

DAFTAR PUSTAKA

- Amin, K. M., Eissa, A. A. M., Abou-Seri, S. M., Awadallah, F. M., and Hassan, G. S., 2013, Synthesis and biological evaluation of novel coumarin-pyrazoline hybrids endowed with phenylsulfonyl moiety as antitumor agents. *Eur. J. Med. Chem.*, *60*, 187–198.
- Anwar, C., Prasetyo, Y. D., Matsjeh, S., Haryadi, W., Sholikhah, E. N., and Nendrowati., 2018, Synthesis of chalcone derivatives and their in vitro anticancer test against breast (T47D) and colon (wiDr) cancer cell line. *Indones. J. Chem.*, *18*(1), 102–107.
- Aslantürk, Ö. S., 2018, *In vitro cytotoxicity and cell viability assays: principles, advantages, and disadvantages, Genotoxicity - A Predictable Risk to Our Actual World*, London: InTechOpen.
- Boice, A. and Bouchier-Hayes, L., 2020, Targeting apoptotic caspases in cancer, *Biochim. Biophys. Acta.*, *1867*(6), 118688
- Brennan, P. and Davey-Smith, G., 2022, Identifying novel causes of cancers to enhance cancer prevention: new strategies are needed. *J. Natl. Cancer Inst.*, *114*(3), 353–360.
- Brett, J. O., Spring, L. M., Bardia, A., and Wander, S. A., 2021, ESR1 mutation as an emerging clinical biomarker in metastatic hormone receptor-positive breast cancer, *Breast Cancer Res.*, *23*(1), 85.
- Calderón-Montaña, J. M., Martínez-Sánchez, S. M., Jiménez-González, V., Burgos-Morón, E., Guillén-Mancina, E., Jiménez-Alonso, J. J., Díaz-Ortega, P., García, F., Aparicio, A., and López-Lázaro, M., 2021, Screening for selective anticancer activity of 65 extracts of plants collected in western andalusia, spain. *Plants*, *10*(10), 2193.
- Cancio, N., Costantino, A. R., Silbestri, G. F., and Pereyra, M. T., 2020, *Ultrasound-assisted syntheses of chalcones: experimental design and optimization*, *41*(1), 13.
- Chen, G., Zhang, M., Chen, Y., Zhang, Y., Luo, G., Long, Y., Yang, W., and Yu, X., 2024, Synthesis, biological evaluation and network pharmacology based studies of 1,3,4-oxadiazole bearing azaphenols as anticancer agents. *Arab. J. Chem.*, *17*(9), 105386.
- Chen, T. R., Drabkowski, D., Hay, R. J., Macy, M., and Peterson, W., 1987, WiDr is a derivative of another colon adenocarcinoma cell line, HT-29, *Cancer Genet. Cytogenet.*, *27*(1), 125–134.
- Cheng, J. Q., Lindsley, C. W., Cheng, G. Z., Yang, H., and Nicosia, S. V., 2005, The Akt/PKB pathway: molecular target for cancer drug discovery. *Oncogene*, *24*(50), 7482–7492.

- Chin, C. H., Chen, S. H., Wu, H. H., Ho, C. W., Ko, M. T., and Lin, C. Y., 2014, cytoHubba: Identifying hub objects and sub-networks from complex interactome. *BMC Syst. Biol.*, 8(4), 1-7.
- Constantinescu, T. and Lungu, C. N., 2021, Anticancer activity of natural and synthetic chalcones. *Int. J. Mol. Sci.*, 22(21), 11306.
- Dai, X., Cheng, H., Bai, Z., and Li, J., 2017, Breast cancer cell line classification and its relevance with breast tumor subtyping. *J. Cancer*, 8(16), 3131–3141.
- Dembitsky, V. M., 2023, Bioactive steroids bearing oxirane ring. *Biomedicines*, 11(8), 2237.
