



## DAFTAR PUSTAKA

- Ahmad, A., Sayed, A., Ginnebaugh, K.R., Sharma, V., Suri, A., Saraph, A., Padhye, S. & Sarkar, F.H., 2015, Molecular docking and inhibition of matrix metalloproteinase-2 by novel difluorinatedbenzylidene curcumin analog, *Am J Transl Res*, 7(2):298-308.
- Allegra, A., Innao, V., Russo, S., Gerace, D., Alonci, A., & Musolino, C., 2017, Anticancer activity of curcumin and its analogues: preclinical and clinical studies, *Cancer investigation*, 35(1), 1-22.
- Al-Mehdi, A., Tozawa, K., Fisher, A., Shientag, L., Lee, A., Muschel, R.J., 2000, Intravascular origin of metastasis from the proliferation of endothelium-attached tumor cells: a new model for metastasis. *Nat Med* 6, 100–102 (2000) doi:10.1038/71429
- American Society of Clinical Oncology, 2015, *Stages of Cancer*, <http://www.cancer.net/navigating-cancer-care/diagnosing-cancer/stages-cancer>.
- Anand, P., Kunnumakkara, A. B., Sundaram, C., Harikumar, K. B., Tharakan, S. T., Lai, O. S., Sung, B., Aggarwal, B. B., 2008, Cancer is a preventable disease that requires major lifestyle changes, *Pharmaceutical research*, 25(9), 2097–2116.
- Balitbangkes Kementerian Kesehatan, 2018, Hasil Utama RISKESDAS 2018, Balitbangkes Kementerian Kesehatan, Jakarta.
- Bode, W., Fernandez-Catalan, C., Grams, H. T., F., & Maskos, H. N., K., 1999, Structural properties of matrix metalloproteinases, *Cellular and Molecular Life Sciences (CMLS)*, 55(4), 639–652. doi:10.1007/s000180050320
- Bray, F., Ferlay, J., Soerjomataram, I., Siegel, R.L., Torre, L.A. and Jemal, A., 2018, Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries, *CA: A Cancer Journal for Clinicians*, 68: 394-424. doi:10.3322/caac.21492
- Brierley, J.D., Gospodarowicz, M.K., Wittekind, Ch., eds, 2017, *TNM classification of malignant tumors*, 8th ed., Wiley-Blackwell, Chichester, West Sussex, UK.



Chaffer, C.L. & Weinberg, R.A., 2011, A perspective on cancer cell metastasis, *Science*, 331(6024):1559-64.

Dar, A.M. & Mir, S., 2017, Molecular Docking: Approaches, Types, Applications and Basic Challenges, *J Anal Biotech*, 8(2).

Devassy, J.G., Nwachukwu, I.D. & Jones, P.J., 2015, Curcumin and cancer: barriers to obtaining a health claim, *Nutrition Reviews*, 73(3):155-165.

Durrant, J. D., de Oliveira, C. A. F., McCammon, J. A., 2011, Pyrone-Based Inhibitors of Metalloproteinase Types 2 and 3 May Work as Conformation-Selective Inhibitors, *Chemical Biology & Drug Design*, 78 (2): 191–198. doi:10.1111/j.1747-0285.2011.01148.x. PMC 3135671. PMID 21609408.

Egeblad, M. and Werb, Z., 2002. New functions for the matrix metalloproteinases in cancer progression. *Nature Reviews Cancer*, 2(3), pp.161-174.

Epstein, J., Sanderson, I.R. & Macdonald, T.T., 2010, Curcumin as a therapeutic agent: the evidence from in vitro, animal and human studies, *British Journal of Nutrition*, 103(11):1545-57.

Farina, A.R. & Mackay, A.R., 2014, Gelatinase b/MMP-9 in tumour pathogenesis and progression. *Cancers*, 6, 240–296.

Ferlay, J., Colombet, M., Soerjomataram, I., Mathers, C., Parkin, D.M., Piñeros, M., Znaor, A. & Bray, F., 2019, Estimating the global cancer incidence and mortality in 2018: GLOBOCAN sources and methods, *Int J Cancer*, 144(8):1941-1953.

Ferreira, L.G., dos Santos, R.N., Oliva, G. & Andricopulo, A.D., 2015, Molecular Docking and Structure-Based Drug Design Strategies, *Molecules*, 20:13384-13421.

