DHR Proceedings

Special Edition: Junior Clinical Research (2022), Vol. 2 No. S2
https://doi.org/10.47488/dhrp.v2iS2.73

COMMENTARY

# Breast Cancer in Hispanic Women

**America Escalona[1,2], Jaraeth Garza[1,3], Isabella Larralde[1,3], Gabriella Martinez[1,4], Mia Muñoz[1,3], Darleny Reyes[1,2], Ryan Villalobos[1,2], Kassandra Zuniga[1,3]**

[1]2nd Annual Junior Clinical Research Internship, South Texas Academy for Education & Training in Research, DHR Health Institute for Research & Development
[2]Progreso Early College High School, Progreso, TX
[3]San Benito High School, San Benito, TX
[4]Robert Vela High School, Edinburg, TX

All correspondence should be addressed to Program Director, 2nd Annual Junior Clinical Research Internship Program, DHR Health Institute for Research & Development, 5323 S McColl Road, Edinburg Texas, 78539

Received 08/05/2022
Accepted for publication 8/16/2022
Published 8/16/2022

Keywords: Breast Cancer; Treatment Breast Cancer; Cancer Hispanic Women

## Introduction

Breast cancer is one of the most common cancers in women (1). It is also the second most common cause of death for females (2). In the United States, there are about 287,850 women diagnosed with breast cancer every year (3). Most women are diagnosed when they are 50 years or older (4). Although it is more likely for older women to be diagnosed, younger women can be at risk of it as well (2). Hispanic women are more likely to be diagnosed at a younger age and more likely to die from breast cancer (5).

## Pathogenesis

Breast cancers are often a type of carcinoma called an adenocarcinoma. By definition, breast cancer is a disease in which cells in the breast grow out of control often leaving a “lump” in the breasts (6).

## Genetics

Between 5% to 10% of breast cancer cases are hereditary. This means the cancer results directly from gene changes or mutations passed on from a parent (7). The mutated genes that are often responsible for cancer are the BRCA1 and BRCA2 genes. BRCA1 and BRCA2 are tumor suppressing genes that contain the instructions for the protein responsible for reparation of damaged DNA, meaning they are the genes responsible for fighting cancer (8). When these genes are working normally, they keep cancer cells from growing and dividing too rapidly or uncontrollably. However, when these genes are mutated, they are not able to do their job properly. As a result, damaged DNA that is left unrepaired by the mutated genes may cause the accumulation of cellular mutations that are likely to divide and change rapidly which can cause cancer (9). Not every woman with mutated BRCA1 and BRCA2 genes will get breast cancer, but they are at an increased risk.

https://doi.org/10.47488/dhrp.v2iS2.73

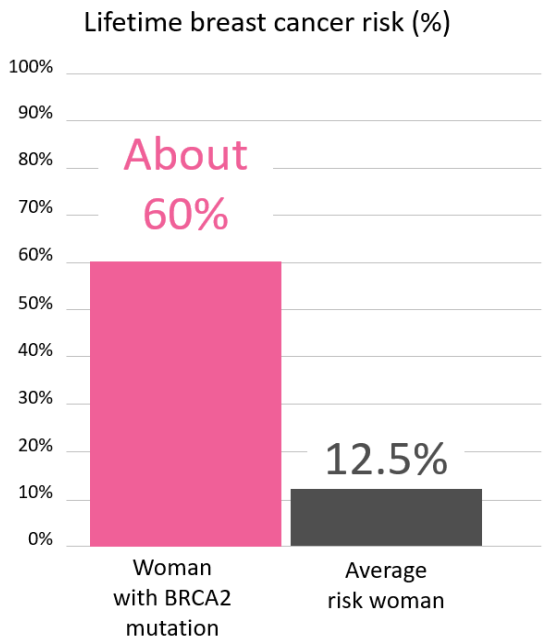


**Figure 1. Cancer risk associated with inherited BRCA2 mutations**

Reference: https://www.facingourrisk.org/info/hereditary-cancer-and-genetic-testing/hereditary-cancer-genes-and-risk/genes-by-name/brca2/cancer-risk

## Diagnosis

Diagnosing patients with breast cancer can be difficult to do as there is a process that has to be done before they are able to diagnose. There are machines that are used to screen for cancer as well as locate the site of the cancer. It may also be used to determine how the cancer has developed. To visualize internal breast structures, a low dose x-ray of the breast is performed; this procedure is known as mammography. It is one of the most suitable techniques to detect breast cancer (6).

There are two most common methods used to diagnose which are known as learning machine and deep learning. Machine learning goes with a small group in simplified words and is used to help or improve research. Deep learning has the same process and steps but in machine learning it is separated and taken slow (6, 10).

