

Breast Cancer

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Abstract—The paper deals with breast cancer. These days the severe diseases that are leading to deaths include breast cancer especially. Generally, it is said that it occurs in women but it is also found in men. Breast cancer is considered as the second most prominent cancer after skin cancer. Breast cancer is case of malignant tumor. Some common symptoms of breast cancer which includes, formation of lumps, irregular shape of breast, bleeding nipples, change in skin color, redness etc. Treatments like surgery, biopsy, chemotherapy, radiotherapy, mastectomy, hormonal therapy, adjuvant and neo-adjuvant therapies and now-a-days nanomedicines are also in use though it is still very rare.

1. INTRODUCTION

Breast cancer is malignant tumor that can spread to other body tissues. It can happen in both- men and women's, although rarely found in men. Breast cancer is uncontrolled cell division in glandular cells or duct cells leading to formation of lumps. Every year almost 2,300 new cases of breast cancer are found in men and around 230,000 new cases in women's. Breast cancer has no specific cause of its occurrence. It can be due to age. It is said that with age, breast cancer chances increases. It can be inherited. Sometimes a change in hormones may also result indevelopment of breast cancer. Family history is also important. If someone, ever had went through any radiation therapy in past, then possibility is that he/she may get breast cancer.

Apart from these, the other risk factors may include contraceptives, consumption of alcohol, overweight, weak immune response, late pregnancy etc.

2. BREAST

A woman's breast consists of lobules, tubes to carry milk to nipple, connective tissues, and blood & lymph vessels. Most of the breast cancers starts in duct line cells. Few start in lobule cells. Cancers can occur in other tissues present in breast. They can be lymphomas and sarcomas.

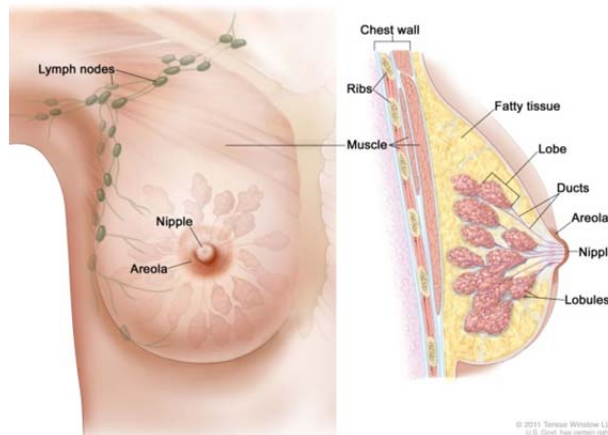


Fig. 1: Breast tissues

2.1 The lymph system of breast

The lymph system is main method of extend of breast cancer. Lymph node connects them by veins which carry lymph. Lymph vessel of breast:

- Lymph node under arm
- Lymph nodes near to collar bone
- Lymph nodes in chest close to breast bone

Breast cancer cells may pass to lymph vessel. If they reach the lymph system then chances of spread of cancer is confirmed. Most of lump of breast are not cancerous they are benign. The benign do not spread to other parts. But they can increase the exposure of breast cancer in women. The breast cancers are called adenocarcinomas i.e., the carcinoma begun in glandular tissues.

Types of Breast cancer

- Inflammatory Breast Cancer**-This is very rare. Usually there is no single tumor. In this, the breast skin gets red and a little warm. The chances are that breast gets hard, itchy, and bigger. This cancer is mistaken with infection, as there is no lump and also the mammogram does not

show. This cancer spreads more rapidly compared to other breast cancer types.



Fig. 2: Irritations and bumps due to IBC

b) **Ductal Carcinoma in situ-** In this the cells which line the ducts are found with abnormal cells. They start invading duct walls in the tissues of breast. It is also called as non-invasive breast cancer. They do not spread to other tissues as cells grown are not through the duct wall. But it can be invasive sometimes and hence it is also called as ‘pre-cancer’. Mammograms can detect them.

