Immunohistochemistry in Surgical Pathology: Current applications and future perspectives.

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Introduction

Immunohistochemistry (IHC) is a powerful diagnostic tool that has revolutionized the field of surgical pathology. By utilizing specific antibodies to detect and visualize target antigens within tissue samples, IHC provides valuable information about the presence, location, and distribution of biomarkers. This article explores the current applications of IHC in surgical pathology and discusses its potential future perspectives. IHC plays a crucial role in tumor classification and subtyping. It enables the identification of specific biomarkers that can distinguish between different tumor types, such as estrogen receptor (ER) and progesterone receptor (PR) in breast cancer. These biomarkers not only aid in accurate diagnosis but also provide essential information for predicting prognosis and guiding treatment decisions [1].

Immunohistochemistry allows the assessment of various prognostic and predictive biomarkers in tumors. Examples include human epidermal growth factor receptor 2 (HER2) in breast cancer and programmed death-ligand 1 (PD-L1) in several malignancies. Evaluation of these biomarkers helps determine patients' response to targeted therapies, immunotherapies, and overall prognosis. IHC assists in the differential diagnosis of tumors with overlapping histological features. By employing a panel of antibodies, IHC helps differentiate between various tumor subtypes. For instance, IHC markers like thyroid transcription factor 1 (TTF-1) and napsin A aid in distinguishing between lung adenocarcinoma and other malignancies [2].

Immunohistochemistry is vital in identifying tissue-specific markers that aid in determining the origin of metastatic tumors. Antibodies such as cytokeratins, CDX2, and TTF-1 can help localize the primary site of metastasis, enabling appropriate treatment planning and management. Advancements in multiplex immunohistochemistry techniques allow the simultaneous evaluation of multiple biomarkers within a single tissue section. This approach enables the analysis of complex signaling pathways and facilitates the identification of tumor heterogeneity. Multiplex IHC has the potential to revolutionize diagnostic and therapeutic decision-making by providing a comprehensive molecular profile of tumors [3].

Integration of immunohistochemistry with digital pathology and artificial intelligence (AI) holds promise for the future. AI algorithms can analyze IHC-stained slides, recognize patterns, and generate objective and standardized interpretations. This technology may enhance diagnostic accuracy, minimize interobserver variability, and enable efficient analysis of large-scale datasets. Ongoing research aims to identify novel biomarkers that can predict response to specific therapies. Incorporating these predictive markers into IHC panels may help tailor treatment plans for individual patients, optimizing outcomes and minimizing unnecessary treatments [4].

Immunohistochemistry will continue to play a vital role in the development of targeted therapies and companion diagnostics. The identification of specific biomarkers through IHC enables the selection of patients who are most likely to benefit from targeted agents, ensuring personalized treatment strategies [5].

Conclusion

Immunohistochemistry has transformed the field of surgical pathology by providing valuable insights into tumor classification, prognostication, and prediction of treatment response. With advancements in technology and ongoing research, the future of IHC looks promising. Multiplex IHC, integration with digital pathology and AI, and the discovery of novel predictive markers are set to further enhance the utility and precision of immunohistochemistry in surgical pathology. As a result, this technique will continue to drive advancements in personalized medicine and improve patient outcomes.

References

1. Farr AG, Nakane PK. Immunohistochemistry with enzyme labeled antibodies: A brief review. J Immunol Methods. 1981;47(2):129-44.
2. Fritz P, Mischlinski A, Grau A, et al. In situ evaluation of immunoglobulin synthesis of synovial plasma cells in rheumatoid arthritis and osteoarthritis by plug photometry. Pathol Res Pract. 1986;181(2):243-8.
3. Weinstein MH, Signoretti S, Loda M. Diagnostic utility of immunohistochemical staining for p63, a sensitive marker of prostatic basal cells. Mod Pathol. 2002;15(12):1302-8.
4. Ferdinandusse S, Denis S, IJlst L, et al. Subcellular localization and physiological role of α-methylacyl-CoA racemase. J Lipid Res. 2000;41(11):1890-6.
5. Elgamal AA, Van de Voorde W, Van Poppel H, et al. Immunohistochemical localization ofprostate-specific markers within the accessory male sex glands of Cowper, Littre, and morgagni. Urol. 1994;44(1):84-90.

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