ABSTRACT

NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines) for Pediatric Aggressive Mature B-Cell Lymphomas include recommendations for the diagnosis and management of pediatric patients with primary mediastinal large B-cell lymphoma (PMBL) and sporadic variants of Burkitt lymphoma and diffuse large B-cell lymphoma. PMBL is now considered as a distinct entity arising from mature thymic B-cells accounting for 2% of mature B-cell lymphomas in children and adolescents. This discussion section includes the recommendations outlined in the NCCN Guidelines for the diagnosis and management of pediatric patients with PMBL.

doi: 10.6004/jnccn.2022.0057

NCCN CATEGORIES OF EVIDENCE AND CONSENSUS

Category 1: Based upon high-level evidence, there is uniform NCCN consensus that the intervention is appropriate.

Category 2A: Based upon lower-level evidence, there is uniform NCCN consensus that the intervention is appropriate.

Category 2B: Based upon lower-level evidence, there is NCCN consensus that the intervention is appropriate.

Category 3: Based upon any level of evidence, there is major NCCN disagreement that the intervention is appropriate.

All recommendations are category 2A unless otherwise noted.

Clinical trials: NCCN believes that the best management of any patient with cancer is in a clinical trial. Participation in clinical trials is especially encouraged.

PLEASE NOTE

The NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) are a statement of evidence and consensus of the authors regarding their views of currently accepted approaches to treatment. Any clinician seeking to apply or consult the NCCN Guidelines is expected to use independent medical judgment in the context of individual clinical circumstances to determine any patient’s care or treatment. The National Comprehensive Cancer Network® (NCCN®) makes no representations or warranties of any kind regarding their content, use, or application and disclaims any responsibility for their application or use in any way.

The complete NCCN Guidelines for Pediatric Aggressive Mature B-Cell Lymphomas are not printed in this issue of JNCCN but can be accessed online at NCCN.org.

© National Comprehensive Cancer Network, Inc. 2022. All rights reserved. The NCCN Guidelines and the illustrations herein may not be reproduced in any form without the express written permission of NCCN.

Disclosures for the NCCN Pediatric Aggressive Mature B-Cell Lymphomas Panel

At the beginning of each NCCN Guidelines Panel meeting, panel members review all potential conflicts of interest. NCCN, in keeping with its commitment to public transparency, publishes these disclosures for panel members, staff, and NCCN itself. Individual disclosures for the NCCN Pediatric Aggressive Mature B-Cell Lymphomas Panel members can be found on page 1275 (The most recent version of these guidelines and accompanying disclosures are available at NCCN.org.)

The complete and most recent version of these guidelines is available free of charge at NCCN.org.
Overview

An estimated 10,470 children (≤14 years) and 5,480 adolescents (aged 15–19 years) will be diagnosed with cancer in the United States in 2022 and 1,050 children and 550 adolescents will die of the disease. The SEER program reports that in 2022, an estimated 87,050 adolescents and young adults (AYAs; 15–39 years) will be diagnosed with cancer and 9,180 AYAs will die of the disease.

Non-Hodgkin lymphomas (NHL) account for 6% and 7% of all cancers, respectively, in children and adolescents. The 5-year relative survival rates are 91% and 89%, respectively. Burkitt lymphoma (BL) and diffuse large B-cell lymphoma (DLBCL) are the most common types of aggressive mature B-cell lymphomas in children and adolescents and the incidence of DLBCL markedly increases with age, especially in adolescents. BL and DLBCL account for about 38% and 20% of NHL, respectively, in children aged 0–14 years, whereas DLBCL accounts for about 37% of NHL in adolescents aged 15–19 years and BL accounts for about 21% of NHL in the same age group. Primary mediastinal large B-cell lymphoma (PMBL) is now considered as a distinct entity of NHL, arising from mature thymic B-cells and accounting for 2% of mature B-cell lymphomas in children and adolescents.

This NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines) for Pediatric Aggressive Mature B-Cell Lymphomas provide recommendations for the diagnosis and management of pediatric patients with PMBL and sporadic variants of BL and DLBCL. The NCCN Pediatric Aggressive Mature B-Cell Lymphoma Panel considers “pediatric” to include any patient aged 18 years and younger, and AYA patients with good organ function treated in a pediatric oncology setting. AYA patients treated in an adult oncology setting should be treated as per the adult NCCN Guidelines for B-Cell Lymphomas. The Pediatric Aggressive Mature B-Cell Lymphomas panel considers “pediatric” to include any patient aged 18 years and younger, and AYA patients older than 18 years of age, who are treated in a pediatric oncology setting. Practice patterns vary with regards to AYA patients from center to center in terms of whether AYA patients (defined by the National Cancer Institute as <39 years of age) with mature B-cell lymphoma are treated primarily by pediatric or adult oncologists. These guidelines are intended to apply to AYA patients with good organ function treated in a pediatric oncology setting. AYA patients treated in an adult oncology setting should be treated as otherwise specified.

Clinical Presentation

PMBL usually presents as a bulky mediastinal mass in the anterior mediastinum (primary site of disease) with or without locoregional spread to adjacent organs such as chest wall, pleura, pericardium, and lung. Although extrathoracic dissemination to kidney or liver may occur, central nervous system (CNS) and bone marrow involvement are generally rare. Patients may also present with clinical symptoms related to rapid growth of a mediastinal mass (tumor lysis syndrome, superior vena cava syndrome, respiratory distress due to airway compression, pericardial and pleural effusions) and those with abdominal disease may present with abdominal distention and nausea/vomiting.
ADDITONAL DIAGNOSTIC TESTING\(^c\)

**ESSENTIAL**

- Adequate immunophenotyping to establish diagnosis\(^d,e,h\)
- IHC panel: Ki-67, BCL2, BCL6, CD3, CD10, CD20, MUM1
- Flow cytometry: Surface kappalambda, CD3, CD5, CD10, CD19, CD20, CD45
- IHC panel for PMBL: CD10, CD19, CD20, CD4, CD23, CD30, BCL2, BCL6, MUM1, and Ki-67; EBV is absent
- Flow cytometry panel for PMBL: Surface kappalambda, CD3, CD5, CD10, CD19, CD20, CD22, CD23, and CD45
- FISH: MYC rearrangement

**USEFUL UNDER CERTAIN CIRCUMSTANCES**

- Karyotype: (8;14) or variants (1:6:22) to identify additional chromosomal abnormalities
- FISH for BCL2 and BCL6 rearrangements
- FISH or single nucleotide polymorphism (SNP) array for 11q aberration
- EBER-ISH\(^k\)
- MYC IHC
- TdT IHC or flow cytometry
- Clonality testing by polymerase chain reaction (PCR) for immunoglobulin gene rearrangement

\(^c\) See Principles of Diagnostic Pathology (PBCL-A)*.
\(^d\) Typical immunophenotype of BL: sIg+, CD10+, CD20+, TdT, Ki-67+ (≥95%), BCL2, BCL6+, simple karyotype with MYC rearrangement as sole abnormality. Typical immunophenotype of DLBCL: sIg+, CD20+, TdT, Ki-67 variably high, CD10+, BCL2+, BCL6+, variable karyotype with MYC, BCL2, BCL6, and/or other IGH rearrangements.
\(^e\) Typical immunophenotype of PMBL: sIg, B-cell antigens+ (CD19+, CD20+, CD79a+, and PAX5+), CD23+, CD30+, MUM1+, BCL2+/-, and BCL6+/-; EBV EBER is negative. See Use of Immunophenotyping/Genetic Testing in Differential Diagnosis of Mature B-Cell and NK/T-Cell Neoplasms (NHODG-A) in the NCCN Guidelines for B-Cell Lymphomas.
\(^f\) If flow cytometry is initially performed, IHC for selected markers (BCL2 and Ki-67) can supplement the flow results.
\(^g\) On formalin-fixed, paraffin-embedded tissue, MYC rearrangement is best assessed by MYC break apart probe to capture any partner gene.
\(^h\) Double-and triple-hit lymphomas are currently not well described or studied in the pediatric population but FISH for BCL2 and BCL6 rearrangements may be considered in the AYA population.
\(^i\) EBER-ISH is most applicable in endemic BL or immunocompromised clinical settings for either BL or DLBCL.

