

## DAFTAR PUSTAKA

- Abo-Aziza, F.A. and Zaki, A.A., 2017. The impact of confluence on bone marrow mesenchymal stem (BMMSC) proliferation and osteogenic differentiation. *International journal of hematology-oncology and stem cell research*, 11(2), p.121.
- Afaq, F., Saleem, M., Krueger, G. C., Reed, D. J., 2005, Anthocyanin and Hydrolyzable Tannin-rich Pomegranate Fruit Extract Modulates MAPK dan NF-kappaB Pathways and Inhibits Skin Tumorigenesis in CD-1 Mice, *International Journal of Cancer*, 113(3), 423-433.
- Ak, T. and Gülçin, I., 2008. Antioxidant and radical scavenging properties of curcumin. *Chemico-biological interactions*, 174(1), pp.27-37.
- Addor, F.A.S.A., 2017. Antioxidants in dermatology. *Anais brasileiros de dermatologia*, 92, pp.356-362.
- Aggarwal, B.B., Kumar, A. and Bharti, A.C., 2003. Anticancer potential of curcumin: preclinical and clinical studies. *Anticancer research*, 23(1/A), pp.363-398.
- Ansary, M. T., Hossain, R. Md., Kamiya, K., Komine, M., & Ohtsuki, M., 2021, Inflammatory Molecules Associated with Ultraviolet Radiation-Mediated Skin Aging, *International Journal of Molecular Sciences*, 22(8), 1-14.
- Bhattacharyya, A., Chattopadhyay, R., Mitra, S. and Crowe, S.E., 2014. Oxidative stress: an essential factor in the pathogenesis of gastrointestinal mucosal diseases. *Physiological reviews*, 94(2), pp.329-354.
- Cavinato, M. & Durr, J. P., 2017, *Molecular mechanisms of UVB-induced senescence of dermal fibroblasts and its relevance for photoaging of the human skin*, *Experimental Gerontology*, 94, 78-82.
- Camillo, L., Gironi, L.C., Esposto, E., Zavattaro, E. and Savoia, P., 2022. Nicotinamide and calcipotriol counteract UVB-induced photoaging on primary human dermal fibroblasts. *Journal of Photochemistry and Photobiology*, 12, p.100158.
- Camillo, L., Grossini, E., Farruggio, S., Marotta, P., Gironi, L. C., Zavattaro, E., & Savoia, P. (2022). Alpha-tocopherol protects human dermal fibroblasts by modulating nitric oxide release, mitochondrial function, redox status, and inflammation. *Skin Pharmacology and Physiology*, 35(1), 1-12.
- Choi, Y., Lee, S., Kim, S., Lee, J., Ha, J., Oh, H., ... & Yoon, Y. (2020). Vitamin E ( $\alpha$ -tocopherol) consumption influences gut microbiota composition. *International journal of food sciences and nutrition*, 71(2), 221-225.
- Cutler, R. G. (1991). Antioxidants and aging. *The American journal of clinical nutrition*, 53(1), 373S-379S.
- Deng, M., Li, D., Zhang, Y., Zhou, G., Liu, W., Cao, Y., & Zhang, W. (2018). Protective effect of crocin on ultraviolet B-induced dermal fibroblast photoaging. *Molecular medicine reports*, 18(2), 1439-1446.
- Dimri, P.G., Lee, X., Basile, G., Acosta, M., Scott, G., Roskelley, C., Medrano, E. E., Linskens, M., Rubelj, I., Smith, P. O., 1995, A biomarker that identifies

- senescent human cells in culture and in aging skin in vivo, *Proc Natl Acad Sci U.S.A.*, 92(20), 9363-9367.
- Debacq-Chainiaux, F., Erusalimsky, J.D., Campisi, J. and Toussaint, O., 2009. Protocols to detect senescence-associated beta-galactosidase (SA- $\beta$ gal) activity, a biomarker of senescent cells in culture and in vivo. *Nature protocols*, 4(12), pp.1798-1806.
