

References on Graviola (*Annona muricata*) from Part 3 of [Fighting Cancer with Plants from the Rainforest](#) By Leslie Taylor

The published research referenced in the book which is shown below will include the initials **HS**, **IVT**, **IVA**, **REV**, **INS**, **REV** and **NEW**. HS refers to research conducted in humans; IVT refers to *in vitro* research conducted inside of test tubes; IVA refers to *in vivo* research conducted in animals; REV refers to a review article that evaluated and summarizes multiple studies on the subject; INS refers to *in silico* research (newer computer modeling including molecular docking studies) and NEW refers new biological research methods which determine genes and signaling pathways, and molecular pathways of actions which were developed during and after the Human Genome Project discussed in chapter 4.

This research below was last updated in August 2025. To view research published after that time, follow these links to the National Institute of Health's National Library of Medicine on [Graviola](#).

Cancer Research on Graviola

(Includes research on the plant and its identified anti-cancerous active chemicals)

Human Studies:

Serretta, V., et al. "A prospective observational study on oral administration of Ellagic Acid and *Annona muricata* in patients affected by non-muscle invasive bladder cancer not undergoing maintenance after 6-week intravesical prophylaxis." *Urologia*. 2022 Feb; 89(1): 49-52.

Ismail, N., et al. "Normalisation of human chorionic gonadotrophin (hCG) levels in a patient with partial molar pregnancy with a uterine mass without chemotherapy: Impact of using herbal remedies." *J. Complement. Integr. Med.* 2021 Apr; 18(4): 859-863.

Costa-Santos, M., et al. "Spontaneous regression of hepatocellular carcinoma: myth or reality?" *BMJ Case Rep.* 2020 Feb; 13(2): e233509. [\[Article\]](#)

Pham, T., et al. "Graviola in metastatic ovarian cancer: a case report of sustained disease stability." *Clinical Oncol. Res.* 2019; 2(6): 2-3. [\[Free Article\]](#)

Donne, M., et al. "Antiviral activity of ellagic acid and *Annona muricata* in cervical HPV related pre-neoplastic lesions: A randomized trial." *J. Funct. Foods.* 2017 Aug; 35: 549-554. [\[Free Article\]](#)

Indrawati, L., et al. "Safety of *Annona muricata* extract supplementation for colorectal cancer patients." *Indones. J. Gastroenterol. Hepatol. Dig. Endosc.* 2017; 17: 170-175. [\[Free Article\]](#)

Indrawati, L., et al. "The effect of an *Annona muricata* leaf extract on nutritional status and cytotoxicity in colorectal cancer: a randomized controlled trial." *Asia Pac. J. Clin. Nutr.* 2017; 26(4): 606-612. [\[Free Article\]](#)

Surono, I., et al. "Inflammatory response of *Annona muricata* Linn leaves extract in colorectal cancer patients." *J. Global Pharma. Technol.* 2017; 9(7 Suppl.): 150-157. [\[Free Article\]](#)

Morosetti, G., et al. "Ellagic acid and *Annona muricata* in the chemoprevention of HPV-related pre-neoplastic lesions of the cervix." *Oncol. Lett.* 2017 Mar; 13: 1880-1884. [\[Free Article\]](#)

Indrawati, L., et al. "Antiproliferative activity and caspase enhancement properties of *Annona muricata* leaves extract against colorectal cancer cells." *Med. J. Indones.* 2016; 25(3): 136-142. [\[Free Article\]](#)

Hansra, D., et al. "Patient with metastatic breast cancer achieves stable disease for 5 years on graviola and xeloda after progressing on multiple lines of therapy." *Adv. Breast Can. Res.* 2014; 3(3): 84-87. [[Free Article](#)]

Reviews:

Albahri, G., et al. "Potential anti-tumorigenic properties of diverse medicinal plants against the majority of common types of cancer." *Pharmaceuticals* (Basel). 2024 Apr; 17(5): 574. (REV)

Isaali, M., et al. "Effect of *Annona muricata* (Soursop) on patients with cancer: A systematic review." *Malay. J. Pharma.* 2024 Dec; 2(10): 3-11. [[Free Article](#)]

Permatasanti, A., et al. "Potential of Indonesian herbal as an anti-cancer therapy: A systemic review of *in vitro* studies." *Cancer Manag. Res.* 2023 Aug; 15: 837-850.

Mutakin, M., et al. "Pharmacological Activities of Soursop (*Annona muricata* Lin.)" *Molecules.* 2022 Feb; 10; 27(4): 1201. (REV)

Ilango, S., et al. "A review on *Annona muricata* and Its anticancer activity." *Cancers* (Basel). 2022 Sep; 14(18): 4539. [[Free Article](#)] (REV)

Chan, W., et al. "The safety and tolerability of *Annona muricata* leaf extract: a systematic review." *J. Pharm. Pharmacol.* 2020 Jan; 72(1): 1-16. [[Free Article](#)] (REV)

da Costa, J., et al. "*Annona* Genus: Traditional uses, phytochemistry and biological activities." *Curr. Pharm. Des.* 2020 26(33): 4056-4091. (REV)

Sagar, P., et al. "Useful anti-cancerous & anti-tumorous Asian medicinal plants (*Taxus baccata* L. or *Taxus baccata* Thunb., *Catharanthus roseus* (L.) G. Don, *Annona muricata* L.)." *Int. J. Tradit. Complem. Med.* 2020; 5: 22. (REV)

Jacobo-Herrera, N., et al. "Selective acetogenins and their potential as anticancer agents." *Front. Pharmacol.* 2019; 10: 783. (REV)

Nugraha, A., et al. "Anti-infective and anti-cancer properties of the *Annona* species: their ethnomedicinal uses, alkaloid diversity, and pharmacological activities." *Molecules.* 2019 Dec; 24(23): E4419. (REV)

Prasad, S., et al. "Anti-cancer properties of *Annona muricata* (L.)." *Med. Plants.* 2019 Jun; 11(2): 117-129. (REV)

Banerjee, A., et al. "Anticancer effects of *Annona muricata* with its acetogenins as bioactive compound." *Cytol. Histol. Int. J.* 2018 Mar; 2(1): 000104. (REV)

Qazi, A., et al. "Emerging therapeutic potential of graviola and its constituents in cancers." *Carcinogenesis.* 2018 Apr; 39(4): 522-533. [[Free Article](#)] (REV)

Quílez, A., et al. "Potential therapeutic applications of the genus *Annona*: Local and traditional uses and pharmacology." *J. Ethnopharmacol.* 2018 Oct; 225: 244-270. (REV)

Rady, I., et al. "Anticancer properties of graviola (*Annona muricata*): A comprehensive mechanistic review." *Oxid. Med. Cell. Longev.* 2018 Jul; 2018: 1826170. [[Free Article](#)] (REV)

Yajid, A. et al. "Potential benefits of *Annona muricata* in combating cancer: A review." *Malay. J. Med. Sci.* 2018 Feb; 25(1): 5-15. [[Free Article](#)] (REV)

Widyastuti, D., et al. "Mini review: Soursop extract (*Annona muricata* Linn.) for cancer therapy." *J. Ilmu. Pangan. Hasil. Pertanian.* 2018; 2(2): 155-161. (REV)

Rady, I., et al. "Anticancer properties of graviola (*Annona muricata*): A comprehensive mechanistic review." *Oxid. Med. Cell Longev.* 2018 Jul; 2018: 1826170. [[Free Article](#)] (REV)

Wahab, S., et al. "Exploring the leaves of *Annona muricata* L. as a source of potential anti-inflammatory and anticancer agents." *Front. Pharmacol.* 2018 Jun; 9: 661. (REV)

Gavamukulya, Y., et al. "Annona muricata: Is the natural therapy to most disease conditions including cancer growing in our backyard? A systematic review of its research history and future prospects." *Asian Pac. J. Trop. Med.* 2017 Sept; 10(9): 835-848. **(REV)**

Saleem, U., et al. "Pharmacological Screening of *Annona muricata*: A Review." *Asian J. Agri. Biol.* 2017; 5(1): 38-46. **(REV)**

