Plasmablastic Lymphoma and Related Disorders

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Key Words: Plasmablastic lymphoma; B-cell lymphomas; Human herpesvirus 8; Castleman disease; HIV infection; Diffuse large B-cell lymphoma; anaplastic large cell lymphoma kinase

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Abstract

B-cell lymphomas with plasmablastic features are a heterogeneous group of lymphomas. While they may share overlapping morphologic or immunophenotypic features, distinct clinicopathologic or molecular genetic features exist for some that have allowed their recognition as distinct entities. Examples include anaplastic large cell lymphoma kinase (ALK)+ diffuse large B-cell lymphoma (DLBCL), primary effusion lymphoma (PEL), large B-cell lymphoma associated with human herpesvirus 8 (HHV-8) infection, and plasmablastic lymphoma (PBL) associated with HIV infection. Outside of these entities, however, other diffuse aggressive B-cell lymphomas may occur that demonstrate cytologic and/or immunologic features of plasmablasts. This may occur in some cases of Epstein-Barr virus (EBV)+ DLBCL of the elderly or DLBCL, not otherwise specified. Thus, pathologists are confronted with the challenge of integrating overlapping (but not identical) morphologic, immunophenotypic, and genotypic features to best classify lymphomas. In addition, clinical information becomes essential because extramedullary manifestation of plasma cell (PC) neoplasms (multiple myeloma) enters the differential diagnosis.

Session 2 of the 2009 Society for Hematopathology/European Association for Haematopathology Workshop dealt with the topic of PBLs and related disorders. Topics included human herpesvirus 8–associated Castleman disease, HHV-8–associated lymphomas, PBLs, and other lymphomas with plasmablastic or plasmacytic features. In this report, we review PBLs and related disorders in the context of submitted cases and illustrate key diagnostic points, highlight controversial areas, and provide recommendations on features that should be assessed and terminology that might be used when dealing with these lymphomas.

Upon completion of this activity you will be able to:
• discuss the spectrum of plasmacytic and plasmablastic proliferations in the setting of Castleman disease.
• describe the typical pathologic feature of plasmablastic lymphoma.
• list B-cell lymphomas with plasmablastic features.

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Table 1
B Cell–Lineage Malignant Lymphomas That May Show Immunophenotypic Evidence of Plasmablastic Differentiation

<table>
<thead>
<tr>
<th>Condition</th>
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<tr>
<td>Plasmablastic lymphoma</td>
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<tr>
<td>Anaplastic lymphoma kinase–positive large B-cell lymphoma</td>
</tr>
<tr>
<td>Large B-cell lymphoma arising in human herpesvirus 8–associated multistage Castleman disease lymphoma</td>
</tr>
<tr>
<td>Primary effusion lymphoma</td>
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<tr>
<td>Immunodeficiency-associated lymphoproliferative disorders</td>
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with plasmablastic or plasmacytic features. In this report, we review the topic of PBL and related disorders in the context of submitted cases and illustrate key diagnostic points, highlight controversial areas, and provide recommendations on features that should be assessed and terminology that might be used when dealing with these lymphomas.

General Concepts

Plasmablasts: B Cells Undergoing Preterminal Differentiation to PCs

The putative normal counterpart to lymphomas with plasmablastic features is a B cell that has undergone preterminal differentiation steps such that the transcriptional program has transitioned to that of a PC. Short-lived proliferating polyclonal B blasts can be produced in vitro from resting peripheral blood B cells with exposure to cytokines and costimulatory molecules that may represent such normal counterparts. Thus, typical surface markers of mature B cells, such as CD20 and CD45, are usually down-regulated while those associated with PCs, such as CD138, are up-regulated. Similarly, transcription factors associated with B cells in general (PAX5) or, more specifically, germinal center–derived B cells (BCL6) are down-regulated, while the terminal differentiation program can be demonstrated with expression of BLIMP1, XBP1, and IRF4/MUM1.

Whether these cells have undergone germinal center transit as evidenced by IGH@ somatic hypermutation has not been extensively studied, although it appears that cases of PBL in the HIV setting can derive from post–germinal center B cells or naive B cells undergoing preterminal differentiation. How such cells relate to bone marrow–derived PCs and multiple myeloma is unclear. However, the principle that mature B cells can be driven to plasmablastic cells that have gene expression profiles similar to bone marrow PCs confirms our observations in tissues. Specifically, much of what we know regarding the expression of B-cell/PC surface markers and B-cell/PC transcription factor programs can be applied to the problem of PBLs. Table 2 shows commonly used phenotypic markers that may be useful in the characterization and diagnosis of PBL. For practical purposes, the plasmablasts express CD138 and IRF4 but not CD20 or PAX5.

