Anti-PAX-5 is a B-cell antibody that has been available at PROPATH for several years, and one that has been a very useful tool for us in the evaluation of a variety of lymphoid and non-lymphoid tissues. In this issue of the FOCUS on Immunohistochemistry, this antibody will be described, and its application will be discussed.

PAX-5, also known as B-cell-specific activator protein (BSAP), is a transcription factor which plays a vital role in B-cell development, activation, and differentiation. PAX-5 gene transcription is initiated in pro-B cells and is detectable at the pre-B- and mature B-cell stages, but is largely absent in terminally differentiated plasma cells.

PAX-5 is widely expressed by B-cells, and since it is a transcription factor, the nuclear pattern of staining lends itself to relative ease in interpretation, especially in small biopsies, cytologic samples, and peripheral blood smears. Also, the similar appearance of PAX-5 to Ki-67 (both are nuclear stains) allows for more rapid identification of tumor when assessing the Ki-67 proliferative fraction of B-cell lymphomas.

Not only can PAX-5 be used to assess the intact overall low-power B-cell architecture in an unusual but reactive lymph node or an exuberant mucosal or cutaneous lymphoid infiltrate, PAX-5 is expressed by the vast majority of B-cell neoplasms, including the well-differentiated small B-cell neoplasms, B-cell small lymphocytic lymphoma/CLL, follicular lymphoma, and marginal zone B-cell lymphoma (and their morphologic variants), hairy cell leukemia, mantle cell lymphoma, diffuse large B-cell lymphoma, and Burkitt lymphoma.

PAX-5 also stains the L&H cells of nodular lymphocyte predominant Hodgkin lymphoma and the Hodgkin cells or Reed-Sternberg cells of classical Hodgkin lymphoma.

PAX-5 is also expressed by precursor B lymphoblastic leukemia/lymphoblastic lymphoma (precursor B-cell acute lymphoblastic leukemia), a tumor which is frequently negative with CD20.
Reportedly, approximately 20% of patients with B-cell lymphoma treated with rituximab (Rituxan; a monoclonal antibody against the CD20 B-cell antigen) will experience relapse with CD20-negative tumor. Staining with PAX-5 is a sensitive method of identifying tumor in this situation.

In our experience, plasma cells and plasma cell neoplasms are typically negative or weak with PAX-5, and its expression seems to be limited to those few plasma cell neoplasms that also express CD20.

It is now well-known that PAX-5 is not entirely specific for B-cells, as it has been reported to stain some carcinomas - neuroendocrine carcinomas, including Merkel cell carcinoma and small cell carcinoma (but not carcinoid tumors), as well as rare bladder carcinomas.

We have also observed nuclear reactivity in splenic endothelial cells and histiocytes, and we have seen cytoplasmic reactivity with PAX-5 in basal layers of the epidermis as well as in metaplastic respiratory epithelium.

PAX-5 is a pan-B-cell marker that is very useful in the evaluation of lymphoid lesions, particularly in small biopsies and in cases where CD20 is negative. Although unusual in epithelial malignancies, PAX-5 is expressed in a subset of neuroendocrine carcinomas.

References:


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