

REFERENCES

- Abah, J., Alu, E. S., & Chahari, A. E. (2020). Computational Model of Artificial Neural Networks and its Applications in Data Mining. *ARID ZONE JOURNAL OF ENGINEERING, TECHNOLOGY AND ENVIRONMENT*, 16(2), 243-254.
- Abbas, M., EL-Manzalawy, Y. (2020) Machine learning based refined differential gene expression analysis of pediatric sepsis. *BMC Med Genomics* 13, 122. <https://doi.org/10.1186/s12920-020-00771-4>
- Afzal, S., Hassan, M., Ullah, S., Abbas, H., Tawakkal, F., & Khan, M. A. (2022). Breast cancer; discovery of novel diagnostic biomarkers, drug resistance, and therapeutic implications. *Frontiers in molecular biosciences*, 9, 783450.
- Ahmad, A., Imran, M., & Ahsan, H. (2023). Biomarkers as Biomedical Bioindicators: Approaches and Techniques for the Detection, Analysis, and Validation of Novel Biomarkers of Diseases. *Pharmaceutics*, 15(6), 1630.
- Akbari, H., Forouzandeh, H., Reza Mirshekari, T., Kashfi, S. A., & Ghavamizadeh, M. (2022). Prevalence and Correlates of the Estrogen and Progesterone Receptors (ER/PR), Human Epidermal Growth Factor Receptor-2 (HER-2) and P53 in Breast Cancer: a Cross-Sectional Study. *Journal of Obstetrics, Gynecology and Cancer Research*, 7(6), 507-512.
- Akram, M., Iqbal, M., Daniyal, M. et al. Awareness and current knowledge of breast cancer. *Biol Res* 50, 33 (2017). <https://doi.org/10.1186/s40659-017-0140-9>
- Alkabban FM, Ferguson T. Breast Cancer. [Updated 2022 Sep 26]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK482286/>
- Almansouri, S., & Zwyea, S. (2020). Early prognosis of human renal cancer with Kaplan-Meier Plotter data analysis model. In *Journal of physics: conference series*, 1530(1), 012051
- Alves, N. R. L., Meira, D. D., Meriguetti, P. L., Casotti, C. M., Ventrone, D. D., Almeida, F. F. J., ... & Louro, D. I. (2023). Biomarkers in breast cancer: an old story with a new end. *Genes*, 14(7), 1364.
- Amberg, A. (2013). In Silico Methods. In: Vogel, H.G., Maas, J., Hock, F.J., Mayer, D. (eds) *Drug Discovery and Evaluation: Safety and Pharmacokinetic Assays*. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-25240-2_55
- Amjad MT, Chidharla A, Kasi A. Cancer Chemotherapy. [Updated 2023 Feb 27]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK564367/>
- Basilotta, R., Mannino, D., Filippone, A., Casili, G., Prestifilippo, A., Colarossi, L., ... & Campolo, M. (2021). Role of calixarene in chemotherapy delivery strategies. *Molecules*, 26(13), 3963.
- Belete T. M. (2021). The Current Status of Gene Therapy for the Treatment of Cancer. *Biologics : targets & therapy*, 15, 67–77. <https://doi.org/10.2147/BTT.S302095>
- Bhatia, A., & Kumar, Y. (2014). Cancer immunoediting: Immunosurveillance, immune equilibrium, and immune escape. In *Cancer Immunology: A Translational Medicine Context* (pp. 195-208). Berlin, Heidelberg: Springer Berlin Heidelberg.
- Bianchini G, Balko JM, Mayer IA, Sanders ME, Gianni L. Triple-negative breast cancer: challenges and opportunities of a heterogeneous disease. *Nat Rev Clin Oncol*. 2016;13:674–690. doi:10.1038/nrclinonc.2016.6627184417

- Boilève, A., Hilmi, M., Delaye, M., Tijeras-Raballand, A., & Neuzillet, C. (2021). Biomarkers in hepatobiliary cancers: what is useful in clinical practice?. *Cancers*, 13(11), 2708.