Mangal, M., et al. "Acetogenins as potential anticancer agents." *Anti-Cancer Agents Med. Chem.* 2016; 16(6): 1-23. **(REV)**

Jayashree, B., et al. "Targets in anticancer research--A review." *Indian J. Exp. Biol.* 2015 Aug; 53(8): 489-507. [\[Free Article\]](#) **(REV)**

Moghadamtousi, S., et al. "*Annona muricata* (Annonaceae): A review of its traditional uses, isolated acetogenins and biological activities." *Int. J. Mol. Sci.* 2015 Jul; 16(7): 15625-58. **(REV)**

Patrikios, I. "Graviola: a systematic review on its anticancer properties." *Am. J. Cancer. Prev.* 2015; 3(6): 128-131. [\[Free Article\]](#) **(REV)**

Qayed, W., et al. "Annonaceous acetogenins as a new anticancer agent." *Der Pharma. Chemica.* 2015; 7(6): 24-35. **(REV)**

Gajalakshmi, S., et al. "Phytochemical and pharmacological properties of *Annona muricata*: a review." *Int. J. Pharm. Pharm. Sci.* 2012; 4(2): 3-6. [\[Free Article\]](#) **(REV)**

Kedari, T., et al. "Guyabano (*Annona muricata*): A review of its traditional uses, phytochemistry and pharmacology." *Am. J. Res. Comm.* 2014; 2: 247-268. [\[Free Article\]](#) **(REV)**

Mishra, S., et al. "*Annona muricata* (the cancer killer): A review." *Glob. J. Pharm. Res.* 2013; 2: 1613-1618. [\[Free Article\]](#) **(REV)**

Alonso-Castro, A., et al. "Mexican medicinal plants used for cancer treatment: pharmacological, phytochemical and ethnobotanical studies." *J. Ethnopharmacol.* 2011; 133: 945-972. **(REV)**

Badrie, N., et al. "Soursop (*Annona muricata* L.): composition, nutritional value, medicinal uses, and toxicology." *Bioactive Foods in Promoting Health.* 2010; Chapter 39: 621-641. [\[Free Article\]](#) **(REV)**

Liaw, C., et al. "Historic perspectives on Annonaceous acetogenins from the chemical bench to preclinical trials." *Planta Med.* 2010; 76(13): 1390-1404. [\[Free Article\]](#)

Calderon, A., et al. "Screening of Latin American plants for cytotoxic activity." *Pharm. Biol.* 2006; 44: 1-11. **(REV)**

Bermejo, A., et al. "Acetogenins from Annonaceae: recent progress in isolation, synthesis and mechanisms of action." *Nat. Prod. Rep.* 2005 Apr; 22(2): 269-303. **(REV)**

Kojima, N. "Systematic synthesis of antitumor Annonaceous acetogenins." *Yakugaku Zasshi.* 2004; 124(10): 673-81. **(REV)**

Betancur-Galvis, L., et al. "Antitumor and antiviral activity of Colombian medicinal plant extracts." *Mem. Inst. Oswaldo Cruz.* 1999; 94(4): 531-35. **(REV)**

Test Tube Studies Testing Multiple Cancer Cell Lines and/or Multiple Chemicals:

Mohammed, M., et al. "Comprehensive tools of alkaloid/volatile compounds-metabolomics and DNA profiles: Bioassay-role-guided differentiation process of six *Annona* sp. grown in egypt as anticancer therapy." *Pharmaceuticals* (Basel). 2024 Jan; 7(1): 103. **(IVT)**

Ginting, B., et al. "Antioxidant and cytotoxicity screenings of ethyl acetate extract from *Annona muricata* leaves and its fractions." *J. Adv. Pharm. Technol. Res.* 2024 Apr-Jun; 15(2): 70-74. **(IVT)**

Fallon, H., et al. "In silico studies on cytotoxicity and antitumoral activity of acetogenins from *Annona muricata* L." *Front. Chem.* 2023 Nov; 11: 1316779. **(IVT, INS)**

Calzada, F., et al. "Secondary metabolites and biological properties of *Annona muricata*." *Rev. Brasil. Farmacog.* 2020 Mar; 30(2): 305-311. (IVT)

Fernandes R., et al. "Muricatacin, a gateway molecule to higher acetogenin synthesis." *Chem. Asian J.* 2020 Nov; 15(22): 3660-3681. (IVT)

Nascimento, J., et al. "Comparison of anticancer properties of *Annona muricata* L. acetonc and methanolic leaf extracts." *J. Nat. Prod.* 2019; 9(4): 312-320. (IVT)

Wang, W., et al., " Antitumour activity of muricatacin isomers and its derivatives in human colorectal carcinoma cell HCT116." *Anticancer Agents Med. Chem.* 2020; 20(2): 254-263. (IVT)

El-Kaream, S. "Biochemical and biophysical study of chemopreventive and chemotherapeutic anti-tumor potential of some Egyptian plant extracts." *Biochem. Biophys. Rep.* 2019; 18: 100637. (IVT)

Agu, K., et al. "*In vitro* anticancer assessments of *Annona muricata* fractions and *in vitro* antioxidant profile of fractions and isolated acetogenin (15-acetyl guanacone)." *J. Cancer Res. Pract.* 2018; 5: 53-66. (IVT)

Onyegeme-Okerenta, B., et al. "Anti-proliferative activity of ethyl acetate leaf extract of *Annona muricata* L. on selected carcinoma human cell lines." *London J. Res. Sci. Nat. Form.* 2018; 18(4): 10. (IVT)

Ragavi, K., et al. "Phytochemical screening and assessment of *in vitro* anticancer potential of ethanolic extract of *Annona muricata* leaves." *J. Pharmacog. Phytochem.* 2018; 7(4): 628-630. (IVT)

Daud, N., et al. "Acetogenins of *Annona muricata* leaves: Characterization and potential anticancer study." *Cancer Sci. Therap.* 2016; 3(4): 543-551. (IVT)

Gavamukulya, Y., et al. "Phytochemical screening, anti-oxidant activity and *in vitro* anticancer potential of ethanolic and water leaves extracts of *Annona muricata* (Graviola)." *Asian Pac. J. Trop. Med.* 2014 Sep; 7S1: S355-63. (IVT)

de Pedro, N., et al. "Analysis of cytotoxic activity at short incubation times reveals profound differences among Annonaceous acetogenins, inhibitors of mitochondrial Complex I." *J. Bioenerg Biomembr.* 2013 Feb; 45(1-2): 145-52. (IVT)

Paul, J., et al. "Anti-cancer activity on graviola, an exciting medicinal plant extract vs various cancer cell lines and a detailed computational study on its potent anti-cancerous leads." *Curr. Top. Med. Chem.* 2013; 13(14): 1666-73. (IVT, INS, NEW)

Ragasa, C., et al. "Acetogenins from *Annona muricata*." *Pharmacog. J.* 2012; 32(4): 32-37. (IVT)

Gomes de Melo, J., et al. "Antiproliferative activity, antioxidant capacity and tannin content in plants of semi-arid northeastern Brazil." *Molecules.* 2010 Nov; 15(12): 8534-42. (IVT)

Yang, H., et al. "Structure-activity relationships of diverse Annonaceous acetogenins against human tumor cells." *Bioorg. Med. Chem. Lett.* 2009 Apr; 19(8): 2199-202. (IVT)

Osorio, G. et al. "Antiprotozoal and cytotoxic activities *in vitro* of Colombian Annonaceae." *J. Ethnopharmacol.*, 2007; 111: 630-635. (IVT)

Gonzalez-Coloma, A., et al. "Selective action of acetogenin mitochondrial complex I inhibitors." *Z. Naturforsch.* 2002; 57(11-12): 1028-34. (IVT)

Kim, G., et al. "Muricoreacin and murihexocin C, mono-tetrahydrofuran acetogenins, from the leaves of *Annona muricata*." *Phytochemistry.* 1998; 49(2): 565-71. (IVT)

