

## DAFTAR PUSTAKA

- Abachi, M., Salati, M., Araghi, S., Shirkoohi, R., & Eslamifar, A. (2017). Molecular Analysis of Acquired Tamoxifen Resistance in Breast Cancer Cell Line. *Asian Pacific Journal of Cancer Biology*, 2(2), 41–49. <https://doi.org/10.31557/apjcb.2017.2.2.41-49>
- Abbasi, H., Hosseinkhani, F., Fouladi, B. I., Tarighi, S., Sadeghizadeh, M., & Montazeri, M. (2024). Dendrosomal Curcumin Showed Cytotoxic Effects on Breast Cancer Cell Line by Inducing Mitochondrial Apoptosis Pathway and Cell Division Arrest. *Iranian Journal of Pharmaceutical Research*, 23(1), 1–10. <https://doi.org/10.5812/ijpr-151714>
- Amalina, N., Nurhayati, I. P., & Meiyanto, E. (2017). Doxorubicin Induces Lamellipodia Formation and Cell Migration. *Indonesian Journal of Cancer Chemoprevention*, 8(2), 61. <https://doi.org/10.14499/indonesianjancanchemoprev8iss2pp61-67>
- Ashrafizadeh, M., Zarrabi, A., Hashemi, F., Moghadam, E. R., Hashemi, F., Entezari, M., Hushmandi, K., Mohammadinejad, R., & Najafi, M. (2020). Curcumin in cancer therapy: A novel adjunct for combination chemotherapy with paclitaxel and alleviation of its adverse effects. *Life Sciences*, 256, 117984. <https://doi.org/10.1016/j.lfs.2020.117984>
- Bartek, J., Iggo, R., Gannon, J., & Lane, D. P. (1990). Genetic and immunochemical analysis of mutant p53 in human breast cancer cell lines. *Oncogene*, 5(6), 893–899.
- Berger, C., Qian, Y., & Chen, X. (2013). The p53-Estrogen Receptor Loop in Cancer. *Current Molecular Medicine*, 13(8), 1229–1240. <https://doi.org/10.2174/15665240113139990065>
- Bertoncini-Silva, C., Vlad, A., Ricciarelli, R., Giacomo Fassini, P., Suen, V. M. M., & Zingg, J. M. (2024). Enhancing the Bioavailability and Bioactivity of Curcumin for Disease Prevention and Treatment. *Antioxidants*, 13(3). <https://doi.org/10.3390/antiox13030331>
- Boulares, A. H., Yakovlev, A. G., Ivanova, V., Stoica, B. A., Wang, G., Iyer, S., & Smulson, M. (1999). Role of poly(ADP-ribose) polymerase (PARP) cleavage in apoptosis. Caspase 3-resistant PARP mutant increases rates of apoptosis in transfected cells. *Journal of Biological Chemistry*, 274(33), 22932–22940. <https://doi.org/10.1074/jbc.274.33.22932>
- Castedo, M., Perfettini, J. L., Roumier, T., Andreau, K., Medema, R., & Kroemer, G. (2004). Cell death by mitotic catastrophe: A molecular definition. *Oncogene*, 23(16 REV. ISS. 2), 2825–2837.

<https://doi.org/10.1038/sj.onc.1207528>

Cerella, C., Grandjenette, C., Dicato, M., & Diederich, M. (2016). Roles of Apoptosis and Cellular Senescence in Cancer and Aging. *Current Drug Targets*, 17(4), 405–415. <https://doi.org/10.2174/1389450116666150202155915>

Chou, R. L. L. (2006). *Dynamic analysis of hepatoma spheroid formation : roles of E-cadherin and  $\beta$  1-integrin*. 411–422. <https://doi.org/10.1007/s00441-005-0148-2>

Cox, J., & Weinman, S. (2016). Mechanisms of doxorubicin resistance in hepatocellular carcinoma. *Hepatic Oncology*, 3(1), 57–59. <https://doi.org/10.2217/hep.15.41>

Da'i, M., Jenie, U. A., Am, S., Kawaichi, M., & Meiyanto, E. (2007). T47D cells arrested at G2M and Hyperploidy Formation Induced by a Curcumin's Analogue PGV-1. *Indonesian Journal of Biotechnology*, 12(2), 1005–1012.

Da'i, M., Jenie, U. A., Supardjan, A., Meiyanto, E., & Kawaichi, M. (2012). The Effect of PGV-1, PGV-0 and Curcumin on Protein Involve in G2-M Phase of Cell Cycle and Apoptosis on T47D Breast Cancer Cell Line. In *Jurnal Ilmu Kefarmasian Indonesia* (Vol. 10, Issue 2).

de Campos, P. S., Matte, B. F., Diel, L. F., Jesus, L. H., Bernardi, L., Alves, A. M., Rados, P. V., & Lamers, M. L. (2017). Low Doses of Curcuma longa Modulates Cell Migration and Cell–Cell Adhesion. *Phytotherapy Research*, 31(9), 1433–1440. <https://doi.org/10.1002/ptr.5872>

Debacq-Chainiaux, F., Erusalimsky, J. D., Campisi, J., & 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), 1798–1806. <https://doi.org/10.1038/nprot.2009.191>

Demirgan, R., Karagöz, A., Pekmez, M., Önay-uçar, E., Artun, F. T., & Mat, A. (2016). *Demirgan et al ., Afr J Tradit Complement Altern Med . ( 2016 ) 13 ( 3 ) : 22-26 Demirgan et al ., Afr J Tradit Complement Altern Med . ( 2016 ) 13 ( 3 ) : 22-26. 13, 22–26.*