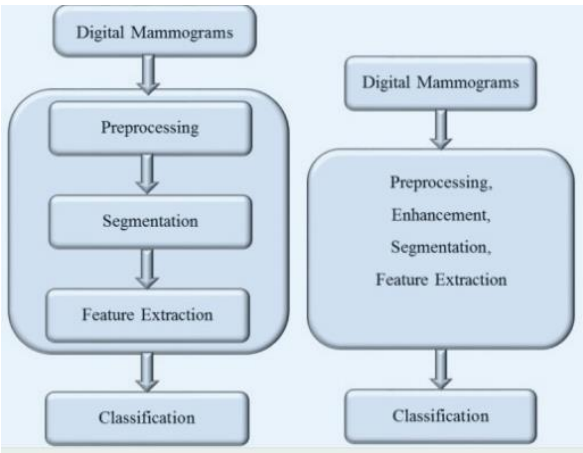


**Figure 2. Difference between two pipelines: conventional machine learning pipeline (left) and deep learning pipeline (right)**

Reference: Gardezi SJS, Elazab A, Lei B, Wang T. Breast Cancer Detection and Diagnosis Using Mammographic Data: Systematic Review. J Med Internet Res. 2019 Jul 26;21(7):e14464. doi: 10.2196/14464. PMID: 31350843; PMCID: PMC6688437.

There are chances of a false positive and false negative due to background noise, unwanted/ unnecessary objects, annotations, and even labels.

The process can be somewhat complex due to many steps in a single process, which can be considered as sub-groups of one process, but have to go through several steps to determine the diagnosis. With that being said the process is time consuming not only that but a vast amount of money just to process and identify to then treat the cancer which can be a great amount of money. For example, the minority populations/ ethnicity/ race can be affected by said process and money such as the poor low economic race such as the Hispanics. In research it is said that the Hispanic/ Latinos are what make the most population of patients that have breast cancer (11). Hispanics are known to take long in the process or not even do the entire steps before it is too late therefore the cancer has spread into more than the breast into muscles surrounding the tissue. In most cases there is a low chance of surviving the cancer as it may be too late.

## Ethnicity/Race

Breast cancer is one of the most common cancers affecting young women. In Hispanic/Latina women, it is the leading cause of cancer death (13).

https://doi.org/10.47488/dhrp.v2iS2.73

There are many components that contribute to this. Some are culture, genetics, and more. Regarding the Hispanic culture, there are many factors that contribute to increased cases of breast cancer, such as diabetes and obesity (15). One example is the diet in the culture. Food is very important in the culture and while it's not always a factor, the diet and overall lifestyle habits of Hispanic people, specifically in the US, is not always the healthiest, and it can contribute to developing diseases like diabetes and obesity (14). Having diseases like diabetes and obesity may lead to developing breast cancer and/or developing a more severe case than they would have otherwise (15).

Another risk factor in the culture is the mindset. There is a relatively common apprehension for seeking medical care within the community. Lack of education may contribute to this, depending on the area. Delay in seeking medical care increases the progression and severity of other diseases in Hispanic women, which can increase the risk of having breast cancer. There can also be a language barrier that contributes to this mindset. The patient may feel uncomfortable being in an environment where they don't fully understand everything that's going on, and they may not feel understood themselves (16). This also contributes to cases of cancer potentially being caught too late, or the patient not getting adequate care for their sickness.

There are also economic disparities that can impact the treatment of Hispanic women with breast cancer. It is very common in the Hispanic culture to find a family with one or more parents who work multiple jobs or work one very long and stressful job, only to be able to make ends meet (17). Adequate cancer treatment can be very expensive and may not be available in the patient's community, so they may have to travel to get this care. This is not always an option, and this can negatively impact the treatment. Another very common barrier that people in the community may face is lack of health insurance, which can also be a reason for not going to see a medical provider or getting adequate care (18).

A further barrier that some Hispanic/Latina women face is documentation. In the US, it is extremely difficult for an undocumented individual to get the same treatment as someone that is documented. Being undocumented can intensify some of the previously mentioned factors such as economic disparities, being uninsured, not being able to freely travel to seek specialized care, and mindset (19). Ultimately, a family may just choose to simply not go through all of the hardships that come with breast cancer treatment, (financial, psychosocial, physical, etc.) especially if there is no guarantee that it will work.

## Age Comparison

Women get breast cancer usually after they turn 65 years old (20). Most new cases in the United States are shown to all be older than 65 years old. Although breast cancer in younger women is not unknown, it is rare because breast cancer only affects about 4-6 % of the women under the age of 45 (21). Breast cancer in younger women has a more aggressive effect than the patients who are older (21) They usually have a worse prognosis and more aggressive phenotype; higher proportions of high-grade and later-stage tumors; and lower estrogen receptor positivity (21) There have also been cases of women with breast cancer of the age of 80 and older. The older the patients, the more risk and life threatening factors there are. The quality of life is retained from any treatment they may receive (22). The women in their mid 50's to late 60's have very low risk compared to the women who are younger or older than those ages (23).