- Borroni, E. M., & Grizzi, F. (2021). Cancer Immunoediting and beyond in 2021. *International journal of molecular sciences*, 22(24), 13275.
- Cao, W., Chen, H. D., Yu, Y. W., Li, N., & Chen, W. Q. (2021). Changing profiles of cancer burden worldwide and in China: a secondary analysis of the global cancer statistics 2020. *Chinese medical journal*, 134(07), 783-791.
- Cesur-Ergün, B., & Demir-Dora, D. (2023). Gene therapy in cancer. *The journal of gene medicine*, 25(11), e3550. <https://doi.org/10.1002/jgm.3550IF>
- Chen, C. J., Chen, T. H., Lei, J., Liang, J. A., Yang, P. S., Huang, C. S., Hsieh, C. M., Tseng, L. M., Liu, L. C., Cheng, S. H., & Shih, K. H. (2022). Correlation of ER, PR, and HER2 at the protein and mRNA levels in Asian patients with operable breast cancer. *Bioscience reports*, 42(1), BSR20211706. <https://doi.org/10.1042/BSR20211706>
- Chicco, D., & Agapito, G. (2022). Nine quick tips for pathway enrichment analysis. *PLoS computational biology*, 18(8), e1010348. <https://doi.org/10.1371/journal.pcbi.1010348>
- Czajka ML, Pfeifer C. Breast Cancer Surgery. [Updated 2023 Feb 8]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK553076/>
- Denkert, Carsten; Budczies, Jan; von Minckwitz, Gunter; Wienert, Stephan; Loibl, Sibylle; Klauschen, Frederick. (2015). Strategies for developing Ki67 as a useful biomarker in breast cancer. *The Breast*, (), S0960977615001551-. doi:10.1016/j.breast.2015.07.017
- Denkert, C., von Minckwitz, G., Darb-Esfahani, S., Lederer, B., Heppner, B. I., Weber, K. E., Budczies, J., Huober, J., Klauschen, F., Furlanetto, J. (2018). Tumour-infiltrating lymphocytes and prognosis in different subtypes of breast cancer: a pooled analysis of 3771 patients treated with neoadjuvant therapy. *Lancet Oncol*. 19:40–50.
- Diamandis, E. P. (2012). The failure of protein cancer biomarkers to reach the clinic: why, and what can be done to address the problem?. *BMC medicine*, 10, 1-5.
- Drew, J., & Martin, L. A. (2023). What is gene therapy?. In *Understanding gene therapy* (pp. 1-10). Garland Science.
- Dudley, W. N., Wickham, R., & Coombs, N. (2016). An Introduction to Survival Statistics: Kaplan-Meier Analysis. *Journal of the advanced practitioner in oncology*, 7(1), 91–100. <https://doi.org/10.6004/jadpro.2016.7.1.8>
- Ekins, S., Mestres, J., & Testa, B. (2007). In silico pharmacology for drug discovery: applications to targets and beyond. *British journal of pharmacology*, 152(1), 21–37. <https://doi.org/10.1038/sj.bjp.0707306>
- Farooq, Q. U. A., Shaukat, Z., Aiman, S., & Li, C. H. (2021). Protein-protein interactions: Methods, databases, and applications in virus-host study. *World journal of virology*, 10(6), 288–300. <https://doi.org/10.5501/wjv.v10.i6.288>
- Feng, Y., Spezia, M., Huang, S., Yuan, C., Zeng, Z., Zhang, L., ... & Ren, G. (2018). Breast cancer development and progression: Risk factors, cancer stem cells, signaling pathways, genomics, and molecular pathogenesis. *Genes & diseases*, 5(2), 77-106.
- Gerolami, J., Wong, J. J. M., Zhang, R., Chen, T., Irtiaz, T., Smith, M., Jamaspishvili, T., Koti, M., Glasgow, J. I., Mousavi, P., Renwick, N., & Tyryshkin, K. (2022). A Computational Approach to Identification of Candidate Biomarkers in High-Dimensional Molecular Data. *Diagnostics* 12(8), 1997.

