), 255–259.
- Singh, A., Singh, P. K., & Singh, R. K. (2014). Antidiabetic and wound healing activity of *Catharanthus roseus* L. in streptozotocin-induced diabetic mice. *American Journal of Phytomedicine and Clinical Therapeutics*, 2(6). www.ajpct.org
- Singh, S., Young, A., & McNaught, C. E. (2017). The physiology of wound healing. In *Surgery (United Kingdom)* (Vol. 35, Issue 9, pp. 473–477). <https://doi.org/10.1016/j.mpsur.2017.06.004>
- Singh, Y., Salker, M. S., & Lang, F. (2021). Green tea polyphenol-sensitive calcium signaling in immune T cell function. *Frontiers in Nutrition*, 7(January), 1–10. <https://doi.org/10.3389/fnut.2020.616934>
- Smith, R. G. (2003). Validation of Wagner's classification: a literature review. *Ostomy/Wound Management*, 49(1), 54–62.
- Snyder, R. J., Driver, V., Fife, C. E., Lantis, J., Peirce, B., Serena, T., & Weir, D. (2011). Using a diagnostic tool to identify elevated protease activity levels in chronic and stalled wounds: a consensus panel discussion. *Ostomy/Wound Management*, 57(12), 36–46.
- Soni, H., & Singhai, A. K. (2012). A recent update of botanicals for wound healing activity. *International Research Journal of Pharmacy*, 3(7), 1–7.
- Sood, S., Mohd. Yussof, S., Omar, E., & Pai, D. (2012). Cellular events and biomarkers of wound healing. *Indian Journal of Plastic Surgery*, 45(2), 220. <https://doi.org/10.4103/0970-0358.101282>
- Sorg, H., Tilkorn, D. J., Hager, S., Hauser, J., & Mirastschijski, U. (2017). Skin wound healing: An update on the current knowledge and concepts. *European Surgical Research*, 58(1–2), 81–94. <https://doi.org/10.1159/000454919>
- Spange, S., Wagner, T., Heinzl, T., & Krämer, O. H. (2009). Acetylation of non-histone proteins modulates cellular signalling at multiple levels. In *International Journal of*

- Spichler, A., Hurwitz, B. L., Armstrong, D. G., & Lipsky, B. A. (2015). Microbiology of diabetic foot infections: From Louis Pasteur to “crime scene investigation.” *BMC Medicine*, 13(1). <https://doi.org/10.1186/s12916-014-0232-0>
- Stahura, F., & Bajorath, J. (2005). Partitioning methods for the identification of active molecules. *Current Medicinal Chemistry*, 10(8), 707–715. <https://doi.org/10.2174/0929867033457881>
- Stipcevic, T., Piljac, J., & Berghe, D. Vanden. (2006). Effect of different flavonoids on collagen synthesis in human fibroblasts. *Plant Foods for Human Nutrition*, 61(1), 29–34. <https://doi.org/10.1007/s11130-006-0006-8>
- Stojadinovic, O., Pastar, I., Gordon, K. A., & Tomic-Canik, M. (2012). *The diabetic foot: medical and surgical management* (G. J. Veves A (ed.); 3rd ed.). Humana Press.
- Sukmana, M., Nopriyanto, D., & Alhawaris. (2020). Irrigation of wounds with Red betel 20% And 40% to bacterial numbers in diabetic foot infection (DFI) patients. *Journal Of Nursing Practice*, 4(1), 51–60. <https://doi.org/10.30994/jnp.v4i1.108>
- Surbakti, D., & Sianturi, N. S. (2015). *Analisis komponen kimia dan uji aktifitas antibakteri minyak atsiri daun sirih merah*.
- Suri, M. A., Azizah, Z., & Asra, R. (2019). A review: Traditional use, phytochemical and pharmacological review of red betel leaves (*Piper crocatum Ruiz & Pav*). *Asian Journal of Pharmaceutical Research and Development*, 9(1), 159–163. <http://dx.doi.org/10.22270/ajprd.v9i1.000>
- Sutrisno, S., & Hidayat, D. P. (2018). Efektivitas penggunaan daun jambu biji (*Psidium guajava*) dan daun sirih merah (*Piper crocatum*) terhadap pengontrolan odour (bau) pada pasien dengan luka diabetes mellitus di Fatchul wound care. *The Shine Cahaya Dunia Ners*, 3(1), 11–18. <https://doi.org/10.35720/tscnrs.v3i1.57>
- Syarif, R. A., Wahyuningsih, M. S. H., Mustofa, M., & Ngatidjan, N. (2018). Antiplasmodial and onset speed of growth inhibitory activities of *Tithonia diversifolia* (Hemsley) A Gray leaf fractions against *Plasmodium falciparum*. *Tropical Journal of Pharmaceutical Research*, 17(November), 2213–2218. <https://doi.org/10.4314/tjpr.v17i11.15>
- Tesfaye, S., Boulton, A. J. M., Dyck, P. J., Freeman, R., Horowitz, M., Kempler, P., Lauria, G., Malik, R. A., Spallone, V., Vinik, A., Bernardi, L., Valensi, P., Albers, J. W., Amarenco, G., Anderson, H., Arezzo, J., Backonja, M. M., Biessels, G. J., Bril, V., ... Jones, T. (2010). Diabetic neuropathies: Update on definitions, diagnostic criteria, estimation of severity, and treatments. *Diabetes Care*, 33(10), 2285–2293. <https://doi.org/10.2337/dc10-1303>
- Tombulturk, F. K., Soydas, T., Sarac, E. Y., Tuncdemir, M., Coskunpinar, E., Polat, E., Sirekbasan, S., & Kanigur-Sultuybek, G. (2019). Regulation of MMP 2 and MMP 9 expressions modulated by AP-1 (c-jun) in wound healing: improving role of *Lucilia sericata* in diabetic rats. *Acta Diabetologica*, 56(2), 177–186. <https://doi.org/10.1007/s00592-018-1237-5>

