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Review Paper

Inflammatory Breast Cancer: A Rapidly Progressive and Aggressive Malignancy Current Insights and Future Directions

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Citation: Michael B (2025). Inflammatory Breast Cancer: A Rapidly Progressive and Aggressive Malignancy Current Insight and Future Directions. V 1(2)

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Received date: July 18, 2025; Accepted date: July 22, 2025; Published date: July 30, 2025

Keywords: modified radical mastectomy, metastatic potential, molecular biology, post-mastectomy radiation

Abstract

Inflammatory breast cancer (IBC) is a rare but highly aggressive form of breast carcinoma characterized by rapid onset, distinct clinical features, and poor prognosis compared to other breast cancer subtypes. Unlike typical breast cancers, IBC often lacks a palpable mass and presents with diffuse erythema, edema (peau d'orange), and skin thickening due to tumor emboli obstructing dermal lymphatics. This review provides a comprehensive overview of the epidemiology, pathophysiology, clinical presentation, diagnostic criteria, molecular characteristics, and current management strategies for IBC. Multimodal treatment—including neoadjuvant chemotherapy, surgery, and radiation therapy—remains the cornerstone of care. Emerging targeted therapies and immunotherapeutic approaches are being investigated to improve outcomes. Early recognition and prompt intervention are crucial for enhancing survival in patients with this aggressive disease

Introduction

Inflammatory breast cancer (IBC) accounts for approximately 1–5% of all breast cancer cases but contributes disproportionately to breast cancer mortality. First described clinically in the 19th century, IBC is distinguished by its rapid progression, high metastatic potential, and unique presentation. Due to its rarity and atypical features, it is often misdiagnosed, leading to delays in treatment.

Epidemiology

IBC is more commonly diagnosed in younger women compared to non-inflammatory breast cancers. It has a higher incidence in African and North African

Pathophysiology and Molecular Characteristics

The hallmark of IBC is the presence of tumor emboli within dermal lymphatic vessels, leading to lymphatic obstruction and characteristic inflammatory signs. However, true inflammation is typically absent

Molecularly, IBC is heterogeneous and often exhibits:

- Overexpression of HER2 in a subset of patients
- High proliferation indices (Ki-67)
- Frequent triple-negative phenotype
- Activation of pathways such as NF-κB, EGFR, and angiogenesis-related signaling

Genomic instability and epithelial–mesenchymal transition (EMT) contribute to its aggressive behavior and metastatic potential.

Clinical Presentation

IBC is primarily a clinical diagnosis. Common features include

- Rapid onset of breast redness (erythema)
- Edema involving more than one-third of the breast
- Skin thickening with a “peau d’orange” appearance
- Warmth and tenderness
- Absence of a distinct lump in many cases

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Axillary lymphadenopathy is frequently present at diagnosis

### Treatment Strategies

Management of IBC requires a multimodal approach:

#### Neoadjuvant Chemotherapy

- First-line treatment to reduce tumor burden
- Anthracycline- and taxane-based regimens are standard
- HER2-positive patients receive targeted therapy (e.g., trastuzumab)

#### Surgery

- Modified radical mastectomy is performed after chemotherapy
- Breast-conserving surgery is generally not recommended

#### Radiation Therapy

- Post-mastectomy radiation is essential to control local disease

#### Targeted and Systemic Therapies

- HER2-targeted agents (trastuzumab, pertuzumab)
- Hormonal therapy for hormone receptor-positive cases
- Immunotherapy (e.g., checkpoint inhibitors) is under investigation

#### Prognosis

IBC has a poorer prognosis compared to other breast cancers. The 5-year overall survival rate ranges from 30% to 55%, depending on stage and response to therapy. Early diagnosis and aggressive treatment improve outcomes

#### Emerging Therapies and Research Directions

Recent advances focus on:

- Molecular profiling for personalized therapy
- Targeting tumor microenvironment and angiogenesis
- Immunotherapy approaches, particularly in triple-negative IBC

- Novel biomarkers for early detection and prognosis

Clinical trials are ongoing to explore these strategies

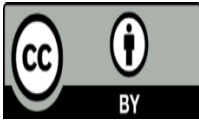
#### Conclusion

Inflammatory breast cancer remains a challenging and aggressive disease requiring early recognition and prompt, multidisciplinary management. Advances in molecular biology and targeted therapies offer hope for improved outcomes. Continued research is essential to better understand its biology and develop more effective treatments

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