

## REFERENCES

- Adyab, N.S.M., Rahmat, A., Abdul Kadir, N.A.A., Jaafar, H., Shukri, R., & Ramli, N.S. (2019). Mangosteen (*Garcinia mangostana*) flesh supplementation attenuates biochemical and morphological changes in the liver and kidney of high fat diet-induced obese rats. *BMC Complem Altern M*, 19, 344. <https://doi.org/10.1186/s12906-019-2764-5>
- Alodokter. (2019). Manfaat Buah Manggis untuk Kesehatan yang Sayang Dilewatkan. Retrieved from <https://www.alodokter.com/manfaat-buah-manggis-untuk-kesehatan-yang-sayang-dilewatkan>
- American Diabetes Association. (2010). Diagnosis and classification of diabetes mellitus. *Diabetes care*, 33 Suppl 1(Suppl 1), S62–S69. <https://doi.org/10.2337/dc10-S062>
- Amic, D., Davidovic-Amic, D., Beslo, D., & Trinajstic, N. (2003). Structure-Radical Scavenging Activity Relationships of Flavonoids. *Croatica Chemica Acta*, 76(1), 55-61.
- Arican, O., Kurutas, E. B., & Sasmaz, S. (2005). Oxidative stress in patients with acne vulgaris. *Mediators of inflammation*, 2005(6), 380–384. <https://doi.org/10.1155/MI.2005.380>
- Ayala, A., Munoz, M.F., & Arguelles, S. (2014). Lipid peroxidation: production, metabolism, and signaling mechanisms of malondialdehyde and 4-hydroxy-2-nonenal. *Oxid Med Cell Longev*, 1-31. <https://doi.org/10.1155/2014/360438>
- Avinash, P., Reddy, A., Begum, N., & Bakshi, V. (2016). Neuroprotective Effect of *Garcinia mangostana* on Streptozotocin Induced Sporadic Type Alzheimer's Disease in Mice. *International Journal of Applied Pharmaceutical Sciences and Research*, 1(1), 8-15. doi: 10.21477/ijapsr.v1i1.9603
- Baroroh, K., Suradi, S., & Rima, A. (2018). Effects of Mangosteen pericarp Extract to Clinical Improvements, The Plasma Level of IL-6 and Malondialdehyde in Acute Exacerbation of COPD Patients. *J Respir Indo*, 38(3), 164-172.
- Betteridge, D.J. (2000). What is oxidative stress?. *Metabolism: clinical and experimental*, 49(2 suppl 1), 3-8. Indo, 2018; 38(3), 164–172: <https://doi.org/10.36497/jri.v38i3.6>
- Boonprom, P., Boonla, O., Chayaburakul, K., Welbat, J.U., Pannangpetch, P., Kukongviriyapan, U., Kukongviriyapan, V., Pakdechote, P., & Prachaney, P. (2017). *Garcinia mangostana* pericarp extract protects against oxidative stress and cardiovascular remodeling via suppression of p47(phox) and iNOS in nitric oxide deficient rats. *Ann Anat*, 212, 27–36. <https://doi.org/10.1016/j.aanat.2017.03.007>
- Cervantes Gracia, K., Llanas-Cornejo, D., & Husi, H. (2017). CVD and Oxidative Stress. *J Clin Med*, 6(2), 22. <https://doi.org/10.3390/jcm6020022>.
- Chang, C.C., Chen, C.W., Owaga, E., Lee, W.T., Liu, T.N., & Hsieh, R.H. (2020). Mangosteen Concentrate Drink Supplementation Promotes Antioxidant Status and Lactate Clearance in Rats after Exercise. *Nutrients*, 12(5). <https://doi.org/10.3390/nu12051447>
- Chen, L.G., Yang, L.L., & Wang, C.C. (2008). Anti-inflammatory activity of mangostins from *Garcinia mangostana*. *Food Chem Toxicol*, 46(2): 688-93. doi: [10.1016/j.fct.2007.09.096](https://doi.org/10.1016/j.fct.2007.09.096)
- Chomnawang, M.T., Surassmo, S., Nukoolkarn, V.S., & Gritasanapan, W. (2005). Antimicrobial effects of Thai medicinal Plants against acne-inducing bacteria. *J Ethnopharmacol*, 101(1-3), 330-3. doi: 10.1016/j.jep.2005.04.038
- Cichoż-Lach, H., & Michalak, A. (2014). Oxidative stress as a crucial factor in liver diseases. *World J Gastroentero*, 20(25), 8082–8091. <https://doi.org/10.3748/wjg.v20.i25.8082>.
