A Deeper Dive into understanding BREAST CANCER

Breast Cancer: A Complex Disease

Breast cancer is a disease in which abnormal breast cells grow out of control and form tumours. If left unchecked, the tumours can spread throughout the body and become fatal. Breast cancer cells begin inside the milk ducts and/or the milk-producing lobules of the breast. The earliest form (in situ) is not life-threatening and can be detected in early stages. Cancer cells can spread into nearby breast tissue (invasion). This creates tumours that cause lumps or thickening. Invasive cancers can spread to nearby lymph nodes or other organs (metastasize). Metastasis can be life-threatening and fatal.

The Development of Breast Cancer

The development of breast cancer is a complex interplay of genetic, hormonal, and environmental factors.

Genetic Factors:

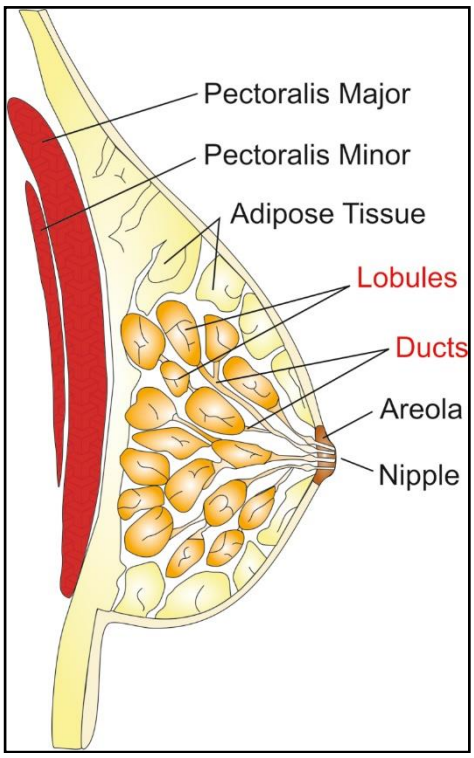
- **Inherited Mutations:** While most breast cancer cases are sporadic, inherited mutations in genes such as BRCA1 and BRCA2 significantly increase the risk. Women with these mutations should consider genetic counselling and early screening.
- **Family History:** A family history of breast cancer, especially among first-degree relatives, can also increase the risk.

Environmental Factors:

- **Obesity:** Excess weight can increase estrogen levels and insulin resistance, both of which can contribute to breast cancer risk.
- **Alcohol Consumption:** Excessive alcohol intake can increase estrogen levels and damage DNA.
- **Diet:** A diet high in red meat and processed foods, and low in fruits and vegetables, may increase the risk.
- **Physical Activity:** Regular physical activity can help reduce breast cancer risk.
- **Radiation Exposure:** Exposure to radiation, such as from radiation therapy for other cancers, can increase the risk of breast cancer.

Hormonal Factors:

- **Estrogen and Progesterone:** These hormones can stimulate the growth of breast cancer cells. Women with early menopause or who have never given birth may have a slightly higher risk.
- **Hormone Replacement Therapy (HRT):** While HRT can be beneficial for menopausal symptoms, it may slightly increase the risk of breast cancer. It's essential to discuss the risks and benefits with a healthcare provider.



Anatomical and histologic origins of breast cancer. Most breast cancers arise from the lobules or the ducts of the breast. In some cases, the tumor infiltrates the skin or components of the chest wall such as the pectoralis muscles. The tumor cells also are capable of converting the microenvironment into a tumor-friendly state to promote their growth and expansion.

Who is at risk?

- Female gender is the strongest breast cancer risk factor. Approximately 99% of breast cancers occur in women and 0.5–1% of breast cancers occur in men. The treatment of breast cancer in men follows the same principles of management as for women.
- Certain factors increase the risk of breast cancer including increasing age, obesity, harmful use of alcohol, family history of breast cancer, history of radiation exposure, reproductive history (such as age that menstrual periods began and age at first pregnancy), tobacco use and postmenopausal hormone therapy. Approximately half of breast cancers develop in women who have no identifiable breast cancer risk factor other than gender (female) and age (over 40 years).
- Family history of breast cancer increases the risk of breast cancer, but most women diagnosed with breast cancer do not have a known family history of the disease. Lack of a known family history does not necessarily mean that a woman is at reduced risk.
- Certain inherited high penetrance gene mutations greatly increase breast cancer risk, the most dominant being mutations in the genes BRCA1, BRCA2 and PALB-2. Women found to have mutations in these major genes may consider risk reduction strategies such as surgical removal of both breasts or chemoprevention strategies.