The 2008 World Health Organization (WHO) classification specifically recognizes PBL as a diffuse immunoblastic lymphoma in which cells have the immunophenotype of PCs. Originally described in the oral cavity of HIV+ patients, it is now recognized to occur at other sites. These other sites are generally extranodal. Furthermore, cases in HIV– patients are recognized. These cases are often, but not always, associated with other immunodeficiency states such as iatrogenic or age-related causes. Outside of this entity, it is recognized that other lymphomas may have prominent but less uniform populations of plasmablastic cells. Furthermore, in the multiple myeloma literature, aggressive variants have been recognized by the presence of immature-appearing blast-like PCs. Thus, the potential for confusion is present if the term PBL is not carefully used. We recommend using the term PBL only for cases meeting the characteristics of lymphomas described initially by Delecluse and colleagues and expanded on by the 2008 WHO classification. Specifically, the tumor cells have the immunophenotypic profile of PCs. The cytologic features are usually those of a large cell with round to oval nuclei that may be eccentrically located. A single central prominent nucleolus or several peripherally located nucleoli are present, and the cytoplasm is moderate to abundant with a paranuclear hof. A Giemsa stain shows basophilic cytoplasm. A subset of cases may show more mature plasmacytic features. With this as background, we review and discuss the topics addressed in session 2.

Table 2
Immunophenotypic Markers of Plasmablastic Differentiation in Plasmablastic Lymphoma

<table>
<thead>
<tr>
<th>Category</th>
<th>Expression</th>
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<tr>
<td>Positive</td>
<td></td>
</tr>
<tr>
<td>CD138</td>
<td>+</td>
</tr>
<tr>
<td>CD38</td>
<td>+</td>
</tr>
<tr>
<td>IRF4/MUM1</td>
<td>+</td>
</tr>
<tr>
<td>BLIMP1</td>
<td>+</td>
</tr>
<tr>
<td>XBP-1</td>
<td>+</td>
</tr>
<tr>
<td>Cytoplasmic immunoglobulin</td>
<td>+</td>
</tr>
<tr>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>CD20</td>
<td>-</td>
</tr>
<tr>
<td>PAX5</td>
<td>-</td>
</tr>
<tr>
<td>EBV-LMP1</td>
<td>-</td>
</tr>
<tr>
<td>Variable</td>
<td></td>
</tr>
<tr>
<td>CD79a</td>
<td>+ or -</td>
</tr>
<tr>
<td>CD56</td>
<td>+ or -</td>
</tr>
<tr>
<td>CD45</td>
<td>+ or -</td>
</tr>
<tr>
<td>CD10</td>
<td>+ or -</td>
</tr>
<tr>
<td>CD30</td>
<td>+ or -</td>
</tr>
<tr>
<td>EBV-EBER</td>
<td>+ or -</td>
</tr>
<tr>
<td>Aberrant</td>
<td></td>
</tr>
<tr>
<td>CD4</td>
<td>?</td>
</tr>
<tr>
<td>Keratin</td>
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EBER, Epstein-Barr virus–encoded RNA; EBV, Epstein-Barr virus; LMP, latent membrane protein.
Castleman Disease

Castleman disease is a heterogeneous group of lymphoproliferative disorders that can be subdivided into at least 3 groups based on morphologic, clinical, and etiologic features [Table 3]. Hyaline vascular (HV) Castleman disease (HVCD) usually occurs as an asymptomatic, solitary, enlarged lymph node or a localized group of enlarged lymph nodes characterized by abnormal follicles and an interfollicular expansion with increased vascularity. Occasional clusters of plasmacytoid dendritic cells can be seen. The follicle centers are often regressed and transformed into expanded mantle zones and penetrating vessels. The expanded mantles may have a concentric ring or “onion skin” appearance and often contain multiple atretic follicle centers. This latter finding is a rather specific feature for HVCD. Occasional follicles or areas of stroma may show atypical hyperchromatic dendritic cells, and rare cases of dendritic cell tumors have been reported in the setting of HVCD.11