Kim, G., et al. "Two new mono-tetrahydrofuran ring acetogenins, anomuricin E and muricapentocin, from the leaves of *Annona muricata*." *J. Nat. Prod.* 1998; 61(4): 432-36. (IVT)

Oberlies, N., et al. "Tumor cell growth inhibition by several Annonaceous acetogenins in an *in vitro* disk diffusion assay." *Cancer Lett.* 1995; 96(1): 55-62. (IVT)

Kinjo, J., et al. "Screening of promising chemotherapeutic candidates from plants extracts." *J. Nat. Med.* 2016; 70: 335-360. (IVT)

Liaw, C., et al. "New cytotoxic monotetrahydrofuran Annonaceous acetogenins from *Annona muricata*." *J. Nat. Prod.* 2002; 65(4): 470-75. (IVT)

Zeng, L., et al. "Five new monotetrahydrofuran ring acetogenins from the leaves of *Annona muricata*." *J. Nat. Prod.* 1996; 59(11): 1035-42. (IVT)

Wu, F., et al. "Additional bioactive acetogenins, annomutacin and (2,4-trans and cis)-10R-annonacin-A-ones, from the leaves of *Annona muricata*." *J. Nat. Prod.* 1995; 58(9): 1430-37. (IVT)

Wu, F., et al. "Muricatocins A and B, two new bioactive monotetrahydrofuran Annonaceous acetogenins from the leaves of *Annona muricata*." *J. Nat. Prod.* 1995; 58(6): 902-8. (IVT)

Wu, F., et al. "New bioactive monotetrahydrofuran Annonaceous acetogenins, annomuricin C and muricatocin C, from the leaves of *Annona muricata*." *J. Nat. Prod.* 1995; 58(6): 909-5. (IVT)

Wu, F., et al. "Two new cytotoxic monotetrahydrofuran Annonaceous acetogenins, annomuricins A and B, from the leaves of *Annona muricata*." *J. Nat. Prod.* 1995; 58(6): 830-36. (IVT)

Rieser, M., et al. "Mircatetrocins A and B and gigantetrocin B: three new cytotoxic monotetrahydrofuran-ring acetogenins from the seed of *Annona muricata*." *Helv. Chim. Acta.* 1993; 76: 2433-2444. (IVT)

Sundarrao, K., et al. "Preliminary screening of antibacterial and antitumor activities of Papua New Guinean native medicinal plants." *Int. J. Pharmacog.* 1993; 31(1): 3-6. (IVT)

Bladder Cancer:

Yuan, S., et al. "Annonacin, a mono-tetrahydrofuran acetogenin, arrests cancer cells at the G1 phase and causes cytotoxicity in a Bax- and caspase-3-related pathway." *Life Sci.* 2003 May; 72(25): 2853-61. (IVT)

Brain Cancer:

Durairaj, B., et al. "Evaluation of the cytotoxic potential of *Annona muricata* Linn leaf extract against N2a-neuroblastoma cells." *Int. J. Green Pharma.* 2018 Oct-Dec; 12(4): S790. (IVT)

Breast Cancer:

Abdallah, R., et al. "Comprehensive chemical profiling and mechanistic insight into anticancer activity of *Annona muricata* leaves extract." *Pharmaceuticals* (Basel). 2024 May;17(5): 614. (IVT, NEW, INS)

Pathirana, O., et al. "Elucidating the potential of *Annona muricata* L. grown in Sri Lanka to be used in developing an anticancer drug against colorectal and breast cancers." *BMC Complement. Med. Ther.* 2024 Nov 28; 24(1): 410. (IVT, NEW)

Bravo-Alfaro, D., et al. "Annonaceae acetogenins: A potential treatment for gynecological and breast cancer." *Fitoterapia.* 2024 Oct; 178: 106187. (REV)

Septaningsih, D., "Untargeted metabolomics using UHPLC-Q-Orbitrap HRMS for identifying cytotoxic compounds on MCF-7 breast cancer cells from *Annona muricata* Linn leaf extracts as potential anticancer agents." *Phytochem. Anal.* 2024 Aug; 35(6): 1418-1427. (IVT, INS, NEW)

Perinbarajan, G., "Silica/*Annona muricata* nano-hybrid: Synthesis and anticancer activity against breast cancer." *Heliyon.* 2024 Jan; 10(3): e25048. (IVT, NEW)

Lopez, M., et al. "Selective cytotoxic effect of *Annona muricata* L. in HCC1954 (HER2+) breast cancer cells." *Bol. Latinoam. Caribe Plant. Med. Aromat.* 2024; 22 (5): 689–699.

Silihe, K., et al. "Comparative anticancer effects of *Annona muricata* Linn (Annonaceae) leaves and fruits on DMBA-induced breast cancer in female rats." *BMC Complement. Med. Ther.* 2023 Jul; 23(1):234. **(IVA, NEW)**

Rojas-Armas, J., et al. "Phytochemical constituents and ameliorative effect of the essential oil from *Annona muricata* L. leaves in a murine model of breast cancer." *Molecules.* 2022 Mar; 27(6): 1818. **(IVA, NEW)**

Hadisaputri, Y., et al. "Antiproliferation activity and apoptotic mechanism of soursop (*Annona muricata* L.) leaves extract and fractions on MCF7 breast cancer cells." *Breast Cancer* (Dove Med Press). 2021 Jul; 13: 447-457. **(IVT)**

Akpan, U., et al. "In vitro studies of *Annona muricata* L. extract-loaded electrospun scaffolds for localized treatment of breast cancer." *J. Biomed. Mater. Res. B. Appl. Biomater.* 2021 Dec; 109(12): 2041-2056. **(IVT)**

Tawiil, G., et al. "Anticancer and apoptogenic effect of graviola and low-dose radiation in tumor xenograft in mice." *Integr. Cancer Ther.* 2020 Jan-Dec: 19: 1534735419900930. **(IVA, NEW)**

Alshaeri, H., et al. "Effects of *Annona muricata* extract on triple-negative breast cancer cells mediated through EGFR signaling." *Cancer Manag. Res.* 2020 Dec; 12: 12519-12526. **(IVT, NEW)**

Antonio, V., et al. "Anti-cancer effect of soursop leaves on breast cancer." *Rev. Fac. Agron.* 2019 Feb; 36(1): 181-184. **(IVT)**

Naik, A., et al. "In vitro evaluation of *Annona muricata* L. (Soursop) leaf methanol extracts on inhibition of tumorigenicity and metastasis of breast cancer cells." *Biomarkers.* 2020 Dec; 25(8): 701-710. **(IVT)**

Fertilal, S., et al. "The cytotoxic activity of *Annona muricata* Linn leaves ethanolic extract (AMLEE) on T47D breast cancer cell line." *Med. Lab. Tech. J.* 2019 Dec; 6(1): 32-39. **(IVT)**

El-Kaream, S. "Biochemical and biophysical study of chemopreventive and chemotherapeutic anti-tumor potential of some Egyptian plant extracts." *Biochem. Biophys. Rep.* 2019; 18: 100637. **(IVA, IVT)**

Daddiouaissa, D., et al. "Antiproliferative activity of ionic liquid-graviola fruit extract against human breast cancer (MCF-7) cell lines using flow cytometry techniques." *J. Ethnopharmacol.* 2019 May; 236: 466-473. **(IVT)**

Endrini, S., et al. "Anti-cancer and anti-gout potential of some Indonesian and Malaysian medicinal plants." *Planta Med.* 2019; 85(18): 1511-1512. **(IVT)**

Torres, C., et al. "Effect of *Morinda citrifolia* and *Annona muricata* on Ehrlich tumor cells in Swiss albino mice and *in vitro* fibroblast cells." *J. Med. Food.* 2019 Jan; 22(1): 46-51. **(IVA)**

Zeweil, M., et al. "Graviola attenuates DMBA-induced breast cancer possibly through augmenting apoptosis and antioxidant pathway and downregulating estrogen receptors." *Environ. Sci. Pollut. Res.* 2019; 26: 15209–17. **(IVA, NEW)**