- Doyle, A., dan Griffiths, JB, 2000. *Cell and Tissue Culture for Medical Research*. John Willey and Sons Ltd., New York.
- Eruslanov, E. and Kusmartsev, S., 2010. Identification of ROS using oxidized DCFDA and flow-cytometry. *Advanced protocols in oxidative stress II*, pp.57-72.
- Fang, F., Ni, K., Cai, Y., Ye, Z., Shang, J., Shen, S., & Xiong, C. (2017). Biological characters of human dermal fibroblasts derived from foreskin of male infertile patients. *Tissue and Cell*, 49(1), 56-63.
- Fitria, W. R. (2020). *The Cytoprotective Activity Of Tomato Callus (Solanum Lycopersicum L.) Medium Extract And Analysis Of TNF Alpha Expression On UV-B Rays Induced Human Gingival Fibroblast Cell Culture* (Doctoral dissertation, Universitas Gadjah Mada).
- Ganceviciene, R., Liakou, I. A., Theodoridis, A., Makrantonaki, E., Zouboulis, C. C., 2012, Skin Anti-aging Strategies, *Dermatoendocrinol*, 4(3), 309-327.
- García-Trejo, S. S., Gómez-Sierra, T., Eugenio-Pérez, D., Medina-Campos, O. N., & Pedraza-Chaverri, J. (2024). Protective Effect of Curcumin on D-Galactose-Induced Senescence and Oxidative Stress in LLC-PK1 and HK-2 Cells. *Antioxidants*, 13(4), 415.
- Gromkowska-Kępa, K.J., Puścion-Jakubik, A., Markiewicz-Żukowska, R. and Socha, K., 2021. The impact of ultraviolet radiation on skin photoaging—Review of in vitro studies. *Journal of cosmetic dermatology*, 20(11), pp.3427-3431.
- Han, A., Chien, A.L., dan Kang, S., 2014, Photoaging, *Dermatologic Clinics*, 32(3), 291-299.
- He, L. P., Lin, L., Zheng, H., Mo, Y., Zhou, C., Sun, S., Hong, P., Qian, J.Z., 2022, Potential Anti-skin Aging Effect of a Peptide AYAPE Isolated From Isochrysis zhanjiangensis on UVB-induced HaCaT Cells and H<sub>2</sub>O<sub>2</sub>-induced BJ cells, *Journal of Photochemistry and Photobiology*, 233, 1-10.
- Ho, J.N., Lee, Y.H., Park, J.S., Jun, W.J., Kim, H.K., Hong, B.S., Shin, D.H. and Cho, H.Y., 2005. Protective effects of aucubin isolated from *Eucommia ulmoides* against UVB-induced oxidative stress in human skin fibroblasts. *Biological and Pharmaceutical Bulletin*, 28(7), pp.1244-1248.
- Huang, M.T., 1997. Antioxidant and antitumorigenic properties of curcumin. In *Food Factors for Cancer Prevention* (pp. 249-252). Springer Japan.
- Hwang, B., Noh, E., Kim, J. S., Kim, J. M., You, O. Y., Hwang, K. J., Kwon, B. K., Lee, R. Y., 2013, Curcumin Inhibits UVB-induced Matrix Metalloproteinase-1/3 Expression by Suppressing The MAPK-p38/JNK Pathways in Human Dermal Fibroblasts, *Experimental Dermatology*, 22(5), 371-374.

- Lee, B.Y., Han, J.A., Im, J.S., Morrone, A., Johung, K., Goodwin, E.C., Kleijer, W.J., DiMaio, D. and Hwang, E.S., 2006. Senescence-associated  $\beta$ -galactosidase is lysosomal  $\beta$ -galactosidase. *Aging cell*, 5(2), pp.187-195.
- Li, R., Jia, Z., & Trush, M. A. (2016). Defining ROS in biology and medicine. *Reactive oxygen species (Apex, NC)*, 1(1), 9.