- Tonahi, J. M. M., Nuryanti, S., & Suherman, S. (2014). Antioksidan dari daun sirih merah (Piper Crocatum). *Jurnal Akademika Kimia*, 3(3), 158–164. <http://jurnal.untad.ac.id/jurnal/index.php/JAK/article/view/7796>
- Trindade, L. C. T., Matias, J. E. F., Aio, C. P. P. S., Farias, R. E., & Biondo-Simões, M. D. L. P. (2019). Differentiation of myofibroblasts in wounds after topical use of metronidazole: An experimental study. *Revista Do Colegio Brasileiro de Cirurgioes*, 46(1), 1–11. <https://doi.org/10.1590/0100-6991e-20192015>
- Truong, D., Nguyen, D. H., Anh Ta, N. T., Bui, A. V., Do, T. H., & Nguyen, H. C. (2019). Evaluation of the use of different solvents for phytochemical constituents, antioxidants, and in vitro anti-inflammatory activities of *Severinia buxifolia*. *Journal of Food Quality*, 2019. <https://doi.org/10.1155/2019/8178294>
- Tsourdi, E., Barthel, a, Rietzsch, H., Reichel, a, & Bornstein, S. R. (2013). Current aspects in the pathophysiology and treatment of chronic wounds in diabetes mellitus. *Biomed Res Int*, 2013, 385641. <https://doi.org/10.1155/2013/385641>
- Uccioli, L., Izzo, V., Meloni, M., Vainieri, E., Ruotolo, V., & Giurato, L. (2015). Non-healing foot ulcers in diabetic patients: general and local interfering conditions and management options with advanced wound dressings. *Journal of Wound Care*, 24(4 Suppl), 35–42. <https://doi.org/10.12968/jowc.2015.24.Sup4b.35>
- Ulviani, F., Yusriadi, & Khaerati, K. (2016). The effect of Red Betel leaf extract gel (Piper crocatum Ruiz & Pav) for healing burns in rabbits (*Oryctolagus c*). *GALENKA Journal of Pharmacy*, 2(2), 103–110. <https://doi.org/2442-8744>
- Ungureanu, C., Marchal, L., Aurelia, A., & Foucault, A. (2013). Bioresource Technology Centrifugal partition extraction , a new method for direct metabolites recovery from culture broth : Case study of torularhodin recovery from *Rhodotorula rubra*. *Bioresource Technology*, 132, 406–409. <https://doi.org/10.1016/j.biortech.2012.11.105>
- Van de Vel, E., Sampers, I., & Raes, K. (2017). A review on influencing factors on the minimum inhibitory concentration of essential oils. *Critical Reviews in Food Science and Nutrition*, August, 1–22. <https://doi.org/10.1080/10408398.2017.1371112>
- Van Putte, L., De Schrijver, S., & Moortgat, P. (2016). The effects of advanced glycation end products (AGEs) on dermal wound healing and scar formation: a systematic review. *Scars, Burns & Healing*. <https://doi.org/10.1177/2059513116676828>
- Vande Berg, J. S., & Robson, M. C. (2003). Arresting cell cycles and the effect on wound healing. *Surgical Clinics of North America*, 83(3), 509–520. <https://doi.org/Arresting cell cycles and the effect on wound healing>
- Velnar, T., Bailey, T., & Smrkolj, V. (2009). The wound healing process: an overview of the cellular and molecular mechanisms. *The Journal of International Medical Research*, 37(5), 1528–1542. <https://doi.org/10.1177/147323000903700531>
- Venkatachalam, R. N., Singh, K., & Marar, T. (2012). Phytochemical screening in vitro antioxidant activity of *psidium guajava*. *Free Radicals and Antioxidants*, 2(1), 31–36. <https://doi.org/10.5530/ax.2012.2.7>
- Venter, C., & Niesler, C. U. (2019). Rapid quantification of cellular proliferation and migration

