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# AN OVERVIEW ON BREAST CANCER AND ITSMANAGEMENT

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## ABSTRACT

Breast cancer is one of the most leading cause in the cancer deaths. Nine out of ten women who develop breast cancer do not have a family history of the disease. Survival rate five years after diagnosis is 88%. Breast cancer is of Ductal carcinoma in-situ and invasive. Breast cancer is caused by Genetic mutations-BRCA1 and BRCA2, Environmental exposure to UV radiation, air pollution. Symptoms may include breast lump, bloody discharge from the nipple, dimpling, Redness. Numerous growth factors that also play a role in a tumor development or secreted by breast cancer cells that are Autocrine growth factors and Paracrine growth factors. Diagnosis of breast cancer include: Breast exam, Mammogram, ultrasound, Biopsy. The four main treatments for breast cancer are radiotherapy, hormone therapy, chemotherapy and surgery. A new research identified molecular markers of tamoxifen resistance, an anti-oestrogen drug that is one of the most successful treatments available for breast cancer.

## KEYWORDS

Breast cancer, Etiology, Risk factors and Treatment.

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## INTRODUCTION

### Breast Cancer[1]

Cancer is group of diseases that cause cell in the body to change and grow out of control. The most common occuring cancer is BREAST CANCER. The vast majority of breast cancer begin in the parts of the breast tissue. Breast tissue contains 15-20 lobes of glandular tissue, which are further divided into small lobules that produce milk for breast feeding small ducts conduct milk to a reservoir that lies just beneath the nipple.

**Types of Breast Cancer**[1]

Breast cancer is of two types: In-situ and Invasive.

**In-situ**: Ductal carcinoma in-situ refers to condition where abnormal cells replace the normal epithelial cells of the breast tissue. It is the most common type of in-situ breast cancer accounting 83% of In-situ cases diagonsed during 2013-2016. Lobular carcinoma in-situ refers to cells that look like cancer cells growing within the lobules of breast. It is considered a marker for increased risk for developing invasive cancer. Lobular carcinoma in-situ is much less than Ductal carcinoma in-situ, accounting for about 13% of female in-situ breast cancer.

**Invasive**: Most breast cancer are invasive or in filtrating. These cancers have broken through walls of glands or ducts where they originated and grown into surrounding tissues of breast.

**Breast Cancer Occurance**[2]

Nine out of ten women who develop breast cancer do not have a family history of the disease. In 2015, about 2,350 women will be diagnosed with breast cancer and 440 men will die from the disease. Between 60-84 years have a high risk of breast cancer in women.

**Breast Cancer Causes**[2]

Genetic mutations-BRCA1 and BRCA2.Environmental exposure to UV radiation, air pollution. Bacterial (helicobacter pylori) and viral infections(Epstein-Barr, HPV, hepatitis B and C).Lifestyle choices (poor diet, inactivity, obesity, heavy alcohol use, smoking cigarettes and tobacco use, exposure to chemicals and toxins).Treatment with chemotherapy radiation or immune suppressive drugs.

## RISK FACTORS[3]

**Hormone Replacement Therapy**

User of hormone replacement therapy have a higher risk of being diagnosed with breast cancer, Estrogen increases the risk of breast cancer and also ovarian cancer.

**Smoking and alcohol consumption**

Smoking is associated with number of diseases and is linked with high risk of breast cancer in younger and pre-menopausal women, about 70%.

**Environmental factors**

The main mechanisms by which environmental compounds increase breast cancer risk are acting like hormones, especially estrogen, or affecting susceptibility to carcinogenesis

**Age**

The risk of getting breast cancer increases with age. A woman is likely to develop breast cancer in 60s than in 20s.The actual lifetime risk is lower than that, because 90% of women die before age 95.

**Sex**

Being a woman is major risk factor for developing breast cancer about 99% of breast cancer are diagnosed in women, 5-15% of breast cancer cases in men.

**Breastfeeding History**

Breastfeeding may slightly lower their breast cancer risk, especially if they continue breast feeding for 1-2 years. Women who give birth and breast feed by the age of 20 may have even greater protection.

**Family History**

In 5% of breast cancer cases there is a strong inherited family risk. Two autosomal dominant genes BRCA1and BRCA2 account for most of the cases of familial breast cancer.