- Goldhirsch, A., Winer, E. P., Coates, A. S. (2013). Personalizing the treatment of women with early breast cancer: highlights of the St Gallen International Expert Consensus on the Primary Therapy of Early Breast Cancer. *Ann Oncol.* 2013;24:2206–2223.
- Goldman, M. J., Craft, B., Hastie, M., Repečka, K., McDade, F., Kamath, A., Banerjee, A., Luo, Y., Rogers, D., Brooks, A. N., Zhu, J., & Haussler, D. (2020). Visualizing and interpreting cancer genomics data via the Xena platform. *Nature biotechnology*, 38(6), 675–678. <https://doi.org/10.1038/s41587-020-0546-8>
- Guo, Y., Van Schaik, T., Jhamat, N., Niazi, A., Chanrot, M., Charpigny, G., ... & Humblot, P. (2019). Differential gene expression in bovine endometrial epithelial cells after challenge with LPS; specific implications for genes involved in embryo maternal interactions. *PLoS One*, 14(9), e0222081.
- Hazra, A., & Gogtay, N. (2017). Biostatistics Series Module 9: Survival Analysis. *Indian journal of dermatology*, 62(3), 251-257.
- Hume, S., Dianov, G. L., & Ramadan, K. (2020). A unified model for the G1/S cell cycle transition. *Nucleic acids research*, 48(22), 12483-12501.
- Hung, M., Bounsanga, J., & Voss, M. W. (2017). Interpretation of correlations in clinical research. *Postgraduate medicine*, 129(8), 902-906.
- Inic, Z., Zegarac, M., Inic, M., Markovic, I., Kozomara, Z., Djuricic, I., Inic, I., Pupic, G., & Jancic, S. (2014). Difference between Luminal A and Luminal B Subtypes According to Ki-67, Tumor Size, and Progesterone Receptor Negativity Providing Prognostic Information. *Clinical Medicine Insights. Oncology*, 8, 107–111. <https://doi.org/10.4137/CMO.S18006>
- Ioannidis, J.P.A.; Bossuyt, P.M.M. Waste, Leaks, and Failures in the Biomarker Pipeline. *Clin. Chem.* 2017, 63, 963–972.
- Johnson, K. S., Conant, E. F., & Soo, M. S. (2021). Molecular subtypes of breast cancer: a review for breast radiologists. *Journal of Breast Imaging*, 3(1), 12-24.
- Jun, T., Anker, J., Galsky, M. D. (2022). Biomarkers for therapy selection in metastatic urothelial cancer. *Journal of Cancer Metastasis and Treatment*. 8: 1. <http://dx.doi.org/10.20517/2394-4722.2021.171>
- Kaddoura, R., Alqutami, F., Asbaita, M., & Hachim, M. (2023). In-silico analysis of publicly available transcriptomic data for the identification of triple-negative breast cancer-specific biomarkers. *Life*, 13(2), 422.
- Kuchuk, I., Bouganim, N., Beusterien, K., Grinspan, J., Vandermeer, L., Gertler, S., ... & Clemons, M. (2013). Preference weights for chemotherapy side effects from the perspective of women with breast cancer. *Breast cancer research and treatment*, 142, 101-107.
- Lánczky, A., & Györfy, B. (2021). Web-Based Survival Analysis Tool Tailored for Medical Research (KMplot): Development and Implementation. *Journal of medical Internet research*, 23(7), e27633. <https://doi.org/10.2196/27633>
- Li, T., Fu, J., Zeng, Z., Cohen, D., Li, J., Chen, Q., Li, B., & Liu, X. S. (2020). TIMER2.0 for analysis of tumor-infiltrating immune cells. *Nucleic acids research*, 48(W1), W509–W514. <https://doi.org/10.1093/nar/gkaa407>
- Li, M., Zhao, Y., Li, H., Deng, X., & Sheng, M. (2023). Application value of circulating LncRNA in diagnosis, treatment, and prognosis of breast cancer. *Functional & Integrative Genomics*, 23(1), 61.