- Devi Sampath, P., & Vijayaraghavan, K. (2007). Cardioprotective effect of alpha-mangostin, a xanthone derivative from mangosteen on tissue defense system against isoproterenol-induced myocardial infarction in rats. *J Biochem Mol Toxic*, 21(6), 336–339. <https://doi.org/10.1002/jbt.20199>
- Diaz-Hung, M.L., & Gonzalez Fraguera, M.E. (2014). Oxidative stress in neurological diseases: cause or effect?. *Neurologia*, 29(8), 451-452.
- Dizdaroglu, M., Jaruga, P., Birincioglu, M., & Rodriguez, H. (2020). Free radical-induced damage to DNA: mechanisms and measurement. *Free Radical Bio Med*, 32(11), 1102-1115. doi:

10.1016/s0891-5849(02)00826-2

- Downs, S.H., & Black, N. (1998). The feasibility of creating a checklist for the assessment of the methodological quality both of randomised and non-randomized studies of health care interventions. *J Epidemiol Commun H*, 52, 377-384. doi: 10.1136/jech.52.6.377
- Dröge, W. (2002). Free radicals in the physiological control of cell function. *Physiol Rev*, 82, 47-95. doi: 10.1152/physrev.00018.2001
- Elshourbagy, N.A., Meyers, H.V., & Abdel-Meguid, S.S. (2014). Cholesterol: the good, the bad, and the ugly - therapeutic targets for the treatment of dyslipidemia. *Med Prin Pract*, 23(2), 99-111. <https://doi.org/10.1159/000356856>.
- Febriane, N.N., Giriwono, P.E., Koswara, S., & Prangdimurti, E. (2015). Suplementasi Mikroenkapsulat Ekstrak Kulit Buah Manggis (Kbm) Menurunkan Kadar Malonaldehida Hati Tikus. *Penelitian Gizi Dan Makanan (The Journal of Nutrition and Food Research)*, 38(1), 61-70. <https://doi.org/10.22435/pgm.v38i1.4423.61-70>
- Gondokesumo, M.E., Pardjianto, B., Sumitro, S.B., Widowati, W., & Handono, K. (2019). Xanthonic analysis and antioxidant activity analysis (applying ESR) of six different maturity levels of mangosteen rind extract (*Garcinia mangostana* Linn.). *Pharmacogn J*, 11(2), 369-373. doi: 10.5530/pj.2019.11.56
- Gutierrez-Orozco, F., & Failla, M. L. (2013). Biological activities and bioavailability of mangosteen xanthonic: a critical review of the current evidence. *Nutrients*, 5(8), 3163-3183. <https://doi.org/10.3390/nu5083163>
- Giacco, F., & Brownlee, M. (2010). Oxidative stress and diabetic complications. *Circulation research*, 107(9), 1058-1070. <https://doi.org/10.1161/CIRCRESAHA.110.223545>
- Hafisalevi, M.D., Setiawan, M., & Sargowo, D. (2012). Effect of Extract from Pericarp of Mangosteen (*Garcinia Mangostana* Linn) as Antioxidant in Rats Models of Atherosclerosis. *J Kardiologi Indones*, 33(2), 75-80. <https://doi.org/10.30701/ijc.v33i2.55>
- Han, Z., Tian, R., Ren, P., Zhou, W., Wang, P., Luo, M., Jin, S., & Jiang, Q. (2018). Parkinson's disease and Alzheimer's disease: a Mendelian randomization study. *BMC Med Genet*, 19(Suppl 1), 215. <https://doi.org/10.1186/s12881-018-0721-7>.