## STAGES OF BREAST CANCER[4]

**Signs and Symptoms**[5]

A breast lump or thicken that feels different from the surrounding tissue. Bloody discharge from the nipple change in size, shape or appearance of a breast Changes to the skin over the breast, such as dimpling A newly inverted nipple peeling, scaling or flaking of pigmented area of skin surrounding nipple or breast skin redness or pitting of the skin over breast, like the skin of orange.

## BREAST CANCERSCREENING[6]

**Breast exam**

Check both of lymph nodes in breast feeling for any lumps or other abnormalities.

**Mammogram**

A mammogram is an X-ray of the breast. Mammograms are commonly used to screen for breast cancer. If an abnormality is detected on a

screening mammogram, and evaluate further abnormality in the breast

**Breast ultrasound**

Ultrasound uses sound waves to produce images of structures deep within the body. Ultrasound may help to distinguish between a solid mass and a fluid-filled cyst.

**Biopsy**

Breast tissue samples are sent to a laboratory for analysis where expects determine whether the cells are cancerous.

**Breast magnetic resonance imaging (MRI)**

An MRI machine uses a magnet and radio waves to create pictures of the interior of breast. Before breast MRI, receive an injection of dye.

Other tests such as Blood count, bone scan, computerized tomography scan.

## BREAST CANCER TREATMENT[7]

**Surgery for Breast Cancer**

The primary goals of breast cancer surgery are to remove cancer from the breast and to determine the stage of disease. Surgical treatment for breast cancer involves breast-conserving surgery (BCS) or Mastectomy.

**Radiation Therapy**

Radiation therapy is the use of high-energy beams or particles to kill cancer cells. Radiation is often used after surgery to destroy cancer cells remaining in the breast, chest wall, or under arm area. Brachytherapy uses a radioactive source placed in one or more catheters that put into the cavity left after Breast conserving surgery and is often an option for patients with early stage breast cancers. Intracavitary brachytherapy is used to show the effectiveness of the disease prevention.

**Systemic Therapy**

Systemic therapy is a treatment that travels through the blood stream and can affect and treat all parts of the body, not just one area. The use of adjuvant systemic therapy is therefore primarily determined by the tumor stage and histopathological characteristics (hormone receptor and HER2 status), although data from gene panels, such as Oncotype DX, can also play a role. Systemic therapy includes Chemotherapy, hormonal therapy, targeted therapy.

**Preventive Measures**[8]

After treatment is completed, follow-up physical examinations of Breast, Chest, Neck and Armpit are done every 3 months/2 years followed by 6 months/5 years. Regular mammograms and breast self-examination also important. Women with metastatic breast cancer, quality of life may deteriorate and chances that further treatment prolong life may be small. Staying comfortable may eventually become more important than trying to prolong life. Psychological and spiritual counseling may also help.

## THE ESSENTIAL STEPS TO BEATING BREAST CANCER

Stop feeding the cancer by avoiding the foods that "feed" the cancer. Increasing your consumption of specific vegetables, oils and glycemic fruits can reduce your breast cancer risk by 60-70%.Balance your Energy. There are specific healing arts and therapeutic tools that can help bring the body to balance. Adopt Very Early Detection. Highly sensitive cancer blood markers can determine the presence of cancer hormones and cancer enzymes.

## RECENT UPDATES OF BREAST CANCER[9-14]

Dr.kauff *et. al.* have reviewed in his article titled Breast Cancer Gene BRCA1 Linked to Aggressive Uterine Cancer have shown serious carcinomas make up about 10% of all uterine cancers .Researchers identified that 'these cancers account for nearly half of all deaths from uterine cancer.' Data of these cancers are more than 1,000 women who tested positive for BRCA1 OR BRCA2 mutation. All of the women in the study underwent preventive surgery to remove ovaries and fallopian tubes. Over a follow-up period of 7 to 13 years, 8 of the women developed uterine cancer, including 5 who developed uterine serous carcinoma," the researchers found.

**The impact of chemotherapy dose intensity and supportive care on the risk of febrile neutropenia in patients with early stage in breast cancer**

A prospective cohort study-Febrile neutropenia is a major dose limiting toxicity of cancer chemotherapy resulting in considerable morbidity, mortality and

cost. Toxicity associated with chemotherapy including neutropenic and infectious complications was recorded over four stages. A decrease in occurance of febrile neutropenia and infection was observed in subsequent stages, along with an increase in utilization of colony stimulating factors, antibiotics and reductions in chemotherapy dose intensity. The overall risk of febrile neutropenia in patients was 16.3%.

