Urine Blastomyces Antigen Testing in an Integrated Medical System

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PROBLEM
- Blastomycosis is a potentially serious systemic and cutaneous fungal infection which mimics a variety of other diseases. Proper diagnosis is important to avoid increased morbidity and mortality.1,2
- Fungal culture is the gold standard for diagnosis of blastomycosis, however it is reportedly 86% sensitive and may take up to 5 weeks for the organism to grow. Fungal smears for rapid diagnosis vary from 24-55% sensitivity depending on the size sampled, and serologic tests often have low sensitivity.1,2

OBJECTIVE
- Explore the geodemographic and clinical features of patients on whom BuAg is performed and compare its test performance to other non-invasive tests for Blastomycosis.

METHODS
- Design: Retrospective chart review of 834 BuAg performed on unique patients, June 2013 through May 2016, for test characteristics and geodemographic features. Of these, 100 cases from 2015 (year containing an outbreak) were randomly selected for detailed analysis of index illness features, testing and ultimate diagnosis. Descriptive statistics compared with chi-square/Fisher exact test or t-tests.
- Patients: Every patient having BuAg performed; first test within time period was studied.
- Setting: Large, integrated Eastern Wisconsin medical system.

RESULTS, CONTINUED
- Sensitivity of BuAg was 91% (based on 12 culture-positive cases)
- Specificity 98%
- PPV=78%
- Only 2/19 (11%) culture positive cases were positive by BlastoAb- ID, Q7/17 by CF.
- Of those with positive BuAg, 16% of co-tested were positive by Ab ID, 4% by CF; all positive ID/CF were positive by BuAg.
- Histoplasma urine antigen was co-performed with BuAg in 69%, positive in 22/378; 16/25 were also BuAg positive (known cross-reactivity).

100 patient charts were examined for index illness details:
- 7 were ultimately diagnosed with blastomycosis (6 had positive BuAg)
- 7 with other fungal disease
- 26 with non infectious lung disease
- 22 pneumonia
- 5 skin lesions
- 6 malignancies
- 3 mycobacterial infections
- 11 other diagnoses (plus 1 unknown entity)
- 12 were tested based on symptoms.

Table 2. Time of onset to test, and test to diagnosis, by category

<table>
<thead>
<tr>
<th>Time from Onset to Test</th>
<th>Time from BuAg to Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Subjects</td>
<td>No. of Subjects</td>
</tr>
<tr>
<td>&lt;7 days</td>
<td>24</td>
</tr>
<tr>
<td>7-30 days</td>
<td>33</td>
</tr>
<tr>
<td>1-3 months</td>
<td>19</td>
</tr>
<tr>
<td>&gt;3 months</td>
<td>8</td>
</tr>
</tbody>
</table>

In the river associated Eastern Wisconsin outbreak, similar to non-outbreak cases, 88% of positive cases had at least one other test for Blastomycosis performed, yet BuAg was the only test positive in 9/16 (56%) in outbreak cases v. 6/34 (18%, p=0.009) other cases.

CONCLUSIONS
- BuAg is now commonly used in our region for work-up of broad differential diagnoses or known exposures.
- It may be particularly useful in outbreaks.
- Of those tested with BuAg, non-White patients (particularly Asians), and males were more likely to be positive.
- Not adding Blastomyces CF and ID tests ($40 each) to BuAg would save money without losing sensitivity.

REFERENCES

ACKNOWLEDGMENTS
I thank Julie Prabucki, MT (ASCP) for providing laboratory data, and Jessica J. F. Kram, MPH for logistic and regulatory assistance.

Table 1. Demographic features of subjects BuAg Positive versus Negative

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Positive BuAg</th>
<th>Negative BuAg</th>
<th>Total</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>35 (7.6%)</td>
<td>425 (92.4%)</td>
<td>460</td>
<td>0.042</td>
</tr>
<tr>
<td>Female</td>
<td>15 (4.0%)</td>
<td>359 (96.0%)</td>
<td>374</td>
<td>0.448</td>
</tr>
<tr>
<td>White</td>
<td>27 (4.1%)</td>
<td>678 (95.9%)</td>
<td>655</td>
<td>0.790</td>
</tr>
<tr>
<td>Black</td>
<td>6 (8.5%)</td>
<td>65 (91.5%)</td>
<td>71</td>
<td>0.124*</td>
</tr>
<tr>
<td>Hispanic</td>
<td>2 (3.8%)</td>
<td>51 (96.2%)</td>
<td>53</td>
<td>0.634</td>
</tr>
<tr>
<td>Asian</td>
<td>12 (37.9%)</td>
<td>20 (62.1%)</td>
<td>32</td>
<td>0.397</td>
</tr>
<tr>
<td>Native American</td>
<td>1 (12.5%)</td>
<td>7 (87.5%)</td>
<td>8</td>
<td>1.000*</td>
</tr>
<tr>
<td>Linkwoni</td>
<td>2 (20.0%)</td>
<td>8 (80.0%)</td>
<td>10</td>
<td>1.000*</td>
</tr>
<tr>
<td>All Non-White</td>
<td>23 (18.3%)</td>
<td>151 (81.7%)</td>
<td>174</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

* Compared to White
*Includes 23 Southeast Asians, 9 were positive
*Outbreak related subjects removed

Figure 1. Blastomycosis yeast forms in culture

Figure 2. Shoreline of river involved in outbreak