## Risk factors

There are many risk factors to getting breast cancer such as smoking, and obesity. Studies have shown that women that smoke at adolescent or peri-menarcheal ages are at a high risk (24). A study showed that out of 102,927 women with 7.7 years follow-up, 1,815 developed breast cancer (24). Obesity is a higher risk for developing breast cancer, particularly in postmenopausal women, and with worse disease outcome for women of all ages. Obesity is associated with the risk of both pre- and post-menopausal breast cancer (25). Many things such as body mass index, weight gain and waist, and hip ratio have all been positively associated with risk of developing breast cancer (25). If you were to drink

https://doi.org/10.47488/dhrp.v2iS2.73

three alcoholic drinks per week you would be 15% more likely to contract breast cancer (26). Experts conclude that for every extra drink your percentage will increase by 10% (26). Women who breastfeed for at least one month had a 50-58% chance, and women with at least 2 children had an 87-93% (27). There are many risk factors to contracting breast cancer, many that you have control over, but there are few that we do. Therefore, people should be proactive and choose a healthier lifestyle to better their chances of improving their quality of life.

## Side Effects

Women diagnosed with breast cancer are in need of information regarding the treatments and side effects of breast cancer. There are many side effects during the different stages of breast cancer. When someone that is a young adult and diagnosed with breast cancer, they run the risk of several complications such as blood clots, sexual difficulties, and infertility (28). Breast cancer (BC) in young women is rare, affecting only 4-6% of women under the age of 40 (29) Regardless, breast cancer remains the most common malignancy among younger patients. Recently, a significant increase in BC rates has been observed among pre-menopausal subjects (30). Breast cancer in young women requires special attention due to its specific morphologic and prognostic characteristics and unique aspects, including fertility preservation and psychosocial issues. If an older person is diagnosed with breast cancer, they are more likely to run more of a risk of infection due to their immune system (30). The side effects include menopause, lymphedema, heart problems, and dental issues. Compared to other ethnicities, the Hispanic/Latino community runs more of a risk of getting diagnosed with breast cancer in women over other ethnicities such as White and Non-Hispanic (31).

Since many women suffer from breast cancer they often have to go through treatments that may leave them with both short-term and long-term side effects due to the therapy they go through. All though breast cancer is a serious topic to deal with, many women may get concerned about the sexual difficulties they may go through. Additionally, it may be difficult to talk to their physician about the way this could affect them or their partner (32). Some may not see what women are going through such as self-image dysmorphia or sexuality concerns. This can cause a person that is diagnosed with breast cancer or has breast cancer to start negatively hating the way they feel because they are dissatisfied with the way they look due to the way they think of themselves (33). They may also believe that they themselves as a person are not sexually appealing and begin to be self-conscious about their surgical scars and texture of their skin. All of these issues are side effects of breast cancer a woman can or has suffered through.

An important factor to consider with both surgical options and medication used to treat cancer is the side effects and to be proactive in the positive outcomes depending on what is recommended to the patient. Side effects include both physical and physiological changes. "Expected physical changes include hair loss, breast or chest wall disfigurement, skin texture change, vaginal irritation, decreased bone density, hot flashes, and weight loss or gain." (34).

Diagnosis and treatments are an enormous change in a patient's life. There are many side effects and issues that can happen. There will be various changes in your diet, day-to-day life, muscle deterioration, and depression. Once you start your journey you will notice that you may not be able to keep certain foods down, and will have a lot of regurgitation. Your taste buds will most likely not like a vast variety of food but you can always get meal supplements to keep your food intake up. Ongoing trials test that the impact of weight loss and lifestyle changes can decrease the risk of secondary breast cancer. On another note your taste buds aren't the only things that change, your muscle mass will defer since you may not want to be mobile anymore due to soreness/pain from your treatments. On average, 25% lower strength was found in lower extremities and 12-16% in the upper extremities (35). Your doctor or oncologist will refer you to a physical therapist to keep muscles and nervous system working. Since you will be going to a lot of treatments and therapies/appointments, you will notice that you may not have the time or energy to see family/friends. There is a 38.2% chance of getting depression and 32.3% of anxiety (36). Any cancer patient is at risk for

https://doi.org/10.47488/dhrp.v2iS2.73

depression but breast cancer patients are at a higher risk. It is good to have a stable support system at home during these tough times, especially to help with mobility, diet, and emotional struggles.

