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(Review Article)

Breast Cancer: A Review Report

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Abstract

Breast cancer is a type of cancer that creates in the cells of the breast. It happens when cells in the breast grow uncontrollably and form a mass or lump. These cancerous cells can attack nearby tissues and, in advanced stages, may spread to other parts of the body through the bloodstream or lymphatic system in this article breast cancer and its etiology and classification are discussed.

Breast cancer, a globally significant health concern, exhibits an increasing incidence worldwide, with over 7 million annual deaths. This paper delves into its prevalence, impact on mortality, risk factors, and research focus. Breast cancer, most prevalent among women, necessitates a thorough understanding for effective prevention, diagnosis, and treatment. The etiology involves age, hormone levels, race, economic status, and viral involvement. The classification encompasses histological and molecular perspectives, detailing subtypes like Luminal, HER2-enriched, Basal-like, and Claudin-Low. Molecular assays aid risk stratification, and the AJCC Classification incorporates biological factors. Understanding histological and molecular subtypes is crucial for tailored treatment and prognosis prediction. The historical context traces breast cancer back thousands of years, with detailed documentation emerging in the 17th century. Surgical interventions dominated the early 20th century, evolving towards less invasive procedures and nuanced understandings. The mid-20th century introduced mammography for early detection, significantly impacting survival rates. Advances in the late 20th and early 21st centuries include targeted therapies, genetic testing, and awareness campaigns. While progress has been made, challenges persist, emphasizing the continuous nature of the outbreak marked by scientific discoveries, medical advancements, and societal efforts against this impactful disease.

Keywords: Breast Cancer, Etiology, Cancer , Lymphatic System

INTRODUCTION

It is obvious from the provided information that cancer, mainly breast cancer, has become a significant global health concern. The increasing incidence of cancer poses assessments across various dimensions of humanoid life, plus physical, mental, and social aspects.

Global Impact of Cancer:

The global occurrence of cancer is rising, with approximations suggesting over 7 million deaths annually.

Industrialized countries experience a 1 to 2 percent occurrence rate, while less developed countries face a 5% yearly increase.

Breast Cancer Statistics:

Breast cancer is recognized as the most predominant type of malignant neoplasm among women globally.

In Iran, breast cancer establishes a major type of cancer among women, with variable reported incidence rates (21.4 or 32%).

In the United States, breast cancer is the most common cancer among women, with an occurrence rate of 12.5%.

Projections and Risk Factors:

Predictions indicate a potential rise in new cancer cases from 10 to 15 million by 2020.

Breast cancer is projected to remain a important health issue, with more than one million new cases reported annually.

The risk of developing breast cancer over a lifetime is 12% (1-in-8) in the United States.

Mortality Risk and Impact:

The risk of an individual dying from breast cancer in the United States is 1-in-35.

The mortality related with breast cancer contributes to the broader impact on the well-being of individuals and societies.

The study mentioned goals to investigate breast cancer and its related factors, underscoring the importance of understanding the disease's dynamics for effective prevention, diagnosis, and treatment.

Breast Cancer and Its Etiology

The information provided highlights key aspects of breast cancer, including its prevalence, impact on

mortality, and some of its primary risk factors and characteristics:

Prevalence and Mortality: Breast cancer is the most common type of cancer and the second leading cause of death. It is a important contributor to mortality, particularly among women aged 45–55 years.

Incidence and Treatment:The incidence of breast cancer is about 1-in-8 women.

Treatment often involves complete tissue removal, chemotherapy, radiotherapy, and hormone therapy.

Nature of Breast Cancer: Breast cancer is a type of tissue cancer that primarily affects the inner layer of milk glands or lobules, as well as ducts (tiny tubes that carry milk).

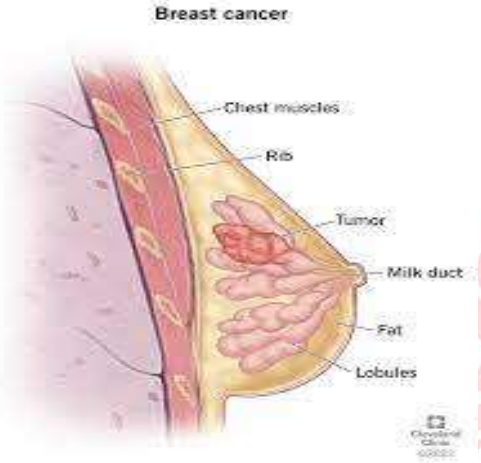
Risk Factors: Primary risk factors include age, with an increased risk observed in older individuals. Elevated hormone levels are also identified as a danger factor. Other factors such as race, economic status, and iodine lack in the diet are stated as contributors to breast cancer risk.