The PC variant of Castleman disease (PCCD) is usually multicentric but may be unicentric in a minority of cases. Clinically, patients may have systemic symptoms such as fever, night sweats, polyclonal hypergammaglobulinemia, and cytopenias. Histologically, PCCD is characterized by follicular hyperplasia and a striking interfollicular proliferation of mature PCs that may form sheets.12,13 If plasmablastic cells are seen in or around follicles, multicentric HHV-8–related PCCD should be strongly considered. Occasional cases may show follicles with features of HVCD (mixed or transitional type of Castleman disease), suggesting a pathogenetic link between HVCD and PCCD. It is interesting that the PCs may be monoclonic IgG or IgA λ, and this picture may be part of the POEMS [polyneuropathy, organomegaly, endocrinopathy, monoclonal gammopathy, and skin changes] syndrome.12,14

Cases of PCCD were submitted to the Workshop and illustrated features related to the PC component. Four cases of PCCD (cases 48, 119, 170, and 238) were submitted, and the issue of expansile sheets of monotypic PCs in a lymph node recurrence of PCCD was raised. Case 170 illustrated issues related to the PC component. Four cases of PCCD with POEMS syndrome in 2003 and a recurrence of PCCD with POEMS syndrome in 2008 (the submitted biopsy) with lymphadenopathy demonstrating diffuse sheets of monoclonal PCs (IgG λ with rearranged IGH@ and IGK@). However, in the background, some residual follicles were present with HVCD features such as concentric rings of mantle cells and regressive transformation. Case 119 similarly was an example of PCCD associated with POEMS syndrome with λ-restricted PCs.

Cases 48 and 238 were additional examples of PCCD with monoclonal PCs (both λ-restricted with monoclonal IGH@ rearrangements). All patients lacked evidence of multiple myeloma or HHV-8 infection.

These cases nicely illustrate issues related to the diagnosis of PCCD. First, the presence of HVCD-type follicles in the background of marked interfollicular plasmacytosis is helpful in recognizing PCCD. Because the histopathologic features of PCCD are not entirely specific, other reactive processes leading to follicular hyperplasia and plasmacytosis, ie, chronic inflammatory processes such as autoimmune disease and infections such as HIV or luetic lymphadenitis, should be excluded. HHV-8 stains help exclude HHV-8–related multicentric Castleman disease (MCCD) of the PC variant histologic type. Second, assessment for light chain restriction in the PCs is mandatory. As illustrated by these cases, λ restriction is prevalent in PCCD. This is a consistent finding in PCCD, and the reasons for this are unknown. Third, 2 cases were associated with POEMS syndrome. This syndrome must be considered when a diagnosis of PCCD is made because lymph node biopsy may be the initial diagnostic procedure in these cases. Finally, the line between PCCD and plasmacytoma of lymph node may not be well defined. At issue is whether PCCD with monoclonal PCs can be considered a plasmacytoma. Patients with PCCD with or without POEMS syndrome seem to have an indolent disease course (outside the setting of HIV and HHV-8), and reported cases of lymph node plasmacytoma also have an indolent or benign course. Thus, the relationship between PCCD with monoclonal PCs and nodal plasmacytoma comes into question.13,15,16 Presumably, not all cases of primary plasmacytoma of lymph node are examples of PCCD because some cases (43% in 1 series) are κ-restricted. This issue deserves further investigation.

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Clinicopathologic Features of Castleman Disease</th>
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<tr>
<td>Clinical Type/Histologic Variant</td>
<td>Pathogenesis</td>
</tr>
<tr>
<td>Unicentric/hyaline vascular</td>
<td>Follicular dendritic cell abnormalities?</td>
</tr>
<tr>
<td>Multicentric/plasma cell</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td>POEMS syndrome</td>
</tr>
<tr>
<td></td>
<td>Human herpesvirus 8</td>
</tr>
<tr>
<td></td>
<td>HIV+</td>
</tr>
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PCN, plasma cell neoplasm; POEMS, polyneuropathy, organomegaly, endocrinopathy, monoclonal gammopathy, and skin changes.
Until definitive studies are performed, we recommend diagnosis of PCCD with monotypic PCs when obvious Castleman disease–type follicles are present. In the absence of histologic features characteristic of Castleman disease, a diagnosis of plasmacytoma may be more appropriate. Whether some cases of PCCD with polytypic PCs represent a precursor lesion to monoclonal PCCD is unclear, and, to our knowledge, cases demonstrating such progression have not been reported. From a practical standpoint, when confronted with a $\lambda$-restricted nodal plasmacytoma, one should consider the possibility of PCCD, raise the possibility of POEMS syndrome, and exclude PC myeloma (PCM). In all cases of PCCD, it is worth remembering that the histopathologic features of PCCD are not entirely specific, and when PCs are polytypic, other reactive processes leading to follicular hyperplasia and plasmacytosis should be considered.