- Lovelace, D. L., McDaniel, L. R., & Golden, D. (2019). Long-term effects of breast cancer surgery, treatment, and survivor care. *Journal of midwifery & women's health*, 64(6), 713-724.

- Ma, C. C., Wang, Z. L., Xu, T., He, Z. Y., & Wei, Y. Q. (2020). The approved gene therapy drugs worldwide: from 1998 to 2019. *Biotechnology advances*, 40, 107502.
- Malumbres, M. Cyclin-dependent kinases. *Genome Biol* 15, 122 (2014). <https://doi.org/10.1186/gb4184>
- Matthews, H. K., Bertoli, C., & de Bruin, R. A. (2022). Cell cycle control in cancer. *Nature Reviews Molecular Cell Biology*, 23(1), 74-88.
- Momenimovahed, Z., & Salehiniya, H. (2019). Epidemiological characteristics of and risk factors for breast cancer in the world. *Breast Cancer: Targets and Therapy*, 151-164.
- Moradi, M., Golmohammadi, R., Najafi, A., Moosazadeh Moghaddam, M., Fasihi-Ramandi, M., & Mirnejad, R. (2022). A contemporary review on the important role of in silico approaches for managing different aspects of COVID-19 crisis. *Informatics in medicine unlocked*, 28, 100862. <https://doi.org/10.1016/j.imu.2022.100862>
- Nounou, M. I., El-Amrawy, F., Ahmed, N., Abdelraouf, K., Goda, S., & Syed-Sha-Qhattal, H. (2015). Breast cancer: conventional diagnosis and treatment modalities and recent patents and technologies. *Breast cancer: basic and clinical research*, 9, BCBCR-S29420.
- Novelli, G., Ciccacci, C., Borgiani, P., Papaluca Amati, M., & Abadie, E. (2008). Genetic tests and genomic biomarkers: regulation, qualification and validation. *Clinical cases in mineral and bone metabolism : the official journal of the Italian Society of Osteoporosis, Mineral Metabolism, and Skeletal Diseases*, 5(2), 149–154.
- Orrantia-Borunda E, Anchondo-Nuñez P, Acuña-Aguilar LE, et al. Subtypes of Breast Cancer. In: Mayrovitz HN, editor. *Breast Cancer* [Internet]. Brisbane (AU): Exon Publications; 2022 Aug 6. Chapter 3. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK583808/> doi: 10.36255/exon-publications-breast-cancer-subtypes
- Palmer, A., Jiménez, R., & Gervilla, E. (2011). Data mining: Machine learning and statistical techniques. *Knowledge-Oriented Applications in Data Mining*, Prof. Kimito Funatsu (Ed.), 373-396.
- Pena, M. J., De Zeeuw, D., Mischak, H., Jankowski, J., Oberbauer, R., Woloszczuk, W., ... & Lambers Heerspink, H. J. (2015). Prognostic clinical and molecular biomarkers of renal disease in type 2 diabetes. *Nephrology Dialysis Transplantation*, 30(suppl_4), iv86-iv95.
- Pereira, R., Oliveira, J., & Sousa, M. (2020). Bioinformatics and computational tools for next-generation sequencing analysis in clinical genetics. *Journal of clinical medicine*, 9(1), 132.
- Reghupaty, S. C., & Sarkar, D. (2019). Current status of gene therapy in hepatocellular carcinoma. *Cancers*, 11(9), 1265.
- Reimand, J., Isserlin, R., Voisin, V., Kucera, M., Tannus-Lopes, C., Rostamianfar, A., Wadi, L., Meyer, M., Wong, J., Xu, C., Merico, D., & Bader, G. D. (2019). Pathway enrichment analysis and visualization of omics data using g:Profiler, GSEA, Cytoscape and EnrichmentMap. *Nature protocols*, 14(2), 482–517. <https://doi.org/10.1038/s41596-018-0103-9>
- Rich, J. T., Neely, J. G., Paniello, R. C., Voelker, C. C., Nussenbaum, B., & Wang, E. W. (2010). A practical guide to understanding Kaplan-Meier curves. *Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery*, 143(3), 331–336. <https://doi.org/10.1016/j.otohns.2010.05.007>
- Sadana, A., & Sadana, N. (2014). Biomarkers and biosensors: detection and binding to biosensor surfaces and biomarkers applications. *Newnes*.