- Haruenkit, R., Poovarodom, S., Leontowicz, H., Leontowicz, M., Sajewicz, M., Kowalska, T., Delgado-Licon, E., Rocha-Guzmán, N.E., Gallegos-Infante, J.A., Trakhtenberg, S., & Gorinstein, S. (2007). Comparative study of health properties and nutritional value of durian, mangosteen, and snake fruit: experiments in vitro and in vivo. *J Agr Food Chem*, 55(14), 5842-5849. <https://doi.org/10.1021/jf070475a>
- Herrera-Aco, D.R., Medina-Campos, O.N., Pedraza-Chaverri, J., Scitutto-Conde, E., Rosas-Salgado, G., & Fragoso-González, G. (2019). Alpha-mangostin: Anti-inflammatory and antioxidant effects on established collagen-induced arthritis in DBA/1J mice. *Food Chem Toxicol*, 124, 300-315. <https://doi.org/10.1016/j.fct.2018.12.018>
- Huang, H.J.J., Chen, W.L.L., Hsieh, R.H.H., & Hsieh-Li, H.M. (2014). Multifunctional effects of mangosteen pericarp on cognition in C57BL/6J and triple transgenic alzheimer's mice. *Evid-Based Compl Alt*, 2014. <https://doi.org/10.1155/2014/813672>
- Husen, S.A., Winarni, D., Khaleyla, F., & Kalqutny, S.H. (2017a). Activity test of various mangosteen (*Garcinia mangostana*) pericarp extract fractions to decrease fasting blood cholesterol levels and lipid peroxidation activity in diabetic mice. *Journal of Biological Researches (Berkala Penelitian hayati)*, 22(1), 13-17. <https://doi.org/10.23869/bphjbr.22.1.20163>
- Husen, S.A., Winarni, D., Khaleyla, F., Kalqutny, S.H., & Ansori, A.N.M. (2017b). Activity assay of mangosteen (*Garcinia mangostana* L.) pericarp extract for decreasing fasting blood cholesterol level and lipid peroxidation in type-2 diabetic mice. *AIP Conf Proc*, 1888(1), 20026. <https://doi.org/10.1063/1.5004303>
- Ighodaro, O.M., & Akinloye, O.A. (2018). First line defence antioxidants-superoxide dismutase (SOD), catalase (CAT), and glutathione peroxidase (GPX): their fundamental role in the entire antioxidant defence grid. *Alexandria Journal of Medicine*, 54(4), 287-293.

- <https://doi.org/10.1016/j.ajme.2017.09.001>
- Im, A.R.R., Kim, Y.M.M., Chin, Y.W.W., & Chae, S. (2017). Protective effects of compounds from *Garcinia mangostana* L. (mangosteen) against UVB damage in HaCaT cells and hairless mice. *Int J Mol Med*, 40(6), 1941–1949. <https://doi.org/10.3892/ijmm.2017.3188>
- Indharty, R.R.S., Japardi, I., Siahaan, A.M.P., & Tandean, S. (2019). Mangosteen extract reduce apoptosis via inhibition of oxidative process in rat model of traumatic brain injury. *Bali Med J*, 8(1), 227–232. doi: 10.15562/bmj.v8i1.1153
- Ismail, S.M., Hui, C.K., Aminuddin, A., & Ugusman, A. (2018). Piper sarmentosum as an antioxidant: a systematic review. *Sains Malaysiana*, 47(10), 2359-2368. doi: 10.17576/jsm-2018-4710-12
- Jariyapongskul, A., Areebambud, C., Suksamrarn, S., & Mekseepralard, C. (2015). Alpha-mangostin attenuation of hyperglycemia-induced ocular hypoperfusion and blood retinal barrier leakage in the early stage of type 2 diabetes rats. *Biomed Res Int*, 2015. <https://doi.org/10.1155/2015/785826>
- Karim, N., Jeenduang, N., & Tangpong, J. (2018). Anti-glycemic and anti-hepatotoxic effects of mangosteen vinegar rind from *Garcinia mangostana* against HFD/STZ-induced type II diabetes in mice. *Pol J Food Nutr Sci*, 68(2), 163–169. <https://doi.org/10.1515/pjfn-2017-0018>