## Treatment

Chemotherapy is a common breast cancer treatment. There were significant racial/ethnic differences in the quality of life controlling for socio demographics, clinical factors and treatment factors. Treatment depends on the stage of cancer. It may consist of chemotherapy, radiation, and surgery. Usually, you receive chemotherapy in two to three week cycles, with periods of rest between cycles. Many Hispanic women take action on complementary interventions during their breast cancer treatment and set out the association between the oppressive side effects and the most common side effects. Some of the side effects can be hair loss, nail changes, mouth sores, loss of appetite or weight changes, nausea and vomiting, diarrhea, fatigue, hot flashes and/or vaginal dryness from menopause caused by chemotherapy and nerve damage (37). The side effects normally go away once the treatment is done; there are always ways to reduce these side effects. There may be some racial/ethnic differences in the effectiveness of some of the treatments for breast cancer that have not been fully understood (38). The chemotherapy for breast cancer can cause side effects, depending on the type and dose given, and the length of the treatment. Hispanic women are more likely to be diagnosed at a later stage and get less aggressive therapy. That leads to a lower survival rate.

## Alternative Treatment Options

Treatment options for Breast Cancer (BC) can range from conservative methods to more aggressive approaches based on the stage of breast cancer. Cancer patients can also opt for chemotherapy, biological therapy and even hormone therapy. Other options include Partial mastectomy (PM), Mastectomy without reconstruction (M), Mastectomy with reconstruction (M+R) and PM with oncoplastic reconstruction (OS).

Treatment options can range from invasive to noninvasive procedures and medication patient's dependent on the stage in which cancer was detected. Hormone levels are also an important factor to consider when looking into therapy. Table 1 illustrates the typical treatment options for breast cancer.

Time is another factor. Both in when it is diagnosed and how much time the patient will be in treatment. In addition to considering time invested in treatment options patients need to also consider what medications they will be taking. Table 2 indicates the medications used in the treatment of breast cancer.

Treatment options along with recommendation for medication can be discussed with the patient's oncologist to determine the best possible option to successfully treat the patient. In addition, it is important to consider what treatment option the patient will pick to prevent a recurrence as much as possible.

## Treatment Cost

The yearly cost of breast cancer treatment in the United States is $16.5 billion according to the CDC (39). It is also said to have the highest cost for treatment amongst cancers (39). The cost of treatment can differ depending on many things like what stage the cancer is in, the type of treatment you'll receive, age, and if you have insurance or not. The typical patient can expect to pay from $60,637-$134,682 for treatment although this can vary (40). Depending on the type of treatment, a Stage 4 patient could expect to pay up to 64% more than patients with lower Stages of breast cancer (40). In patients undergoing a surgical removal, those with Stage 0 patients can expect to pay 121% more than Stage 4 patients (40). Since breast cancer in younger women tends to be more aggressive, the treatment is usually more intensive and expensive (41). Treatment is expensive with or without insurance, however, a patient is likely to pay more without it. Fortunately, there are multiple organizations who offer help to patients (42). Some of these organizations include The Healthwell Foundation, Partnership for Prescription Assistance, and The Pink Fund (43). Some of these foundations

can also provide support for those that have insurance but do not cover individual drugs or certain treatments.

## Conclusion

The consequences of breast cancer include not only different occurrences during treatment, but also diagnosis. Breast cancer is most common in Hispanic women, making up more than half of the population of Hispanic women. During the early years of mammography, there were many new cases of cancer in situ, but 75% of the cases died due to cancer in situ. Thanks to the advancements in cancer treatment methods, the quality of life for cancer patients has greatly improved. Furthermore, there is still a need to change the rate. Hispanic women are more likely than non-Hispanic women to be affected by this breast cancer. It is due to poor living/economic options that Hispanics and Latinos are the most affected. The Hispanics had scarce or no resources compared to other races. In spite of this, many Hispanics do not seek medical attention until they are too ill or have a condition. This in turn means that the disease or cancer has spread to other parts of the body. Poor economic sources are one possibility, which can greatly impact the entire community, thus contributing to the large breast cancer population.

## Acknowledgments

Dr. Monica Betancourt-Garcia, MD, Scientific Director; Melissa Eddie, MS, Program Manager; Xochitl Lopez, BS, Program Coordinator

## Funding

Funded by DHR Health Institute for Research & Development; DHR Health; Region One ESC GEARUP College Ready, Career Set!; Region One ESC GEARUP College Now, Career Connected and Region One ESC PATHS