\*Available online, in these guidelines, at NCCN.org. \(\dagger\) To view the most recent version of these guidelines, visit NCCN.org.

---

**Diagnosis**

**Biopsy**

Excisional or incisional biopsy of the most accessible site is preferred, with fresh biopsy tissue sent to pathology in saline to ensure viable diagnostic tissue (see PBCL-1, page 1268). Fine-needle aspiration biopsy alone is not suitable for the initial diagnosis of mature B-cell lymphomas.\(^10\)

A core needle biopsy is not optimal but can be used when a lymph node or tumor mass is not easily accessible for excisional or incisional biopsy. Touch preparation of fresh tissue samples is recommended whenever possible to obtain essential cytologic details that may be difficult to detect in small core needle biopsy samples, and hematopathology review should be performed as clinically indicated.\(^11\)

PMBL has variable morphologic features, and typical findings include diffuse sheets of atypical lymphocytes in a background of compartmentalizing fibrosis.\(^7,9,12\)

The atypical lymphocytes are medium to large in size, with round to lobulated or irregular nuclei, dispersed chromatin, prominent nucleoli, and abundant pale to clear cytoplasm. Occasionally, atypical lymphocytes are more pleomorphic and may even resemble Reed-Sternberg cells.\(^7,9\)

---

**Additional Diagnostic Testing**

Immunophenotyping is essential for the differentiation of mature B-cell lymphoma subtypes and it can be performed using immunohistochemistry and flow cytometry (see PBCL-2, above). Cytogenetic or molecular genetic analysis may be necessary under certain circumstances to identify the specific chromosomal translocations that are characteristic of each subtype or to establish clonality.

PMBL expresses B-cell antigens and lacks surface immunoglobulin. PMBL is CD19+, CD20+, CD79a+, PAX5+, CD23+, and MUM1+ with a variable expression of BCL2 and BCL6.\(^9\)

CD30 is heterogeneously expressed in more than 80% of cases. BCL2, BCL6, and MYC rearrangements are very rare. PMBL is almost always negative for EBV and the presence or absence of EBV is useful to differentiate PMBL from other mediastinal lymphomas with overlapping pathologic features.

Gene expression profiling has shown that adult PMBL has molecular features that overlap with classic Hodgkin lymphoma and the biology of pediatric PMBL has also been reported to be similar to that of adult PMBL.\(^13-16\) Genetic alterations involving the major histocompatibility complex class II transactivator gene at chromosome 16p are highly recurrent in PMBL.\(^17,18\) Gains or amplifications in chromosome 9p24 (including JAK2, PD1, and PD2) and
chromosome 2p16 (including REL and BCL11A) have also been detected in PMBL.

**Workup**

Workup for patients with a diagnosis of PMBL includes history and physical examination, laboratory analysis, bilateral bone marrow aspirate and biopsy, lumbar puncture, and imaging. Imaging should include cross-sectional scans of the neck, chest, abdomen, and pelvis. Cross-sectional scans of the neck, chest, abdomen, and pelvis should be obtained for full diagnostic quality, high-resolution CT or MRI. In addition, a baseline echocardiogram or multigated acquisition scan and ECG should be obtained to assess cardiac status. FDG-PET/CT or FDG-PET/MRI does not exclude the need for full diagnostic quality high-resolution CT or MRI.