Global Prevalence

Breast cancer is the most commonly diagnosed cancer among women worldwide. The incidence rates vary significantly across different regions due to factors such as genetics, lifestyle, and access to healthcare. In 2022, there were 2.3 million women diagnosed with breast cancer and 670 000 deaths globally. Breast cancer occurs in every country of the world in women at any age after puberty but with increasing rates in later life.

In India:

- Breast cancer has emerged as the leading cancer among Indian women.
- The rising incidence is attributed to lifestyle changes, late-stage diagnosis, and limited awareness about breast health.

  Breast cancer is the most common cancer in Indian women, and its incidence and prevalence are increasing:
  - Incidence: The age-adjusted incidence rate of breast cancer in India is 25.8 per 100,000 women. The incidence rate has increased by 40% between 1990 and 2016.
  - Mortality: The mortality rate for breast cancer in India is 12.7 per 100,000 women.
  - Age: The incidence of breast cancer is increasing in younger women in India, with almost 48% of patients being under 50 years of age.

Types of Breast Cancer

Breast cancer can be classified into several types based on its origin and behaviour :

Invasive Ductal Carcinoma (IDC): IDC is the most common type of breast cancer with about 80% of all breast cancers being constituted by invasive ductal carcinomas. The IDC classification includes several subtypes: tubular carcinoma of the breast, medullary carcinoma of the breast, mucinous carcinoma of the breast, papillary carcinoma of the breast, and cribriform carcinoma of the breast.

Invasive Lobular Carcinoma (ILC): ILC is the second most common type of breast cancers and accounts for approximately 10–15% of all breast cancers. Although ILC can affect women at any age, it is more common in older women. ILC tends to occur later in life than IDC, e.g. in the early 60s as opposed to the mid-to late 50s for IDC.

Ductal Carcinoma In Situ (DCIS): As one of the most common types of breast cancer, DCIS is a non-invasive or pre-invasive breast cancer, which develops inside of pre-existing normal ducts. While DCIS is itself not invasive, in situ carcinomas have high potential to become invasive cancers, so early and adequate treatment is important in preventing the patient from developing an invasive cancer.

Metastatic breast cancer: Metastatic breast cancers, also known as stage IV or advanced breast cancers, are late stage breast cancers, which have spread to other organs in the body. Metastases from breast cancers can be found in lymph nodes in the armpit, and/or in distant sites such as the lung, liver, bone and brain. Even after the primary tumor is removed, microscopic tumor cells or micro-metastases may remain in the body, which allows the cancer to return and disseminate. Clinically, patients may initially be diagnosed with metastatic disease (or de novo metastatic breast cancers), or they may develop metastases months or years after receiving initial treatment. The risk of breast cancer returning and metastasizing is not clearly understood or predictable as it varies from person to person, largely depending on the unique molecular biology of the tumor and the stage at the time of the original diagnosis. Unfortunately, approximately 30% of the women diagnosed with early-stage breast cancer will develop a metastatic form of the disease.

Stages of Breast Cancer

Breast cancer staging is crucial for determining treatment options and prognosis. The stages range from 0 (non-invasive) to IV (metastatic). Key factors influencing staging include tumor size, lymph node involvement, and whether the cancer has spread to distant organs.

Anatomic stage groups of breast cancer.