- Liu, X., Zhang, R., Shi, H., Li, X., Li, Y., Taha, A. and Xu, C., 2018. Protective effect of curcumin against ultraviolet A irradiation-induced photoaging in human dermal fibroblasts. *Molecular medicine reports*, 17(5), pp.7227-7237.
- Ithana, K., Campisi, J., Dimri, P.G., 2007, Methods to detect biomarkers of cellular senescence: the senescence-associated beta-galactosidase assay, *Biological Acid*, 21-31.
- Jin, J-Y., Ji, Y., Jang, P-Y., Choung, S, Y., 2021, *Acer tataricum subsp. ginnala* Inhibits Skin Photoaging via Regulating MAPK/AP-1, NF- $\kappa$ B, and TGF $\beta$ /Smad Signaling in UVB-Irradiated Human Dermal Fibroblasts, *Molecules*, 26(662), 1-16.
- Junedi, S., 2010, *Prosedur Tetap Perhitungan Sel*, Cancer Chemoprevention Research Center, Fakultas Farmasi, Yogyakarta.
- Karumuri, B.K.R. and Tech, B., 2013. *Metabolic assay-based validation of cell viability to inflammatory stimuli and anti-cancer drugs in normal and tumor brain glia* (Doctoral dissertation, Louisiana Techng University).
- Kaur, G. and Dufour, J.M., 2012. Cell lines: Valuable tools or useless artifacts. *Spermatogenesis*, 2(1), pp.1-5.
- Kciuk, M., Marciniak, B., Mojzych, M. and Kontek, R., 2020. Focus on UV-induced DNA damage and repair—disease relevance and protective strategies. *International Journal of Molecular Sciences*, 21(19), p.7264.
- Kisiel, M.A. and Klar, A.S., 2019. Isolation and culture of human dermal fibroblasts. *Skin Tissue Engineering: Methods and Protocols*, pp.71-78.
- Kuilman, T., Michaloglou, W., Mooi, J. W., Peeper, S. D., 2010, The essence of senescence, *Cold Spring Harbor Laboratory*, 24, 2463-2479.
- Kurniawati, Y., Adi, S., Achadiyahani, Suwarsa, O., Erlangga, D., dan Putri, T., 2015, Kultur Primer Fibroblas: Penelitian Pendahuluan, *Artikel Penelitian*, 38(1).
- Lago, J. C., & Puzzi, M. B. (2019). The effect of aging in primary human dermal fibroblasts. *PLoS One*, 14(7), e0219165.
- Lestari, M.L. and Indrayanto, G., 2014. Curcumin. *Profiles of drug substances, excipients and related methodology*, 39, pp.113-204.
- Li, R., Jia, Z. and Trush, M.A., 2016. Defining ROS in biology and medicine. *Reactive oxygen species (Apex, NC)*, 1(1), p.9.
- Liu, X., Xing, Y., Yuen, M., Yuen, T., Yuen, H., and Peng, Q., 2022, Anti-Aging Effect and Mechanism of Proanthocyanidins Extracted from Sea Buckthorn on Hydrogen Peroxide-Induced Aging Human Skin Fibroblasts , *Antioxidants JournaAPL*, 11, 1-15.
- López-García, J., Lehocký, M., Humpolíček, P., & Sába, P. (2014). HaCaT keratinocytes response on antimicrobial atelocollagen substrates: extent of cytotoxicity, cell viability and proliferation. *Journal of functional biomaterials*, 5(2), 43-57.
- Mardja, T. E., Rahmi, F., Rusmawati, E., Adriany, R., Murtiningsih, M., Setijanti,

- H. B., & Usia, T. (2016). Riset Sitotoksik Campuran Ekstrak Daun Sirsak (*Annona Muricata* L) Dan Kulit Buah Manggis (*Garcinia Mangostana* L) Pada Sel Vero Dan AML12. *Journal of Tropical Pharmacy and Chemistry*, 3(4), 283-290.