- Karim, N., Rahman, A., Chanudom, L., Thongsom, M., & Tangpong, J. (2019a). Mangosteen Vinegar Rind from *Garcinia mangostana* Prevents High-Fat Diet and Streptozotocin-Induced Type II Diabetes Nephropathy and Apoptosis. *J Food Sci*, 84(5), 1208–1215. <https://doi.org/10.1111/1750-3841.14511>
- Karim, N., Rahman, M.A., Changlek, S., & Tangpong, J. (2019b). Short-Time Administration of Xanthone From *Garcinia mangostana* Fruit Pericarp Attenuates the Hepatotoxicity and Renotoxicity of Type II Diabetes Mice. *J Am Coll Nutr*, 1-10. <https://doi.org/10.1080/07315724.2019.1696251>
- Kim, S.O., Merchant, K., Nudelman, R., Beyer Jr, W.F., Keng, T., DeAngelo, J., Hausladen, A., & Stamler, J.S. (2002). OxyR A molecular code for redox-related signaling. *Cell*, 109(3), 383-396. doi: 10.1016/s0092-8674(02)00723-7
- Kondo, M., Zhang, L., Ji, H., Kou, Y., & Ou, B. (2009). Bioavailability and antioxidant effects of a xanthone-rich Mangosteen (*Garcinia mangostana*) product in humans. *J Agr Food Chem*, 57(19), 8788–8792. <https://doi.org/10.1021/jf901012f>
- Kumar, H., Lim, H.W., More, S.V., Kim, B.W., Koppula, S., Kim, I.S., & Choi, D.K. (2012). The role of free radicals in the aging brain and parkinson's disease: convergence and parallelism. *International Journal of Molecular Sciences*, 13, 10478-10504. doi: 10.3390/ijms130810478
- Kumar, V., Bhatt, P.C., Kaithwas, G., Rashid, M., Al-abbasi, F.A., Khan, J.A.J., Anwar, F., & Verma, A. (2016).  $\alpha$ -Mangostin Mediated Pharmacological Modulation of Hepatic Carbohydrate Metabolism in Diabetes Induced Wistar Rat. *Beni-Suef University Journal of Basic and Applied Sciences*, 5(3), 255–276. <https://doi.org/10.1016/j.bjbas.2016.07.001>
- Leontowicz, H., Leontowicz, M., Drzewiecki, J., Haruenkit, R., Poovarodom, S., Park, Y.S., Jung, S.T., Kang, S.G., Trakhtenberg, S., & Gorinstein, S. (2006). Bioactive properties of Snake fruit (*Salacca edulis* Reinw) and Mangosteen (*Garcinia mangostana*) and their influence on plasma lipid profile and antioxidant activity in rats fed cholesterol. *Eur Food Res Technol*, 223(5), 697–703. doi: 10.1007/s00217-006-0255-7
- Leontowicz, M., Leontowicz, H., Drzewiecki, J., Jastrzebski, Z., Haruenkit, R., Poovarodom, S., Park, Y.S., Jung, S.T., Kang, S.G., Trakhtenberg, S., & Gorinstein, S. (2007). Two exotic fruits positively affect rat's plasma composition. *Food Chem*, 102(1), 192–200. <https://doi.org/10.1016/j.foodchem.2006.05.046>
- Liguori, I., Russo, G., Curcio, F., Bulli, G., Aran, L., Della-Morte, D., Gargiulo, G., Testa, G., Cacciatore, F., Bonaduce, D., & Abete, P. (2018). Oxidative stress, aging, and diseases. *Clin Interv Aging*, 13, 757–772. <https://doi.org/10.2147/CIA.S158513>
- Lim, Y.S., Lee, S.S.H., & Tan, B.C. (2013). Antioxidant capacity and antibacterial activity of different parts of mangosteen (*Garcinia mangostana* Linn.) extracts. *Fruits*, 68(6), 483-389. <https://doi.org/10.1051/fruits/2013088>