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.

Gupta GP., Massagué J, 2006, Cancer metastasis: building a framework, *Cell*, 127:679–695.

Hanahan, D. & Weinberg, R.A., 2000, The Hallmarks of Cancer, *Cell*, 100(1):57-70.



Hassan, Z.K. & Daghestani, M.H., 2012, Curcumin Effect on MMPs and TIMPs Genes in a Breast Cancer Cell Line, *Asian Pac J Cancer Prev*, 13(7):3259-64.

Huang, H., 2018, Matrix Metalloproteinase-9 (MMP-9) as a Cancer Biomarker and MMP-9 Biosensors: Recent Advances, *Sensors*, 18(10):3249.

Joyce, JA, Pollard, JW. Microenvironmental regulation of metastasis. *Nat Rev Cancer*. 2009; 9:239–252.

Kessenbrock, K., Plaks, V. & Werb, Z., 2010, Matrix Metalloproteinases: Regulators of the Tumor Microenvironment, *Cell*, 141(1):52-67.

Kholifah, E., 2019, Studi In Vitro dan In Silico Efek Kurkumin dan PGV 0 Terhadap Metastasis dengan Target Protein Matrix Metalloproteinase 9 Pada Sel Kanker Payudara 4T1, Tesis, Universitas Gadjah Mada, Yogyakarta.

Kitchen, D. B., Decornez, H., Furr, J. R., & Bajorath, J., 2004, Docking and scoring in virtual screening for drug discovery: methods and applications, *Nature Reviews Drug Discovery*, 3(11), 935–949. doi:10.1038/nrd1549

Klein, T. & Bischoff, R., Physiology and pathophysiology of matrix metalloproteases. *Amino Acids* 2011, 41:271–290.

Kocaadam, B. & Sanlier, N., 2017, Curcumin, an active component of turmeric (*Curcuma longa*), and its effects on health, *Critical Reviews in Food Science and Nutrition*, 57(13):2889-2895.

McCawley, L.J. & Matrisian, L.M., 2000, Matrix metalloproteinases: multifunctional contributors to tumor progression, *Mol Med Today*, 6(4):149-56.

Meiyanto, E., Supardjan, Da'i, M. & Agustina, D., 2006, Antiproliferative effect of pentagamavunon-0 on T47D breast cancer cells, *Med J Yarsi*, 14, 11-5.

Meiyanto, E., Supardjan, Da'i, M. & Agustina, D., 2007, Pentagamavunon-0 induces Apoptosis on T47D breast cancer cell line through caspase-3 activation, *Med J Yarsi*, 15, 75-9.

Meiyanto, E., Septisetyani, E.P., Larasati, Y.A., and Kawaichi, M., 2018, Curcumin Analog Pentagamavunon-1 (PGV-1) Sensitizes Widr Cells to 5-Flourouracil through Inhibition of NF- $\kappa$ B Activation, *Asian Pacific Journal of Cancer Prevention*, 19(1), 49-56.



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., 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), 445-452.

Meng, X., Zhang, H., Mezei, M. & Cui, M., 2011, Molecular Docking: A powerful approach for structure-based drug discovery, *Curr Comput Aided Drug*, 7(2):146-157.

Monika, G., Punam, G. & Sarbjot, S., 2010, An overview on Molecular Docking. *International Journal of Drug Development and Research*. 2. 219-231.

Mook, O.R., Fredericks, W.M. & Van Noorden, C.J., 2004, The role of gelatinases in colorectal cancer progression and metastasis, *Biochim Biophys Acta*, 1705(2):69-89.

Naksuriya, O., Okonogi, S., Schiffelers, R.M. & Hennink, W.E., 2015, Curcumin nanoformulations: A review of pharmaceutical properties and preclinical studies and clinical data related to cancer treatment, *Biomaterials*, 35(10):3365-83.

National Cancer Institute, 2015, *What is Cancer?*, <https://www.cancer.gov/about-cancer/understanding/what-is-cancer>, 5 Maret 2019.

