Elevation of levels of serum (1→3) beta-D-glucan (BDG), an important cell wall component of most fungi, including *Pneumocystis jirovecii*, have been observed in adult patients with *Pneumocystis jirovecii* pneumonia (PCP), usually at levels exceeding 500 pg/ml (4, 6, 10). However, there are no reports to date on the use of this serological marker to assist in diagnosing PCP in children. We report 3 immunocompromised children who presented to the Children’s Hospital of Southwest Florida with elevated serum BDG levels with confirmed (n = 1) and presumed (n = 2) PCP based on clinical presentation (Table 1).

All patients were hypoxemic and developed bilateral interstitial infiltrates radiographically, which led to the suspicion of PCP. All three patients were on PCP prophylaxis with pentamidine. Two patients had a bronchoalveolar lavage (BAL) performed, and one had positive Giemsa staining (GMS) for *Pneumocystis jirovecii*. In the second patient, trimethoprim-sulfamethoxazole (TMP-SMX) and prednisone were discontinued after the BAL fluid was negative for PCP GMS, and 48 h later, she deteriorated, developed increasing interstitial pulmonary infiltrates and hypoxemia, and was changed to oscillatory ventilation. All patients responded to therapy with TMP-SMX, supporting the diagnosis of PCP.

Establishing the diagnosis of PCP in non-HIV-immunocompromised patients can be difficult. The sensitivity of the BAL fluid for the diagnosis of PCP has been shown to be lower in non-HIV patients, as well as in patients receiving aerosolized pentamidine (1, 3, 5). Therefore, finding markers that aid in diagnosis in this population is important.

Fiscelli and Sax (8) commented on the usefulness of the BDG assay in HIV patients with clinical suspicion of PCP despite negative microscopic results. They described 3 patients with respiratory failure and radiologic findings consistent with PCP with elevated serum levels of BDG of >500 pg/ml who experienced favorable outcomes after therapy. Del Bono et al. (2) found similar elevated levels of BDG (median, 423 pg/ml; range, 113 to 523 pg/ml) in 16 immunocompromised patients who met clinical criteria for PCP but had no BAL performed.

There is very little experience regarding the performance of the BDG test in children, with only 3 studies published in the medical literature (7, 9, 11). Smith et al. (9) measured BDG levels in 120 normal children and found a mean value of 68 (±128) pg/ml, which is higher than the normal range for adults (<60 pg/ml), with 2 patients with levels over 500 pg/ml. Mularoni et al. (7) measured BDG levels in 4 pediatric patients with confirmed invasive fungal infections (*Candida parapsilosis* and filamentous fungi), and all patients had levels greater than 500 pg/ml. Zhao et al. (11) prospectively evaluated the diagnostic value of BDG for invasive fungal infections in 130 immunocompromised pediatric patients and found that the assay had a sensitivity and specificity of 81.8 and 82.4%, respectively; however, none of their patients had PCP.

Our limited experience suggests that measuring BDG levels in immunocompromised children with clinical and radiographic suspicion for PCP may be a useful noninvasive diagnostic tool. We acknowledge that larger studies with confirmed cases in the pediatric population are required to validate these observations and to establish a cutoff BDG value for the diagnosis of PCP in children. Nonetheless, we think it is important to raise the awareness of the potential use of this noninvasive assay in pediatric patients with *Pneumocystis jirovecii*.

### TABLE 1. Patient characteristics

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age (yr)/race/ gender</th>
<th>Underlying condition</th>
<th>PCP prophylaxis</th>
<th>Oxygen saturation on room air (%)</th>
<th>LDH</th>
<th>BDG level (pg/dl)</th>
<th>BAL result</th>
<th>Treatment/outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9/Hispanic/M</td>
<td>Non-Hodgkin’s lymphoma</td>
<td>Monthly inhaled pentamidine</td>
<td>90-93</td>
<td>Xray found bilateral interstitial infiltrates</td>
<td>N/A</td>
<td>&gt;500</td>
<td>Positive PCP GMS, positive PCP PCR</td>
</tr>
<tr>
<td>2</td>
<td>11/white/F</td>
<td>Acute lymphoblastic leukemia</td>
<td>Monthly inhaled pentamidine</td>
<td>80</td>
<td>Xray found bilateral interstitial infiltrates</td>
<td>796</td>
<td>&gt;500</td>
<td>Negative PCP GMS, PCP PCR</td>
</tr>
<tr>
<td>3</td>
<td>3/Hispanic/F</td>
<td>Non-Hodgkin’s lymphoma</td>
<td>Monthly intravenous pentamidine</td>
<td>88-89</td>
<td>CT found bilateral interstitial infiltrates</td>
<td>N/A</td>
<td>&gt;500</td>
<td>TMP-SMX plus prednisone/survived</td>
</tr>
</tbody>
</table>

*PCP, *Pneumocystis jirovecii* pneumonia; LDH, lactate dehydrogenate; BDG, serum (1→3)-beta-D-glucan; BAL, bronchoalveolar lavage; M, male; F, female; Xray, chest radiograph; CT, computed tomography scan; GMS, Giemsa staining; TMP-SMX, trimethoprim-sulfamethoxazole; N/A, not performed.

*BDG levels tested at ViraCor, Lee’s Summit, MO, for patient 1 and at Beacon Diagnostics, Falmouth, MA, for patients 2 and 3.*
REFERENCES