- Lotter, J., Möller, M., Dean, O., Berk, M., & Harvey, B.H. (2020). Studies on Haloperidol and Adjunctive  $\alpha$ -Mangostin or Raw *Garcinia mangostana* Linn Pericarp on Bio-Behavioral Markers in an Immune-Inflammatory Model of Schizophrenia in Male Rats. *Front Psychiatry*, *11*, 121. <https://doi.org/10.3389/fpsy.2020.00121>
- Lushchak, V.I. (2012). Glutathione homeostasis and functions: potential targets for medical interventions. *Journal of Amino acids*, *2012*, 1-26. <https://doi.org/10.1155/2012/736837>
- Mills, O. H., Criscito, M. C., Schlesinger, T. E., Verdicchio, R., & Szoke, E. (2016). Addressing Free Radical Oxidation in Acne Vulgaris. *The Journal of clinical and aesthetic dermatology*, *9*(1), 25–30.
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D.G., & The PRISMA group. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med*, *6*(7), e1000097. <https://doi.org/10.1136/bmj.b2535>
- Nakagawa, Y., Inuma, M., Naoe, T., Nazowa, Y., & Akao, Y. (2007). Characterized mechanism of alpha-mangostin-induced cell death: caspase-independent apoptosis with release of endonuclease-G from mitochondria and increased miR-143 expression in human colorectal cancer DLD-1 cells. *Bioorgan Med Chem*, *15*(16), 5650-8. doi: 10.1016/j.bmc.2007.04.071
- Nelli, G.B., Solomon, K.A., & Kilari, E.K. (2013). Antidiabetic effect of  $\alpha$ -mangostin and its protective role in sexual dysfunction of streptozotocin induced diabetic male rats. *Syst Biol Reprod Med*, *59*(6), 319–328. doi: 10.3109/19396368.2013.820369
- Oberholzer, I., Möller, M., Holland, B., Dean, O.M., Berk, M., & Harvey, B.H. (2018). *Garcinia mangostana* Linn displays antidepressant-like and pro-cognitive effects in a genetic animal model of depression: a bio-behavioral study in the Flinders Sensitive Line rat. *Metab Brain Dis*, *33*(2), 467–480. <https://doi.org/10.1007/s11011-017-0144-8>
- Oberley, L.W. (1988). Free radicals and diabetes. *Free Radical Bio Med*, *5*, 113-124. doi: [https://doi.org/10.1016/0891-5849\(88\)90036-6](https://doi.org/10.1016/0891-5849(88)90036-6).
- Ong, Y.S., Murugaiyah, V., Goh, B.H., & Khaw, K.Y. (2020). Bioactive Xanthenes from *Garcinia mangostana*. *Plant-derived Bioactives*, 281-300.
- Panche, A. N., Diwan, A. D., & Chandra, S. R. (2016). Flavonoids: an overview. *Journal of nutritional science*, *5*, e47. doi:10.1017/jns.2016.41
- Parkhe, A., Parekh, P., Nalla, L.V., Sharma, N., Sharma, M., Gadepalli, A., Kate, A., & Khairnar, A. (2020). Protective effect of alpha mangostin on rotenone induced toxicity in rat model of Parkinson's disease. *Neurosci Lett*, *716*, 134652. <https://doi.org/10.1016/j.neulet.2019.134652>
- Pérez-Rojas, J.M., Cruz, C., García-López, P., Sánchez-González, D.J., Martínez-Martínez, C.M., Ceballos, G., Espinosa, M., Meléndez-Zajgla, J., & Pedraza-Chaverri, J. (2009). Renoprotection by alpha-Mangostin is related to the attenuation in renal oxidative/nitrosative stress induced by cisplatin nephrotoxicity. *Free Radical Res*, *43*(11), 1122–1132. <https://doi.org/10.1080/10715760903214447>
- Pham-Huy, L.A., He, H., & Pham-Huy, C. (2008). Free radicals, antioxidants in disease and health. *Int J Biomed Sci*, *4*(2), 89–96.