Dawood, H., et al. "Integrated in silico-*in vitro* strategy for screening of some traditional Egyptian plants for human aromatase inhibitors." *J. Ethnopharmacol.* 2018 Oct; 224: 359-372. **(IVT, INS)**

Rahman, H., et al. "Phytochemicals of *Annona muricata* leaves extract and cytotoxic effects on breast cancer cells." *Asian Pac. J. Trop. Med.* 2018; 11(12): 659-665. **(IVT)**

Kim, J., "Annona muricata leaf extract triggered intrinsic apoptotic pathway to attenuate cancerous features of triple negative breast cancer MDA-MB-231." *Cells. Evid. Based Complement. Alternat. Med.* 2018 Jul; 2018: 7972916. **(IVT)**

Sulistyoningrum, E., et al. "Annona muricata leaves extract reduce proliferative indexes and improve histological changes in rat's breast cancer." *J. Appl. Pharmaceut. Sci.* 2017; 7(1): 149-155. **(IVA, NEW)**

Prabhakaran, K., et al. "Polyketide natural products, acetogenins from graviola (*Annona muricata* L), its biochemical, cytotoxic activity and various analyses through computational and bio-programming methods." *Curr. Pharm. Des.* 2016; 22(34): 5204-5210. **(INS, IVT, NEW)**

Najmuddin, S., et al. "Anti-cancer effect of *Annona muricata* Linn leaves crude extract (AMCE) on breast cancer cell line." *BMC Complement. Altern. Med.* 2016 Aug; 16(1): 311. **(IVT)**

Muchtaromah, B., et al. "Effect of *Annona muricata* leaf extract on antioxidant activity and histology of the mamary tissue in the breast cancer model *in vivo*." *Australia. J. Basic Appl. Sci.* 2015; 9(7): 92-95. **(IVA, NEW)**

Arun, R., et al. "Screening of anticancer and antibacterial activity of methanolic extracts of *Annona muricata* leaf and bark." *Int. J. Sci.* 2015 May-Jun; 2(3): 1-4. **(IVT)**

Pricillia, A., et al. "Cytotoxicity assay of saponin containing extract from soursop leaf against breast cancer cell." *Proceed. Int. Conf. Innova. Entrepr. Tech.* 2015 Nov; 256-260. **(IVT)**

Fidianingsih, I., et al. "*Annona muricata* aqueous extract suppresses T47D breast cancer cell proliferation." *Univ. Med.* 2014 Jan-Apr; 33(1): 19-26. **(IVT)**

Minari, J., et al. "Chemopreventive effect of *Annona muricata* on DMBA-induced cell proliferation in the breast tissues of female albino mice." *Egypt. J. Med. Human Genet.* 2014; 15: 327-334. **(IVA)**

Endrini, S., et al. "Soursop leaf cytotoxic activity against breast cancer." *Univ. Med.* 2014 Sep-Dec; 33(3): 179-184. **(IVT)**

Owolabi, M., et al. "The cytotoxic activity of *Annona muricata* leaf oil from Badagary, Nigeria." *Amer. J. Essen. Oil Nat. Prod.* 2013; 1(1): 1-3. **(IVT)**

George, V., et al. "Quantitative assessment of the relative antineoplastic potential of the n-butanolic leaf extract of *Annona muricata* Linn. in normal and immortalized human cell lines." *Asian Pac. J. Cancer Prev.* 2012; 13(2): 699-704. **(IVT)**

Ekaprasasti, N., et al. "The anti-breast cancer from leaf extract of *Annona muricata* against cell line in T47D." *Int. J. Applied Sci. Technol.* 2012; 2(1): 157-164. **(IVT)**

Dai, Y., et al. "Selective growth inhibition of human breast cancer cells by graviola fruit extract *in vitro* and *in vivo* involving downregulation of EGFR expression." *Nutr. Cancer.* 2011; 63: 795-801. **(IVA, IVT, NEW)**

Ko, Y., et al. "Annonacin induces cell cycle-dependent growth arrest and apoptosis in estrogen receptor- α -related pathways in MCF-7 cells." *J. Ethnopharmacol.* 2011 Oct; 137(3): 1283-90. **(IVA, NEW)**

Cervical Cancer:

Sun, Y., et al. "Curzerenone inactivates the nuclear factor-kappa B signaling to suppress malignancy and immune evasion in cervical cancer by targeting CSNK2B." *Hum. Cell.* 2024 Dec; 38(1): 35.

Qorina, F., et al. "Cytotoxicity of soursop leaves (*Annona muricata*) against cervical HeLa cancer cells." *Pharmacogn. J.* 2020 Jan-Feb; 12(1): 20-24. **(IVT, NEW)**

Ugochi, N., et al. "Anticancer activity of the crude extracts and an isolate (-sitosterol) from the leaf of *Annona muricata*." *J. Med. Pharma. Allied Sci.* 2018 Dec; 790(V7-I8): 2013-2019. **(IVT)**

Morosetti, G., et al. "Ellagic acid and *Annona muricata* in the chemoprevention of HPV-related pre-neoplastic lesions of the cervix." *Oncol. Lett.* 2017 Mar; 13: 1880-1884. **(HS)**

Artanti, A., et al. "Cytotoxic activity of non-polar fraction from *Annona muricata* L. leaves on HeLa and RAJI cell line." *J. Pharma. Sci. Clin. Res.* 2016; 1: 112-118. **(IVT)**

Astirin, O., et al. "*Annona muricata* Linn leaf induce apoptosis in cancer cause virus." *J. Cancer Ther.* 2013; 4: 1244-1250. **(IVT)**

Indrawati, L., et al. "In vitro anticancer activity of leaves extracts from *Annona muricata* against HeLa cervical cancer cell line." 18th Busan Active Aging Conference in Asia Pacific. 2013 Jun; 36-46. (IVT)

Suyatmi, S., et al. "The selective cytotoxicity of ethanolic extract of *Annona muricata* leaf on HeLa cervical cancer cells." *Altern. Med. Health Care*. 2012; 22-23. (IVT)

Chen, C., et al. "(-)-Anonaine induces apoptosis through Bax- and caspase-dependent pathways in human cervical cancer (HeLa) cells." *Food Chem. Toxicol*. 2008; 46: 2694-2702. (IVT)

Yuniarti, L., et al. "Soursop effect in cervical cancer apoptosis mechanism." *Global Med. Health Comm*. 2014; 2(1): 6-14.

Colorectal Cancer:

Pathirana, O., et al. "Elucidating the potential of *Annona muricata* L. grown in Sri Lanka to be used in developing an anticancer drug against colorectal and breast cancers." *BMC Complement. Med. Ther*. 2024 Nov 28; 24(1): 410. (IVT, NEW)

Manoharan, J., et al. "Overcoming multi drug resistance mediated by ABC transporters by a novel acetogenin - annonacin from *Annona muricata* L." *J. Ethnopharmacol*. 2024 Mar; 322: 117598. (INS, NEW)

Jeevitha, M. et al. "Study on reversal of ABCB1 mediated multidrug resistance in colon cancer by acetogenins: An *in-silico* approach." *J. Biomol. Struct. Dyn*. 2022 Jun; 40(9): 4273-4284. (INS)

Murugaiyaa, S., et al. "A network pharmacological approach to reveal the multidrug resistance reversal and associated mechanisms of acetogenins against colorectal cancer." *Biomol. Struct. Dyn*. 2022; 40(24): 13527-13546. (INS, NEW)

Agu, K., et al. "Biochemical studies on the colorectal tissues of Wistar rats treated with methanol leaf and stem bark extracts of *Annona muricata* (Soursop)." *Niger. J. Physiol. Sci*. 2022 Jun; 37(1): 127-135. (IVA, INS, NEW)

Wang, W., et al. "Antitumour activity of muricatacin isomers and its derivatives in human colorectal carcinoma cell HCT116." *Anticancer Agents Med. Chem*. 2020; 20(2): 254-263. (IVT)