**Treatment Recommendations**

**Primary Mediastinal Large B-Cell Lymphoma**

**Initial Treatment**

Historically, pediatric patients with PMBL enrolled in prospective clinical trials of pediatric mature aggressive B-cell lymphomas have been treated with same protocols used for BL and DLBCL (dose-intensive multiagent chemotherapy regimens and intrathecal therapy for CNS prophylaxis). However, outcomes in the subset of patients with PMBL differs from those of BL and DLBCL, with reported 5-year event-free survival (EFS) rates of 66%–70%.

The Berlin Frankfurt-Munster (BFM) Group reported the pooled outcomes of 30 patients with PMBL (median age, 14 years) enrolled in 3 consecutive NHL-BFM trials. Treatment consisted of 4–6 courses of intensified chemotherapy using steroids, oxazaphosphorine alkylating agents, methotrexate, cytarabine, etoposide, and doxorubicin. With a median follow-up of 5 years, the estimated EFS rate was 70%. Residual mediastinal masses were present in 15 patients after the end of treatment (EOT) and elevated lactate dehydrogenase LDH (≥500 U/L) was associated with increased risk of failure in multivariate analysis. In the international FAB/LMB96 mature B-cell NHL trial that enrolled 42 patients with PMBL, the estimated 5-year EFS and overall survival (OS) rates were 66% and 73%, respectively. Patients received prephase therapy with COP (low-dose cyclophosphamide, vincristine, and prednisone) followed by an induction course of COPADM (cyclophosphamide, vincristine prednisone, doxorubicin, and methotrexate) and a consolidation course of CYM (cytarabine and high-dose methotrexate).
The French LMB2001 prospective study evaluated intensive LBMBased chemotherapy (based on the FAB/LMB96 protocol) in pediatric patients with PMBL (42 of 773 patients with newly diagnosed B-cell NHL had PMBL). All patients received prephase COP followed by 4 to 8 courses (induction, consolidation, and maintenance) of chemotherapy and rituximab was added to chemotherapy after 2008. In 2010, the protocol was modified to recommend 6 courses of LBMB-modified chemotherapy (B/C) with rituximab for all patients (2 induction courses of R-COPADM followed by 2 consolidation courses of R-CYVE [rituximab, cytarabine, and etoposide] and 2 courses of maintenance therapy [vincristine, cytarabine, doxorubicin, prednisone, and rituximab]). The cumulative dose of doxorubicin was limited at 240 mg/m². The median follow-up was 7 years (11 years for patients treated without rituximab and 6 years for those treated with rituximab). The 5-year EFS and OS rates were 88% and 95%, respectively, for the whole population. This study also showed that the addition of rituximab to chemotherapy improves the outcome (not based on a randomized comparison but based on a comparison of 2 periods using different intensity chemotherapy). The 5-year EFS rate was 95% with rituximab and 81% without rituximab. The corresponding 5-year OS rates were 100% and 91%.

Dose-adjusted EPOCH-R without radiation therapy (RT) has been shown to be effective in adult patients with PMBL without the routine use of RT and the use of RCHOP with a PET-adapted approach has also been associated with favorable outcomes in adult patients with PMBL. There are limited data with dose-adjusted EPOCH-R in pediatric patients (as discussed subsequently).

In a multicenter retrospective analysis of 156 children and adults with PMBCL treated with dose-adjusted EPOCH-R, with a median follow-up of 23 months, the estimated 3-year EFS and OS rates were 86% and 95%, respectively. The outcomes were not statistically different between pediatric and adult patients in terms of both EFS (81% vs 87%; P=.338) and OS (91% vs 97%; P=.170). Thrombotic complications were more common in pediatric patients (46% compared with 23% in adult patients; P=.011). Another analysis that compared outcomes for pediatric patients with PMBCL from 3 different trials also reported that modified dose-adjusted EPOCH-R (with at least one dose of intrathecal therapy and cumulative dose of doxorubicin limited at 360 mg/m²) resulted in a superior 5-year EFS rate (84%) compared with intensive chemotherapy regimens used in the B-NHL-BFM-04 (59%; P=.016) and NHL-BFM 95 (39%; P<.001) trials.