**Epigenetics biomarkers in cancers**

Epigenetics refers to DNA methylation, histone modifications and micro RNA's and this epigenetic modifications are extensively investigated as potential biomarkers for cancer. Characterizing genome wide epigenetic changes involved in cancers. Epigenetics are very stable and easy to measure in peripheral samples like blood and urine and also very sensitive.

**Avastin May Be Helpful Before Breast Cancer Surgery**

The addition of the cancer-fighting medication Avastin to chemotherapy prior to breast cancer surgery increases the chance that all of the cancer will be removed, according to new research. However, when looking at patients might benefit the most from this therapy, to recent studies found conflicting results, and neither study was yet able to address whether or not the addition of Avastin early in the treatment process would improve survival rates.

**Nitrobenzaldehyde Used to treat non- invasive breast cancer**

Researchers have developed a new, non-invasive method that can kill cancer cells in 2hrs, and advance that may significantly help people with inoperable or hard-to-reach tumors as well as young children stricken with the deadly disease. The method involves injecting a chemical compound, Nitro benzaldehyde, into the tumor and allowing it to diffuse into the cancer tissue of breast and kill them.

| Stage | Classification |
|---|---|
| Stage I | The tumor is no longer than two centimeters , and has not spread to the lymph nodes |
| Stage II | The tumor is around five centimeters in size and may have spread to the lymph nodes under the arm |
| Stage III | The tumor [s] may have spread to lymph nodes, be clumped together or sticking to other structures. The tumor [s] may have also spread to surrounding breast tissue |
| Stage IV | Tumor[s] that have spread to other organs in the body e.g. lungs, liver, or bone. This is sometimes referred to as ' invasive cancer' |

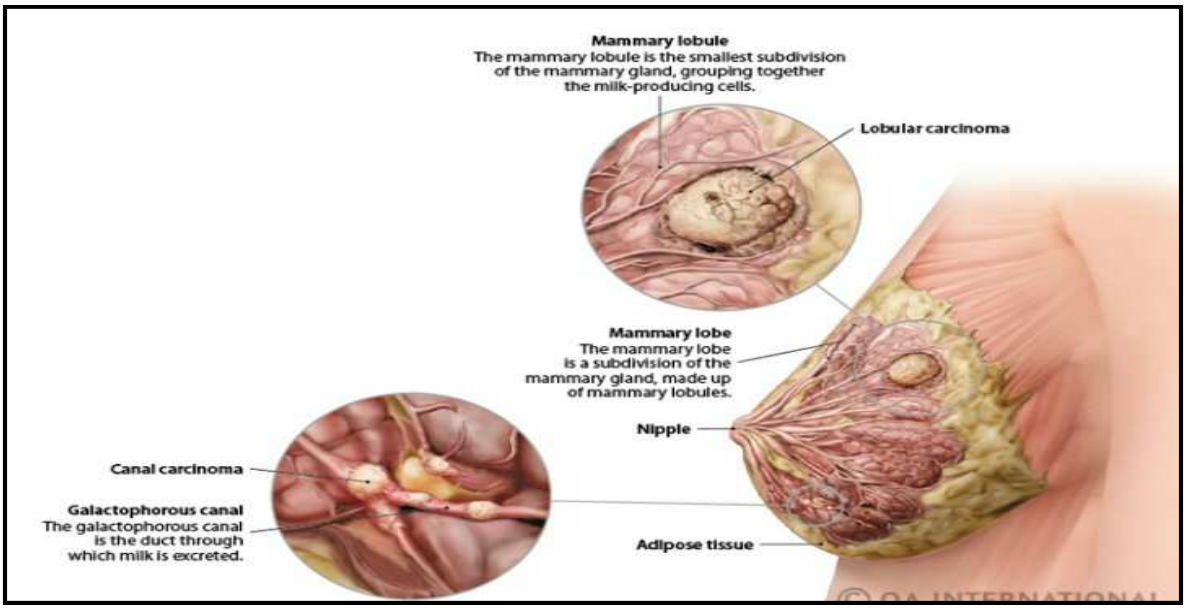
**Table No.1: Drugs used in breast cancer**