El-Khashab, I., et al. "Anti-tumor effect of graviola and/or cranberry as a natural antiproliferative agent on colorectal cell lines (CACO-2)." *Euro. J. Biomed. Pharmaceut. Sci*. 2019; 6(1): 86-98. (IVT)

Abdullah, M., et al. "The value of caspase-3 after the application of *Annona muricata* leaf extract in COLO-205 colorectal cancer cell line." *Gastroenterol. Res. Pract*. 2017; 2017: 4357165. (IVT, INS, NEW)

Indrawati, L., et al. "Cytotoxic activity of soursop "*Annona muricata*" leaves extracts and their phytochemical contents." *J. Globe. Pharm. Tech*. 2017; 2(9): 35-40. (IVT)

Indrawati, L., et al. "Antiproliferative activity and caspase enhancement properties of *Annona muricata* leaves extract against colorectal cancer cells." *Med. J. Indones*. 2016; 25: 136-42. (IVT)

Abdullah, M., et al. "Chemopotential features of *Annona muricata* leaves for colorectal neoplasm." *Indo. J. Gastroenterol. Hepatol. Digest. Endo*. 2016 Dec; 17(3): 153-4. (REV)

Moghadamtousi, S., et al. "The chemopotential effect of *Annona muricata* leaves against azoxymethane-induced colonic aberrant crypt foci in rats and the apoptotic effect of acetogenin anomuricin E in HT-29 cells: A bioassay-guided approach." *PLoS One*. 2015; 10(4): e0122288. (IVA, NEW)

Eggadi, V., et al. "Evaluation of anticancer activity of *Annona muricata* in 1,2-dimethyl hydrazine induced colon cancer." *World Appl. Sci. J*. 2014; 32: 444-450. (IVA, NEW)

Moghadamtousi, S., et al. "*Annona muricata* leaves induce G1 cell cycle arrest and apoptosis through mitochondria-mediated pathway in human HCT-116 and HT-29 colon cancer cells." *J. Ethnopharmacol*. 2014; 156: 277-89. (IVT, NEW)

Zorofchian, M., et al. "*Annona muricata* leaves induce G cell cycle arrest and apoptosis through mitochondria-mediated pathway in human HCT-116 and HT-29 colon cancer cells." *J. Ethnopharmacol.* 2014 Oct; 156: 277-89. (IVT, NEW)

Andullah, M., et al. "The effect of ethanolic leaves extract of soursop (*Annona muricata* L.) on human colorectal cancer cell line: cell viability and *in silico* study to cyclin D1 protein." *Health Sci. J. Indones.* 2013 Dec; 10(20): 96-102. (IVT INS, NEW)

Okolie, N., et al. "Protective effect of ethanolic leaf extract of *Annona muricata* Linn on some early events in cycas-induced colorectal carcinogenesis in rats." *J. Pharm. Sci. Innov.* 2013; 2(4): 14-21. (IVA, IVT, NEW)

Endometrial Cancer:

Yap, C. et al. "Annonacin exerts antitumor activity through induction of apoptosis and extracellular signal-regulated kinase inhibition." *Pharmacognosy Res.* 2017 Oct-Dec; 9(4): 378-383. (IVT NEW)

Fibrosarcoma:

Marrero, A., et al. "A proteomic study of the bioactivity of *Annona muricata* leaf extracts in HT-1080 fibrosarcoma cells." *Int. J. Mol. Sci.* 2023; 24(15): 12021. (IVT NEW)

Gastric Cancer:

Li, Y., et al. "Annonaceous acetogenins mediated up-regulation of Notch2 exerts growth inhibition in human gastric cancer cells *in vitro*." *Oncotarget.* 2017 Mar; 8(13): 21140-21152. (IVT)

Quispe, A., et al. "Cytotoxic effect of *Annona muricata* (Guanabana) in culture of gastric and pulmonary adenocarcinoma cell lines." *Cien. Invest. Med. Est. Latinam.* 2007; 12(1): 9. (IVT)

Leukemia:

Subaramaniyam, U., et al. "Annonaceous acetogenins as promising DNA methylation inhibitors to prevent and treat leukemogenesis - an *in silico* approach." *J. Biomol. Struct. Dyn.* 2023 Dec: 1-14. (INS, NEW)

Pieme, C., et al. "Antiproliferative activity and induction of apoptosis by *Annona muricata* (Annonaceae) extract on human cancer cells." *BMC Complement. Altern. Med.* 2014 Dec; 14: 516. (IVT)

Ezirim, A., et al. "Induction of apoptosis in myelogenous leukemic k562 cells by ethanolic leaf extract of *Annona muricata*." *Indian J. Drug Dis.* 2013; 2: 142-151. (IVT)

Liver Cancer:

Adelina, R., et al. "Liposomal delivery of *Annona muricata* leaves extract for the treatment of hepatocellular carcinoma." *Drug Dev. Ind. Pharm.* 2024 Nov 30: 1-13. (IVA, IVT, INS, NEW)

Abdallah, R., et al. "Comprehensive chemical profiling and mechanistic insight into anticancer activity of *Annona muricata* leaves extract." *Pharmaceuticals* (Basel). 2024 May 10; 17(5): 614. (IVA, IVT, INS, NEW)

Abdallah, R., et al. "LCMS/MS phytochemical profiling, molecular, pathological, and immune-histochemical studies on the anticancer properties of *Annona muricata*." *Molecules.* 2023 Jul; 28(15): 5744. (IVA, IVT, INS, NEW)

Tejasari, M., et al. "Bcl2 gene expression profile on administration of novel active compound from soursop leaves (SF-1603) as a new molecular target in liver cancer therapy." *SKIC-MHS.* 2018; 57-64. (IVT)

Costa-Santos, M., et al. "Spontaneous regression of hepatocellular carcinoma: myth or reality?" *BMJ Case Rep.* 2020 Feb; 13(2): e233509. **(HS)**

Babu, M., et al. "Evaluation of cytotoxic activity of *Annona muricata* fruits and leaves." *Res. J. Pharm. Tech.* 2019; 12(8): 3802-3806. **(IVT)**

Apriyanto, D., et al. "Cytotoxicity of soursop leaf methanol extract (*Annona muricata* L.) against hepatocellular carcinoma HUH7IT-1 cell line strain." *Tunas. Medika J. Med. Health.* 2018; 4(1): 1-5. **(IVT)**

Tejasari, M., et al. "Anticancer activity of novel soursop leaves active compound (SF-1603) through apoptotic induction in liver cancer." *Malay. J. Fund. Appl. Sci.* 2018; 14(2): 226-234. **(IVT)**

Banerjee, A., et al. "Possible cytotoxic activity of *Annona muricata* leaves in Huh-7 human liver cancer cells." *Hepatol. Pancrea. Sci.* 2017 Feb; 1(1): 1: 104. **(IVT, NEW)**

Liu, N., et al. "Functional proteomic analysis reveals that the ethanol extract of *Annona muricata* L. induces liver cancer cell apoptosis through endoplasmic reticulum stress pathway." *J. Ethnopharmacol.* 2016 Aug; 189: 210-7. **(IVT, NEW)**

Yang, H., et al. "Ethanol extract of *Annona muricata* L. induces liver cancer cell apoptosis through ROS pathway." *Biomed. Pharmacol. J.* 2016; 9(3). **(IVT, NEW)**

de Pedro, N., et al. "Mitochondrial complex I inhibitors, acetogenins, induce HepG2 cell death through the induction of the complete apoptotic mitochondrial pathway." *J. Bioenerg. Biomembr.* 2013 Feb; 45(1-2): 153-64. **(IVT)**

Adelina, R., et al. "*Annona muricata*'s leaves ethanolic extract enhance p53 expression in rat hepatic cells induced by dimethylbenz(a)anthracene (DMBA)." *Indones. J. Cancer Chemoprevent.* 2013 Feb; 4(1): 483-487. **(IVA)**