Two cases (345 and 104) represented HHV-8–associated MCCD, one occurring in an HIV+ patient and the other in an HIV–elderly man with prostate cancer (and, thus, possibly immunosuppressed). HHV-8 is found...
Histopathologic features of human herpesvirus 8 (HHV-8)–associated multicentric Castleman disease (MCCD) and large B-cell lymphoma arising in HHV-8–associated MCCD. A (Case 345), Low-power view of the lymph node showing the characteristic architecture of HHV-8–associated MCCD with numerous hyperplastic B-cell follicles with poorly defined borders lacking well-developed mantle zones and interfollicular plasmacytosis (H&E). B (Case 345), High-power view of the hyperplastic B-cell follicle showing relatively normal follicle center morphologic features containing centroblasts and centrocytes in the center (upper right) and numerous plasmablasts at the periphery of the follicle center (lower left) (H&E). C, D, and E (Case 345), The plasmablasts are embedded in the CD21+ meshwork of the follicle (C) and express IRF4 (D) and HHV-8 latent nuclear antigen (E) (immunoperoxidase).
in nearly all HIV-associated MCCD cases but in only 50% of non–HIV-associated cases. In these cases, one typically sees follicles with variable degrees of regressive transformation or involution, follicle hyalinization, and mantle zone expansion. The HHV-8+ plasmablasts are found predominantly in the mantle zones and follicles centers but can be seen scattered as individual cells in the interfollicular area. The interfollicular area has a dense infiltrate of polytypic PCs. These plasmablasts (cells with high-level IgM expression) can be demonstrated to contain IgM \( \lambda \), but molecular testing reveals them to be polyclonal in most cases.

Patients tend to follow a downhill course, and, thus, HHV-8+ MCCD is an aggressive lymphoproliferative process of plasmablasts, particularly in HIV+ patients. HHV-8+ large B-cell lymphoma can arise from these lesions in what may be a progression from microlymphoma (clusters and confluent aggregates of plasmablasts) to overt PBL; however, the pathogenetic features and histologic criteria for this progression have not been well characterized. From a practical standpoint, the presence of sheets of plasmablasts outside of follicles that distort architecture or are easily visible at low magnification with IgM \( \lambda \) restriction should be sufficient for a diagnosis of HHV+ large B-cell lymphoma (Image 2). In difficult cases, demonstration of monoclonality by molecular methods may be helpful.

**HHV-8–Associated Lymphomas**

Several cases of HHV-8+ large B-cell lymphomas with plasmablastic differentiation were submitted Table 4. Two of these cases were associated with an underlying MCCD (cases 23 and 163), while no clear histopathologic evidence of MCCD was present in the other 2 cases (cases 37 and 227). In 3 cases, the patients were HIV+, while the HIV status was unknown in the fourth case (case 37). Immunophenotypically, the tumor cells showed variable expression of B-cell and PC markers (CD20–, PAX5–, CD79a–, CD138–/+ negative for immunoglobulins, CD30–/+). The neoplastic cells were coinfected by EBV and HHV-8 in all cases.
Plasmablastic Lymphoma

PBL was first described as a specific clinicopathologic entity by Delecluse and colleagues as an aggressive B-cell lymphoma occurring in the oral cavity arising in the context of HIV infection. The neoplastic cells had “immunoblast-like” morphologic features but lacked expression of markers of

Several cases were submitted that showed the spectrum of HHV-8+ large B-cell lymphomas. Unfortunately, no cases of so-called germinotropic lymphoproliferative (GLPD) disorder arising in HHV-8+ MCCD were submitted. Only a handful of cases have been reported, so the features of GLPD have yet to be fully described. Reported cases occur in HIV−, non-immunosuppressed adults as lymphadenopathy. The histologic features are those of MCCD, but plasmablasts coalesce within follicle centers. This seems to differ from the plasmablastic proliferation described above in that plasmablasts of GLPD appear to be germinal center–localized with biologic features similar to germinal center B cells (mutated IGH@ genes, IgA class-switched) and are EBV-coinfected. This is in contrast with the plasmablasts of MCCD, which are IgH-unmutated, IgM+, and EBV−. The disease seems to follow a more indolent course than that of HHV-8+ MCCD.22