- Verma, S., Gupta, M., Popli, H., & Aggarwal, G. (2018). Diabetes mellitus treatment using herbal drugs. *International Journal of Phytomedicine*, 10(1), 01. <https://doi.org/10.5138/09750185.2181>
- Vlad, A., & Timar, R. (2012). Pathogenesis of type 1 diabetes mellitus: A brief overview. *Romanian Journal of Diabetes, Nutrition and Metabolic Diseases*, 19(1), 67–72. <https://doi.org/10.2478/v10255-012-0009-1>
- Vowden, K., & Vowden, P. (2014). Wound dressings: principles and practice. *Surgery (Oxford)*, 32(9), 462–467. <https://doi.org/10.1016/j.mpsur.2014.07.001>
- Wade, L. (2012). *Organic Chemistry* (8th Editio). Prentice Hall. https://books.google.co.id/books?hl=id&lr=&id=7sa4DwAAQBAJ&oi=fnd&pg=PR19&dq=Organic+Chemistry+8th+ed&ots=hLZM2_QGM8&sig=5UGHB1y0rAV-MdxL71T6buAnnc&redir_esc=y#v=onepage&q=Organic+Chemistry+8th+ed&f=false
- Wahyuningsih, M. S. H., Mubarika, S., Ganjar, I. G., Wahyuono, S., & Takeya, T. (2017). 5 α -Oleandrin reduce Bcl-2 protein and increase Bax protein expression on Hela cervical cancer cell. *Universa Medicina*, 36(2), 102. <https://doi.org/10.18051/UnivMed.2017.v36.102-109>
- Wahyuningsih, M. S. H., Wirohadidjojo, Y. W., Hidayat, R., & Sadid, A. (2015). Antifibrotic effect of standardized ethanol extract of Tithonia diversifolia (Hemsley) A. Gray on keloid fibroblasts. *International Journal of Pharmacognosy and Phytochemical Research*, 7(4), 642–647.
- Wan, R., Weismann, J. P., Grundman, K., Lang, L., Gribowski, G., & Galiano, R. D. (2021). Diabetic wound healing: The impact of diabetes on myofibroblast activity and its potential therapeutic treatments. *The International Journal of Tissue Repair and Regeneration*, 29(4), 573–581. <https://doi.org/10.1111/wrr.12954>
- Wang, Z., & Shi, C. (2020). Cellular senescence is a promising target for chronic wounds : a comprehensive review. *Burns & Trauma*, 8, 1–8. <https://doi.org/10.1093/burnst/tkaa021>
- Watanabe, K., Shibuya, S., Ozawa, Y., Toda, T., & Shimizu, T. (2021). Pathological relationship between intracellular superoxide metabolism and p53 signaling in mice. In *International Journal of Molecular Sciences* (Vol. 22, Issue 7). <https://doi.org/10.3390/ijms22073548>
- Watkins, P. (2005). ABC of diabetes. In *Ethnicity and Disease* (Vol. 15, Issue 4). <https://doi.org/10.1136/bmj.326.7395.924>
- Weller, M. G. (2012). A unifying review of bioassay-guided fractionation, effect-directed analysis and related techniques. *Sensors*, 12, 9181–9209. <https://doi.org/10.3390/s120709181>
- Widjiastuti, I. et al. (2016). Biocompatibility of red betel leaf extract (Piper crocatum) and 0,2 chlorhexidine gluconat toward BHK-21 fibroblast. *Conservative Dentistry Journal*, 4(1), 6–11.
- Wijaya, L., Budiyo, A., & Astuti, I. (2019). Pathogenesis, evaluation, and recent management of diabetic foot ulcer. *Journal of the Medical Sciences*, 51(1), 82–97.

