Editorial: Special Issue on Immunohistochemical Biomarkers in Endocrine Pathology

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Published online: 23 May 2018
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Immunohistochemical biomarkers are utilized throughout surgical pathology in the identification of tissue types, classification of tumors, prognostication of tumors, and theranostically, in identifying molecular targetable tumors. This special issue of *Endocrine Pathology* focuses on the application of immunohistochemical biomarkers in the field of endocrine pathology. The manuscripts highlight the utility, recent advances, limitations, and pitfalls of immunohistochemical biomarkers useful to practicing pathologists and researchers. The manuscripts in this issue span the spectrum of immunohistochemical biomarkers in thyroid, parathyroid, pituitary, and adrenal cortical pathology, to neuroendocrine tumors involving the gastrointestinal tract, pancreas, lung, and thymus, paragangliomas and pheochromocytomas, and mesenchymal and hematolymphoid tumors involving endocrine tissues. A special article on the suitability of immunohistochemical biomarkers for diagnostic, prognostic, and predictive testing as well as quality assurance aspects of this technology is also included.

The application of immunohistochemical biomarkers to thyroid pathology is used diagnostically and prognostically as well as in the management of thyroid tissues and tumors [1]. Whether confirming a tumor is of thyroid origin, subclassifying folliculogenic from C-cell lesions, or differentiating among folliculogenic thyroid tumors, Dr. Baloch, Dr. Mete, and Dr. Asa review how immunohistochemical markers are used in thyroid pathology [1]. They also discuss the utility

of new and emerging biomarkers. In parathyroid pathology, immunohistochemical biomarkers can help identify parathyroid tissues or lesions, as an adjunct in the differentiation of parathyroid adenoma, particularly atypical adenoma, from parathyroid carcinoma [2]. The prognostic utility of immunohistochemical biomarkers in parathyroid disease is emerging. The utility and limitations of parafibromin are also discussed. The importance of a panel of biomarkers is stressed in the evaluation of endocrine tissues and tumors. Pituitary pathology is a field that utilizes immunohistochemical biomarkers extensively [3]. Biomarkers are used diagnostically and prognostically in tumors of the sellar region and generally replace technologies such as electron microscopy. Dr. Asa and Dr. Mete provide an approach to understanding the importance of biomarkers diagnostically and in guiding patient management [3]. Authors from Canada, the USA, Italy, and Japan outline the value immunohistochemical biomarkers in enhancing diagnostic accuracy in adrenal cortical tumors and providing prognostic information in adrenal cortical carcinomas [4]. They note the increasing clinical role of pathologists in providing potential theragnostic information gained from immunohistochemical biomarkers in predicting treatment response.

Drs. Ucella, Volante, and Papotti from Italy and Dr. La Rosa from Switzerland review the role of immunohistochemical biomarkers in the diagnostic approach to the classification of neuroendocrine tumors of the gastrointestinal tract, pancreas, lung, and thymus as well as the prognostic and theragnostic utility of biomarkers [5]. Dr. Gill and colleagues from Australia discuss the classic as well as new and emerging immunohistochemical biomarkers in pheochromocytoma and paragangliomas [6]. Immunohistochemical markers accompany the evolving molecular landscape of these tumors and have become an adjunct to screening programs for inherited conditions and a tool to assist risk stratification.

Dr. Kuzu from Turkey and Dr. Dogan from the USA incorporate the latest World Health Organization Classification in providing an approach to the evaluation of hematolymphoid

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processes involving pituitary, thyroid, and adrenal tissues [7]. These hematopathologists provide insight into disorders varying from Langerhan cell histiocytosis, Erdheim Chester disease, IgG4-related diseases, to lymphoproliferative disease involving endocrine tissues. Dr. Hung and Dr. Hornick from the USA review the challenging topic of diagnosing mesenchymal neoplasms arising in or near endocrine organs [8]. The importance of recognizing the histologic features and understanding the role of immunohistochemical biomarkers in this setting is important to avoid misdiagnosing these tumors and confusing them with endocrine neoplasms. Dr. Torlakovic from Canada provides unique insight into understanding the suitability of panels of immunohistochemical biomarker panels for diagnostic, prognostic, and predictive testing [9]. This, combined with the importance of quality assurance in immunohistochemical biomarkers, ensures that these are “fit-for-purpose” in endocrine pathology.

This special issue of *Endocrine Pathology* is comprised of a series of manuscripts that review the utilization of immunohistochemical biomarkers in the diagnosis and classification of endocrine tissues and tumors. Recent developments and novel applications of these widely available and relatively cost-efficient markers that have enhanced the field of endocrine pathology are also reviewed in this ever advancing field.

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