**Image 3** (Case 224) Histopathologic features of extracavitary primary effusion lymphoma manifesting in the colon of an HIV+ patient. A. High-power view of large lymphoid cells with plasmablastic features infiltrating the submucosa (H&E). B, C, and D. The neoplastic cells express IRF4/MUM1 (B) and human herpesvirus 8 latent nuclear antigen (C) and are positive for Epstein-Barr virus–encoded RNA (B and C, immunoperoxidase; D, in situ hybridization).
mature B cells and showed expression of PC differentiation antigens. The neoplastic cells were infected by EBV in most cases. Since the original description, it has become apparent that the clinical and morphologic features of PBL are broader than originally described, and these have been reflected in the 2008 WHO classification. Although PBLs are most commonly seen at mucosal sites in HIV-infected patients, tumors with similar morphologic features and immunophenotype have been reported in other immunodeficiency states and in elderly patients without apparent immunosuppression. A plasmablastic immunophenotype is required but not sufficient for a diagnosis of PBL because a plasmablastic phenotype can be seen in a number of other B-cell lineage lymphomas.

In the 2008 WHO classification, PBL is described as a diffuse proliferation of large neoplastic cells morphologically resembling immunoblasts, sometimes with plasmacytic differentiation, expressing PC markers such as CD138, CD38, VS38c, and IRF4/MUM1 but not the markers expressed by mature B cells, such as CD45, CD20, and PAX5. Most cases are EBV-infected and show clonal immunoglobulin gene rearrangements. Bone marrow involvement may be seen, but the clinical disease distribution is that of a lymphoma rather than a PCM. The cytogenetics of PBL are poorly described, but recent evidence suggests that deregulation of MYC gene expression through translocation or amplification of the MYC gene region may be important in the pathogenesis. The 16 cases submitted to the Workshop with the diagnosis of PBL reflected the clinical and biologic heterogeneity represented in the literature. There were 8 cases arising in the background of HIV infection. Clinically, all cases manifested with extranodal disease, but 3 cases had bone marrow involvement at initial examination. The presence of a paraprotein was reported in 3 cases, 2 of which also had evidence of bone marrow involvement, raising the differential diagnosis of PCM. Of these cases, 5 were EBV+ and 3 were EBV−, including 1 case with bone marrow involvement. Despite bone marrow involvement, the disease distribution was that of a lymphoma rather than PCM in these cases.

The remaining 8 cases did not have a history of HIV infection or evidence of underlying immunosuppression except for case 112, which was identified to have monoclonal B-cell lymphocytosis during the staging investigations. Compared with the PBL arising in the HIV-infected patients, this group of PBLs manifested primarily with lymph node involvement and lacked evidence of bone marrow involvement. Half of the cases were positive for EBV, and the patients in all EBV+ cases were older than 50 years, raising the differential diagnosis with EBV+ large B-cell lymphoma of the elderly. One of the EBV+ cases with extranodal nasopharyngeal involvement had clinical and pathologic features indistinguishable from HIV+ PBL. The other case (case 114) with extranodal manifestations had a unique clinical history. The case involved a 12-year-old girl with a history of cerebral palsy, scoliosis, and surgical vertebral fusion. At diagnosis, the patient had rapid-onset paraplegia and a spinal mass at the site of the fusion. The biopsy showed a cytologically high-grade lymphoid neoplasm. At diagnosis, the patient had rapid-onset paraplegia and a spinal mass at the site of the fusion. The biopsy showed a cytologically high-grade lymphoid neoplasm with a plasmablastic immunophenotype. The patient had no evidence of systemic immunosuppression, and the PBL was negative for EBV.

Morphologically, HIV+ and HIV− cases were similar and showed a spectrum of features. At one end of the spectrum there were cases with centroblastic/immunoblastic...
karyotype, often with abnormalities involving the MYC gene locus at 8q24, was detected. By fluorescence in situ hybridization analysis, the majority of PBLs had evidence of rearrangement of the MYC gene, often as part of t(8;14)(MYC/IGH) (Table 5).