| S.No | Category | Dose | Mechanism Of Action |
|---|---|---|---|
| 1 | **CHEMOTHERAPY DRUGS** | 100mg/day | The main effect is due to its metabolite phosphor amide mustard which forms DNA crosslinks between (interstrand cross linkages) and within (intrastrand cross linkages) DNA strands at guanine N-7 position, this eventually leads to cell death. |
| | **Alkylating agents** | | |
| | CHLORMBUCIL, | 200mg/day | |
| | CYCLOPHOSPHAMIDE | 50mg | |
| | **Antimetabolite:** | 36g/m2 | These drugs block synthesis of DNA |
| | METHOTREXATE, | | |
| | CYTARABINE, | 100mg/day | These drugs are block division of cancer cells |
| | 6-MERCAPTOPURINE, | 50mg/amp | Inhibit topoisomerase enzymes that are |

| | | | |
|---|---|---|---|
| | 5-FLUROURACIL.<br><br>**Antimitotics:** PACLITAXEL(TAXOL), DOXETAXEL<br><br>**TOPOISOMERASEINHIBITORS:** DOXORUBICIN, ININOTRCAN.<br><br>**Platinum derivatives:** CISPLATIN, CARBOPLATIN, OXALIPLATIN. | 175mg/m2<br><br>75mg/m2<br><br>2mg<br><br>20mg<br><br>1mg/ml<br><br>360mg/m2<br><br>65mg/m2 | essential for the integrity of genetic material.<br><br>acts against cells that are actively synthesizing nucleic acids (S phase) and against cells mitosis (M phase) |
| 2 | **HORMONALTHERAPY: Selective estrogen receptors modulators (SERMs):** TAMOXIFEN, **Anti-estrogen drugs:** FULVESTRANT **Aromatase inhibitors:** ANASTROZOLE, **LH-RH agonists:** GOSERELIN, LEUPROLID. | 20mg/day<br>500mg/day<br>1mg/day<br><br>3.6mg/day<br><br>3.75mg/day | Drugs used for hormone therapy stop or slow the growth of hormone-sensitive cancer cells. |
| 3 | **TARGETTED THERAPY: Monoclonal antibodies:** TRESTUZUMAB (Herceptin), PERTUZUMAB.<br><br>**Tyrosine Kinase inhibitors:** LAPATINIB | 6mg/kg<br>840mg/kg<br><br>500mg/day | These two drugs are used to treat HER-2(Human Epidermal Growth Factor2) positive breast cancer.<br><br>These drugs may be used to treat women who have HER-2Positive cancer, inhibit tyrosine kinase enzyme used for the transfer of phosphate group from ATP in a cell. |

**Table No.2: Difference of mastectomy with or without radiation therapy)**

| S.No | Mastectomy with Radiation therapy | Mastectomy without Radiation therapy |
|---|---|---|
| 1 | Simple mastectomy: Removing all breast tissues except muscle under breast | Radical mastectomy: Removing of all breast tissues and lymph nodes in armpit and muscle |
| 2 | Modified radical mastectomy: Removing all breast tissues and remove lymph nodes in armpit except muscle | External radiation therapy: Send radiation outside the body towards cancer |
| 3 | Modified radical mastectomy: Removing all breast tissues and remove lymph nodes in armpit except muscle | Radical mastectomy: Removing of all breast tissues and lymph nodes in armpit and muscle |
| 4 | | Internal radiation therapy: Uses radioactive substance scaled in needles, wires placed directly into cancer |




## CONCLUSION

Each and every year more than one million women are diagnosed with breast cancer worldwide over half of whom will die from this disease. Breast cancer is caused by mainly genetic and environmental factors. Mammogram is main risk factor for breast cancer while diagnosing it. Extensive breast cancer screening programme and the development of new treatments have improved the prognosis of breast cancer overall. An average only 35% of women with advanced breast cancer are alive 5 years after diagnosis. Mastectomy with or without radiation is the main surgery for the breast cancer. Chemotherapy, hormonal and targeted therapies are frequently used to treat patients with more advanced form of disease. A new research to treat cancer cells in breast within two hours is by injecting Nitrobenzaldehyde, a chemical compound.

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**CONFLICT OF INTEREST**

We declare that we have no conflict of interest.

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