- Phaniendra, A., Jestadi, D. B., & Periyasamy, L. (2015). Free radicals: properties, sources, targets, and their implication in various diseases. *Indian journal of clinical biochemistry : IJCB*, *30*(1), 11–26. <https://doi.org/10.1007/s12291-014-0446-0>
- Phyu, M.P., & Tangpong, J. (2014). Neuroprotective effects of xanthone derivative of *Garcinia mangostana* against lead-induced acetylcholinesterase dysfunction and cognitive impairment. *Food Chem Toxicol*, *70*, 151–156. <https://doi.org/10.1016/j.fct.2014.04.035>
- Pillai, S., Oresajo, C., & Hayward, J. (2005). Ultraviolet radiation and skin aging: roles of reactive oxygen species, inflammation and protease activation, and strategies for prevention of inflammation-induced matrix degradation – a review. *International Journal of Cosmetic Science*, *27*(1), 17-34.
- Pittayapruk, P., Meephanan, J., Prapapan, O., Komine, M., & Ohtsuki, M. (2016). Role of Matrix Metalloproteinases in Photoaging and Photocarcinogenesis. *International journal of molecular sciences*, *17*(6), 868. doi:10.3390/ijms17060868

- Pizzino, G., Irrera, N., Cucinotta, M., Pallio, G., Mannino, F., Arcoraci, V., Squadrito, F., Altavilla, D., & Bitto, A. (2017). Oxidative Stress: Harms and Benefits for Human Health. *Oxidative medicine and cellular longevity*, 2017, 8416763. <https://doi.org/10.1155/2017/8416763>
- Rana, M.N., Tangpong, J., & Rahman, M.A. (2020). Xanthones protects lead-induced chronic kidney disease (CKD) via activating Nrf-2 and modulating NF- $\kappa$ B, MAPK pathway. *Biochemistry and Biophysics Reports*, 21, 100718. <https://doi.org/10.1016/j.bbrep.2019.100718>
- Sampath, P.D., & Kannan, V. (2009). Mitigation of mitochondrial dysfunction and regulation of eNOS expression during experimental myocardial necrosis by alpha-mangostin, a xanthonic derivative from *Garcinia mangostana*. *Drug Chem Toxicol*, 32(4), 344–352. <https://doi.org/10.1080/01480540903159210>
- Samuagam, L., Sia, C.M., Akowuah, G.A., Okechukwu, P.N., & Yim, H.S. (2015). In vivo antioxidant potentials of rambutan, mangosteen, and langsat peel extracts and effects on liver enzymes in experimental rats. *Food Sci Biotechnol*, 24(1), 191–198. doi: 10.1007/s10068-015-0026-y
- Santos-Sánchez, N.F., Salas-Coronado, R., Villanueva-Cañongo, C., & Hernández-Carlos, B. (2019). Antioxidant Compounds and Their Antioxidant Mechanism. *Antioxidants*, 2019. doi: 10.5772/intechopen.85270.
