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Immunohistochemical Profiling of Breast Cancer Subtypes: Correlation with Clinical Outcomes

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Abstract

Breast cancer is a heterogeneous disease with various subtypes that exhibit distinct biological behaviors and clinical outcomes. Immunohistochemical (IHC) profiling is a critical tool in the classification of breast cancer subtypes, influencing treatment strategies and predicting patient prognosis. This study aims to evaluate the immunohistochemical profiles of breast cancer subtypes and their correlation with clinical outcomes, including response to therapy, recurrence and overall survival.

Keywords: Pituitarygland • Breast cancer • Clinical outcomes

Introduction

Breast cancer remains one of the most prevalent malignancies among women worldwide. Its heterogeneity is reflected in the different subtypes, which have distinct histological and molecular characteristics. Immunohistochemical (IHC) profiling has become a standard method for classifying breast cancer into subtypes such as Luminal A, Luminal B, HER2-positive and Triple-negative breast cancer (TNBC). Each subtype has unique prognostic and therapeutic implications. This study seeks to analyze the IHC profiles of various breast cancer subtypes and correlate them with clinical outcomes [1].

Description

Study design: This retrospective cohort study included 200 female patients diagnosed with breast cancer between 2010 and 2018. Patient records, including histopathological data and clinical outcomes, were reviewed.

Immunohistochemical analysis: Formalin-fixed, paraffin-embedded tissue samples from each patient were analyzed using standard IHC techniques. The following biomarkers were assessed:

- Estrogen Receptor (ER)
- Progesterone Receptor (PR)
- Human Epidermal Growth Factor Receptor 2 (HER2)
- Ki-67 (proliferation marker)

Classification of subtypes: Based on the IHC results, tumors were classified into the following subtypes:

- Luminal A (ER+ and/or PR+, HER2-)
- Luminal B (ER+ and/or PR+, HER2+)
- HER2-positive (ER- and PR-, HER2+)
- Triple-negative (ER-, PR-, HER2-)

Clinical outcomes: Clinical outcomes assessed included:

- Response to initial therapy (complete response, partial response, stable disease, progression)
- Recurrence-free survival (RFS)
- Overall survival (OS)

Statistical analysis: Descriptive statistics, chi-square tests and Kaplan-Meier survival curves were used to evaluate the correlation between IHC profiles and clinical outcomes. Cox proportional hazards models were employed to assess the impact of IHC profiles on survival outcomes [2].

Immunohistochemical (IHC) profiling is a pivotal technique in the classification of breast cancer subtypes based on the expression of specific biomarkers in tumor tissues. This method involves staining tissue samples with antibodies targeting particular proteins, which are then visualized under a microscope. The primary biomarkers assessed in breast cancer IHC profiling include [3]:

1. **Estrogen receptor (ER)**: A protein that, when present, indicates that the tumor is likely to respond to hormone therapies that target estrogen.
2. **Progesterone receptor (PR)**: Similar to ER, the presence of PR suggests that the tumor may respond to progesterone-based treatments.
3. **Human epidermal growth factor receptor 2 (HER2)**: An overexpressed protein in some breast cancers that is associated with more aggressive disease. HER2-positive tumors may benefit from targeted therapies such as trastuzumab.
4. **Ki-67**: A marker of cell proliferation, which helps assess the growth rate of the tumor.

Based on the expression patterns of these biomarkers, breast cancer is classified into subtypes:

- **Luminal A**: ER-positive and/or PR-positive, HER2-negative. Typically, these tumors have a better prognosis and respond well to hormone therapies.
- **Luminal B**: ER-positive and/or PR-positive, HER2-positive or HER2-negative with high Ki-67. These tumors are generally more aggressive than Luminal A.
- **HER2-positive**: ER-negative, PR-negative and HER2-positive.

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These tumors are often aggressive but can be effectively targeted with HER2-specific therapies.

- **Triple-negative (TNBC)**: ER-negative, PR-negative and HER2-negative. This subtype lacks targeted treatment options and is associated with a higher risk of recurrence [4].

IHC profiling not only helps in the accurate classification of breast cancer subtypes but also informs treatment strategies and prognosis, guiding personalized therapy and improving patient outcomes.

Patient demographics: The cohort consisted of 200 patients with a median age of 56 years. The distribution of subtypes was as follows:

- Luminal A: 45%
- Luminal B: 30%
- HER2-positive: 15%
- Triple-negative: 10%

IHC profile and treatment response

- Luminal A tumors exhibited the highest rate of complete response to hormone therapy (65%) compared to Luminal B (45%), HER2-positive (40%) and Triple-negative (25%).
- HER2-positive tumors showed the highest rate of complete response to targeted therapy (50%).

Recurrence-free Survival

- Luminal A tumors had the longest RFS (median 7.5 years), followed by Luminal B (median 5.2 years), HER2-positive (median 3.8 years) and Triple-negative (median 2.0 years).
- Triple-negative tumors had the highest recurrence rate.

Overall survival

- Luminal A subtype demonstrated the best OS (median 10.2 years), whereas Triple-negative tumors had the poorest OS (median 4.5 years).

The study confirms that immunohistochemical profiling is crucial for the accurate classification of breast cancer subtypes and has significant implications for treatment and prognosis. Luminal A tumors, characterized by ER+ and/or PR+ expression, generally have favorable outcomes with a high response to hormone therapy and extended survival. In contrast, Triple-negative breast cancer, lacking ER, PR and HER2 expression, is associated with a higher recurrence rate and poorer survival outcomes [5].

The findings underscore the need for personalized treatment approaches based on IHC profiles and highlight the importance of ongoing research to improve therapeutic strategies for less favorable subtypes.

Conclusion

Immunohistochemical profiling of breast cancer subtypes provides valuable insights into the disease's biological behavior and its correlation with clinical outcomes. Accurate subtype classification through IHC can guide treatment decisions and improve patient management, ultimately enhancing survival and quality of life for breast cancer patients.

Acknowledgement

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Conflict of Interest

None.

References

1. Cardascia, Nicola, Valentina Pastore, Vito Bini and Maria Gabriella Lategola, et al. "Graft detachment after Descemet's stripping automated endothelial keratoplasty in bullous keratopathy and Fuchs dystrophy." *Med Hypothesis Discov Innov Ophthalmol* 9 (2020): 15.
2. Zhang, Jie, Dipika V. Patel and Charles NJ McGhee. "The Rapid transformation of transplantation for corneal endothelial diseases: An evolution from penetrating to lamellar to cellular transplants." *Asia Pac J Ophthalmol* 8 (2019): 441-447.
3. Kim, Bia Z., Jay J. Meyer, Nigel H. Brookes and S. Louise Moffatt, et al. "New Zealand trends in corneal transplantation over the 25 years 1991–2015." *Br J Ophthalmol* 101 (2017): 834-838.
4. Gain, Philippe, Rémy Jullienne, Zhiguo He and Mansour Aldossary, et al. "Global survey of corneal transplantation and eye banking." *JAMA Ophthalmol* 134 (2016): 167-173.
5. Audat, Z., O. Moutasem, K. Yousef and B. Mohammad. "Comparison of clinical and radiological results of posterolateral fusion, posterior lumbar interbody fusion and transforaminal lumbar interbody fusion techniques in the treatment of degenerative lumbar spine." *Singap Med J* 53 (2012): 183-187.

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