Multistage Nature and Viral Involvement:

Breast cancer is described as a multi-stage disease. Viruses are implicated in one stage of the pathogenic process of breast cancer. The reference of viruses playing a role bring into line with the broader understanding that viruses can be associated with various types of cancers.

General Viral Involvement in Cancer:

The statement suggests that viruses are implicated in different cancer types, indicating a general association between viruses and cancer. Understanding the etiology of breast cancer is critical for developing preventive measures, early detection strategies, and effective treatment plans. Research into the role of viruses in the pathogenic process can provide valuable insights into potential targets for intervention and therapeutic approaches. Additionally, addressing identified risk factors and promoting awareness can contribute to reducing the incidence and impact of breast cancer.



Breast Cancer Classification

The provided information plans the histological organization of invasive breast cancers, molecular classification, and various subtypes based on histological and molecular features. Here is a summary of the key points:

Histological Classification:

Variability in Invasive Breast Cancers:

Invasive breast cancers (IBC) exhibit a wide spectrum of tumours with variations in clinical presentation, behaviour, and morphology.

The World Well-being Organization (WHO) recognizes at least 18 dissimilar histological breast cancer types.

Invasive Breast Cancer of No Special Type (NST):

Formerly known as invasive ductal carcinoma, NST is the most frequent subgroup (40–80%).

It is diagnosed when a tumour cannot be classified into one of the histological special types.

Distinctive Subtypes:

About 25% of invasive breast cancers present characteristic growth patterns and cytological features, leading to specific subtypes (e.g., invasive lobular carcinoma, tubular, mucinous A, mucinous B, neuroendocrine).

Molecular Classification:

Initial Molecular Subtypes:

Molecular classification, independent of histological subtypes, identified four molecular subtypes: Luminal, HER2-enriched, Basal-like, and Normal Breast-like.

Luminal further classified into Luminal A and B.

Claudin-Low Subtype:

The 5th intrinsic subtype, claudin-low breast cancer, was discovered later.

It is characterized by low expression of cell-cell adhesion genes, high expression of epithelial-mesenchymal transition (EMT) genes, and immune and stromal cell infiltration.

PAM50 and Prosigna Test:

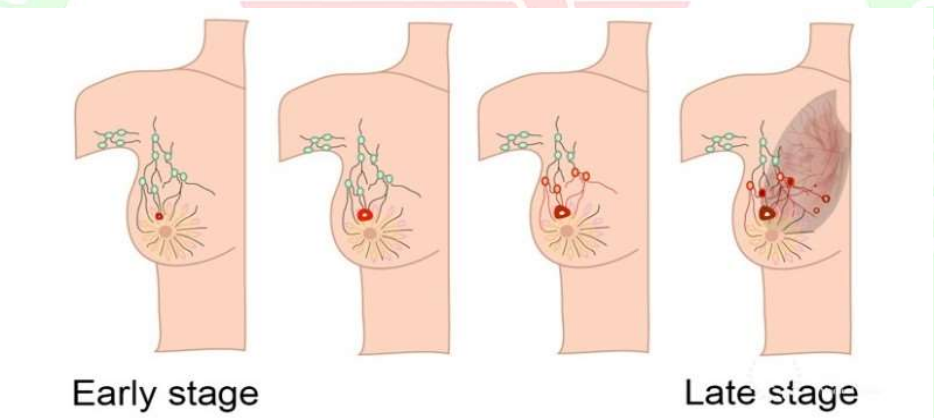
PAM50, a 50-gene signature, classifies breast cancer into main intrinsic subtypes with 93% accuracy.

Prosigna® test, based on PAM50, combines assay and clinical information for assessing the risk of distant relapse in postmenopausal women.

Subtypes:

Luminal Breast Cancer (70%):

ER-positive tumours, comprising almost 70% of breast cancer cases.
Divided into Luminal A (low-grade, better prognosis) and Luminal B (higher grade, worse prognosis) based on biological processes.
HER2-Enriched (10–15%):
Characterized by high expression of HER2 with the absence of ER and PR.
Historically had a worse prognosis but improved with HER2-targeted therapies.
Basal-Like/Triple-Negative (20%):
Triple-Negative Breast Cancer (TNBC), ER-negative, PR-negative, HER2-negative.
Heterogeneous collection with aggressive behaviour and often worse prognosis.
Claudin-Low (7–14%):
Poor prognosis tumours, mainly ER-negative, PR-negative, and HER2-negative.
Characterized by low expression of cell-cell adhesion genes, high EMT gene expression, and immune and stromal cell infiltration.
Surrogate Markers and AJCC Classification:
Surrogate Markers:
Molecular assays are used for risk social stratification and guidance of adjuvant therapy.
Immunohistochemical (IHC) markers like ER, PR, and HER2 are commonly used for classification.
AJCC Classification (8th Edition):
Incorporates biological factors (ER, PR, HER2, grade, and multigene assays) in addition to anatomical features.
The 21-gene assay Oncotype DX® is included for staging and provides prognostic information for hormone receptor-positive, HER2-negative, node-negative tumors.
Histologic Grading:
Elston-Ellis's modification of Scarff-Bloom-Richardson grading system is widely used.
Grades tumours based on morphologic features, such as tubule formation, mitotic count, and nuclear characteristics.
The understanding of histological and molecular subtypes is crucial for tailoring action strategies and predicting prognosis in breast cancer patients. The integration of molecular information enhances the precision of diagnosis and therapeutic decision-making.