## References

1. Ben-Dror J, Shalamov M, Sonnenblick A. The History of Early Breast Cancer Treatment. Genes (Basel). 2022 May 27;13(6):960. doi: 10.3390/genes13060960. PMID: 35741721; PMCID: PMC9222657.
2. Medical costs associated with metastatic breast cancer in younger, midlife, and older women. (n.d.). Retrieved August 3, 2022, from https://link.springer.com/epdf/10.1007/s10549-020-05654-x?sharing_token=ennPG7dHcm4Xn5HwoPPmafe4RwlQNchNByi7wbcMAY6G4bjMM1WsZz04bmGDXIdn6Up8qzO5I09t4r_MtTnmK1BezwP-tCb5bkI8sY5nKD6BBrjg4KR6m4tjwHZkUfG8__YCZXc3iz-k4RnYSgyN0UWssKgX1RBkIT3JCzjNbvI%3D
3. Breast cancer statistics: How common is breast cancer? American Cancer Society. (n.d.). Retrieved August 3, 2022, from https://www.cancer.org/cancer/breast-cancer/about/how-common-is-breast-cancer.html#:~:text=About%20287%2C850%20new%20cases%20of,will%20die%20from%20breast%20cancer.
4. Centers for Disease Control and Prevention. (2021, September 20). What are the risk factors for breast cancer? Centers for Disease Control and Prevention. Retrieved August 3, 2022, from https://www.cdc.gov/cancer/breast/basic_info/risk_factors.htm#:~:text=Most%20breast%20cancers%20are%20found,factors%20have%20the%20same%20effect.
5. Bcrf. (2022, January 11). What Hispanic women and latinas need to know about breast cancer. Breast Cancer Research Foundation. Retrieved August 2, 2022, from https://www.bcrf.org/blog/hispanic-latina-breast-cancer-facts-statistics/
6. Centers for Disease Control and Prevention. (2021, September 22). What is breast cancer? Centers for Disease Control and Prevention. Retrieved August 2, 2022, from https://www.cdc.gov/cancer/breast/basic_info/what-is-breast-cancer.htm
7. Breast cancer risk factors you can't change. American Cancer Society. (n.d.). Retrieved August 2, 2022, from https://www.cancer.org/cancer/breast-cancer/risk-and-prevention/breast-cancer-risk-factors-you-cannot-

change.html#:~:text=Having%20a%20first%2Ddegree%20relative,higher%20risk%20of%20breast%20cancer.

8. Centers for Disease Control and Prevention. (2021, September 27). Hereditary breast cancer and BRCA genes. Centers for Disease Control and Prevention. Retrieved August 2, 2022, from https://www.cdc.gov/cancer/breast/young_women/bringyourbrave/hereditary_breast_cancer/
9. Centers for Disease Control and Prevention. (2021, September 27). BRCA gene mutations. Centers for Disease Control and Prevention. Retrieved August 3, 2022, from https://www.cdc.gov/cancer/breast/young_women/bringyourbrave/hereditary_breast_cancer/brca_gene_mutations.htm
10. Gardezi SJS, Elazab A, Lei B, Wang T. Breast Cancer Detection and Diagnosis Using Mammographic Data: Systematic Review. J Med Internet Res. 2019 Jul 26;21(7):e14464. doi: 10.2196/14464. PMID: 31350843; PMCID: PMC6688437.
11. Radecka B, Litwiniuk M. Breast cancer in young women. Ginekol Pol. 2016;87(9):659-663. doi: 10.5603/GP.2016.0062. PMID: 27723074.
12. Romero-Cordoba SL, Salido-Guadarrama I, Rebollar-Vega R, Bautista-Piña V, Dominguez-Reyes C, Tenorio-Torres A, Villegas-Carlos F, Fernández-López JC, Uribe-Figueroa L, Alfaro-Ruiz L, Hidalgo-Miranda A. Comprehensive omic characterization of breast cancer in Mexican-Hispanic women. Nat Commun. 2021 Apr 14;12(1):2245. doi: 10.1038/s41467-021-22478-5. PMID: 33854067; PMCID: PMC8046804.
13. Nahleh Z, Botrus G, Dwivedi A, Badri N, Otoukesh S, Diab N, Biswas S, Jennings M, Elzamly S. Clinico-pathologic disparities of breast cancer in Hispanic/Latina women. Breast Dis. 2018;37(3):147-154. doi: 10.3233/BD-170309. PMID: 29376844.
14. Albrecht, S. (2021, October 11). Concerning dietary patterns among Latinx linked to years living in. Search the website. Retrieved August 3, 2022, from https://www.publichealth.columbia.edu/public-health-now/news/concerning-dietary-patterns-among-latinx-linked-years-living-us
15. Jaiswal P, Tripathi V, Nayak A, Kataria S, Lukashevich V, Das AK, Parmar HS. A Molecular Link Between Diabetes and Breast Cancer: Therapeutic Potential of Repurposing Incretin-based Therapies for Breast Cancer. Curr Cancer Drug Targets. 2021;21(10):829-848. doi: 10.2174/1568009621666210901101851. PMID: 34468298.
16. Machado, A. (2014, May 7). Why many latinos dread going to the doctor. The Atlantic. Retrieved August 3, 2022, from https://www.theatlantic.com/health/archive/2014/05/why-many-latinos-dread-going-to-the-doctor/361547/
17. Wildsmith, E., Ramos-Olazagasti, M. A., Alvira-Hammond, M., Chen, Y., Cabrera, N., & Finno-Velasquez, M. (2020, February 18). The job characteristics of low-income Hispanic parents. Hispanic Research Center. Retrieved August 3, 2022, from https://www.hispanicresearchcenter.org/research-resources/the-job-characteristics-of-low-income-hispanic-parents/
18. Artiga, S., Tolbert, J., & Orgera, K. (2020, November 6). Hispanic people are facing widening gaps in health coverage. KFF. Retrieved August 3, 2022, from https://www.kff.org/policy-watch/hispanic-people-facing-widening-gaps-health-coverage/
19. Beck TL, Le TK, Henry-Okafor Q, Shah MK. Medical Care for Undocumented Immigrants: National and International Issues. Physician Assist Clin. 2019 Jan;4(1):33-45. doi: 10.1016/j.cpha.2018.08.002. Epub 2018 Nov 16. PMID: 32289088; PMCID: PMC7141175.
20. Muss HB. Factors used to select adjuvant therapy of breast cancer in the United States: an overview of age, race, and socioeconomic status. J Natl Cancer Inst Monogr. 2001;(30):52-5. doi: 10.1093/oxfordjournals.jncimonographs.a003461. PMID: 11773292