- Dhaliwal, J. S., Moshawih, S., Goh, K. W., Loy, M. J., Hossain, Md. S., Hermansyah, A., Kotra, V., Kifli, N., Goh, H. P., Dhaliwal, S. K. S., Yassin, H., and Ming, L. C., 2022, Pharmacotherapeutics applications and chemistry of chalcone derivatives, *Molecules*, 27(7062), 1–24.
- Elkanzi, N. A. A., Hrichi, H., Alolayan, R. A., Derafa, W., Zahou, F. M., and Bakr, R. B., 2022, Synthesis of chalcones derivatives and their biological activities: a review. *ACS Omega*, 7(32), 27769–27786.
- El-Meligie, S., Taher, A. T., Kamal, A. M., & Youssef, A. (2017). Design, synthesis and cytotoxic activity of certain novel chalcone analogous compounds. *Eur. J. Med. Chem.*, 126, 52–60.
- Eryanti, Y., Zamri, A., & Dan Rahmita, J. (2010). Sintesis Turunan 2'-Hidroksi Kalkon Sintesis Turunan 2'-hidroksi Kalkon melalui Kondensasi Claisen-Schmidt dan Uji Aktivitasnya sebagai Antimikroba. *Jurnal Natur Indonesia*, 12(2), 223–227.
- Evranos, B., 2012,, Spectral properties of chalcones II. *J.Pharm. Sci*, 37(4), 205-216.
- Falzone, L., Salomone, S., and Libra, M., 2018, Evolution of cancer pharmacological treatments at the turn of the third millennium. *Front. Pharmacol.*, 9, 1300.
- Fatmayanti, B. R., Jumina, Purwono, B., Kurniawan, Y. S., Pranowo, H. D., and Sholikhah, E. N., 2024, Oleate epoxides derived from palm oil as new anticancer agents: synthesis, cytotoxicity evaluation, and molecular docking studies against FASN protein. *ChemistrySelect*, 9(17), 1-9.
- Ferlay, J., Colombet, M., Soerjomataram, I., Parkin, D. M., Piñeros, M., Znaor, A., and Bray, F., 2021, Cancer statistics for the year 2020: An overview. *Int. J. Cancer*, 149(4), 778–789.
- Fogaça, T. B., Martins, R. M., Begnini, K. R., Carapina, C., Ritter, M., de Pereira, C. M. P., Seixas, F. K., and Collares, T., 2017, Apoptotic effect of chalcone derivatives of 2-acetylthiophene in human breast cancer cells, *Pharmacol. Rep.*, 69(1), 156–161.

- Gfeller, D., Grosdidier, A., Wirth, M., Daina, A., Michielin, O., and Zoete, V., 2014, SwissTargetPrediction: A web server for target prediction of bioactive small molecules, *Nucleic Acids Res.*, 42(1), 32-38.
- Gomes, A. R., Varela, C. L., Tavares-da-Silva, E. J., & Roleira, F. M. F., 2020, Epoxide containing molecules: A good or a bad drug design approach, *Eur. J. Med. Chem.*, 201, 112327.
- Goodwin, E. C., & Dimairo, D., 2000, Repression of human papillomavirus oncogenes in HeLa cervical carcinoma cells causes the orderly reactivation of dormant tumor suppressor pathways, *PNAS*, 97(23), 12513-12518.
- Gupta, D. and Jain, D. K., 2015, Chalcone derivatives as potential antifungal agents: Synthesis, and antifungal activity. *J. Adv. Pharm. Technol. Res.*, 6(3), 114–117.
- Haider, K., Shafeeque, M., Yahya, S., and Yar, M. S., 2022, A comprehensive review on pyrazoline based heterocyclic hybrids as potent anticancer agents, *Eur. J. Med. Chem. Rep.*, 5, 100042.
- Han, H., Zhao, Y., Cuthbertson, T., Hartman, R. F., and Rose, S. D., 2010, Cell cycle arrest and apoptosis induction by an anticancer chalcone epoxide. *Archiv der Pharmazie*, 343(8), 429–439.