Di Micco, R., Krizhanovsky, V., Baker, D., & d'Adda di Fagagna, F. (2021). Cellular senescence in ageing: from mechanisms to therapeutic opportunities. *Nature Reviews Molecular Cell Biology*, 22(2), 75–95. <https://doi.org/10.1038/s41580-020-00314-w>

El-Far, A. H., Darwish, N. H. E., & Mousa, S. A. (2020). Senescent Colon and Breast Cancer Cells Induced by Doxorubicin Exhibit Enhanced Sensitivity

to Curcumin, Caffeine, and Thymoquinone. *Integrative Cancer Therapies*, 19. <https://doi.org/10.1177/1534735419901160>

Elmore, S. (2007). Apoptosis: A Review of Programmed Cell Death. *Toxicologic Pathology*, 35(4), 495–516. <https://doi.org/10.1080/01926230701320337>

Elwakeel, A., Sari, A. N., Dhanjal, J. K., Meidinna, H. N., Sundar, D., Kaul, S. C., & Wadhwa, R. (2021). Mutant p53L194F Harboring Luminal-A Breast Cancer Cells Are Refractory to Apoptosis and Cell Cycle Arrest in Response to MortaparibPlus, a Multimodal Small Molecule Inhibitor. *Cancers*, 13(12), 3043.

Endah, E., Wulandari, F., Putri, Y., Jenie, R. I., & Meiyanto, E. (2022). Piperine Increases Pentagamavunon-1 Anti-cancer Activity on 4T1 Breast Cancer Through Mitotic Catastrophe Mechanism and Senescence with Sharing Targeting on Mitotic Regulatory Proteins. *Iranian Journal of Pharmaceutical Research*, 21(1). <https://doi.org/10.5812/ijpr.123820>

Feng, Y., Spezia, M., Huang, S., Yuan, C., Zeng, Z., Zhang, L., Ji, X., Liu, W., Huang, B., Luo, W., Liu, B., Lei, Y., Du, S., Vuppapalapati, A., Luu, H. H., Haydon, R. C., He, T. C., & Ren, G. (2018). Breast cancer development and progression: Risk factors, cancer stem cells, signaling pathways, genomics, and molecular pathogenesis. *Genes and Diseases*, 5(2), 77–106. <https://doi.org/10.1016/j.gendis.2018.05.001>

Gupta, S. C., Patchva, S., Koh, W., & Aggarwal, B. B. (2012). Discovery of curcumin, a component of golden spice, and its miraculous biological activities. *Clinical and Experimental Pharmacology and Physiology*, 39(3), 283–299. <https://doi.org/10.1111/j.1440-1681.2011.05648.x>

Han, H. S., Vikas, P., Costa, R. L. B., Jahan, N., Taye, A., & Stringer-Reasor, E. M. (2023). Early-Stage Triple-Negative Breast Cancer Journey: Beginning, End, and Everything in Between. *American Society of Clinical Oncology Educational Book*, 43, 1–12. [https://doi.org/10.1200/edbk\\_390464](https://doi.org/10.1200/edbk_390464)

Hanahan, D. (2022). Hallmarks of Cancer: New Dimensions. *Cancer Discovery*, 12(1), 31–46. <https://doi.org/10.1158/2159-8290.CD-21-1059>

Hanahan, D., & Weinberg, R. A. (2011). Hallmarks of cancer: The next generation. *Cell*, 144(5), 646–674. <https://doi.org/10.1016/j.cell.2011.02.013>

Harada, N., Arahori, Y., Okuyama, M., Luis, P. B., Joseph, A. I., Kitakaze, T., Goshima, N., Schneider, C., Inui, H., & Yamaji, R. (2022). Curcumin activates G protein-coupled receptor 97 (GPR97) in a manner different from glucocorticoid. *Biochem Biophys Res Commun.*, 595, 41–46. <https://doi.org/doi:10.1016/j.bbrc.2022.01.075>.

- Hasbiyani, N. A. F., Wulandari, F., Nugroho, E. P., Hermawan, A., & Meiyanto, E. (2021). Bioinformatics analysis confirms the target protein underlying mitotic catastrophe of 4t1 cells under combinatorial treatment of pgv-1 and galangin. In *Scientia Pharmaceutica* (Vol. 89, Issue 3). <https://doi.org/10.3390/scipharm89030038>
- Hosseini, F., Ahmadi, A., Hassanzade, H., Gharedaghi, S., Rassouli, F. B., & Jamialahmadi, K. (2024). Inhibition of melanoma cell migration and invasion by natural coumarin auraptene through regulating EMT markers and reducing MMP-2 and MMP-9 activity. *European Journal of Pharmacology*, 971(November 2023), 176517. <https://doi.org/10.1016/j.ejphar.2024.176517>
- Hu, S., Xu, Y., Meng, L., Huang, L., & Sun, H. E. (2018). *Curcumin inhibits proliferation and promotes apoptosis of breast cancer cells*. 1266–1272. <https://doi.org/10.3892/etm.2018.6345>
- Ichikawa, A., Ando, J., & Suda, K. (2008). G1 arrest and expression of cyclin-dependent kinase inhibitors in tamoxifen-treated MCF-7 human breast cancer cells. *Human Cell*, 21(2), 28–37. <https://doi.org/10.1111/j.1749-0774.2008.00048.x>
- Jaberian Asl, B., Afarin, R., Hatami, M., Dehghani Madiseh, A., Roshanazadeh, M., & Rashidi, M. (2024). Curcumin-Etoposide Synergy: Unveiling the Molecular Mechanisms of Enhanced Apoptosis and Chemoresistance Attenuation in Breast Cancer. *Iranian Journal of Pharmaceutical Research*, 23(1), 1–11. <https://doi.org/10.5812/ijpr-150978>
- Jaerapong, N., Jamil, Q. A., Riha, J., Milovanovic, D., Krupitza, G., Stieger, B., Jarukomjorn, K., & Jäger, W. (2019). Organic anion-transporting polypeptides contribute to the uptake of curcumin and its main metabolites by human breast cancer cells: Impact on antitumor activity. *Oncology Reports*, 41(4), 2558–2566. <https://doi.org/10.3892/or.2019.7011>
- Karim, A. M., Eun Kwon, J., Ali, T., Jang, J., Ullah, I., Lee, Y. G., Park, D. W., Park, J., Jeang, J. W., & Kang, S. C. (2023). Triple-negative breast cancer: epidemiology, molecular mechanisms, and modern vaccine-based treatment strategies. *Biochemical Pharmacology*, 212(February), 115545. <https://doi.org/10.1016/j.bcp.2023.115545>
- Kashani Vahid, N., Nameni, F., & Yazdanparast Chaharmahali, B. (2022). Effect of Interval Training and Curcumin on BAX, Bcl-2, and Caspase-3 Enzyme Activity in Rats. *Gene, Cell and Tissue*, 9(4). <https://doi.org/10.5812/gct-112792>
- Kau, P., Nagaraja, G. M., Zheng, H., Gizachew, D., Galukande, M., Krishnan, S., & Asea, A. (2012). A mouse model for triple-negative breast cancer tumor-