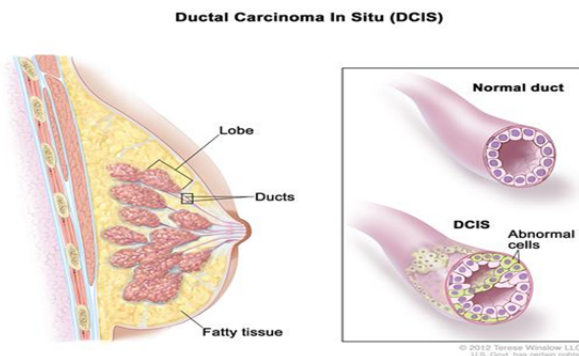


Fig. 3: Ductal carcinoma

c) **Invasive Ductal Carcinoma-** It is common type of breast cancer. Earlier it starts in duct wall lined cells and later it invades the tissues in breast. Now the cancer cells can easily spread to other parts.

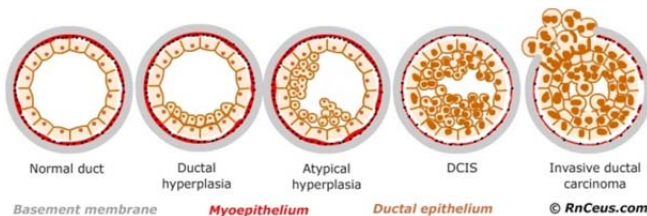


Fig. 4: Invasive ductal carcinoma

3. SYMPTOMS OF BREAST CANCER

Most common symptom is new mass or lump of cells. The lump formed may be painful soft or some may be painless and hard. The following symptoms can be noted down:

- a. Swelling in breast and near to it
- b. Pain in breast
- c. Irritation in skin
- d. Redness and thickening of nipples
- e. Pain in nipples sometimes

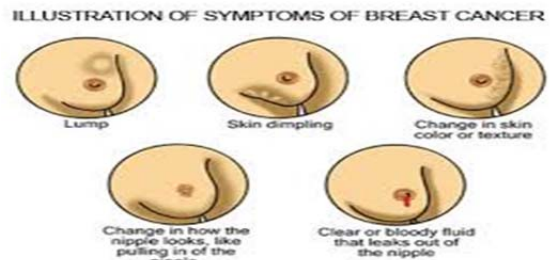


Fig. 5: Symptoms of breast cancer

4. STAGES OF BREAST CANCER

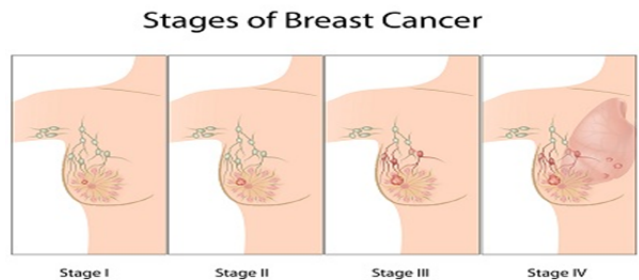


Fig. 6: Stages of breast cancer

At stage 0, cancer cells are within the ducts and are not spread. At stage 1, 2 and 3, cancer is notable by their size the region of spread whether its wall or chest or lymph nodes. At stage 4, cancer has metastasized to other organs.

5. BIOMARKERS

Biomarkers are the structures or substances which measures the incidence of diseases. Biomarkers are not indications of medical symptoms like high temperature which a patient can use to find out how good they are but an increase in heart rate is a result of physical exertion which is a biomarker. Biomarkers are used to determine what will happen when you use a particular treatment or when you do not use the treatment and also the risk of mounting certain medical conditions. Biomarkers can have wide variety. As an example-

some biomarkers are used to show the presence of certain microbes or organisms, which includes the history of their occurrence even if they are no longer. One of best example is an antibody The substance developed by body in order to fight disease. Biomarkers can also be use to differentiate among cells or even for cancer treatments like some are even designed to target the specific cells, by using their biomarkers just like a tag. Estrogen receptor and human epidermal growth factor receptor 2 (HER2) are commonly used biomarkers in breast cancer cases.