History and Outbreak

Breast cancer has a long history dating back thousands of years, with evidence of cases recorded in ancient Egyptian papyrus manuscripts. However, it wasn't until the 17th century that more detailed descriptions of breast cancer were documented. Over the centuries, our understanding of the disease has evolved, and advancements in medical science have provided insights into its causes, prevention, and treatment. The outbreak of breast cancer, if we can call it that, is not a sudden occurrence but rather a gradual realization of its prevalence and impact on society. The awareness and diagnosis of breast cancer have increased significantly in recent decades, leading to a more comprehensive understanding of the disease. In the early 20th century, the primary focus was on surgical interventions. Radical mastectomies, which involved the removal of the entire breast, underlying chest muscles, and lymph nodes, were the standard treatment. However, as medical knowledge advanced, less invasive procedures and a more nuanced understanding of breast cancer emerged.
The mid-20th century saw the development of screening methods such as mammography, enabling earlier detection of breast cancer. This shift toward early diagnosis has been crucial in improving survival rates and treatment outcomes. The identification of risk factors, including genetic predispositions and hormonal influences, has also played a significant role in understanding the complexities of breast cancer.
The late 20th and early 21st centuries witnessed a surge in research and technological advancements. Targeted therapies, hormone therapies, and immunotherapies have become integral parts of breast cancer treatment. Genetic testing for specific mutations, such as BRCA1 and BRCA2, has allowed for personalized treatment plans and preventive measures for individuals at higher risk.
Public awareness campaigns, fundraising initiatives, and support groups have played a pivotal role in

educating the public about breast cancer, encouraging regular screenings, and providing emotional support to those affected. October, recognized globally as Breast Cancer Awareness Month, has become a platform for advocacy and fundraising activities.

While advancements have been made in understanding and treating breast cancer, challenges persist. Disparities in access to healthcare, varying levels of awareness, and ongoing research to unlock the complexities of the disease remain areas of focus.

In conclusion, the history of breast cancer spans centuries, with a gradual evolution in our understanding and approach to the disease. The outbreak, if we consider it as the widespread recognition and awareness of breast cancer, has been a continuous process marked by scientific discoveries, medical advancements, and societal efforts to combat this prevalent and impactful disease.

CONCLUSION

The exploration of breast cancer in this overview reveals a complex and evolving landscape. The global impact of this disease is substantial, with increasing incidence rates and significant mortality risks, particularly among women. The multifaceted risk factors, including age, hormonal influences, socioeconomic factors, and viral involvement, underscore the need for a comprehensive understanding of breast cancer's etiology.

The classification of breast cancer into histological and molecular subtypes enhances our ability to tailor treatment strategies, predict prognosis, and employ precision medicine approaches. Molecular assays and the AJCC Classification contribute to refining risk assessment and guiding therapeutic decisions. The ever-expanding knowledge about the disease reflects ongoing research efforts and a commitment to improving outcomes for affected individuals.

The historical journey of breast cancer, from ancient records to contemporary advancements, demonstrates the continuous evolution in our approach to diagnosis and treatment. Early surgical interventions have given way to more refined and less invasive procedures, with a focus on early detection through methods like mammography. The integration of genetic testing, targeted therapies, and awareness campaigns has further propelled advancements in the field.

While progress has been made, challenges persist, including healthcare disparities, awareness gaps, and the ongoing quest to unravel the complexities of breast cancer. The concerted efforts of researchers, healthcare professionals, and advocacy groups, particularly highlighted during Breast Cancer Awareness Month, signify a collective commitment to combatting this impactful disease.

In essence, the history and current state of breast cancer exemplify a continuous journey marked by scientific discoveries, medical breakthroughs, and societal endeavors. The ongoing outbreak is not a sudden occurrence but a persistent, collective response to the challenges posed by breast cancer. With each milestone achieved, there emerges a renewed dedication to improving prevention, diagnosis, and treatment, ultimately working towards a future where the impact of breast cancer is minimized and the well-being of individuals is prioritized.

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