initiating cells (TNBC-TICs) exhibits similar aggressive phenotype to the human disease. *BMC Cancer*, 12(1), 120. <https://doi.org/10.1186/1471-2407-12-120>

Kciuk, M., Gielecińska, A., Mujwar, S., Kołat, D., Kałuzińska-Kołat, Ż., Celik, I., & Kontek, R. (2023). Doxorubicin—An Agent with Multiple Mechanisms of Anticancer Activity. *Cells*, 12(4), 26–32. <https://doi.org/10.3390/cells12040659>

Kyffin, J. A., Sharma, P., Leedale, J., Colley, H. E., Murdoch, C., Harding, A. L., Mistry, P., & Webb, S. D. (2019). Characterisation of a functional rat hepatocyte spheroid model. *Toxicology in Vitro*, 55(February 2019), 160–172. <https://doi.org/10.1016/j.tiv.2018.12.014>

Larasati, Y. A., Yoneda-Kato, N., Nakamae, I., Yokoyama, T., Meiyanto, E., & Kato, J. (2018). Curcumin targets multiple enzymes involved in the ROS metabolic pathway to suppress tumor cell growth. *Scientific Reports*, 8. <https://doi.org/10.1038/s41598-018-20179-6>

Lavasani, M. A., & Moinfar, F. (2012). Molecular classification of breast carcinomas with particular emphasis on “basal-like” carcinoma: A critical review. *Journal of Biophotonics*, 5(4), 345–366. <https://doi.org/10.1002/jbio.201100097>

Lee, H. S., & Kim, W. J. (2022). The Role of Matrix Metalloproteinase in Inflammation with a Focus on Infectious Diseases. *International Journal of Molecular Sciences*, 23(18). <https://doi.org/10.3390/ijms231810546>

Lee, Y., Kang, B. S., & Bae, Y. (2014). Premature senescence in human breast cancer and colon cancer cells by tamoxifen-mediated reactive oxygen species generation. *Life Sciences*, 97(2), 116–122. <https://doi.org/10.1016/j.lfs.2013.12.009>

Leedale, J., Colley, H. E., Gaskell, H., Williams, D. P., Bearon, R. N., Chadwick, A. E., Murdoch, C., & Webb, S. D. (2019). In silico-guided optimisation of oxygen gradients in hepatic spheroids. *Computational Toxicology*, 12(June), 100093. <https://doi.org/10.1016/j.comtox.2019.100093>

Lestari, B., Nakamae, I., Yoneda-Kato, N., Morimoto, T., Kanaya, S., Yokoyama, T., Shionyu, M., Shirai, T., Meiyanto, E., & Kato, J. ya. (2019). Pentagamavunon-1 (PGV-1) inhibits ROS metabolic enzymes and suppresses tumor cell growth by inducing M phase (prometaphase) arrest and cell senescence. In *Scientific Reports* (Vol. 9, Issue 1). <https://doi.org/10.1038/s41598-019-51244-3>

Leu, T. H., & Maa, M. C. (2002). The molecular mechanisms for the antitumorigenic effect of curcumin. *Current Medicinal Chemistry - Anti-*