See Principles of Systemic Therapy (PBCL-B)†.
See Response Criteria (PBCL-C)‡.
Definitive diagnosis may not be feasible before beginning treatment. Short course of COP regimen is recommended. Enrolment in a clinical trial is recommended.
An FDA-approved biosimilar is an appropriate substitute for rituximab.
Optimal treatment has not been established. Enrollment in a clinical trial is recommended.
Remission assessment was performed after the second consolidation course. At the EOT, if PET/CT is positive, or a large residual tumor remains, then biopsy/removal of the residual mass is recommended. No treatment decisions were to be based on PET/CT results only.
Residual mediastinal masses are common. Biopsy of PET-positive mass is recommended if additional systemic treatment is contemplated.
In the vast majority of patients, relapse occurs within 18 months of diagnosis. EOT PET scan can have a fair number of false positives. Biopsy is warranted to confirm relapse.
The corresponding 5-year OS rates were 90%, 72%, and 70%, respectively.

A more recent multicenter single arm prospective phase II study involving 46 pediatric patients with PMBL showed that dose-adjusted EPOCH-R did not improve EFS compared with survival rates from the FAB/LMB 96 study (discussed previously). After a median follow-up of 59 months, the 4-year EFS and OS rates were 70% and 85%, respectively. Although the EFS rates were not better in this study, dose-adjusted EPOCH-R had a favorable toxicity profile (grade 2 adverse cardiac events occurred in only 9% of patients). In this study, adherence to dose-intensity was not followed in 29% of patients. These results are in contrast to the EFS and OS rates for dose-adjusted EPOCH-R reported in the aforementioned analyses, and the survival rates reported in this phase II study are also inferior to those reported in the LMB2001 prospective study (discussed previously).

In the absence of data from randomized trials, optimal first-line treatment of patients with PMBL has not been established. Enrollment in a clinical trial is preferred for all patients. Based on the available data (as discussed previously), the following regimens are included as options for first-line therapy: dose-adjusted EPOCH-R (6 cycles) or R-CHOP (6 cycles) or RT or LMB-modified B/C chemotherapy with rituximab (see PBCL-12, page 1271). There are not enough data on the use of RT in pediatric patients. De
e
t
c

Primary Mediastinal Large B-Cell Lymphoma

<table>
<thead>
<tr>
<th>RELAPSE OR REFRACTORY PMBL</th>
<th>THERAPY FOR RELAPSE OR REFRACTORY DISEASE</th>
<th>RESPONSE</th>
<th>CONSOLIDATION/ADDITIONAL THERAPY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relapse or refractory disease</td>
<td>Clinical trial (preferred) or DHAP + rituximab or RICE or Pembrolizumab or Nivolumab</td>
<td>Response assessment at EOT</td>
<td>CR: Autologous HCT (if eligible) ± RT or Clinical trial or Brentuximab vedotin + nivolumab or pembrolizumab or Anti-CD19 CAR T-cell therapy (after ≥2 prior chemotherapy regimens) or Pembrolizumab or Nivolumab</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PR: Clinical trial or Brentuximab vedotin + nivolumab or pembrolizumab or Anti-CD19 CAR T-cell therapy (after ≥2 prior chemotherapy regimens) or Pembrolizumab or Nivolumab</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;PR: Clinical trial or Best supportive care</td>
</tr>
</tbody>
</table>

"See Principles of Systemic Therapy (PBCL-B)."
"See Response Criteria (PBCL-C)."
"Optimal treatment has not been established. Enrollment in a clinical trial is recommended.
"An FDA-approved biosimilar is an appropriate substitute for rituximab.
"There are not enough data on the use of RT in pediatric patients.
"In the vast majority of patients relapse occurs within 18 months of diagnosis. EOT PET scan can have a fair number of false positives. Biopsy is warranted to confirm relapse.
"RT is often included in high-dose therapy regimens given prior to autologous HCT. RT could be an option for local recurrence. Allogeneic HCT is not considered an optimal approach.