21. Tichy JR, Lim E, Anders CK. Breast cancer in adolescents and young adults: a review with a focus on biology. J Natl Compr Canc Netw. 2013 Sep 1;11(9):1060-9. doi: 10.6004/jnccn.2013.0128. PMID: 24029122.
22. Shachar SS, Hurria A, Muss HB. Breast Cancer in Women Older Than 80 Years. J Oncol Pract. 2016 Feb;12(2):123-32. doi: 10.1200/JOP.2015.010207. PMID: 26869650.
23. Hill DA, Friend S, Lomo L, Wiggins C, Barry M, Prossnitz E, Royce M. Breast cancer survival, survival disparities, and guideline-based treatment. Breast Cancer Res Treat. 2018 Jul;170(2):405-414. doi: 10.1007/s10549-018-4761-7. Epub 2018 Mar 22. PMID: 29569018; PMCID: PMC6002943. https://pubmed.ncbi.nlm.nih.gov/29569018/
24. Jones, M. E., Schoemaker, M. J., Wright, L. B., Ashworth, A., & Swerdlow, A. J. (2017). Smoking and risk of breast cancer in the Generations Study cohort. Breast cancer research: BCR, 19(1), 118. https://doi.org/10.1186/s13058-017-0908-4
25. Carmichael A. R. (2006). Obesity and prognosis of breast cancer. Obesity reviews : an official journal of the International Association for the Study of Obesity, 7(4), 333–340. https://doi.org/10.1111/j.1467-789X.2006.00261.x
26. Drinking alcohol. (n.d.). Retrieved August 2, 2022, from https://www.breastcancer.org/risk/risk-factors/drinking-alcohol
27. Yaghjyan, L., Austin-Datta, R. J., Oh, H., Heng, Y. J., Vellal, A. D., Sirinukunwattana, K., Baker, G. M., Collins, L. C., Murthy, D., Rosner, B., & Tamimi, R. M. (2021). Associations of reproductive breast cancer risk factors with breast tissue composition. Breast cancer research : BCR, 23(1), 70. https://doi.org/10.1186/s13058-021-01447-2
28. Ekwueme DU, Allaire BT, Guy GP Jr, Arnold S, Trogdon JG. Treatment Costs of Breast Cancer Among Younger Women Aged 19-44 Years Enrolled in Medicaid. Am J Prev Med. 2016 Feb;50(2):278-85. doi: 10.1016/j.amepre.2015.10.017. PMID: 26775907; PMCID: PMC5860800
29. Hale MJ, Howell A, Dowsett M, Cuzick J, Sestak I. Tamoxifen related side effects and their impact on breast cancer incidence: A retrospective analysis of the randomized IBIS-I trial. Breast. 2020 Dec;54:216-221. doi: 10.1016/j.breast.2020.10.015. Epub 2020 Oct 31. PMID: 33160147; PMCID: PMC7649356
30. Johnson RH, Anders CK, Litton JK, Ruddy KJ, Bleyer A. Breast cancer in adolescents and young adults. Pediatr Blood Cancer. 2018 Dec;65(12):e27397. doi: 10.1002/pbc.27397. Epub 2018 Aug 28. PMID: 30156052; PMCID: PMC6192832
31. Yedjou CG, Sims JN, Miele L, Noubissi F, Lowe L, Fonseca DD, Alo RA, Payton M, Tchounwou PB. Health and Racial Disparity in Breast Cancer. Adv Exp Med Biol. 2019;1152:31-49. doi: 10.1007/978-3-030-20301-6_3. PMID: 31456178; PMCID: PMC6941147
32. Hungr C, Sanchez-Varela V, Bober SL. Self-Image and Sexuality Issues among Young Women with Breast Cancer: Practical Recommendations. Rev Invest Clin. 2017 Mar-Apr;69(2):114-22. doi: 10.24875/ric.17002200. PMID: 28453509
33. Reese JB, Beach MC, Smith KC, Bantug ET, Casale KE, Porter LS, Bober SL, Tulsky JA, Daly MB, Lepore SJ. Effective patient-provider communication about sexual concerns in breast cancer: a qualitative study. Support Care Cancer. 2017 Oct;25(10):3199-3207. doi: 10.1007/s00520-017-3729-1. Epub 2017 Apr 27. PMID: 28451911; PMCID: PMC5803445
34. Maughan, K. L., Lutterbie, M. A., & Ham, P. S. (2010). Treatment of breast cancer. American family physician, 81(11), 1339–1346.
35. Klassen, O., Schmidt, M. E., Ulrich, C. M., Schneeweiss, A., Potthoff, K., Steindorf, K., & Wiskemann, J. (2017). Muscle strength in breast cancer patients receiving different treatment regimes. Journal of cachexia,