- Martic, I., Wedel, S., Durr, J. P., Cavinato, M., 2020, *A New Model to Investigate UVB-Induced Cellular Senescence and Pigmentation in Melanocytes*, Mechanisms of Ageing and Development, 190, 1-10.
- Masaki, H., 2010. Role of antioxidants in the skin: anti-aging effects. *Journal of dermatological science*, 58(2), pp.85-90.
- McKinnon, K.M., 2018. Flow cytometry: an overview. *Current protocols in immunology*, 120(1), pp.5-1.
- Meiyanto, E., Putri, H., Larasati, Y.A., Utomo, R.Y., Jenie, R.I., Ikawati, M., Lestari, B., Yoneda-Kato, N., Nakamae, I., Kawaichi, M. and Kato, J.Y., 2019. Anti-proliferative and anti-metastatic potential of curcumin analogue, pentagamavunon-1 (PGV-1), toward highly metastatic breast cancer cells in correlation with ROS generation. *Advanced pharmaceutical bulletin*, 9(3), p.445.
- Mintaryanti, B., 2010, Pengaruh Pelarut Polar Aprotik pada Sintesis THPGV-0 dan Uji Aktivitasnya sebagai Antibakteri, Skripsi, Fakultas Farmasi Universitas Gadjah Mada, Yogyakarta.
- Nabila, A. Y., Damayanti, Handayani, S., Setyaningrum, T., 2021, The Effect of Lifestyle on Skin Aging, 33(2), 110-115.
- Ng, N.S. and Ooi, L., 2021. A simple microplate assay for reactive oxygen species generation and rapid cellular protein normalization. *Bio-protocol*, 11(1), pp.e3877-e3877.
- Oglah, M.K., Mustafa, Y.F., Bashir, M.K., Jasim, M.H. and Mustafa, Y.F., 2020. Curcumin and its derivatives: A review of their biological activities. *Syst. Rev. Pharm*, 11(3), pp.472-481.
- Ortiz, A. A., Yan, B., D'Orazio, A. J., 2014, Ultraviolet Radiation, Aging and the Skin: Prevention of Damage by Topical cAMP Manipulation, *Molecules*, 19(5), 6202-6219.
- Park, E. K., Lee, H. J., Lee, H., Kim, J. H., Hwang, J., Koo, J. I., Kim, S.H., 2018, The Anti-Wrinkle Mechanism of Melatonin in UVB Treated HaCaT Keratinocytes and Hairless Mice via Inhibition of ROS and Sonic Hedgehog Mediated Inflammatory Proteins, *International Journal of Molecular Science*, 19, 1-11.
- Patwardhan, J., dan Bhatt, P., 2015, Ultraviolet-B Protective Effect of Flavonoids from *Eugenia Caryophyllata* on Human Dermal Fibroblast Cells, *Phcog Mag* 11:397-406.
- Prasad, S., Gupta, S.C., Tyagi, A.K. & Aggarwal, B.B., 2014, Curcumin, a Component of Golden Spice: From Bedside to Bench and Back, *Biotechnology Advances*, 32(6), 1053–1064.
- Pelikh, O., Pinnapireddy, S. R., & Keck, C. M., 2021, Dermal Penetration Analysis of Curcumin in an Ex Vivo Porcine Ear Model Using Epifluorescence Microscopy and Digital Image Processing, *Skin Pharmacology and*

- Physiology Journal, 34(5), 281-299.
- Pientaweeratch, S., Panapisal, V. and Tansirikongkol, A., 2016. Antioxidant, anti-collagenase and anti-elastase activities of *Phyllanthus emblica*, *Manilkara zapota* and *silymarin*: An in vitro comparative study for anti-aging applications. *Pharmaceutical biology*, 54(9), pp.1865-1872.