- Savas, P., Salgado, R., Denkert, C., Sotiriou, C., Darcy, P. K., Smyth, M. J., & Loi, S. (2016). Clinical relevance of host immunity in breast cancer: from TILs to the clinic. *Nature reviews Clinical oncology*, 13(4), 228-241.
- Schirmacher, V. (2019). From chemotherapy to biological therapy: A review of novel concepts to reduce the side effects of systemic cancer treatment. *International journal of oncology*, 54(2), 407-419.
- Schober, P., & Vetter, T. R. (2020). Correlation Analysis in Medical Research. *Anesthesia & Analgesia*, 130(2), 332-332
- Senkus E, Kyriakides S, Penault-Llorca F, Poortmans P, Thompson A, Zackrisson S, Cardoso F: Primary breast cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. *Ann Oncol*. 2013, 24: vi7-vi23. 10.1093/annonc/mdt284
- Shahryari, A., Saghaeian Jazi, M., Mohammadi, S., Razavi Nikoo, H., Nazari, Z., Hosseini, E. S., Burtscher, I., Mowla, S. J., & Lickert, H. (2019). Development and Clinical Translation of Approved Gene Therapy Products for Genetic Disorders. *Frontiers in genetics*, 10, 868. <https://doi.org/10.3389/fgene.2019.00868>
- Sheng, Z., Han, W., Huang, B., & Shen, G. (2020). Screening and identification of potential prognostic biomarkers in metastatic skin cutaneous melanoma by bioinformatics analysis. *Journal of Cellular and Molecular Medicine*, 24(19), 11613-11618.
- Smolarz, B., Nowak, A. Z., & Romanowicz, H. (2022). Breast cancer—epidemiology, classification, pathogenesis and treatment (review of literature). *Cancers*, 14(10), 2569.
- Sung, H., Ferlay, J., Siegel, R. L., Laversanne, M., Soerjomataram, I., Jemal, A., & Bray, F. (2021). Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA: a cancer journal for clinicians*, 71(3), 209–249. <https://doi.org/10.3322/caac.21660>
- Szklarczyk, D., Gable, A. L., Lyon, D., Junge, A., Wyder, S., Huerta-Cepas, J., Simonovic, M., Doncheva, N. T., Morris, J. H., Bork, P., Jensen, L. J., & Mering, C. V. (2019). STRING v11: protein-protein association networks with increased coverage, supporting functional discovery in genome-wide experimental datasets. *Nucleic acids research*, 47(D1), D607–D613. <https://doi.org/10.1093/nar/gky1131>
- Tadesse, S., Yu, M., Kumarasiri, M., Le, B. T., & Wang, S. (2015). Targeting CDK6 in cancer: State of the art and new insights. *Cell cycle (Georgetown, Tex.)*, 14(20), 3220–3230. <https://doi.org/10.1080/15384101.2015.1084445>
- Tang, J., Lu, M., Cui, Q., Zhang, D., Kong, D., Liao, X., ... & Wu, G. (2019). Overexpression of ASPM, CDC20, and TTK confer a poorer prognosis in breast cancer identified by gene co-expression network analysis. *Frontiers in oncology*, 9, 310.
- Tang, Y., Cui, Y., Zhang, S., & Zhang, L. (2019). The sensitivity and specificity of serum glycan-based biomarkers for cancer detection. *Progress in molecular biology and translational science*, 162, 121–140. <https://doi.org/10.1016/bs.pmbts.2019.01.010>
- Taylor, C. W., & Kirby, A. M. (2015). Cardiac side-effects from breast cancer radiotherapy. *Clinical Oncology*, 27(11), 621-629.