- Sattayasai, J., Chaonapan, P., Arkaravichie, T., Soi-Ampornkul, R., Junnu, S., Charoensilp, P., Samer, J., Jantaravinid, J., Masaratana, P., Suktitipat, B., Manissorn, J., Thongboonkerd, V., Neungton, N., Moongkarndi, P., & others. (2013). Protective effects of mangosteen extract on H<sub>2</sub>O<sub>2</sub>-induced cytotoxicity in SK-N-SH cells and scopolamine-induced memory impairment in mice. *PLoS One*, 8(12), e85053. <https://doi.org/10.1371/journal.pone.0085053>
- Schneider, K., Schwarz, M., Burkholder, I., Kopp-Schneider, A., Edler, L., Kinsner-Ovaskainen, A., Hartung, T., & Hoffmann, S. (2009). “ToxRTool”, a new tool to assess the reliability of toxicological data. *Toxicol Lett*, 189(2), 138-144. doi: 10.1016/j.toxlet.2009.05.013
- Sinaga, R.N., & Siregar, N.S. (2016). Phytochemical screening and test of antioxidant activity in the extract of mangosteen rind. *International conference on Public Health*, 124. <https://doi.org/10.26911/theicph.2016.057>
- Subani, N.D. (2014). Effect of Skin Extract Mangosteen (*Garcinia mangostana* L.) Against Sperm Quality And Malondialdehyde Levels of Mice (*Mus musculus*) Exposed With 2-Methoxyethanol. *Jurnal Info Kesehatan*, 12(1), 670–683. doi: 10.31965/infokes.v12i1.50
- Suthammarak, W., Numpraphrut, P., Charoensakdi, R., Neungton, N., Tunrungruangtavee, V., Jaisupa, N., Charoensak, S., Moongkarndi, P., & Muangpaisan, W. (2016). Antioxidant-enhancing property of the polar fraction of mangosteen pericarp extract and evaluation of its safety in humans. *Oxid Med Cell Longev*, 2016. <https://doi.org/10.1155/2016/1293036>
- Sutono, T. (2013). Efficacy of *Garcinia mangostana* L. (mangosteen rind extract) to reduce acne severity. *Med J Indones*, 22(3), 167–172. <https://doi.org/10.13181/mji.v22i3.586>
- Suttirak, W., & Manurakchinakorn, S. (2014). In vitro antioxidant properties of mangosteen peel extract. *Journal of food science and technology*, 51(12), 3546–3558. <https://doi.org/10.1007/s13197-012-0887-5>
- Taher, M., Tg Zakaria, T.M.F.S., Susanti, D., & Zakaria, Z.A. (2016). Hypoglycaemic activity of ethanolic extract of *Garcinia mangostana* Linn. in normoglycaemic and streptozotocin-induced diabetic rats. *BMC Complem Altern M*, 16(135). doi: 10.1186/s12906-016-1118-9
- Tjahjani, S., Biantoro, Y., & Tjokropranoto, R. (2019). Ethyl acetate Fraction of *Garcinia Mangostana* L Rind Study as Antimalaria and Antioxidant in *Plasmodium berghei* Inoculated Mice. *Open Access Maced J Med Sci*, 7(12), 1935. <https://doi.org/10.3889/oamjms.2019.480>
- Tsai, H.H., Chen, C.W., Yu, P.L., Lin, Y.L., Hsieh, R.H., Hui-Hsuan, T., Chia-Wen, C., Pei-Ling, Y., Yu-Ling, L., Rong-Hong, H., Tsai, H.H., Chen, C.W., Yu, P.L., Lin, Y.L., & Hsieh, R.H. (2020). Mangosteen pericarp components alleviate progression of prostatic hyperplasia and mitochondrial dysfunction in rats. *Sci Rep-UK*, 10(1), 1–9. <https://doi.org/10.1038/s41598-019-56970-2>
- Tsai, S.Y.Y., Chung, P.C.C., Owaga, E.E., Tsai, I.J.J., Wang, P.Y.Y., Tsai, J.I.I., Yeh, T.S.S., & Hsieh, R.H.H. (2016). Alpha-mangostin from mangosteen (*Garcinia mangostana* Linn.) pericarp extract

- reduces high fat-diet induced hepatic steatosis in rats by regulating mitochondria function and apoptosis. *Nutr Metab*, 13(1), 88. <https://doi.org/10.1186/s12986-016-0148-0>
- Uttara, B., Singh, A. V., Zamboni, P., & Mahajan, R. T. (2009). Oxidative stress and neurodegenerative diseases: a review of upstream and downstream antioxidant therapeutic options. *Current neuropharmacology*, 7(1), 65–74. <https://doi.org/10.2174/157015909787602823>
- Valko, M., Leibfritz, D., Moncol, J., Cronin, M.T., Mazur, M., & Telser, J. (2007). Free radicals and antioxidants in normal physiological functions and human diseases. *The International Journal of Biochemistry & Cell Biology*, 39(1), 44-84.