*Cancer Agents*, 2(3), 357–370.  
<https://doi.org/10.2174/1568011024606370>

- Liu, Q., Cao, Y., Zhou, P., Gui, S., Wu, X., Xia, Y., & Tu, J. (2018). Panduratin A inhibits cell proliferation by inducing G0/G1 phase cell cycle arrest and induces apoptosis in breast cancer cells. *Biomolecules and Therapeutics*, 26(3), 328–334. <https://doi.org/10.4062/biomolther.2017.042>
- Liu, R., Xu, X., Liang, C., Chen, X., Yu, X., Zhong, H., Xu, W., Cheng, Y., Wang, W., Wu, Y., Yu, L., & Hu, X. (2019). ER $\beta$  modulates genistein's cisplatin-enhancing activities in breast cancer MDA-MB-231 cells via P53-independent pathway. *Molecular and Cellular Biochemistry*, 456(1–2), 205–216. <https://doi.org/10.1007/s11010-019-03505-y>
- López-Lázaro, M. (2008). Anticancer and carcinogenic properties of curcumin: Considerations for its clinical development as a cancer chemopreventive and chemotherapeutic agent. *Molecular Nutrition and Food Research*, 52(SUPPL. 1), 103–127. <https://doi.org/10.1002/mnfr.200700238>
- Losordo, D. W., & Isner, J. M. (2001). Estrogen and angiogenesis: A review. *Arteriosclerosis, Thrombosis, and Vascular Biology*, 21(1), 6–12. <https://doi.org/10.1161/01.ATV.21.1.6>
- Lv, Z., Liu, X., Zhao, W., Dong, Q., Li, F., Wang, H., & Kong, B. (2014). *Curcumin induces apoptosis in breast cancer cells and inhibits tumor growth in vitro and in vivo*. 7(6), 2818–2824.
- Maiti, A., Okano, I., Oshi, M., Okano, M., Tian, W., Kawaguchi, T., Katsuta, E., Takabe, K., Yan, L., Patnaik, S., & Hait, N. C. (2021). Altered expression of secreted mediator genes that mediate aggressive breast cancer metastasis to distant organs. *Cancers*, 13(11), 1–21. <https://doi.org/10.3390/cancers13112641>
- Makanjuola, D., Alkushi, A., Alzaid, M., Abukhair, O., Al Tahan, F., & Alhadab, A. (2014). Breast cancer in women younger than 30 years: Prevalence rate and imaging findings in a symptomatic population. *Pan African Medical Journal*, 19, 1–9. <https://doi.org/10.11604/pamj.2014.19.35.2849>
- Mehrgou, A., & Akouchekian, M. (2016). The importance of BRCA1 and BRCA2 genes mutations in breast cancer development Amir. *Estuarine, Coastal and Shelf Science*, 30:369. <https://doi.org/10.1016/j.ecss.2017.04.019>
- Meiyanto, E., Melannisa, R., & Da'i, M. (2006). PGV-1 menurunkan ekspresi faktor angiogenesis (VEGF dan COX-2) pada sel T47D terinduksi estrogen. *Indonesian Journal of Pharmacy*, 17(1), 1–6.
- Meiyanto, E., Putri, D. D. P., Susidarti, R. A., Murwanti, R., Sardjiman, Fitriasari,

- A., Husnaa, U., Purnomo, H., & Kawaichi, M. (2014). Curcumin and its analogues (PGV-0 and PGV-1) enhance sensitivity of resistant MCF-7 cells to doxorubicin through inhibition of HER2 and NF- $\kappa$ B activation. *Asian Pacific Journal of Cancer Prevention*, 15(1), 179–184. <https://doi.org/10.7314/APJCP.2014.15.1.179>
- Meiyanto, E., Putri, H., Larasati, Y. A., Utomo, R. Y., Jenie, R. I., Ikawati, M., Lestari, B., Yoneda-Kato, N., Nakamae, I., Kawaichi, M., & 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. *Journal of Cardiovascular and Thoracic Research*, 9(3), 445–452. <https://doi.org/10.15171/jcvtr.2015.24>
- Meiyanto, E., Septisetyani, E. P., Larasati, Y. A., & Kawaichi, M. (2018). Curcumin analog pentagamavunon-1 (PGV-1) sensitizes widr cells to 5-fluorouracil through inhibition of NF- $\kappa$ B activation. *Asian Pacific Journal of Cancer Prevention*, 19(1), 49–56. <https://doi.org/10.22034/APJCP.2018.19.1.49>
- Messori, L., & Merlino, A. (2016). Cisplatin binding to proteins: A structural perspective. *Coordination Chemistry Reviews*, 315, 67–89. <https://doi.org/10.1016/j.ccr.2016.01.010>
- Mohamad Kamal, N. S., Safuan, S., Shamsuddin, S., & Foroozandeh, P. (2020). Aging of the cells: Insight into cellular senescence and detection Methods. *European Journal of Cell Biology*, 99(6), 151108. <https://doi.org/10.1016/j.ejcb.2020.151108>
- Moirangthem, A., Bondhopadhyay, B., Mukherjee, M., Bandyopadhyay, A., Mukherjee, N., Konar, K., Bhattacharya, S., & Basu, A. (2016). Simultaneous knockdown of uPA and MMP9 can reduce breast cancer progression by increasing cell-cell adhesion and modulating EMT genes. *Scientific Reports*, 6(February). <https://doi.org/10.1038/srep21903>
- Molloy, M. E., White, B. E. P., Gherezghiher, T., Michalsen, B. T., Xiong, R., Patel, H., Zhao, H., Maximov, P. Y., Jordan, V. C., Thatcher, G. R. J., & Tonetti, D. A. (2014). Novel selective estrogen mimics for the treatment of tamoxifen-resistant breast cancer. *Molecular Cancer Therapeutics*, 13(11), 2515–2526. <https://doi.org/10.1158/1535-7163.MCT-14-0319>
- Mooney, L. M., Al-Sakkaf, K. A., Brown, B. L., & Dobson, P. R. M. (2002). Apoptotic mechanisms in T47D and MCF-7 human breast cancer cells. *British Journal of Cancer*, 87(8), 909–917. <https://doi.org/10.1038/sj.bjc.6600541>
- Mota, A. de L., Evangelista, A. F., Macedo, T., Oliveira, R., Scapulatempo-Neto, C., Vieira, R. A. da C., & Marques, M. M. C. (2017). Molecular

characterization of breast cancer cell lines by clinical immunohistochemical markers. *Oncology Letters*, 13(6), 4708–4712. <https://doi.org/10.3892/ol.2017.6093>

Muflikhasari, H. A., Jenie, R. I., Susidarti, R. A., & Meiyanto, E. (2019). Growth Inhibitory Property of Pentagamavunone-0 (PGV-0) on 4T1 Cells under Stress Condition: 2D and 3D Culture Model. In *Indones. J. Cancer Chemoprevent* (Vol. 10, Issue 3).