Chiu, H., et al. "Bullatacin, a potent antitumor Annonaceous acetogenin, induces apoptosis through a reduction of intracellular CAMP and CGMP levels in human hepatoma 2.2.15 cells." *Biochem. Pharmacol.* 2003; 65(3): 319-327. **(IVT, NEW)**

Chang, F., et al. "Novel cytotoxic Annonaceous acetogenins from *Annona muricata*." *J. Nat. Prod.* 2001; 64(7): 925-31. **(IVT)**

Lung Cancer:

Grijaldo, S., et al. "Integrating computational methods in network pharmacology and *in silico* screening to uncover multi-targeting phytochemicals against aberrant protein glycosylation in lung cancer." *ACS Omega.* 2023 May; 8(23): 20303-20312. **(INS, IVT, NEW)**

Salac, E., et al. "Biological assay-guided fractionation and mass spectrometry-based metabolite profiling of *Annona muricata* L.: Cytotoxic compounds against lung cancer A549 cell line." *Plants (Basel).* 2022 Sep; 11(18): 2380. **(IVT, NEW)**

Zheng, T., et al. "Anticancer effects of curzerenone against drug-resistant human lung carcinoma cells are mediated via programmed cell death, loss of mitochondrial membrane potential, ROS, and blocking the ERK/MAPK and NF- κ B signaling pathway." *J. B.U.O.N.* 2019 May-Jun; 24(3): 907-912. **(IVT, NEW)**

Rajesh, V., et al. "Antiproliferative and chemopreventive effect of *Annona muricata* Linn. on Ehrlich ascites carcinoma and benzo[a]pyrene induced lung carcinoma." *Orient. Pharm. Exp. Med.* 2015; 15: 239-256. **(IVA, IVT, NEW)**

Chen, B., et al. "(–)-Anonaine induces DNA damage and inhibits growth and migration of human lung carcinoma H1299 cells." *J. Agric. Food Chem.* 2011 Mar; 59(6): 2284–2290. **(IVT)**

Tantithanaporn, S., et al. "Cytotoxic activity of acetogenins and styryl lactones isolated from

Goniiothalamus undulatus Ridl. root extracts against a lung cancer cell line (COR-L23)." *Phytomedicine*. 2011 Apr; 18(6): 486-90. (IVT)

Quispe, A., et al. "Cytotoxic effect of *Annona muricata* (Guanabana) in culture of gastric and pulmonary adenocarcinoma cell lines." *Cien. Invest. Med. Est. Latinam*. 2007; 12(1): 9. (IVT)

Quispe, A., et al. "In vitro selective cytotoxic effect of muricin H (acetogenin of *Annona muricata*) in lung cancer cell cultures." *Rev. Peru. Med. Exp. Public Health*. 2006; 23: 265-269. (IVT)

Moghadamtousi, S., et al. "*Annona muricata* leaves induced apoptosis in A549 cells through mitochondrial-mediated pathway and involvement of NF- κ B." *BMC Complement. Altern. Med*. 2014 Aug; 14: 299. (INS, NEW)

Lymphoma:

Naik, A., et al. "Antitumour activity of *Annona muricata* L. leaf methanol extracts against Ehrlich Ascites carcinoma and Dalton's Lymphoma Ascites mediated tumours in Swiss albino mice." *Libyan J. Med*. 2021 Dec; 16(1): 1846862 (IVA, IVT, INS).

Nalini, P., et al. "Antitumor potential of hydroethanolic extract of *Annona muricata* leaves against Dalton's lymphoma ascites-induced tumor in mice." *Asian J. Pharma. Clin. Res*. 2018; 11(3): 364-367. (IVA, NEW)

Artanti, A., et al. "Cytotoxic activity of non-polar fraction from *Annona muricata* L. leaves on heLa and RAJI cell line." *J. Pharma. Sci. Clin. Res*. 2016; 1: 112-118. (IVT)

Astirin, O., et al. "The expression of p53 and hsp70 proteins after treatment with *Annona muricata* Linn leaf for activating apoptotic and lead to homeostasis program of Raji cells." *Int. J. Cancer Thera. Oncol*. 2014 Apr; 2(2): 1-5. (IVT, INS)

Oral Cancer:

Thitame, S., et al. "Exploring the therapeutic potential of hanuman phal (*Annona muricata*) in the adjunctive treatment of oral cancer: A review." *J. Pharm. Bioallied. Sci*. 2025 May; 17(Suppl 1): S28-S31. (REV)

Rekha, M., et al. "Deciphering Annona's anticancer potential: comparative analysis of crude extract versus nanoformulation on SCC-25 oral cancer cells through cell viability, apoptosis, cell cycle, ROS, and MMP Analysis." *J. Maxillofac. Oral Surg*. 2024 Aug; 23(4): 935-952. (IVT, INS, NEW)

Mary, S., et al. "Anti-cancer effects of green synthesized gold nanoparticles using leaf extract of *Annona muricata*. L against squamous cell carcinoma cell line 15 through apoptotic pathway." *Dent. Res. J (Isfahan)*. 2024 Feb 22; 21: 14. (IVT, INS)

Mary, S., et al. "Evaluation of the cytotoxic, anti-proliferative, anti-metastatic and pro-apoptotic effect of aqueous leaf extract of *Annona muricata* on oral tongue squamous cell carcinoma cell line (SCC-15): An in vitro study." *J. Oral Maxillofac. Pathol*. 2023 Jul-Sep; 27(3): 469-475. (IVT, INS)

Mary, S., et al. "In vitro evaluation of cytotoxic effects of methanolic leaf extracts of *Annona muricata* on oral squamous cell carcinoma-15 cell lines and its effect on expression of Bcl 2-associated X protein, B-cell C/lymphoma 2 and p53 genes." *Contemp. Clin. Dent*. 2023 Jul-Sep; 14(3): 227-231. (IVT, INS, NEW)

Barreto-Diaz, M., et al. "Hormetic effect of an ethanolic graviola leaf extract on HGF-1 cells survival." *BAOJ Cancer Res. Ther*. 2022; 6: 1005. (IVT)

Velázquez-Aponte, R., et al. "Antiproliferative properties of ethanolic and aqueous graviola leaf extracts on tongue squamous cell carcinoma cell line-25." *J. Med. Case Rep. Rev*. 2020 Aug; 3(8): 749-755. (IVT)

Magadi, V. "Evaluation of cytotoxicity of aqueous extract of graviola leaves on squamous cell carcinoma cell-25 cell lines by 3-(4,5-dimethylthiazol-2-yl) -2,5-diphenyltetrazolium bromide assay and determination of percentage of cell inhibition at G2M phase of cell cycle by flow cytometry: An *in vitro* study." *Contemp. Clin. Dent.* 2015 Oct-Dec; 6(4): 529-33. (IVT, INS, NEW)

Osteosarcoma:

Yagnik, D., et al. "Annona muricata Graviola Induces apoptosis in two osteosarcoma cell lines and downregulates the cytokines IL-6 and TGFβ1 which are implicated in tumour growth and metastasis." *Integr. Cancer Ther.* 2025 Jan-Dec; 24: 15347354251360338. (IVT, NEW)

Ovarian Cancer:

Periyasamy, L., et al. "Acetogenin extracted from Annona muricata prevented the actions of EGF in PA-1 ovarian cancer cells." *Protein Pept. Lett.* 2021; 28(3): 304-314. (IVT, NEW)

Ukwubile, C., et al. "Anti-tumor and anti-ovarian cancer screening of compound from the leaf methanol extract of *Annona muricata* Linn (Annonaceae)." *Int. J. Res. Stud. Biosci.* 2016 Nov; 4(11): 40-46. (IVA, IVT)

Nakanishi, Y., et al. "Acetogenins as selective inhibitors of the human ovarian 1A9 tumor cell line." *J. Med. Chem.* 2003; 46: 3185-3188. (IVT)

Pancreatic Cancer:

Torres, M., et al. "Graviola: a novel promising natural-derived drug that inhibits tumorigenicity and metastasis of pancreatic cancer cells *in vitro* and *in vivo* through altering cell metabolism." *Cancer Lett.* Apr 2012; 323(1): 29-40. [\[Free Article\]](#) (IVA, IVT, INS)