- Hashim, F., Wan Mohamed Zin, W. M. K., Mohamed, M., Mohd Norhadi Shah, N. S., Tuan Johari, S. A. T., Daud, A. I., and Rahamathullah, R., 2018, Morphological analysis of MCF-7 cells treated with chalcone derivatives, *Front. Pharmacol.*, 9.
- Hermawan, F., Jumina, J., and Pranowo, H. D., 2020, Design of thioxanthone derivatives as potential tyrosine kinase inhibitor: A molecular docking study, *Rasayan J. Chem.*, 13(4), 2626–2632.
- Hopkins, A. L., 2008, Network pharmacology: The next paradigm in drug discovery, *Nat. Chem. Biol.*, 4(11), 682–690.
- Illian, D. N., Hasibuan, P. A. Z., Sumardi, S., Nuryawan, A., Wati, R., and Basyuni, M., 2019, Anticancer activity of polyisoprenoids from *avicennia alba* blume in widr cells, *Iran. J. Pharm. Res.*, 18(3), 1477–1487.
- Jainey, P. J. and Bhat, I. K., 2012, Antitumor, analgesic, and anti-inflammatory activities of synthesized pyrazolines, *J. Young Pharm.*, 4(2), 82–87.
- Jayapal, M. R., Sreenivasa Prasad, K., and Sreedhar, N. Y., 2010, Synthesis and characterization of 2,4-dihydroxy substituted chalcones using aldol condensation by SOCl_2 / EtOH. *J. Chem. Pharm. Res.*, 2(3), 127–132.
- Kuang, B., Yang, K., Zhong, X., Tan, Y., Zhou, Y., & Ye, J., 2025, Celecoxib in oncology: targeting the COX-2/PGE2 axis to reprogram the tumor immune microenvironment and enhance multimodal therapy. *Front. Pharmacol.*, 16,1-15.

- Kumar, B. H., Kabekkodu, S. P., and Pai, K. S. R., 2025, Structural insights of AKT and its activation mechanism for drug development. *Mol. Divers.*, 29(6), 5443-5463.
- Kurniawan, Y. S., Priyanga, K. T. A., Jumina, Pranowo, H. D., Sholikhah, E. N., Zulkarnain, A. K., Fatimi, H. A., and Julianus, J., 2021, An update on the anticancer activity of xanthone derivatives: A review. *Pharmaceuticals*, 14(11).
- Laamari, Y., Bimoussa, A., Chagaleti, B. K., Saravanan, V., Alotaibi, S. H., Alotaibi, F. M., MK, K., Oubella, A., Itto, M. Y. A., and Auhmani, A., 2025, Thymol-1,2,3-triazole derivatives: Network pharmacology, molecular simulations and synthesis targeting breast cancer, *J. Mol. Struct.*, 1321(4), 140060.
- Lahsasni, S. A., Al Korbi, F. H., and Aljaber, N. A. A., 2014, Synthesis, characterization, and evaluation of antioxidant activities of some novel chalcones analogues, *Chem. Cent. J.*, 8, 32.
- McCauley, J., Zivanovic, A., and Skropeta, D., 2013, Bioassays for anticancer activities, *Methods Mol. Biol.*, 1055, 191–205.
- Meng, X.-Y., Zhang, H.-X., Mezei, M., and Cui, M., 2011, Molecular docking: A powerful approach for structure-based drug discovery. *Curr Comput Aided Drug Des.*, 7(2), 146-157.
- Minhas, S., Kashif, M., Altaf, W., Afzal, N., and Nagi, A. H., 2017, Concomitant-chemoradiotherapy-associated oral lesions in patients with oral squamous-cell carcinoma. *Cancer Biol. Med.*, 14(2), 176–182.