Murad, H., Hawat, M., Ekhtiar, A., AlJapawe, A., Abbas, A., Darwish, H., Sbenati, O., & Ghannam, A. (2016). Induction of G1-phase cell cycle arrest and apoptosis pathway in MDA-MB-231 human breast cancer cells by sulfated polysaccharide extracted from *Laurencia papillosa*. *Cancer Cell International*, 16(1), 1–11. <https://doi.org/10.1186/s12935-016-0315-4>

Murwanti, R., Kholifah, E., Sudarmanto, B. S. A., & Hermawan, A. (2020). Curcumin and its analogue targeting  $\beta$ -catenin and gsk-3 $\beta$  in wnt signaling pathways: In vitro and in silico study. *Research Journal of Pharmacy and Technology*, 13(4), 1715–1719. <https://doi.org/10.5958/0974-360X.2020.00309.1>

Murwanti, R., Rahmadani, A., Ritmaleni, Hermawan, A., & Ari Sudarmanto, B. S. (2020). Curcumin analogs induce apoptosis and G2/M arrest in 4T1 murine triple-negative breast cancer cells. *Indonesian Journal of Pharmacy*, 31(1), 11–18. <https://doi.org/10.14499/indonesianjpharm31iss1pp11>

Musyayyadah, H., Wulandari, F., Nangimi, A. F., Anggraeni, A. D., Ikawati, M., & Meiyanto, E. (2021). The Growth Suppression Activity of Diosmin and PGV-1 Co-Treatment on 4T1 Breast Cancer Targets Mitotic Regulatory Proteins. *Asian Pacific Journal of Cancer Prevention*, 22(9), 2929–2938. <https://doi.org/10.31557/APJCP.2021.22.9.2929>

Nadal-Serrano, M., Sastre-Serra, J., Pons, D. G., Miró, A. M., Oliver, J., & Roca, P. (2012). The ERalpha/ERbeta ratio determines oxidative stress in breast cancer cell lines in response to 17Beta-estradiol. *Journal of Cellular Biochemistry*, 113(10), 3178–3185. <https://doi.org/10.1002/jcb.24192>

Nagaraju, G. P., Aliya, S., Zafar, S. F., Basha, R., Diaz, R., & El-Rayes, B. F. (2012). The impact of curcumin on breast cancer. *Integrative Biology (United Kingdom)*, 4(9), 996–1007. <https://doi.org/10.1039/c2ib20088k>

Nathanson, S. D., Detmar, M., Padera, T. P., Yates, L. R., Welch, D. R., Beadnell, T. C., Scheid, A. D., Wrenn, E. D., & Cheung, K. (2022). Mechanisms of breast cancer metastasis. *Clinical and Experimental Metastasis*, 39(1), 117–137. <https://doi.org/10.1007/s10585-021-10090-2>

- Nedeljkovi, M. (2019). Nedeljković-2019-Mechanisms of Chemotherapy Re.pdf. *Cells*, 8(9), 957. <https://www.mdpi.com/2073-4409/8/9/957>
- Nocito, M. C., De Luca, A., Prestia, F., Avena, P., La Padula, D., Zavaglia, L., Sirianni, R., Casaburi, I., Puoci, F., Chimento, A., & Pezzi, V. (2021). Antitumoral activities of curcumin and recent advances to improve its oral bioavailability. *Biomedicines*, 9(10). <https://doi.org/10.3390/biomedicines9101476>
- Noel, P., Muñoz, R., Rogers, G. W., Neilson, A., Von Hoff, D. D., & Han, H. (2017). Preparation and metabolic assay of 3-dimensional spheroid co-cultures of pancreatic cancer cells and fibroblasts. *Journal of Visualized Experiments*, 2017(126), 1–8. <https://doi.org/10.3791/56081>
- Novitasari, D., Kato, J. ya, Ikawati, M., Putri, D. D. P., Wulandari, F., Widayari, S., Zulfin, U. M., Salsabila, D. U., & Meiyanto, E. (2023). PGV-1 permanently arrests HepG2 cells in M phase and inhibits DMH-induced liver carcinogenesis in rats. *Journal of Applied Pharmaceutical Science*, 13(8), 204–211. <https://doi.org/10.7324/JAPS.2023.131550>
- Nugraheni, N., Zulfin, U. M., Lestari, B., Hapsari, N. P., Ikawati, M., Utomo, R. Y., Suenaga, Y., Hippo, Y., & Meiyanto, E. (2024). PGV-1 causes disarrangement of spindle microtubule organization resulting in aberrant mitosis in HLF and HuH6 cells associated with altered MYCN status. *Advanced Pharmaceutical Bulletin*, 14(3), 665–674. <https://doi.org/10.34172/apb.2024.058>
- O'Reilly, D., Sendi, M. Al, & Kelly, C. M. (2021). Overview of recent advances in metastatic triple negative breast cancer. *World Journal of Clinical Oncology*, 12(3), 164–182. <https://doi.org/10.5306/wjco.v12.i3.164>
- Ogrodnik, M. (2021). Cellular aging beyond cellular senescence: Markers of senescence prior to cell cycle arrest in vitro and in vivo. *Aging Cell*, 20(4), 1–19. <https://doi.org/10.1111/acel.13338>
- Panieri, E., Gogvadze, V., Norberg, E., Venkatesh, R., Orrenius, S., & Zhivotovsky, B. (2013). Reactive oxygen species generated in different compartments induce cell death, survival, or senescence. *Free Radical Biology and Medicine*, 57, 176–187. <https://doi.org/10.1016/j.freeradbiomed.2012.12.024>
- Park, W., Ruhul Amin, A. R. M., Chen, Z. G., & Shin, D. M. (2013). New perspectives of curcumin in cancer prevention. *Cancer Prevention Research*, 6(5), 387–400. <https://doi.org/10.1158/1940-6207.CAPR-12-0410>
- Pawlik, A., Słomińska-Wojewódzka, M., & Herman-Antosiewicz, A. (2016).