- Wilkinson, H. N., & Hardman, M. J. (2020). Senescence in wound repair: emerging strategies to target chronic healing wounds. *Frontiers in Cell and Developmental Biology*, 8(August), 1–13. <https://doi.org/10.3389/fcell.2020.00773>
- Wu, H., Li, F., Shao, W., Gao, J., & Ling, D. (2019). Promoting angiogenesis in oxidative diabetic wound microenvironment using a nanozyme-reinforced self-protecting hydrogel. *ACS Central Science*, 5(3), 477–485. <https://doi.org/10.1021/acscentsci.8b00850>
- Wu, Z., Zheng, X., Gong, M., & Li, Y. (2016). Myricetin, a potent natural agent for treatment of diabetic skin damage by modulating TIMP/MMPs balance and oxidative stress. *Oncotarget*, 7(44), 71754–71760. <https://doi.org/10.18632/oncotarget.12330>
- Wulandari, N., Meiftasari, A., Fadliyah, H., & Jenie, R. I. (2018). Red Betel leaves methanolic extract (*Piper crocatum* Ruiz & Pav.) increases cytotoxic effect of Doxorubicin on WiDr colon cancer cells through apoptosis induction. *Indonesian Journal of Cancer Chemoprevention*, 9(1), 1. <https://doi.org/10.14499/indonesianjcanchemoprev9iss1pp1-8>
- Wurlina, Meles, D. K., Dewa Putu Anom Adnyana, I., Sasmita, R., & Putri, C. (2019). Biological study of piper crocatum leaves ethanol extract improving the skin histopathology of wistar rat wound infected by staphylococcus aureus. *EurAsian Journal of BioSciences*, 13(1), 219–221.
- Yagihashi, S., Mizukami, H., & Sugimoto, K. (2011). Mechanism of diabetic neuropathy: Where are we now and where to go? *Journal of Diabetes Investigation*, 2(1), 18–32. <https://doi.org/10.1111/j.2040-1124.2010.00070.x>
- Yan, H., Peng, K. J., Wang, Q. L., Gu, Z. Y., Lu, Y. Q., Zhao, J., Xu, F., Liu, Y. L., Tang, Y., Deng, F. M., Zhou, P., Jin, J. G., & Wang, X. C. (2013). Effect of pomegranate peel polyphenol gel on cutaneous wound healing in alloxan-induced diabetic rats. *Chinese Medical Journal*, 126(9), 1700–1706. <https://doi.org/10.3760/cma.j.issn.0366-6999.20122728>
- Yazdanpanah, L. (2015). Literature review on the management of diabetic foot ulcer. *World Journal of Diabetes*, 6(1), 37. <https://doi.org/10.4239/wjd.v6.i1.37>
- Yen, Y. H., Pu, C. M., Liu, C. W., Chen, Y. C., Chen, Y. C., Liang, C. J., Hsieh, J. H., Huang, H. F., & Chen, Y. L. (2018). Curcumin accelerates cutaneous wound healing via multiple biological actions: The involvement of TNF- α , MMP-9, α -SMA, and collagen. *International Wound Journal*, 15(4), 605–617. <https://doi.org/10.1111/iwj.12904>
- Yulianti, E., Sunarti, & Wahyuningsih, M. S. H. (2021). The effect of Kappaphycus alvarezii fraction on plasma glucose, advanced glycation end-products formation, and renal RAGE gene expression. *Heliyon*, 7(October 2020). <https://doi.org/10.1016/j.heliyon.2021.e05978>
- Zhu, Y., Doornebal, E. J., Pirtskhalava, T., Giorgadze, N., Wentworth, M., Fuhrmann-Stroissnigg, H., Niedernhofer, L. J., Robbins, P. D., Tchkonja, T., & Kirkland, J. L. (2017). New agents that target senescent cells: The flavone, fisetin, and the BCL-XL inhibitors, A1331852 and A1155463. *Aging*, 9(3), 1–9. <https://doi.org/10.18632/aging.101202>



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Efek Fraksi Aktif Piper crocatum Ruiz & Pav terhadap Deposisi Kolagen dan Wound Closure melalui

Regulasi Ekspresi p53, Alfa SMA, SOD1 dan E-cadherin pada Wounded Hyperglycemia Fibroblasts

ANDINA SETYAWATI, Piper crocatum Ruiz & Pav, diabetic wound healing, mechanism, p53, Alpha SMA, SOD1

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