- Modi, S. J. and Kulkarni, V. M., 2019, Vascular endothelial growth factor receptor (VEGFR-2)/KDR inhibitors: Medicinal chemistry perspective. *Med. Drug Discov.*, 2, 100009.
- Mphahlele, M. J., Maluleka, M. M., and Mampa, R. M., 2019, Elucidation of the structure of the 2-amino-3,5- dibromochalcone epoxides in solution and solid state. *Crystals*, 9(6), 277.
- Muhammad, Z., Hamza, A. N., Ya’u, J., Magaji, M. G., and Zezi, A. U., 2023, Antitumor activity of a quinoline-substituted chalcone epoxide. *Trop. J. Nat. Prod. Res.*, 7(8), 3770–3774.
- Mulyana, F. E., Waskitha, S. S. W., Pranowo, D., Khairuddean, M., and Wahyuningsih, T. D., 2023, Synthesis of chalcone derivatives with methoxybenzene and pyridine moieties as potential antimalarial agents, *Pharmacia*, 70(4), 1305–1313.
- Ngo, D., Kalala, M., Hogan, V., and Manchanayakage, R., 2014, One-pot synthesis of chalcone epoxides - A green chemistry strategy, *Tetrahedron Lett.*, 55(32), 4496–4500.
- Nussinov, R. and Tsai, C. J., 2013, Allosteric in disease and in drug discovery, *Cell*, 153(2), 293–305.

- Ovonramwen, O. B., 2021, Synthesis of 1-(2,4-Dinitrophenyl)-3,5-diphenyl-1H-pyrazol-4-ol via trans-1,3-Diphenyl-2,3-epoxy-1-propanone. *Tanz. J. Sci.*, 47(3), 1243–1251.
- Pavia, D. L., Lampman, G. M., Kriz, G. S., and Vyvyan, J. R., 2001, *Introduction to spectroscopy 3rd edition*, Pacific Grove, CA: Brooks/Cole.
- Pinto, P., Machado, C. M., Moreira, J., Almeida, J. D. P., Silva, P. M. A., Henriques, A. C., Soares, J. X., Salvador, J. A. R., Afonso, C., Pinto, M., Bousbaa, H., and Cidade, H., 2019, Chalcone derivatives targeting mitosis: synthesis, evaluation of antitumor activity and lipophilicity, *Eur. J. Med. Chem.*, 184, 111752.
- Riza, N.F., 2025, Sintesis turunan *N*-fenilpirazolina berbahan dasar 2-asetil-5-klorotiofena serta uji aktivitasnya sebagai antikanker, *Tesis*, Universitas Gadjah Mada.
- Sangpheak, K., Mueller, M., Darai, N., Wolschann, P., Suwattanasophon, C., Ruga, R., Chavasiri, W., Seetaha, S., Choowongkamon, K., Kungwan, N., Rungnim, C., and Rungrotmongkol, T., 2019, Computational screening of chalcones acting against topoisomerase II α and their cytotoxicity towards cancer cell lines. *J. enzym. inhib. med. chem.*, 34(1), 134–143.
- Schopf, F. H., Biebl, M. M., & Buchner, J., 2017, The HSP90 chaperone machinery, *Nat. Rev. Mol. Cell Biol.*, 18(6), 345–360.
- Sethy, C. and Kundu, C. N., 2021, 5-Fluorouracil (5-FU) resistance and the new strategy to enhance the sensitivity against cancer: Implication of DNA repair inhibition. *Biomed. Pharmacother.*, 137, 111285.
- Sharma, V., Kumar, V., and Kumar, P., 2013, *Anti-cancer agents in medicinal chemistry*, 23(13).
- Sheikh, K. A., Gupta, A., Umar, M., Ali, R., Shaquiquzzaman, M., Akhter, M., Khan, M. A., Kaleem, M., Ambast, P. K., Charan, S., and Alam, M. M., 2024, Advances in chalcone derivatives: Unravelling their anticancer potential through structure-activity studies, *J. Mol. Struct.*, 1299, 137154.