The main issues raised in the session were the clinical and pathological overlap between PBL and PCM and the distinction of HIV–, EBV+ PBL from EBV+ DLBCL of the elderly. The first issue is obviously critical, and PBL and PCM have very different management requirements, clinical course, and outcome. The approach to this problem is discussed in detail in the article by Lorsbach et al27 in this issue of the Journal that summarizes the findings on PCM-related

**Image 4** Histopathologic features of plasmablastic lymphoma. A (Case 209), Immunoblastic cytologic features (H&E). B (Case 169), Centroblastic cytologic features (H&E). C (Case 329), Plasmablastic/plasmacytic cytologic features (H&E). D (Case 151), Bone marrow involvement by plasmablastic lymphoma (Giemsa).
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cases submitted to the Workshop. An algorithmic approach for the diagnosis of B cell–lineage malignant lymphomas with plasmablastic differentiation is provided in Figure 1.

In contrast, the distinction of HIV–, EBV+ PBL from EBV+ DLBCL of the elderly is perhaps more of a terminology difference. It is not known whether such a distinction reflects true pathologic and clinical differences between 2 entities. Further investigation is needed.

**Other Lymphoid Proliferations With Plasmablastic Differentiation**

The 2008 WHO classification includes a number of entities other than described herein that may show a plasmablastic immunophenotype indistinguishable from that of PBL. In addition, terminal plasmablastic differentiation as part of a spectrum can be seen in other B cell–lineage lymphoid proliferations. Such cases were comprehensively reflected in the cases submitted to the Workshop displaying a spectrum of B-cell lymphoproliferations with plasmablastic and plasmacytic differentiation. Examples are discussed in the following paragraphs.

ALK+ large B-cell lymphoma is a B-cell neoplasm characterized by plasmablastic morphologic features and a translocation involving the ALK gene, most often t(2;17)(p23;q23), leading to a CLTC-ALK fusion product. Immunophenotypically, the tumor cells express terminal PC differentiation markers such as CD38 and VS38c and lack expression of mature B-cell markers. CLTC-ALK fusion leads to unique cytoplasmic granular distribution of the ALK protein, which can be detected by immunohistochemical studies.

There were 3 cases diagnosed as ALK+ large B-cell lymphoma submitted to the Workshop (cases 150, 199, and 201). All cases occurred in young patients and manifested with lymph node–based disease. The morphologic features and immunophenotype were consistent with previously published data. The tumor cells did not express mature B-cell markers such as CD20 or PAX5 but showed evidence of a plasmablastic phenotype, variably expressing CD138/CD38, IRF4, epithelial membrane antigen, and cytoplasmic immunoglobulin. All cases were positive for ALK with a characteristic granular cytoplasmic pattern.

A number of cases of posttransplantation lymphoproliferative disorder were submitted showing a spectrum of morphologic appearances, including polymorphic (case 259), monomorphic DLBCL (case 115), plasmacytoma (cases 19, 61, and 216), and monomorphic plasmablastic (cases 56, 129, and 178). The case with a plasmablastic designation had morphologic and immunophenotypic features indistinguishable from those of PBL seen in HIV+ patients and immunocompetent patients.

There were also cases of DLBCL with plasmablastic/plasmacytic differentiation (cases 18, 28, 194, and 251). These cases were distinguished from PBL by the presence of morphologically and immunophenotypically distinct neoplastic B-cell and PC populations. One of these cases (case 8) was positive for EBV, and given the patient’s age, would be best classified as EBV+ DLBCL of the elderly.

The other small group of cases were PBL or DLBCL showing plasmacytic differentiation associated with other lymphomas. Case 14 was a low-grade, t(14;18)+ follicular lymphoma with plasmacytic differentiation and composite EBV– PBL. Although no comparative clonality analysis was done, the proximity of the 2 neoplasms favors plasmablastic transformation of follicular lymphoma. The other 2 cases were EBV+ clonally unrelated PBL and DLBCL showing plasmacytic differentiation occurring in the setting of chronic lymphocytic leukemia (case 97) and angioimmunoblastic T-cell lymphoma (case 331), respectively.

The second session of this Workshop demonstrated the spectrum of lymphomas with plasmablastic features and helped illustrate the morphologic features and immunophenotypic markers associated with them. The markers shown in Table 2 and the approach in Figure 1 may be of value in the evaluation of these lymphomas.
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