Rosdi, M., et al. "Cytotoxic effect of *Annona muricata* Linn leaves extract on Capan-1 cells." *J. Appl. Pharma. Sci.* 2015 May; 5(5): 45-48. (IVT)

Prostate Cancer:

Foster, K., et al. "Selective cytotoxic and anti-metastatic activity in DU-145 prostate cancer cells induced by *Annona muricata* L. bark extract and phytochemical, annonacin." *BMC Complement. Med. Ther.* 2020 Dec; 20(1): 375. (IVT, NEW)

Minari, J., et al. "Analysis of annexin 7 gene of malignant prostatic hyperplasia-induced male Wistar rats in the presence of *Annona muricata*." *J. Taibah. Uni. Sci.* 2019; 13:1: 460-467. (IVA, NEW)

Salehi, B., et al. "Phytochemicals in prostate cancer: from bioactive molecules to upcoming therapeutic agents." *Nutrients.* 2019 Jul; 11(7): 1483. (REV)

Asare, G., et al. "Antiproliferative activity of aqueous leaf extract of *Annona muricata* L. on the prostate, BPH-1 cells, and some target genes." *Integr. Cancer Thera.* 2015 Jan; 14(1): 65-74. (IVA, IVT)

Deep, G., et al. "Graviola inhibits hypoxia-induced NADPH oxidase activity in prostate cancer cells reducing their proliferation and clonogenicity." *Sci. Rep.* 2016; 6: 23135. (IVA, IVT)

Hall, J., et al. "Isolation of an anti-tumor compound from the leaves of *Annona muricata* and pharmacological characterization in PC-3 cells." *FASEB J.* 2016 Apr; 30(1): 1193. (IVT, NEW)

Yang, C., et al. "Synergistic interactions among flavonoids and acetogenins in graviola (*Annona muricata*) leaves confer protection against prostate cancer." *Carcinogenesis.* 2015 Jun; 36(6): 656-65. (IVA, IVT)

Zuhrotun, A., et al. "Antitumor activity of soursop (*Annona muricata* L.) leaves on prostate cancer cell line." *Acta Pharmaceu. Indo.* 2013; 2(38): 43-47. (IVT)

Skin Cancer:

Roduan, M., et al. "Modulation of cancer signaling pathway(s) in two -stage mouse skin tumorigenesis by annonacin." *BMC Complement. Altern. Med.* 2019 Sep; 19(1): 238. (IVA, NEW)

Chamcheu, J., "Graviola (*Annona muricata*) exerts anti-proliferative, anti-clonogenic and pro-apoptotic effects in human non-melanoma skin cancer UW-BCC1 and A431 cells *in vitro*: Involvement of hedgehog signaling." *Int. J. Mol. Sci.* 2018 Jun; 19(6). (IVT, NEW)

Roduan, M., "Annona muricata leaves extracts prevent DMBA/TPA-induced skin tumorigenesis via modulating antioxidants enzymes system in ICR mice." *Biomed. Pharmacother.* 2017 Oct; 94: 481-488. (IVA, NEW)

Magadi, V. "Evaluation of cytotoxicity of aqueous extract of graviola leaves on squamous cell carcinoma cell-25 cell lines by 3-(4,5-dimethylthiazol-2-Yl) -2,5-diphenyltetrazolium bromide assay and determination of percentage of cell inhibition at G2M phase of cell cycle by flow cytometry: An *in vitro* study." *Contemp. Clin. Dent.* 2015 Oct-Dec; 6(4): 529-33. (IVT, NEW)

Hamizah, S., et al. "Chemopreventive potential of *Annona muricata* L leaves on chemically-induced skin papillomagenesis in mice." *Asian Pac. J. Cancer Prev.* 2012; 13(6): 2533-9. (IVA)

Sulaiman, H., "Chemopreventive potential of *Annona muricata* L leaves on chemically-induced skin papillomagenesis in mice." *Asian Pac. J. Cancer Prev.* 2012; 13: 2532-2533. (IVA)

Reversing Multi-Drug-Resistance

Manoharan, J., et al, "Overcoming multi drug resistance mediated by ABC transporters by a novel acetogenin - annonacin from *Annona muricata* L." *J. Ethnopharmacol.* 2024 Mar; 322: 117598. (INS, NEW)

Manoharan, J., et al. "Computational binding affinity and molecular dynamic characterization of Annonaceous acetogenins at nucleotide binding domain (NBD) of multi-drug resistance ATP-binding cassette sub-family B member 1 (ABCB1)." *J. Biomol. Struct. Dyn.* 2023 Feb; 41(3): 821-832. (INS, NEW)

Jeevitha, M. et al. "Study on reversal of ABCB1 mediated multidrug resistance in colon cancer by acetogenins: An in-silico approach." *J. Biomol. Struct Dyn.* 2022 Jun; 40(9): 4273-4284. (INS, NEW)

Murugaiyaa, S., et al. "A network pharmacological approach to reveal the multidrug resistance reversal and associated mechanisms of acetogenins against colorectal cancer." *Biomol. Struct. Dyn.* 2022; 40(24): 13527-13546. (REV)

Priya, M., et al. "Computational investigations on reversal effect of acetogenins on multidrug resistance mediated by ABCB1." *Proceed. Int. Conf. Drug Discov.* 2020 Feb; 3532377. (INS, NEW)

Kuete, V., et al. "Cytotoxicity of methanol extracts of *Annona muricata*, *Passiflora edulis* and nine other Cameroonian medicinal plants towards multi-factorial drug-resistant cancer cell lines." *Springerplus.* 2016 Sep; 5(1): 1666. (REV)

Oberlies, N., et al. "Structure-activity relationships of diverse Annonaceous acetogenins against multidrug resistant human mammary adenocarcinoma (MCF-7/Adr) cells." *J. Med. Chem.* 1997; 40(13): 2102-6. (IVT)

Reducing Chemotherapy/Radiation Drug Side Effects or Enhancing Cancer Drug Efficacy:

Li, R., et al. "Annonaceous acetogenins synergistically inhibit hepatocellular carcinoma with Sorafenib." *J. Nat. Prod.* 2024 Jan; 87(1): 14-27. (IVA, INS)

Elmas, O., et al. "The effect of *Annona muricata* (Graviola) on the prevention of brain damage due to ionizing radiation in rats." *Heliyon*. 2024 Feb; 10(4): e25932.

Han, J., et al. "Polysaccharides from *Annona muricata* leaves protect against cisplatin-induced cytotoxicity in macrophages by alleviating mitochondrial dysfunction." *Mol. Med. Rep.* 2023 Jan; 27(1): 16. (IVA, IVT, INS, NEW)

Salsabila, I., et al. "Synergistic cotreatment potential of soursop (*Annona muricata* L.) leaves extract with doxorubicin on 4T1 cells with antisenescence and anti-reactive-oxygen-species properties." *Iran J. Pharm. Res.* 2021 Spring; 20(2): 57-67. (IVT)

Cancer Preventative Actions:

Agu, K., et al. "In vivo anti-neoplastic properties of *Annona muricata* on Cycas-treated adult Wistar rats." *Acta Poloniae Pharma. Drug Res.* 2017; 74(6): 1813-1826. (IVA, IVT, NEW)

Acesio, N., et al. Assessment of the antioxidant, cytotoxic, and genotoxic potential of the *Annona muricata* leaves and their influence on genomic stability." *J. Toxicol. Environ. Health.* 2017; 80: 1290-1300. (IVA, IVT, NEW)

Husnayain, K., et al. "The utilization of ethanol extract of the soursop leaves (*Annona muricata* L.) as breast cancer chemopreventive." *J. Agromed. Unila.* 2014; 1(1): 72-76. (IVT)

Atawodi, S., et al. "Nigerian foodstuffs with prostate cancer chemopreventive polyphenols." *Infect. Agents Cancer.* 2011; 6: 1-4. (REV)

