

Pathophysiology, Types & Management of Breast Cancer: A Review

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Abstract: *Cancer is a disease of the cells, which are the body's basic building blocks. The body constantly makes new cells to help us grow, replace worn-out tissue and heal injuries. A woman's breast is made up of glands that can make breast milk (lobules), small tubes that carry milk from the lobules to the nipple (ducts), fatty and connective tissue, blood vessels, and lymph vessels. Most breast cancers begin in the cells that line the ducts. Fewer breast cancers start in the cells lining the lobules. Breast cancer is the most common non-cutaneous malignancy which is second leading cause of cancer death around the world. Breast cancer in young women is associated with adverse pathological factors, including high grade tumors, hormone receptor negativity, and HER2 overexpression. The mammogram is the main test to find breast cancer early followed by breast MRI. Treatment of breast cancer includes surgery, Mastectomy Radiation, Chemotherapy, Hormone therapy, Targeted therapy, Bone-directed therapy*

Keywords: Breast, cancer, mammogram, young age

1. Introduction

Cancer is a disease of the cells, which are the body's basic building blocks. The body constantly makes new cells to help us grow, replace worn-out tissue and heal injuries. Normally, cells multiply and die in an orderly way. Sometimes cells don't grow, divide and die in the usual way. This may cause blood or lymph fluid in the body to become abnormal, or form a lump called a tumour. A tumour can be benign or malignant¹. The cancer that first develops in a tissue or organ is called the primary cancer. A malignant tumour is usually named after the organ or type of cell affected. A malignant tumour that has not spread to other parts of the body is called localised cancer. A tumour may invade deeper into surrounding tissue and can grow its own blood vessels. If cancerous cells grow and form another tumour at a new site, it is called a secondary cancer or metastasis¹. A metastasis keeps the name of the original cancer. For example, breast cancer that has spread to the bones is called metastatic breast cancer, even though the person may be experiencing symptoms caused by problems in the bones. A woman's breast is made up of glands that can make breast milk (lobules), small tubes that carry milk from the lobules to the nipple (ducts), fatty and connective tissue, blood vessels, and lymph vessels. Most breast cancers begin in the cells that line the ducts. Fewer breast cancers start in the cells lining the lobules. Cancers can also start in cells of the other tissues in the breast. These are called sarcomas and lymphomas and are not really thought of as breast cancers².

2. The Lymph System of the Breast

The lymph system is one of the main ways breast cancer spreads. Normally, lymph nodes are small, bean-shaped tissues that contain a certain kind of immune system cell (cells that fight infections). Lymph nodes are connected by vessels (like small veins) that carry a clear fluid called lymph instead of blood. Breast cancer cells can travel in lymphatic vessels and begin to grow in lymph nodes. If cancer cells

spread to lymph nodes, there is a greater chance that the cells have also spread to other places in the body². The chance goes up the more lymph nodes with cancer there are. Since cancer in lymph nodes doesn't always cause the nodes to get larger, doctors often remove one or more lymph nodes to check for cancer spread. Most breast lumps are not cancer – they are benign. Benign breast tumors are abnormal growths, but they do not spread outside of the breast and they are not life threatening. But some benign breast lumps can increase a woman's risk of getting breast cancer.

Breast cancer is the most common non-cutaneous malignancy, accounting for nearly one in three cancers diagnosed among women in the United States, and the second leading cause of cancer death around the world^{3, 4}. Around 6.6% of all breast cancer cases are diagnosed in women less than 40 of age, 2.4% in women less than 35, and 0.65% in women less than 30^{5,6} if plotted on a curve, the cumulative incidence of breast cancer seems to follow an exponential function below the age of 40 after which it seems to rise linearly. The overall worldwide burden of breast cancer has doubled between 1975 and 2000, and this is thought to be attributable to the increasing life expectancy and widespread adoption of westernized lifestyle with all its risk factors⁷. However, these trends are not seen in early onset breast cancer, as the rates have been more or less stable in most countries in the past 20 years⁸. Approximately 1 in 200 women under the age of 40 were diagnosed with breast cancer in 2012. Prevalence of breast cancer in premenopausal women has been steadily increasing in several countries over the last years^{9, 10}. Moreover, the management of breast cancer in young patients (<35 or <40 years) solicits an integrated approach taking into account relevant issues such as fertility preservation and pregnancy, apart from a long-life expectancy. Overall, young patients have been reported to be associated with an increased risk of recurrence and death, as well as with unfavorable clinical and biological characteristics when compared to older patients¹¹⁻¹⁵.

3. Types of Breast Cancers

There are many types of breast cancer, but some of them are very rare. Sometimes a breast tumor can be a mix of these types.

Ductal carcinoma in situ (DCIS)

DCIS means that abnormal cells start in the cells lining the ducts without growing (invading) through the walls of the ducts into the tissue of the breast. Because the cells haven't invaded, DCIS is also sometimes called a non-invasive breast cancer. Since the cells haven't grown through the duct wall, they cannot spread to lymph nodes or other organs. But sometimes DCIS can go on to become an invasive cancer. That is why it is sometimes called a pre-cancer. Mammograms find many cases of DCIS.