Sensitization of estrogen receptor-positive breast cancer cell lines to 4-hydroxytamoxifen by isothiocyanates present in cruciferous plants. *European Journal of Nutrition*, 55(3), 1165–1180. <https://doi.org/10.1007/s00394-015-0930-1>

Pinto, B., Henriques, A. C., Silva, P. M. A., & Bousbaa, H. (2020). Three-dimensional spheroids as in vitro preclinical models for cancer research. *Pharmaceutics*, 12(12), 1–38. <https://doi.org/10.3390/pharmaceutics12121186>

Radde, B. N., Ivanova, M. M., Mai, H. X., Salabei, J. K., Hill, B. G., & Klinge, C. M. (2015). Bioenergetic differences between MCF-7 and T47D breast cancer cells and their regulation by oestradiol and tamoxifen. *Biochemical Journal*, 465, 49–61. <https://doi.org/10.1042/BJ20131608>

Rahmawati, D. R., Meiyanto, E., Jenie, R. I., & Nurrochmad, A. (2025a). Curcumin Enhances Antimigration of Pentagamavunon-1 by Suppressing MMP-2 and MMP-9 Expression in Triple-Negative (4T1) and Luminal A (T47D) Breast Cancer Cells. *Indones Biomed J.*, 17(1), 34–42. <https://doi.org/10.18585/inabj.v17i1.3431>

Rahmawati, D. R., Meiyanto, E., Jenie, R. I., & Nurrochmad, A. (2025b). *Curcumin Enhances Antimigration of Pentagamavunon-1 by Suppressing MMP-2 and MMP-9 Expression in Triple-Negative (4T1) and Luminal A (T47D) Breast Cancer Cells. 1*, 1–9.

Rahmawati, D. R., Nurrochmad, A., Jenie, R. I., & Meiyanto, E. (2023). The Synergistic Cytotoxic Effect of Pentagamavunon-1 (PGV-1) and Curcumin Correlates with the Cell Cycle Arrest to Induce Mitotic Catastrophe in 4T1 and T47D Breast Cancer Cells. *The Indonesian Biomedical Journal*, 15(5), 318–327. <https://doi.org/10.18585/inabj.v15i5.2594>

Ramachandran, C., Rodriguez, S., Ramachandran, R., Nair, P. K. R., Fonseca, H., Khatib, Z., Escalon, E., & Melnick, S. J. (2005). *Expression Profiles of Apoptotic Genes Induced by Curcumin in Human Breast Cancer and Mammary Epithelial Cell Lines*. 3302, 3293–3302.

Rezaeidian, J., Naseh, V., Entezari, M., Ziyadi, H., & Hashemi, M. (2024). Curcumin Induces MCF-7 Breast Cancer Cell Apoptosis Through miR-15a Alteration. *International Journal of Cancer Management*, 17(1), 1–8. <https://doi.org/10.5812/ijcm-154265>

Riffle, S., Pandey, R. N., Albert, M., & Hegde, R. S. (2017). Linking hypoxia, DNA damage and proliferation in multicellular tumor spheroids. *BMC Cancer*, 17(1), 1–12. <https://doi.org/10.1186/s12885-017-3319-0>

- Roper, S. J., & Coyle, B. (2022). Establishing an In Vitro 3D Spheroid Model to Study Medulloblastoma Drug Response and Tumor Dissemination. *Current Protocols*, 2(1), 1–29. <https://doi.org/10.1002/cpz1.357>
- Rovere, M., Reverberi, D., Arnaldi, P., Palamà, M. E. F., & Gentili, C. (2023). Spheroid size influences cellular senescence and angiogenic potential of mesenchymal stromal cell-derived soluble factors and extracellular vesicles. *Frontiers in Bioengineering and Biotechnology*, 11(December), 1–20. <https://doi.org/10.3389/fbioe.2023.1297644>
- Sahebkhari, N., Fernandez-Guerra, P., Nochi, Z., Carlsen, J., Bross, P., & Palmfeldt, J. (2019). Deficiency of the mitochondrial sulfide regulator ETHE1 disturbs cell growth, glutathione level and causes proteome alterations outside mitochondria. *Biochimica et Biophysica Acta - Molecular Basis of Disease*, 1865(1), 126–135. <https://doi.org/10.1016/j.bbadis.2018.10.035>
- Salim, E. I., Alabasy, M. M., Nashar, E. M. E., Al-Zahrani, N. S., Alzahrani, M. A., Guo, Z., Beltagy, D. M., & Shahen, M. (2024). Molecular interactions between metformin and D-limonene inhibit proliferation and promote apoptosis in breast and liver cancer cells. *BMC Complementary Medicine and Therapies*, 24(1), 1–15. <https://doi.org/10.1186/s12906-024-04453-x>
- Sardjiman, S. S., Reksodiprodjo, M. S., Hakim, L., Van Der Goot, H., & Timmerman, H. (1997). 1,5-Diphenyl-1,4-pentadiene-3-ones and cyclic analogues as antioxidative agents. Synthesis and structure-activity relationship. *European Journal of Medicinal Chemistry*, 32(7–8), 625–630. [https://doi.org/10.1016/S0223-5234\(97\)83288-6](https://doi.org/10.1016/S0223-5234(97)83288-6)
- Sazonova, E. V., Petrichuk, S. V., Kopeina, G. S., & Zhivotovsky, B. (2021). A link between mitotic defects and mitotic catastrophe: detection and cell fate. *Biology Direct*, 16(1), 1–11. <https://doi.org/10.1186/s13062-021-00313-7>
- Shankar, S., & Srivastava, R. K. (2007). Bax and Bak genes are essential for maximum apoptotic response by curcumin, a polyphenolic compound and cancer chemopreventive agent derived from turmeric, *Curcuma longa*. *Carcinogenesis*, 28(6), 1277–1286. <https://doi.org/10.1093/carcin/bgm024>
- Sherar, M. D., Noss, M. B., & Foster, F. S. (1987). Ultrasound backscatter microscopy images the internal structure of living tumour spheroids. *Nature*, 330(6147), 493–495. <https://doi.org/10.1038/330493a0>
- Starek-Świechowicz, B., Budziszewska, B., & Starek, A. (2021). Endogenous estrogens—breast cancer and chemoprevention. *Pharmacological Reports*, 73(6), 1497–1512. <https://doi.org/10.1007/s43440-021-00317-0>