Adelina, R., et al. "*Annona muricata*'s leaves ethanolic extract enhance p53 expression in rat hepatic cells induced by dimethylbenz(a)anthracene (DMBA)." *Indones. J. Cancer Chemoprevent.* 2013 Feb; 4(1): 483-487. (IVA, NEW)

Mechanisms of Actions/Cancer Pathways

Abdallah, R., et al. "Comprehensive chemical profiling and mechanistic insight into anticancer activity of *Annona muricata* leaves extract." *Pharmaceuticals* (Basel). 2024 May 10; 17(5): 614. (IVA, INS)

Carddenas, C., et al. "Non-targeted metabolomics characterization of *Annona muricata* leaf extracts with anti-angiogenic activity." *Biomed. Pharmacother.* 2021 Dec; 144: 112263. (INS, NEW, IVT)

Drishya, G., et al. "RECK and TIMP-2 mediate inhibition of MMP-2 and MMP-9 by *Annona muricata*." *J. Biosci.* 2020; 45: 89. (INS, NEW, IVT, Ex vivo)

Rosdi, M., et al. "Molecular docking studies of bioactive compounds from *Annona muricata* Linn as potential inhibitors for Bcl-2, Bcl-w and Mcl-1 antiapoptotic proteins." *Apoptosis.* 2018 Jan; 23(1): 27-40. (INS, NEW, IVT)

Handayani, S., et al. "Molecular docking and drug-likeness for the identification of inhibitory action of acetogenins from *Annona muricata* as potential anticancer against hypoxia inducible Factor 1 Alpha." *Biomed. Pharmacol. J.* 2018 Sep; 11(3): 301-1307. (INS, NEW, IVT)

Granchi, C., et al. "Anticancer agents interacting with membrane glucose transporters." *Med. Chem. Comm.* 2016 Sep; 7(9): 1716-1729. (REV)

Yang, H., et al. "Ethanol extract of *Annona muricata* L. induces liver cancer cell apoptosis through ROS pathway." *Biomed. Pharmacol. J.* 2016; 9(3). (INS, NEW, IVT)

Antony, P., and Vijayan, R. "Acetogenins from *Annona muricata* as potential inhibitors of antiapoptotic proteins: a molecular modeling study." *Drug Des. Devel. Ther.* 2016 Apr; 10: 1399-410. (INS, NEW, IVT)

Han, B., et al. "Annonaceous acetogenin mimic AA005 induces cancer cell death via apoptosis inducing factor through a caspase-3-independent mechanism." *BMC. Cancer.* 2015 Mar; 15: 139. (IVT, NEW)

Gallego, R., et al. "Angiogenesis modulatory activity of SC-CO₂ leaf extract of guyabano (*Annona muricata* Linn.) using chick embryo chorioallantoic membrane assay." *AAB. Bioflux*. 2015; 7(3): 206-216. **(IVA, NEW)**

Chen, Y., et al. "Antitumor activity of Annonaceous acetogenins in HepS and S180 xenografts bearing mice." *Bioorg. Med. Chem. Lett.* 2012 Apr; 22(8): 2717-9. **(IVA, IVT, NEW)**

Coothankandaswamy, V., et al. "The alternative medicine pawpaw and its acetogenin constituents suppress tumor angiogenesis via the HIF-1/VEGF pathway." *J. Nat. Prod.* 2010 May; 73(5): 956-61. **(IVT, NEW)**

Tormo, J., et al. "In vitro antitumor structure-activity relationships of threo/trans/threo mono-tetrahydro-furanic acetogenins: Correlations with their inhibition of mitochondrial complex I." *Oncol. Res.* 2003; 14(3): 147-54. **(IVT)**

Cancer Drug Development from Graviola Chemicals

Kusaba, K., et al. "Targeting oxidative phosphorylation with a novel thiophene carboxamide increases the efficacy of Imatinib against leukemic stem cells in chronic myeloid leukemia." *Int. J. Mol. Sci.* 2024 Oct; 25(20): 11093.

Ohta, K., et al. "Thiophene carboxamide analogs with long alkyl chains comprising ethylene glycol units inhibit glioblastoma cell proliferation by activating AMPK." *J. Med. Chem.* 2023 May; 66(9): 6403-6413.

Ando, S., et al. "JCI-20679 suppresses the proliferation of glioblastoma stem cells by activating AMPK and decreasing NFATc2 expression levels." *Mol. Med. Rep.* 2022 Jul; 26(1): 238.

Hosomi, H., et al. "Synthesis of acetogenin analogs comprising pyrimidine moieties linked by amine bonds and their inhibitory activity against human cancer cell lines." *Chem. Pharm. Bull. (Tokyo)*. 2022; 70(11): 823-826.

Akatsuka, A., et al. "A novel thiophene-3-carboxamide analog of Annonaceous acetogenin exhibits antitumor activity via inhibition of mitochondrial complex I." *Pharmacol. Res. Perspect.* 2016 Jul; 4(4): e00246.

Han, B., et al. "Annonaceous acetogenin mimic AA005 induces cancer cell death via apoptosis inducing factor through a caspase-3-independent mechanism." *BMC Cancer*. 2015 Mar; 15:139.

Kojima, N., et al. "Thiophene-3-carboxamide analogue of Annonaceous acetogenins as antitumor drug lead." *Eur. J. Med. Chem.* 2014 Oct; 86: 684-9.

Liu, Y., et al. "Identification of an Annonaceous acetogenin mimetic, AA005, as an AMPK activator and autophagy inducer in colon cancer cells." *PLoS One*. 2012; 7(10): e47049.

Kojima, N., et al. "Medicinal chemistry of Annonaceous acetogenins: Design, synthesis, and biological evaluation of novel analogues." *Molecules*. 2009; 14(9): 3621-3661.

Indonesian Herbal Drug Approved as Adjuvant Cancer Therapy:

Yetri, E., et al. "Tablet formulation of the ethyl acetate soluble extract of Soursop (*Annona muricata* L.) leaves." *Asian J. Appl. Sci.* 2014 June 2(3): 323-329.

Anti-cancer Actions of Polyphenols in Graviola:

Alam, M., et al. "Therapeutic implications of caffeic acid in cancer and neurological diseases." *Front. Oncol.* 2022 Mar; 12: 860508. [\[Free Article\]](#) **(REV)**

Tang, S., et al. "Pharmacological basis and new insights of quercetin action in respect to its anti-cancer effects." *Biomed. Pharmacother.* 2020 Jan; 121: 109604. [[Free Article](#)] (REV)

Huang, S., et al. "Chlorogenic acid effectively treats cancers through induction of cancer cell differentiation." *Theranostics*. 2019 Sept; 9(23): 6745-6763. [[Free Article](#)]

Razak, S., et al. "Taxifolin, a natural flavonoid interacts with cell cycle regulators causes cell cycle arrest and causes tumor regression by activating Wnt/ β -catenin signaling pathway." *BMC Cancer*. 2018 Oct; 18(1): 1043.

Kaempferol and cancer: <https://www.ncbi.nlm.nih.gov/pmc/?term=kaempferol+and+cancer>

Toxicity Studies Referenced in the Book:

Zubaidi, S., et al. "Assessing the acute toxicological effects of *Annona muricata* leaf ethanol extract on rats: biochemical, histopathological, and metabolomics analyses." *Mediani. A. Toxics*. 2023 Aug; 11(8): 688. (IVA)

Chan, W., et al. "The safety and tolerability of *Annona muricata* leaf extract: a systematic review." *J. Pharm. Pharmacol.* 2020 Jan; 72(1): 1-16. (IVA)

Sánchez-De-La-Rosa, S., et al. "Evaluation of genotoxic effect and antigenotoxic potential against DNA damage of the aqueous and ethanolic leaf extracts of *Annona muricata* using an *in vivo* erythrocyte rodent micronucleus assay." *Biomed. Res. Int.* 2022 Dec; 2022: 9554011. (IVA)

Return to the Rain-Tree [Tropical Plant Database page on Graviola](#)

© Copyrighted 2025 by Leslie Taylor. All Rights Reserved.