Invasive (or infiltrating) ductal carcinoma (IDC)

This is the most common breast cancer. It starts in the cells lining a duct, and then the abnormal cells break through the wall of the duct and grow into (invade) the tissue of the breast. From there, the cancer cells can spread to nearby lymph nodes or other parts of the body.

Invasive (infiltrating) lobular carcinoma (ILC)

This cancer starts in the cells lining the milk glands (the lobules). The cells grow through the wall of the lobules and then can spread to nearby lymph nodes or other parts of the body.

Inflammatory breast cancer (IBC)

This is a rare type of invasive breast cancer. Often, there is no single lump or tumor. Instead, IBC makes the skin of the breast look red and feel warm. It also may make the skin look thick and pitted, something like an orange peel. The breast may get bigger, hard, tender, or itchy.

4. Risk factors

Early onset breast cancer does not seem to be directly related to westernization or standard of living, where a weak correlation is found between country income level and early onset breast cancer⁸. Genetic factors may play a role in affecting rates of early onset breast cancer in different areas, though their role cannot by itself account for international variation in risk. Different cancers have different risk factors. Some risk factors, such as smoking, drinking, and diet are linked to things a person does. Others, like a person's age, race, or family history, can't be changed. Some risk factors have a bigger effect than others, and your risk for breast cancer can change over time because of aging or lifestyle changes. Hormones seem to play a role in many cases of breast cancer, but just how this happens is not fully understood. Environmental factors Nevertheless, most of the variation in risk is believed to be due to differential environmental exposure to certain risk factors. Studies of migrants further emphasize this hypothesis; incidence of cancers tend to rise following migration from low to high incidence countries, especially if it occurs early in life¹⁶.

5. Exercise, diet and obesity

Although many studies showed a favorable outcome of exercise regarding breast cancer risk, some studies failed to show it^{17,18}. While several observational studies of fruit and vegetable consumption did not show any benefit in reducing breast cancer risk in both premenopausal and postmenopausal women, the Nurses' Health study showed nearly a 50% greater risk of breast cancer in premenopausal women who consume a high animal fat diet, but not with women on high vegetable fat diet¹⁹. Obesity is known to increase the risk of breast cancer in postmenopausal women, probably due to the increase in estrogen exposure caused by aromatization in fatty tissues. In contrast, a high BMI seems to be protective in the premenopausal group²⁰, for reasons which are still unknown.

6. Advanced stage at presentation

Several studies raised the notion that young breast cancer patients tend to present with more advanced stages than older women. A retrospective cohort from Denmark of 10,356 women diagnosed before 50 years reported that patients aged ≤ 35 years at diagnosis were at higher risk of being node positive (51% vs. 46%; $P=0.02$) compared with patients between 35 and 50 years²¹.

Diagnosis

Breast imaging tests¹

Imaging tests use different methods to create pictures of the inside of your body. These tests can be used to look more closely at the breast.

Mammograms

A mammogram is an x-ray of the breast. A technologist (most often a woman) will position your breast for the test. The breast is pressed between 2 plates to flatten and spread the tissue. The pressure lasts only a few seconds while the picture is taken. The breast and plates are repositioned and then another picture is taken. The whole process takes about 20 minutes.

Breast ultrasound

An ultrasound uses sound waves to outline a part of the body. The sound wave echoes are picked up by a computer to create a picture on a computer screen. For most breast ultrasounds, a small, microphone-like instrument is placed on the skin of the breast after Sgel is applied.

MRI of the breast

MRI scans use magnets and radio waves (instead of x-rays) to produce very detailed, cross-sectional images of the body.

Biopsy

A biopsy is done when other tests show that you might have breast cancer. The only way to know for sure is for you to have a biopsy. During this test, cells from the area of concern are removed so they can be studied in the lab.

7. Treatment

Surgery for Breast Cancer

Most women with breast cancer have some type of surgery to treat the main breast tumor. The purpose of surgery is to remove as much of the cancer as possible. Surgery can also be done to find out whether the cancer has spread to the lymph nodes under the arm, to restore the breast's shape after a mastectomy, or to relieve symptoms of advanced cancer.

Breast-Conserving Surgery (BCS)

This type of surgery removes only a part of the breast. How much is removed depends on the size and place of the tumor and other factors. The medical term for this surgery is partial (or segmental) mastectomy, but it is often called lumpectomy. Sometimes the breast becomes swollen and tender for some time after surgery. This will get better over time. The more breast tissue removed, the more likely it is there will be a change in the shape of the breast afterward.

Mastectomy

Mastectomy is surgery that removes the entire breast. All of the breast tissue is removed, sometimes along with other nearby tissues. If just the breast is removed (and not lymph nodes under the arm) it is called a simple (or total) mastectomy. A simple mastectomy combined with an axillary lymph node dissection (discussed below) is called a modified radical mastectomy.

The other types of treatment for breast cancer are:

- Radiation
- Chemotherapy
- Hormone therapy
- Targeted therapy
- Bone-directed therapy

8. Conclusion

Age at diagnosis remains an important factor for prognostication and treatment decisions in patients with breast cancer. Although, breast cancer in women below 40 years of age constitutes a small proportion of the total incidence, it has a significant burden on women and society. Management of young women with breast cancer still requires particular attention to surgical negative margins, long term follow-up after breast-conserving therapy and more aggressive adjuvant therapy because of poorly differentiated histologies

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