Available online, in these guidelines, at NCCN.org. To view the most recent version of these guidelines, visit NCCN.org.
residual mass was recommended. A PET-adapted treatment approach was also used to identify adult patients for whom RT can be safely omitted, and only those with a PET-positive scan at EOT received RT. However, the role of RT in patients with a positive EOT PET remains undefined in pediatric patients due to the increased late effects of RT.

The guidelines recommend response assessment at EOT with PET/CT. Routine clinical surveillance (as described subsequently) is recommended for patients with a complete response (CR) to initial treatment (negative PET; Deauville 1–3). Additional imaging studies (PET/CT or PET/MRI or chest CT) should be considered for patients experiencing less than CR (positive PET; Deauville 4–5). Patients experiencing less than CR to initial treatment should be managed as described for relapsed/refractory disease. Biopsy of PET-positive mass is recommended if additional treatment is contemplated.

**Surveillance**

In the vast majority of patients, relapse occurs within 18 months of diagnosis. Biopsy is warranted to confirm relapse before the start of treatment of relapsed/refractory disease because PET scans can show a fair number of false-positive results. History and physical examination are recommended every 3 to 6 months in the first 3 years, and then annually. Monthly monitoring of CBC with differential is recommended until counts are normal and then at each exam visit. Surveillance imaging (PET/CT, PET/MRI, or CT chest/abdominal/pelvis) should only be considered if there is a clinical suspicion of relapse. In addition, patients should be monitored for late effects of treatment as per the COG Survivorship Guidelines.

**Treatment of Relapsed/Refractory Disease**

The management of relapsed/refractory PMBL in both pediatric and adult patients is similar to the management of relapsed/refractory DLBCL: second-line therapy with cross-resistant chemoimmunotherapy regimens followed by autologous hematopoietic cell transplantation (HCT) and outcomes following HCT are more favorable in patients with chemosensitive disease.

Targeted therapies such as programmed cell death inhibitors (pembrolizumab and nivolumab) and anti-CD30 antibody drug conjugate (brentuximab vedotin, single agent or in combination with nivolumab) have shown activity in relapsed/refractory PMBL. Anti CD19 CAR T-cell therapy has demonstrated significant efficacy for the treatment of relapsed/refractory DLBCL in adult patients after ≥2 prior systemic therapy regimens. Axicabtagene ciloleucel, tisagenlecleucel, and lisocabtagene maraleucel are the 3 anti-CD19 CAR T-cell therapies that are approved for relapsed/refractory DLBCL in adults. Tisagenlecleucel is also approved for relapsed/refractory acute lymphoblastic leukemia in pediatric and young adult patients.

Very limited data are available regarding the outcome of pediatric patients with relapsed/refractory PMBL. Enrollment in clinical trials is recommended for all patients. R-ICE (rituximab, ifosfamide, carboplatin, and etoposide), R-DHAP (rituximab, dexamethasone, cytarabine, and cisplatin), pembrolizumab, and nivolumab are included as options for second-line therapy for relapsed/refractory PMBL (see PBCL-13, page 1272). Patients with a CR to second-line therapy should receive a autologous HCT. Allogeneic HCT is not considered an optimal approach. RT alone could be an option for local recurrence with disease restricted to the mediastinum.

Brentuximab vedotin in combination with nivolumab or pembrolizumab and anti-CD19 CAR T-cell therapies (axicabtagene ciloleucel or lisocabtagene maraleucel) are included as options for patients with partial response to second-line therapy. Limited data are available on the use of CAR T-cell therapies for pediatric patients with mature B-cell lymphomas. The inclusion of axicabtagene ciloleucel or lisocabtagene maraleucel as options for relapsed/refractory PMBL is based on extrapolation of data from clinical trials that have evaluated these therapies in adult patients with relapsed/refractory DLBCL including PMBL. Patients with relapsed/refractory PMBL were included in the ZUMA-1 (axicabtagene ciloleucel) and TRANSCEND-NHL-001 trials (lisocabtagene maraleucel), whereas patients with relapsed/refractory PMBL were not included in the JULIET trial (tisagenlecleucel). Ongoing clinical trials are evaluating CAR T-cell therapies in pediatric patients with NHL.