sarcopenia and muscle, 8(2), 305–316. https://doi.org/10.1002/jcsm.12165

36. Tsaras, K., Papathanasiou, I. V., Mitsi, D., Veneti, A., Kelesi, M., Zyga, S., & Fradelos, E. C. (2018). Assessment of Depression and Anxiety in Breast Cancer Patients: Prevalence and Associated Factors. Asian Pacific journal of cancer prevention: APJCP, 19(6), 1661–1669. https://doi.org/10.22034/APJCP.2018.19.6.1661
37. Chemotherapy for breast cancer: Breast cancer treatment. American Cancer Society. (n.d.). Retrieved August 4, 2022, from https://www.cancer.org/cancer/breast-cancer/treatment/chemotherapy-for-breast-cancer.html
38. Ma SJ, Serra LM, Yu B, Farrugia MK, lovoli AJ, Yu H, Yao S, Oladeru OT, Singh AK Racial/Ethnic Differences and Trends in Pathologic Complete Response Following Neoadjuvant Chemotherapy for Breast Cancer. Cancers (Basel). 2022 Jan 21;14(3):534. Doi :10.3390/cancers 14030534. PMID: 35158802; PMCID: PMC8833599.
39. Centers for Disease Control and Prevention. (2021, August 18). Cost-effectiveness of breast cancer interventions. Centers for Disease Control and Prevention. Retrieved August 2, 2022, from https://www.cdc.gov/chronicdisease/programs-impact/pop/breast-cancer.htm#:~:text=%2416.5%20BILLION&text=13%25%20of%20all%20cancer%20treatment,States%20are%20for%20breast%20cancer.&text=Breast%20cancer%20has%20the%20highest%20treatment%20cost%20of%20any%20cancer.&text=The%20amount%20that%20patients%20pay,widely%20depending%20on%20insurance%20coverage.
40. Price, S. (2022, March 1). Stage 4 breast cancer treatment & chemo costs top $130,000. ValuePenguin. Retrieved August 2, 2022, from https://www.valuepenguin.com/health-insurance-breast-cancer-treatment-study
41. Ekwueme DU, Allaire BT, Guy GP Jr, Arnold S, Trogdon JG. Treatment Costs of Breast Cancer Among Younger Women Aged 19-44 Years Enrolled in Medicaid. Am J Prev Med. 2016 Feb;50(2):278-85. doi: 10.1016/j.amepre.2015.10.017. PMID: 26775907; PMCID: PMC5860800.
42. Covering the costs of your breast cancer care. (n.d.). Retrieved August 3, 2022, from https://www.breastcancer.org/managing-life/covering-cost-of-care
43. Financial assistance programs for young women with breast cancer. Young Survival Coalition, Young women facing breast cancer together. (n.d.). Retrieved August 4, 2022, from https://www.youngsurvival.org/learn/living-with-breast-cancer/practical-concerns/financial-assistance