- Thomas P. D. (2017). The Gene Ontology and the Meaning of Biological Function. *Methods in molecular biology (Clifton, N.J.)*, 1446, 15–24. https://doi.org/10.1007/978-1-4939-3743-1_2
- Tian, Z., He, W., Tang, J., Liao, X., Yang, Q., Wu, Y., & Wu, G. (2020). Identification of important modules and biomarkers in breast cancer based on WGCNA. *OncoTargets and therapy*, 6805-6817.

- Tower, H., Ruppert, M., & Britt, K. (2019). The immune microenvironment of breast cancer progression. *Cancers*, 11(9), 1375.
- Trayes, K. P., & Cokenakes, S. E. (2021). Breast cancer treatment. *American family physician*, 104(2), 171-178.
- Tripathi, A., & Grivas, P. (2020). The utility of next generation sequencing in advanced urothelial carcinoma. *European Urology Focus*, 6(1), 41-44.
- Wang, J. T., Zaki, M. J., Toivonen, H. T., & Shasha, D. (2005). Introduction to data mining in bioinformatics. In *Data mining in bioinformatics* (pp. 3-8). London: Springer London.
- Wang, L., Liu, G., Zheng, L., Long, H., & Liu, Y. (2023). A new era of gene and cell therapy for cancer: a narrative review. *Annals of Translational Medicine*, 11(9), 321-321.
- Wirth, T., Parker, N., & Ylä-Herttua, S. (2013). History of gene therapy. *Gene*, 525(2), 162–169. <https://doi.org/10.1016/j.gene.2013.03.137>
- Wilkinson, L., & Gathani, T. (2022). Understanding breast cancer as a global health concern. *The British journal of radiology*, 95(1130), 20211033. <https://doi.org/10.1259/bjr.20211033>
- Wu, M., Li, Q., & Wang, H. (2021). Identification of Novel Biomarkers Associated With the Prognosis and Potential Pathogenesis of Breast Cancer via Integrated Bioinformatics Analysis. *Technology in cancer research & treatment*, 20, 1533033821992081. <https://doi.org/10.1177/1533033821992081>
- Wu, C., Yang, P., Liu, B., & Tang, Y. (2020). Is there a CDKN2A-centric network in pancreatic ductal adenocarcinoma?. *OncoTargets and therapy*, 13, 2551–2562. <https://doi.org/10.2147/OTT.S232464>
- World Health Organization. (n.d.). Who launches a new roadmap on breast cancer. World Health Organization. <https://www.who.int/news/item/03-02-2023-who-launches-new-roadmap-on-breast-cancer>
- Yahya, E. B., & Alqadhi, A. M. (2021). Recent trends in cancer therapy: A review on the current state of gene delivery . *Life Sciences*, (), -. doi:10.1016/j.lfs.2021.119087
- Yersal, O., & Barutca, S. (2014). Biological subtypes of breast cancer: Prognostic and therapeutic implications. *World journal of clinical oncology*, 5(3), 412–424. <https://doi.org/10.5306/wjco.v5.i3.412>
- Yi, X., Zeng, W., Wang, C., Chen, Y., Zheng, L., Zhu, X., ... & Huang, Q. (2022). A step-by-step multiple stimuli-responsive metal-phenolic network prodrug nanoparticles for chemotherapy. *Nano Research*, 15, 1205-1212.
- Yin, L., Duan, J.J., Bian, X.W. et al. Triple-negative breast cancer molecular subtyping and treatment progress. *Breast Cancer Res* 22, 61 (2020). <https://doi.org/10.1186/s13058-020-01296-5>
- Zheng, H., Zhang, G., Zhang, L., Wang, Q., Li, H., Han, Y., ... & Guo, X. (2020). Comprehensive review of web servers and bioinformatics tools for cancer prognosis analysis. *Frontiers in oncology*, 10, 68.
- Zhou, Y., Abel, G., Hamilton, W. et al. Diagnosis of cancer as an emergency: a critical review of current evidence. *Nat Rev Clin Oncol* 14, 45–56 (2017). <https://doi.org/10.1038/nrclinonc.2016.155>