Nicolescu, AC, Holt, A, Kandasamy, AD, Pacher, P and Schulz, R., Inhibition of matrix metalloproteinase-2 by PARP inhibitors. *Biochem Biophys Res Commun*, 2009; 387: 646-650

Page-McCaw, A., Ewald, A. J., & Werb, Z., 2007, Matrix metalloproteinases and the regulation of tissue remodelling, *Nature reviews Molecular cell biology*, 8(3), 221-233.

Park, W., Amin, A.R., Chen, Z.G. and Shin, D.M., 2013. New perspectives of curcumin in cancer prevention. *Cancer prevention research*, 6(5), pp.387-400.

Parks, W.C., Wilson, C.L. and López-Boado, Y.S., 2004. Matrix metalloproteinases as modulators of inflammation and innate immunity. *Nature Reviews Immunology*, 4(8), pp.617-629.



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):1053-64.

Ritchie, H. & Roser, M., 2019, *Causes of Death*, <https://ourworldindata.org/causes-of-death> [Online Resource]

Sardjiman, S.S., Reksohadiprodjo, M.S., Hakim, L., van der Goot, H., and Timmerman, H., 1997, 1,5-Diphenyl-1,4-pentadiene-3-ones and cyclic analogues as antioxidative agents. Synthesis and structure-activity relationship., *Eur. J. Med. Chem.*, 32, 625-630.

Sardjiman, 2000, Synthesis of Some New Series of Curcumin Analogue, Anti-Oxidative, Anti-Inflammatory, Anti-Bacterial Activities and Qualitative Structure-Activity Relationship, *Disertasi*, Universitas Gadjah Mada, Yogyakarta.

Seyfried, T.N. & Huysentruyt, L.C., 2013, On the Origin of Cancer Metastasis, *Crit Rev Oncog*, 18(1-2):43-73.

Shehzad, A., Lee, J. & Lee, Y.S., 2013, Curcumin in Various Cancers, *International Union of Biochemistry and Molecular Biology*, 39(1):56-68.

Shipley, J.M., Doyle, G.A., Fliszar, C.J., Ye, Q.Z., Johnson, L.L., Shapiro, S.D., Welgus, H.G., Senior, R.M., 1996, The structural basis for the elastolytic activity of the 92-kDa and 72-kDa gelatinases. Role of the fibronectin type ii-like repeats. *J. Biol. Chem.*, 271, 4335–4341.

Sternlicht. MD., Werb, Z, 2001, How matrix metalloproteinases regulate cell behavior. *Annu Rev Cell Dev Biol*, 17:463–516. [PubMed: 11687497]

Sudarmanto, B.S., 2016, Studi Komputasional Mekanisme Aksi Pyrethroid pada Enzim Gonadal Steroidogenik yang Terlibat dalam Biosintesis Hormon Reprouktif, *Disertasi*, Universitas Gadjah Mada, Yogyakarta.

Tallant, C., Marrero, A., & Gomis-Rüth, F. X., 2010, Matrix metalloproteinases: fold and function of their catalytic domains, *Biochimica et Biophysica Acta (BBA)-Molecular Cell Research*, 1803(1), 20-28.

Valastyan, S. & Weinberg, RA, 2011, Tumor Metastasis: Molecular Insights and Evolving Paradigms, *Cell*, 147(2): 275–292.



Vandooren, J., Van den Steen, P.E., Opdenakker, G., 2013, Biochemistry and molecular biology of gelatinase B or matrix metalloproteinase-9 (MMP-9): The next decade. *Crit. Rev. Biochem. Mol. Biol.*, 48, 222–272.

Visse, R., & Nagase, H., 2003, Matrix metalloproteinases and tissue inhibitors of metalloproteinases: structure, function, and biochemistry. *Circulation research*, 92(8), 827-839.

Wermuth, CG, Ganellin, CR, Lindberg, P, Mitscher, LA, 1998, Glossary of terms used in medicinal chemistry (IUPAC Recommendations 1998), *Pure and Applied Chemistry*, 70 (5): 1129–1143.

World Health Organization, 2018, Cancer, <https://www.who.int/news-room/fact-sheets/detail/cancer>, 19 Maret 2019.

Yang, S.-Y., 2010, Pharmacophore modeling and applications in drug discovery: challenges and recent advances. *Drug Discovery Today*, 15(11-12), 444–450. doi:10.1016/j.drudis.2010.03.013