https://doi.org/10.47488/dhrp.v2iS2.73

**Table 1: Typical Treatment Options for Breast Cancer by Stage**

| | | | *Adjuvant therapy* | | |
|---|---|---|---|---|---|
| *Cancer stage and type* | *Primary treatment* | *Node evaluation* | *Hormone receptor negative* | *Hormone receptor positive* | *ERBB2 overexpression* |
| Stage 0: in situ | | | | | |
| Lobular carcinoma in situ | No treatment or consider prophylaxis with tamoxifen[6] | — | — | — | — |
| Ductal carcinoma in situ | Breast-conserving surgery (consider mastectomy if extensive or multifocal) and radiation therapy | — | — | — | — |
| Stages I and II: early-stage invasive | Breast-conserving surgery[7] and radiation therapy[8] | SLN biopsy[9-11] or ALN dissection* | Chemotherapy† | Chemotherapy and endocrine therapy[12] | Chemotherapy and trastuzumab (Herceptin)[13,14] |
| Stage III: locally advanced | | | | | |
| Noninflammatory | Induction chemotherapy,[15] followed by breast-conserving surgery‡[16-19] and radiation therapy | ALN dissection or SLN biopsy[20] | Induction chemotherapy[15,21] | Induction chemotherapy and post-operative endocrine therapy | Induction chemotherapy and postoperative trastuzumab |
| Inflammatory | Induction chemotherapy, followed by mastectomy and radiation therapy | ALN dissection | | | |
| Stage IV: metastatic | | | | | |
| Initial or recurrent | Address patient's treatment goals; radiation therapy or bisphosphonates for bone pain | — | Chemotherapy | Endocrine therapy with or without chemotherapy | Trastuzumab with or without chemotherapy |
| Recurrent | | | | | |
| Local after breast-conserving surgery | Mastectomy | ALN dissection§ | Chemotherapy‖ | Chemotherapy and endocrine therapy¶ | Chemotherapy and trastuzumab |
| Local after mastectomy | Wide excision | ALN dissection** | | | |
| Local inoperable | Induction chemotherapy | ALN dissection | | | |

*ALN = axillary lymph node; SLN = sentinel lymph node.*

**—SLN biopsy if clinically negative nodes; otherwise, ALN dissection is recommended.*
*†—Except lowest risk (i.e., tumor ≤ 1 cm, node negative).*
*‡—Mastectomy may be considered if tumor does not sufficiently respond to induction chemotherapy.*
*§—If nodes are clinically negative and SLN biopsy is done initially, SLN biopsy can be repeated; if nodes are clinically positive, ALN dissection is needed.*
*‖—Local recurrence is often associated with distant metastases; therefore, prophylactic chemotherapy theoretically may be of benefit and is currently being studied.[22]*
*¶—Benefit of adjuvant therapy is uncertain and currently being studied; until results are available, chemotherapy is generally recommended.*
***—May not need to explore axilla if ALN dissection is done initially and there are clinically negative nodes with recurrence.*

*Information from references 6 through 22.*

Reference: Maughan, K. L., Lutterbie, M. A., & Ham, P. S. (2010). Treatment of breast cancer. American family physician, 81(11), 1339–1346. (34)

https://doi.org/10.47488/dhrp.v2iS2.73

**Table 2: Medication Used in the Treatment of Breast Cancer**

| *Therapy type* | *Medication* | *Typical course of treatment* |
|---|---|---|
| Chemotherapy[24] | **Anthracyclines** | |
| | Doxorubicin (Adriamycin) | IV every 14 to 21 days for four to six cycles; used in combination with a taxane (docetaxel [Taxotere] or paclitaxel [Taxol]), cyclophosphamide, and/or fluorouracil |
| | Epirubicin (Ellence) | IV day 1 or days 1 and 8, every 21 to 28 days for three to eight cycles; used in combination with cyclophosphamide or fluorouracil |
| | **Taxanes** | |
| | Docetaxel | IV every 21 days for three to four cycles; used in combination with doxorubicin, epirubicin, cyclophosphamide, and/or fluorouracil |
| | Paclitaxel | IV every seven to 21 days for four to 12 cycles; used in combination with doxorubicin and cyclophosphamide |
| Endocrine | **Aromatase inhibitors** | |
| | Anastrozole (Arimidex) | Oral tablet daily for five years; used alone or in sequence with tamoxifen[36,37] |
| | Exemestane (Aromasin) | Oral tablet daily for at least two to five years; used alone or in sequence with tamoxifen[38,39] |
| | Letrozole (Femara) | Oral tablet daily for two to five years; used alone or in sequence with tamoxifen[40,41] |
| | **Gonadotropin-releasing hormone agonist** | |
| | Goserelin (Zoladex) | Subcutaneously every one to three months for two years[42,43] |
| | **Selective estrogen receptor modulators** | |
| | Tamoxifen | Oral tablet daily for two to five years; used alone or in sequence with an aromatase inhibitor[36] |
| Tissue-targeted | **Monoclonal antibody** | |
| | Trastuzumab (Herceptin) | IV with first dose of chemotherapy regimen and then every one or three weeks to complete one year[44-46] |

*IV = intravenously.*

*Information from references 24 and 36 through 46.*

Reference: Maughan, K. L., Lutterbie, M. A., & Ham, P. S. (2010). *Treatment of breast cancer*. American family physician, 81(11), 1339–1346. (38)