Stages		Definition
Stage 0		Ductal Carcinoma In Situ
Stage I	IA	Primary invasive tumour with a size of ≤20 mm No nodal involvement
	IB	Nodal micrometastases (>0.2 mm, <2.0 mm) with or without ≤ 20 mm primary tumour
Stage II	IIA	Movable ipsilateral Level I, II lymph node metastases with ≤20 mm primary tumour; Or > 20 mm, ≤ 50 mm tumour with no nodal involvement
	IIB	Movable ipsilateral Level I, II lymph node metastases with >20 mm, ≤ 50 mm tumour; Or > 50 mm tumour with no nodal involvement
Stage III	IIIA	Movable ipsilateral Level I, II lymph node metastases with >50 mm tumor; Or any size primary tumour with fixed ipsilateral Level I, II or internal lymph node metastases
	IIIB	Primary tumour with chest wall and/or skin invasion
	IIIC	Any size primary tumour with supraclavicular or ipsilateral Level III lymph node metastases; Or with ipsilateral Level I, II and internal lymph node metastases
Stage IV		Any case with distant organ metastasis

Notes: 1). Lobular carcinoma in situ is now considered benign thus removed from the breast cancer staging system.
2). The Anatomic Stage Group is to be used when biomarker tests are not available.
Source: AJCC Cancer Staging Manual, Eighth Edition, The American College of Surgeons (ACS), Chicago, IL, USA. With reprint permission of ACS.

Treatments for Breast Cancer

Treatment plans are tailored based on the type and stage of breast cancer. Common modalities include:

- **Surgery:** Options include lumpectomy (removal of the tumour) or mastectomy (removal of one or both breasts).
- **Radiation Therapy:** Often used post-surgery to eliminate remaining cancer cells.
- **Chemotherapy:** Systemic treatment using drugs to kill rapidly dividing cells.
- **Hormonal Therapy:** Used for cancers that are hormone receptor-positive.
- **Targeted Therapy:** Focuses on specific characteristics of cancer cells (e.g., HER2-positive cancers).

Treatments for breast cancer are more effective and are better tolerated when started early and taken to completion. Surgery may remove just the cancerous tissue (called a lumpectomy) or the whole breast (mastectomy). Surgery may also remove lymph nodes to assess the cancer's ability to spread. Radiation therapy treats residual microscopic cancers left behind in the breast tissue and/or lymph nodes and minimizes the chances of cancer recurring on the chest wall. Advanced cancers can erode through the skin to cause open sores (ulceration) but are not necessarily painful. Women with breast wounds that do not heal should seek medical care to have a biopsy performed. Medicines to treat breast cancers are selected based on the biological properties of the cancer as determined by special tests (tumour marker determination). The great majority of drugs used for breast cancer are already on the WHO Essential Medicines List (EML).Lymph nodes are removed at the time of cancer surgery for invasive cancers. Complete removal of the lymph node bed under the arm (complete axillary dissection) in the past was thought to be necessary to prevent the spread of cancer. A smaller lymph node procedure called "sentinel node

biopsy" is now preferred as it has fewer complications.

Self-Care Guidelines for Breast Cancer Patients

Self-care plays an essential role in managing health during different stages of breast cancer:

- **Early Stage:** Focus on nutrition and physical activity; maintain a healthy weight.
- **During Treatment:** Manage side effects through hydration, rest, and emotional support; consider joining support groups.
- **Post-Treatment:** Regular follow-ups with healthcare providers; continue healthy lifestyle practices to reduce recurrence risk.

Preventive Measures for Breast Cancer

Preventive strategies include:

- **Regular Screening:** Mammograms are essential for early detection.
- **Genetic Testing:** For those with a family history or known genetic mutations.
- **Lifestyle Modifications:** Maintaining a healthy weight, exercising regularly, limiting alcohol intake, and avoiding tobacco use can significantly reduce risk.

Self-Examination for Breast Cancer

Self-examination is a crucial tool for early detection. Women should perform monthly breast self-exams starting in their 20s. Key steps include:

1. Visually inspect breasts for changes in size or shape.
2. Use fingers to feel for lumps or abnormalities while lying down or standing.
3. Report any unusual findings to a healthcare provider promptly.
4. By fostering awareness about breast health and encouraging proactive measures like self-examinations and regular screenings, individuals can play an active role in their health management.

In conclusion, understanding breast cancer's complexities—from its development to treatment options—empowers patients and communities alike. Awareness campaigns and education are vital in reducing stigma and increasing early detection rates globally.

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