- Pizzino, G., Irrera, N., Cucinotta, M., Pallio, G., Mannino, F., Arcoraci, V., Squadrito, F., Altavilla, D. and Bitto, A., 2017. Oxidative stress: harms and benefits for human health. *Oxidative medicine and cellular longevity*, 2017
- Poprac, P., Jomova, K., Simunkova, M., Kollar, V., Rhodes, C.J. and Valko, M., 2017. Targeting free radicals in oxidative stress-related human diseases. *Trends in pharmacological sciences*, 38(7), pp.592-607.
- Qin, Z., Balimunkwe, R. M., & Quan, T. (2017). Age-related reduction of dermal fibroblast size upregulates multiple matrix metalloproteinases as observed in aged human skin in vivo. *British Journal of Dermatology*, 177(5), 1337-1348.
- Quan, C., Cho, M. K., Perry, D., & Quan, T. (2015). Age-associated reduction of cell spreading induces mitochondrial DNA common deletion by oxidative stress in human skin dermal fibroblasts: implication for human skin connective tissue aging. *Journal of biomedical science*, 22, 1-10.
- Rahmawati, A., Lukitaningsih, E., Nurrochmad, A., 2017, Aktivitas Ekstrak Etanol Rumput Laut Coklat (*Turbinaria deccurens*) Terhadap Viabilitas Sel Human Dermal Fibroblast Adult Sebagai Salah Satu Uji Anti Aging, Skripsi, Farmasi, Universitas Gadjah Mada.
- Riss, T.L., Moravec, R.A., Niles, A.L., Duellman, S., Benink, H.A., Worzella, T.J. and Minor, L., 2016. Cell viability assays. *Assay Guidance Manual [Internet]*.
- Ritmaleni, Praditya, I., Wibowo, H., Sardjiman, 2015, Synthesis of TetrahydroHexaGamavunon-5 and Tetrahydrohexagamavunon-7, Indonesian Journal Of Pharmacy, 26(2), 103-107.
- Rittié, L., & Fisher, G. J. (2005). Isolation and culture of skin fibroblasts. *Fibrosis Research: Methods and Protocols*, 83-98.
- Rittie and Fisher, 2015, Natural and Sun-Induced Aging of Human Skin, Cold Spring Harbor Perspectives in Medicine, 5, 1-14.
- Rumiyati, R., Sismindari, S., Semiarti, E., Widyarani, S., Sari, D.T., Apritadila, B.K. and Riasri, A., 2019. Cytoprotective activity of carrot and tomato callus extracts and the ex-pression of cytokines in UV-B irradiated fibroblast cells. *Indonesian Journal of Biotechnology*, 24(2), pp.94-100.
- Sari, N. K. P., Ritmaleni, Sardjiman, Daya Tangkap Senyawa Tetrahidroheksagamavunon-5 (THHGV-5), Tetrahidroheksagamavunon-7 (THHGV-7 dan 1,5-bis-(4'-triflorometilfenil)-pentan-3-on (THC7) terhadap Radikal 2,2-difenil-1-pikrilhidrazil dan Daya Reduksinya terhadap Ion Feri, Skripsi, Universitas Gadjah Mada, Yogyakarta.
- Satria, E. H. (2023). *Proteksi Senyawa Analog Kurkumin, Pentagamavunon-5 (PGV-5), terhadap Akumulasi ROS Intraseluler Sel Human Dermal Fibroblasts yang Diinduksi UVA-Photoaging* (Doctoral dissertation, Universitas Gadjah Mada).
- Shin, D., Lee, S., Huang, Y.H., Lim, H.W., Lee, Y., Jang, K., Cho, Y., Park, S.J., Kim, D.D. and Lim, C.J., 2018. Protective properties of geniposide against

- UV-B-induced photooxidative stress in human dermal fibroblasts. *Pharmaceutical Biology*, 56(1), pp.176-182.
- Sikora, E., Bielak-Żmijewska, A. and Mosieniak, G., 2018. What is and what is not cell senescence. *Postepy Biochem*, 64(2), pp.110-119.
- Sin, B. Y., & Kim, H. P. (2005). Inhibition of collagenase by naturally-occurring flavonoids. *Archives of pharmacal research*, 28, 1152-1155.