- Wahjuni, S., Laksmiwati, A.A.I.A.M., & Puspawati, N.M. (2017). Intake Pericarp of Garcinia mangostana L. Extract Inhibited Oxidative Stress on Wistar Rat Hyperglycemic through the Increased of Superoxide Dismutase and. *KnE Life Sciences*, 202–207. doi: 10.18502/cls.v3i5.994
- Wang, A., Li, D., Wang, S., Zhou, F., Li, P., Wang, Y., & Lin, L. (2018).  $\gamma$ -Mangostin, a xanthone from mangosteen, attenuates oxidative injury in liver via NRF2 and SIRT1 induction. *J Funct Food*, 40, 544–553. <https://doi.org/https://doi.org/10.1016/j.jff.2017.11.047>
- Wang, A., Zhou, F., Li, D., Lu, J.J., Wang, Y., & Lin, L. (2019).  $\gamma$ -Mangostin alleviates liver fibrosis through Sirtuin 3-superoxide-high mobility group box 1 signaling axis. *Toxicol Appl Pharm*, 363, 142–153. <https://doi.org/10.1016/j.taap.2018.11.011>
- Weecharangsan, W., Opanosopit, P., Sukma, M., Ngawhirunpat, T., Sotanaphun, U., & Siripong, P. (2006). Antioxidative and neuroprotective activities of extracts from the fruit hull of mangosteen (*Garcinia mangostana* Linn.). *Med Princ Pract*, 15(4), 281-7. doi: 10.1159/000092991
- Wihastuti, T.A., Sargowo, D., Heriansyah, T., Rahmawati, G., & Sulfia, Y.H. (2015). Modulation of paraoxonase activity (PON)-1 by xanthone in sub chronic exposure of orgnophosphate: Antioxidant in dichorvos intoxicity. *Toxicol Environ Health Sci*, 7(2), 136–142. doi: 10.1007/s13530-015-0232-2
- Xie, Z., Sintara, M., Chang, T., & Ou, B. (2015b). Daily consumption of a mangosteen-based drink improves in vivo antioxidant and anti-inflammatory biomarkers in healthy adults: A randomized, double-blind, placebo-controlled clinical trial. *Food Sci Nutr*, 3(4), 342–348. <https://doi.org/10.1002/fsn3.225>
- Xie, Z., Sintara, M., Chang, T., & Ou, B. (2015a). Functional beverage of garcinia mangostana (mangosteen) enhances plasma antioxidant capacity in healthy adults. *Food Sci Nutr*, 3(1), 32–38. <https://doi.org/10.1002/fsn3.187>
- Yan, X., Sun, Y.S., Ren, S., Zhao, L.C., Liu, W.C., Chen, C., Wang, Z., & Li, W. (2018). Dietary  $\alpha$ -mangostin provides protective effects against acetaminophen-induced hepatotoxicity in mice via Akt/mTOR-mediated inhibition of autophagy and apoptosis. *Int J Mol Sci*, 19(5), 1335. <https://doi.org/10.3390/ijms19051335>
- Zhang, S., & Duan, E. (2018). Fighting against Skin Aging: The Way from Bench to Bedside. *Cell transplantation*, 27(5), 729–738. doi:10.1177/0963689717725755
- Zhang, Y.J., Wang, F., Zhou, Y., Li, Y., Zhou, T., Zheng, J., Zhang, J.J., Li, S., Xu, D.P., & Li, H.B. (2016). Effects of 20 selected fruits on ethanol metabolism: Potential health benefits and harmful impacts. *Int J Environ Res Public Health*, 13(4). <https://doi.org/10.3390/ijerph13040399>