6. DETECTION

- 1) **Mammogram-** The X-ray for breast cancer. The breasts are positioned, and pressed between the two plates to get a picture by spreading and flattening the tissue. A small pressure is developed for few seconds. This process takes around 20 minutes. It is a screening technique. But it cannot surely give result that whether the patient is having cancer or not.
- 2) **Breast ultrasound-** Ultrasound waves are used to get outline of breast. Gel is applied and then a small microscope is used and is put on breast. It can differentiate between tumor and a cyst.
- 3) **MRI-** Use of magnets and radio waves are included in MRI. In this, the patient is allowed to lie on a platform facing downwards. Openings are present on platform so that images can be obtained easily. It is a long process, generally takes an hour. MRI is used as screening test as well as in patients who already have cancer just to check the size of the cancer.
- 4) **Biopsy-** Biopsy is a confirmed test for breast cancer. Cells from affected area are removed and studied. There are different kinds of biopsies:

Breast biopsy –Use of needle to remove cell from affected area. This is done when lump is suspected to be present. If needle biopsy fails then the lump is removed.

Lymph node biopsy–When the lymph nodes under arms are swollen then it is checked for cancer. It generally includes needle biopsy. It can be performed during surgery. The entire lymph node is removed.

1. **Gene pattern tests-** It focuses on recurrence of breast cancer by observing the gene number patterns.
 - Biomarkers like HER2 and ER can help to detect the breast cancer.
 - Breast cancer grades are given accordingly to the samples taken while biopsy, if found to be cancerous like 1 to 3 low grades means the cancer rate is slow and high grades define the rate to be fast.

- The cancer can spread to other parts also and to check this spread tests like PET, CT scan, MRI, chest X-ray, bone scan, ultrasound are done.

7. TREATMENTS

General treatments like chemotherapy, radiation therapy, bone directed therapy, surgeries, hormone therapies etc are given.

Chemotherapy- One of the common mechanisms which involves drugs to kill cancer. Chemotherapy is generally given in early stage of cancer either before or after the surgery. They kill the cancer cells. In case of early staged cancer, the chemotherapy may last for four to six months.

Chemotherapy has its side effects also. This may include nausea, baldness, discontinue of menstrual period, loss or increase in appetite, bleeding, fatigue. These are considered as short term effects. The long terms may include damage in heart, the stopping or restart of menstrual periods and damage in nerves

Mastectomy- The process of removing breast, it can be done in two ways. Firstly, breast is removed but not the lymph node. Secondly, if the chest wall muscles are also removed.

Adjuvant and neoadjuvant therapy- Adjuvant therapy is given to those patients who already survived the breast cancer just to ensure or prevent it from occurring again. Adjuvant therapy can be given by hormones, chemotherapy, radiations etc. In case of hormones, tamoxifen, a drug is given which in turn blocks the activity of estrogen. Tamoxifen is a very useful drug as it prevents the cancer to spread to the other breast and moreover, it also helps in preventing the original tumor to occur again.

Adjuvant therapy can be given via injection to a blood stream or orally.

Neoadjuvant therapy is given before the surgery so that the tumor can be shrinked. This, if done properly then chances are there to avoid the surgery basically mastectomy.

7.1 Use of nanomedicine in treatment of breast cancer

Using nanomedicines to treat breast cancer can be beneficial as it is quite fast and its reaction towards the disease is enough good compare to other treatments. They have potential to detect cancer earlier, they can help in getting the cancer treatment, to be given. Though it is quite expensive. Also, we are not sure up to what extent safer they are. A drug named Abraxane, which consists of nanoparticle, is used by many clinics to treat breast cancer.

Some of nanomedicine product for breast cancer is – Genexal-PM, Myocet, LEP-ETU, Nektar-102, and Endo TAG-1.

According to sources, cancer nanotubes have been discovered to detect breast cancer and destroy it. The scientists took HER2 cancer cell of breast and passed through IR of wavelengths 785 nm. Thenanotube reflected them. When 808 nm

wavelengths were passed, the nanotube absorbed them, giving an indication of presence of the cancer or a tumor. Though many test are still in process to check whether nanomedicines are good enough.

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