Clinical trial or best supportive care are recommended for patients experiencing less than partial response to second-line therapy.

**References**


<table>
<thead>
<tr>
<th>Panel Member</th>
<th>Clinical Research Support/Data Safety Monitoring Board</th>
<th>Scientific Advisory Boards, Consultant, or Expert Witness</th>
<th>Promotional Advisory Boards, Consultant, or Speakers Bureau</th>
<th>Specialties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saro Armenian, DO, MPH</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Hematology/Hematologic oncology</td>
</tr>
<tr>
<td>Anthony N. Audino, MD</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology</td>
</tr>
<tr>
<td>Matthew Barth, MD</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology</td>
</tr>
<tr>
<td>Lindsay Blazin, MD, MPH</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology; Hematology/Hematologic oncology</td>
</tr>
<tr>
<td>David Bloom, MD</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Diagnostic radiology</td>
</tr>
<tr>
<td>Jong Chung, MD</td>
<td>Forma Therapeutics; Novartis Pharmaceuticals Corporation</td>
<td>Chiesi; Global Blood Therapeutics</td>
<td>None</td>
<td>Pediatric oncology</td>
</tr>
<tr>
<td>Kimberly Davies, MD</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology</td>
</tr>
<tr>
<td>Hilda Ding, MD</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology</td>
</tr>
<tr>
<td>James B. Ford, DO</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology</td>
</tr>
<tr>
<td>Paul J. Galardy, MD*</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology</td>
</tr>
<tr>
<td>Rabi Hanna, MD</td>
<td>Regeneron Pharmaceuticals</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology; Bone marrow transplantation</td>
</tr>
<tr>
<td>Robert Hayashi, MD</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology; Bone marrow transplantation</td>
</tr>
<tr>
<td>Cathy Lee-Miller, MD</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology</td>
</tr>
<tr>
<td>Andrea Judit Machnitz, MD</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology; Diagnostic radiology</td>
</tr>
<tr>
<td>Kelly W. Maloney, MD</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology</td>
</tr>
<tr>
<td>Lianna Marks, MD</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology</td>
</tr>
<tr>
<td>Paul L. Martin, PhD, MD</td>
<td>Bluebird Bio; Novartis Pharmaceuticals Corporation</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology; Diagnostic radiology</td>
</tr>
<tr>
<td>David McCall, MD</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology</td>
</tr>
<tr>
<td>Martha Pacheco, MD</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology</td>
</tr>
<tr>
<td>Anne F. Reilly, MD, MPH</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology</td>
</tr>
<tr>
<td>Mikhail Roshal, MD, PhD*</td>
<td>Agios; Cellularity; Roche Laboratories, Inc.</td>
<td>Auron</td>
<td>None</td>
<td>Pathology</td>
</tr>
<tr>
<td>Sophie Song, MD, PhD</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Pathology</td>
</tr>
<tr>
<td>Joanna Weinstein, MD</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology</td>
</tr>
<tr>
<td>Ana C. Xavier, MD</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology</td>
</tr>
<tr>
<td>Sara Zarnegar-Lumley, MS, MD</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Pediatric oncology</td>
</tr>
</tbody>
</table>

The NCCN Guidelines Staff have no conflicts to disclose.
*The following individuals have disclosures relating to employment/governing board, patent, equity, or royalty:
  Paul J. Galardy, MD: Abbott Laboratories, AbbVie, Inc., and Johnson & Johnson
  Mikhail Roshal, MD, PhD: Auron