- Su, Y., Hu, X., Kang, Y., Zhang, C., Cheng, Y. Y., Jiao, Z., Nie, Y., & Song, K. (2023). Curcumin nanoparticles combined with 3D printed bionic tumor models for breast cancer treatment. *Biofabrication*, *15*(1), 6–11. <https://doi.org/10.1088/1758-5090/aca5b8>
- Świerczewska, M., Sterzyńska, K., Ruciński, M., Andrzejewska, M., Nowicki, M., & Januchowski, R. (2023). The response and resistance to drugs in ovarian cancer cell lines in 2D monolayers and 3D spheroids. *Biomedicine and Pharmacotherapy*, *165*. <https://doi.org/10.1016/j.biopha.2023.115152>
- Tao, K., Fang, M., Alroy, J., & Gary, G. G. (2008). Imagable 4T1 model for the study of late stage breast cancer. *BMC Cancer*, *8*, 1–20. <https://doi.org/10.1186/1471-2407-8-228>
- Tester, A. M., Ruangpanit, N., Anderson, R. L., & Thompson, E. W. (2000). MMP-9 secretion and MMP-2 activation distinguish invasive and metastatic sublines of a mouse mammary carcinoma system showing epithelial-mesenchymal transition traits. *Clinical and Experimental Metastasis*, *18*(7), 553–560. <https://doi.org/10.1023/A:1011953118186>
- Thanuja, B., Parimalavalli, R., Vijayanand, S., Alharbi, R. M., Abdel-Raouf, N., Ibraheem, I. B. M., Sholkamy, E. N., Durairaj, K., & Meansbo Hadish, K. (2022). Anticancer and Cytotoxicity Activity of Native and Modified Black Rice Flour on Colon Cancer Cell Lines. *Evidence-Based Complementary and Alternative Medicine*, *2022*, 1–12. <https://doi.org/10.1155/2022/8575026>
- To, N. B., Truong, V. N. P., Ediriweera, M. K., & Cho, S. K. (2022). Effects of Combined Pentadecanoic Acid and Tamoxifen Treatment on Tamoxifen Resistance in MCF-7/SC Breast Cancer Cells. *International Journal of Molecular Sciences*, *23*(19). <https://doi.org/10.3390/ijms231911340>
- Toden, S., & Goel, A. (2017). The Holy Grail of Curcumin and its Efficacy in Various Diseases: Is Bioavailability Truly a Big Concern? *Journal of Restorative Medicine*, *6*(1), 27–36. <https://doi.org/10.14200/jrm.2017.6.0101>
- Tomeh, M. A., Hadianamrei, R., & Zhao, X. (2019). A review of curcumin and its derivatives as anticancer agents. *International Journal of Molecular Sciences*, *20*(5). <https://doi.org/10.3390/ijms20051033>
- Utomo, R. Y., Wulandari, F., Novitasari, D., Lestari, B., Susidarti, R. A., Jenie, R. I., Kato, J. Y., Sardjiman, S., & Meiyanto, E. (2022). Preparation and Cytotoxic Evaluation of PGV-1 Derivative, CCA-1.1, as a New Curcumin Analog with Improved-Physicochemical and Pharmacological Properties. *Advanced Pharmaceutical Bulletin*, *12*(3), 603–612. <https://doi.org/10.34172/apb.2022.063>