- Shibuya, M., 2011, Vascular endothelial growth factor (VEGF) and its receptor (VEGFR) signaling in angiogenesis: A crucial target for anti- and pro-angiogenic therapies. *Genes and Cancer*, 2(12), 1097–1105.
- Stelzer, G., Rosen, N., Plaschkes, I., Zimmerman, S., Twik, M., Fishilevich, S., Iny Stein, T., Nudel, R., Lieder, I., Mazor, Y., Kaplan, S., Dahary, D., Warshawsky, D., Guan-Golan, Y., Kohn, A., Rappaport, N., Safran, M., and Lancet, D., 2016, The GeneCards suite: From gene data mining to disease genome sequence analyses, *Curr. protoc. bioinform.* 54(1), 1-33.
- Stiawan, A., Sholikhah, E. N., Kurniawan, Y. S., Priastomo, Y., and Jumina. , 2021, Synthesis, cytotoxicity assay, and molecular docking study of hydroxychalcone derivatives as potential tyrosinase inhibitors, *J. Chin. Pharm. Sci.*, 30(8), 634–644.

- Swanepoel, B., Nitulescu, G. M., Olaru, O. T., Venables, L., and van de Venter, M., 2019, Anti-cancer activity of a 5-aminopyrazole derivative lead compound (BC-7) and potential synergistic cytotoxicity with cisplatin against human cervical cancer cells, *Int. J. Mol. Sci.*, 20(22), 5559.
- Umar, S., Katariya, S., Soni, R., Soman, S. S., and Suresh, B., 2024, O-Allyloxy chalcone derivatives: Design, synthesis, anticancer activity, network pharmacology and molecular docking, *Chem. Pap.*, 78, 8903-8917.
- Urban-Wojciuk, Z., Khan, M. M., Oyler, B. L., Fåhraeus, R., Marek-Trzonkowska, N., Nita-Lazar, A., Hupp, T. R., and Goodlett, D. R., 2019, The role of tlrs in anti-cancer immunity and tumor rejection, *Front. in Immunol.*, 10, 2388.
- Venkataramireddy, V., Shankaraiah, M., Rao, A. T., Kalyani, C., Lakshmi Narasu, M., Varala, R., and Jayashree, A., 2018, Synthesis and anticancer activity of novel 3-aryl thiophene-2-carbaldehydes and their aryl/heteroaryl chalcone derivatives, *Rasayan J. Chem.*, 9(1), 31–39.
- Wang, J., Huang, L., Cheng, C., Li, G., Xie, J., Shen, M., Chen, Q., Li, W., He, W., Qiu, P., and Wu, J., 2019, Design, synthesis and biological evaluation of chalcone analogues with novel dual antioxidant mechanisms as potential anti-ischemic stroke agents. *Acta Pharm. Sin. B.*, 9(2), 335–350.
- Widiandani, T., Tandian, T., Zufar, B. D., Suryadi, A., Purwanto, B. T., Hardjono, S., and Siswandono., 2023, In vitro study of pinostrobin propionate and pinostrobin butyrate: Cytotoxic activity against breast cancer cell T47D and its selectivity index. *J. Public Health Afr.*, 14, 2516.
- Wijayanti, L. W., Swasono, R. T., Lee, W., and Jumina, J., 2021, Synthesis and evaluation of chalcone derivatives as novel sunscreen agent. *Molecules*, 26(9), 2698.
- Xu, M., Wu, P., Shen, F., Ji, J., and Rakesh, K. P., 2019, Chalcone derivatives and their antibacterial activities: Current development. *Bioorg. Chem.*, 91, 103133.
- Zhuang, C., Zhang, W., Sheng, C., Zhang, W., Xing, C., and Miao, Z., 2017, Chalcone: A privileged structure in medicinal chemistry. *Chem. Rev.*, 117(12), 7762–7810).