- Shon, M.S., Lee, Y., Song, J.H., Park, T., Lee, J.K., Kim, M., Park, E. and Kim, G.N., 2014. Anti-aging potential of extracts prepared from fruits and medicinal herbs cultivated in the Gyeongnam area of Korea. *Preventive nutrition and food science*, 19(3), p.178.
- Silveira, S. J.E.P. and Myaki Pedroso, D.M., 2014. UV light and skin aging. *Reviews on environmental health*, 29(3), pp.243-254.
- Simbara, A. & Ritmaleni, 2010, Sintesis Tetrahidropentagamavunon-0, *Indonesian Journal of Pharmacy*, 21, 100-105.
- Simioni, C., Zauli, G., Martelli, A.M., Vitale, M., Sacchetti, G., Gonelli, A. and Neri, L.M., 2018. Oxidative stress: role of physical exercise and antioxidant nutraceuticals in adulthood and aging. *Oncotarget*, 9(24), p.17181.
- Sonti, A., Makino, T. E., Garruto, A. J., Gruber, J. V., Rao, A., Mehta, C. R., 2012, Efficacy of a Novel Treatment Serum in The Improvement of Photodamaged Skin, *International Journal of Cosmetic Science*, 35(2), 156-162.
- Standard, I. (2009). Biological evaluation of medical devices—Part 5: Tests for in vitro cytotoxicity. *Geneve, Switzerland: International Organization for Standardization*.
- Tu, Y. and Quan, T., 2016. Oxidative stress and human skin connective tissue aging. *Cosmetics*, 3(3), p.28.
- Utama, D. G. A., 2012, Uji Daya Tangkap Radikal 2,2-difenil-1-pikrilhidrazil dan Daya Reduksi Senyawa Tetrahidropentagamavunon-1 (THPGV-1), Skripsi, Fakultas Farmasi UGM, Yogyakarta.
- Wang, C.Y., Chen, Y.Y., dan Hou, C. Y., 2019, Antioxidant Antibacterial Activity of Seven Predominant Terpenoids, *International Journal of Food Properties*, 22: 330-238.
- Warshaw, E. M., Ruggiero, J. L., DeKoven, J. G., Silverberg, J. I., Maibach, H. I., Taylor, J. S., ... & Reeder, M. J. (2021). Patch Testing With Tocopherol and Tocopherol Acetate: The North American Contact Dermatitis Group Experience, 2001 to 2016. *Dermatitis*, 32(5), 308-318.
- Wastuwidya, G. (2017). *Pengaruh variasi kadar THPGV-0 (Tetrahidropentagamavunon-0) dalam sediaan krim terhadap efek iritasi akut dermal dan nilai SPF (Sun Protecting Factor)* (Doctoral dissertation, Universitas Gadjah Mada).
- Xue, N., Liu, Y., Jin, M. & Chen, X., 2022, Chlorogenic Acid Prevents UVA-Induced Skin Photoaging through Regulating Collagen Metabolism and Apoptosis in Human Dermal Fibroblasts, *International Journal of Molecular Science*, 23(13), 6941.
- Yang, L., Shi, J., Wang, X., Zhang, R., 2022, Curcumin Alleviates D-Galactose-Induced Cardiomyocyte Senescence by Promoting Autophagy via the SIRT1/AMPK/mTOR Pathway, *Hindawi*, 1-11.

Yousef, H., Alhadjj, M. and Sharma, S., 2017. Anatomy, skin (integument), epidermis.

Zhang, S. and Duan, E., 2018, Fighting Against Skin Aging, The Way from Bench to Bedside, *SAGE Journal*, 27(5), 729-738.

Zhai, K., Brockmuller, A., Kubatka, P., Shakibaei, 2020, Curcumin's Beneficial Effects on Neuroblastoma: Mechanisms, Challenges, and Potential Solutions, *Biomolecules*, 10, 1-28.