- Valentin, M. D., Da Silva, S. D., Privat, M., Alaoui-Jamali, M., & Bignon, Y. J. (2012). Molecular insights on basal-like breast cancer. *Breast Cancer Research and Treatment*, *134*(1), 21–30. <https://doi.org/10.1007/s10549-011-1934-z>
- Varadharaj, V. A., & Suresh, P. K. (2020). Arecoline, hesperidin and trifluoperazine-mediated cytotoxicity and cell death potential in nih/3t3 fibroblasts cells –toxicity/safety assessment in a nih/3t3 model fibroblast cell line. *Indian Journal of Pharmaceutical Education and Research*, *54*(3), s537–s551. <https://doi.org/10.5530/ijper.54.3s.153>
- Vayssade, M., Haddada, H., Faridoni-Laurens, L., Tourpin, S., Valent, A., Bénard, J., & Ahomadegbe, J. C. (2005). p73 functionally replaces p53 in Adriamycin-treated, p53-deficient breast cancer cells. *International Journal of Cancer*, *116*(6), 860–869. <https://doi.org/10.1002/ijc.21033>
- Victorelli, S., & Passos, J. F. (2019). Reactive oxygen species detection in senescent cells. *Methods in Molecular Biology*, *1896*, 21–29. [https://doi.org/10.1007/978-1-4939-8931-7\\_3](https://doi.org/10.1007/978-1-4939-8931-7_3)
- Wang, H., Zhang, K., Liu, J., Yang, J., Tian, Y., Yang, C., Li, Y., Shao, M., Su, W., & Song, N. (2021). Curcumin Regulates Cancer Progression: Focus on ncRNAs and Molecular Signaling Pathways. *Frontiers in Oncology*, *11*(April), 1–10. <https://doi.org/10.3389/fonc.2021.660712>
- Wang, T., Wu, X., Al rudaisat, M., Song, Y., & Cheng, H. (2020). Curcumin induces G2/M arrest and triggers autophagy, ROS generation and cell senescence in cervical cancer cells. *Journal of Cancer*, *11*(22), 6704–6715. <https://doi.org/10.7150/jca.45176>
- Wang, Y. A., Johnson, S. K., Brown, B. L., McCarragher, L. M., Al-Sakkaf, K., Royds, J. A., & Dobson, P. R. M. (2008). Enhanced anti-cancer effect of a phosphatidylinositol-3 kinase inhibitor and doxorubicin on human breast epithelial cell lines with different p53 and oestrogen receptor status. *International Journal of Cancer*, *123*(7), 1536–1544. <https://doi.org/10.1002/ijc.23671>
- Wang, Z., Gao, J., Liu, H., Ohno, Y., & Xu, C. (2020). Targeting senescent cells and tumor therapy (Review). *International Journal of Molecular Medicine*, *46*(5), 1603–1610. <https://doi.org/10.3892/ijmm.2020.4705>
- Watson, J. L., Greenshields, A., Hill, R., Hilchie, A., Lee, P. W., Giacomantonio, C. A., & Hoskin, D. W. (2010). Curcumin-induced apoptosis in ovarian carcinoma cells is p53-independent and involves p38 mitogen-activated protein kinase activation and downregulation of Bcl-2 and survivin expression and akt signaling. *Molecular Carcinogenesis*, *49*(1), 13–24. <https://doi.org/10.1002/mc.20571>

- Wolanin, K., Magalska, A., Mosieniak, G., Klinger, R., McKenna, S., Vejda, S., Sikora, E., & Piwocka, K. (2006). Curcumin affects components of the chromosomal passenger complex and induces mitotic catastrophe in apoptosis-resistant Bcr-Abl-expressing cells. *Molecular Cancer Research*, 4(7), 457–469. <https://doi.org/10.1158/1541-7786.MCR-05-0172>
- Wulandari, F., Ikawati, M., Kirihata, M., Kato, J. Y., & Meiyanto, E. (2021). Curcumin Analogs, PGV-1 and CCA-1.1 Exhibit Anti-migratory Effects and Suppress MMP9 Expression on WiDr Cells. *Indonesian Biomedical Journal*, 13(3), 271–280. <https://doi.org/10.18585/inabj.v13i3.1583>
- Wulandari, F., Ikawati, M., Kirihata, M., Widyarini, S., Kato, J.-Y., & Meiyanto, E. (2021). *The Two Mono-Carbonyl Curcumin Analogs, PGV-1 and CCA-1.1: The Chemopreventive Activity Against DMH-Induced Colorectal Cancer Rat and Proteins Target Candidate Involved*. 1–17. <http://dx.doi.org/10.21203/rs.3.rs-950137/v1>
- Wulandari, F., Utomo, R. Y., Novitasari, D., & Ikawati, M. (2021). The anti-migratory activity of a new curcumin analog, CCA-1.1, against T47D breast cancer cells. *International Journal of Pharmaceutical Research*, 13(01), 2877–2887. <https://doi.org/10.31838/ijpr/2021.13.01.421>
- Yadav, B., Taurin, S., Rosengren, R. J., Schumacher, M., Diederich, M., Somers-Edgar, T. J., & Larsen, L. (2010). Synthesis and cytotoxic potential of heterocyclic cyclohexanone analogues of curcumin. *Bioorganic and Medicinal Chemistry*, 18(18), 6701–6707. <https://doi.org/10.1016/j.bmc.2010.07.063>
- Yang, M., Jaaks, P., Dry, J., Garnett, M., Menden, M. P., & Saez-rodriguez, J. (2020). Stratification and prediction of drug synergy based on target functional similarity. *Npj Systems Biology and Applications*, 6(1), 16. <https://doi.org/10.1038/s41540-020-0136-x>
- Yin, L., Duan, J. J., Bian, X. W., & Yu, S. C. (2020). Triple-negative breast cancer molecular subtyping and treatment progress. *Breast Cancer Research*, 22(1), 1–13. <https://doi.org/10.1186/s13058-020-01296-5>
- Yu, S., Kim, T., Yoo, K. H., & Kang, K. (2017). The T47D cell line is an ideal experimental model to elucidate the progesterone-specific effects of a luminal A subtype of breast cancer. *Biochemical and Biophysical Research Communications*, 486(3), 752–758. <https://doi.org/10.1016/j.bbrc.2017.03.114>
- Zeng, Z., Shen, Z. L., Zhai, S., Xu, J. L., Liang, H., Shen, Q., & Li, Q. Y. (2017). Transport of curcumin derivatives in Caco-2 cell monolayers. *European Journal of Pharmaceutics and Biopharmaceutics*, 117(August), 123–131. <https://doi.org/10.1016/j.ejpb.2017.04.004>



- Zha, W. (2018). Transporter-mediated natural product–drug interactions for the treatment of cardiovascular diseases. *Journal of Food and Drug Analysis*, 26(2), S32–S44. <https://doi.org/10.1016/j.jfda.2017.11.008>
- Zhou, X., Zhang, F., Chen, C., Guo, Z., Liu, J., Yu, J., Xu, Y., Zhong, D., & Jiang, H. (2017). Impact of curcumin on the pharmacokinetics of rosuvastatin in rats and dogs based on the conjugated metabolites. *Xenobiotica*, 47(3), 267–275. <https://doi.org/10.1080/00498254.2016.1183060>