Immune Response to *Bacteroides ureolyticus* in a Patient with Brain Abscess

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A high titer (1:256) of agglutinating antibodies against *Bacteroides ureolyticus* was demonstrated in a 35-year-old woman with brain abscess, using a microagglutination test. Tests done with *B. ureolyticus* and heterologous sera as well as with heterologous strains and the patient’s serum were negative. Circulating antibody to *B. ureolyticus* has not been reported previously.

The role of anaerobic bacteria, especially that of *Bacteroidaceae*, has been well established in clinical infections (6, 7, 13, 15, 17–19). However, knowledge of the host-parasite interactions involved in infections with anaerobic bacteria is rather limited. The immune response in infections due to *Bacteroides* spp. has not been studied extensively. Although the first such report was in 1922 (11), subsequent reports have been few and far between (1, 2, 14,16). The present paper deals with an immune response to an infecting strain of *Bacteroides ureolyticus* in a patient with brain abscess.

A 35-year-old woman was admitted to the Neurology Ward of the Christian Medical Hospital, Vellore, India, in September 1979, with evidence of a space-occupying lesion in the left parietal region. A large abscess with an ill-defined wall was encountered in the posterior and inferior part of the left parietal lobe during surgery.

The aspirated material was cultured both aerobically and anaerobically (3, 4, 10). A heavy growth of *Bacteroides* colonies and a few *Fusobacterium* colonies were grown in anaerobic culture. The *Bacteroides* grew as small, translucent, smooth colonies, easily emulsifiable. *Fusobacterium*, on the other hand, showed rough colonies with a tendency for spontaneous agglutination. Anthony staining (5) revealed the presence of a capsule in *Bacteroides*. The asaccharolytic *Bacteroides* strain was identified as *B. ureolyticus* by S. M. Finegold at the Wadsworth Medical Center, Los Angeles, Calif., as the strain was positive for the enzyme urease. This finding was confirmed at our laboratory also. The patient was started on chloramphenicol and metronidazole and gradually recovered over a period of 1 month without any neurological deficit.

Microagglutination tests (MATs) were performed on multiple serum samples collected 2, 5, 11, 23, and 32 days after surgery. Whole-cell antigen (2) was used after the organism was grown on brain heart infusion-blood agar for 72 h and harvested with physiological salt solution. The MAT was performed with serial doubling dilutions of the samples, using physiological salt solution as the diluent. A 0.05-ml portion of the antigen, adjusted to Browne opacity no. 3, was added to an equal quantity of serum. The microtiter plates were incubated at 37°C for 18 h, and results were read with a magnifying mirror. Tests were also done with cells heated at 100°C for 30 min. The MAT was also performed on heterologous sera obtained from three patients, two with *Bacteroides fragilis* infection (septicaemia and empyema thoracis, respectively) and one with postabortal sepsis from whom *Bacteroides melaninogenicus* and *Peptostreptococcus* species were isolated. Similarly, tests were done with *B. fragilis* obtained as described above as heterologous strains. Ten sera obtained from healthy people were used as controls.

Results of MATs done with serum samples from the brain abscess patient, using *B. ureolyticus*, are shown in Table 1. The titers of the first two samples were very high, but they dropped over a period of 1 month. Tests performed with cells heated at 100°C for 30 min gave negative results, showing the thermolability of the antigen. Among the three heterologous sera tested, only one showed a positive result, but the titer was very low (<1:32). Tests done with strains of *B. fragilis* and the patient’s serum were negative. Of the 10 control sera obtained from healthy persons, only 1 showed a positive reaction (at 1:8) with *B. ureolyticus* antigen. All of these results substantiate the specificity of the reaction.
TABLE 1. Results of MAT

<table>
<thead>
<tr>
<th>Serum sample</th>
<th>Days after operation</th>
<th>Titer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>1:256</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>1:256</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td>1:128</td>
</tr>
<tr>
<td>4</td>
<td>23</td>
<td>1:64</td>
</tr>
<tr>
<td>5</td>
<td>32</td>
<td>1:32</td>
</tr>
</tbody>
</table>

Only a few studies have been reported in the literature about the immune response in *Bacteroides* infection (9). Various tests have been used for this purpose, namely, complement fixation, agglutination, indirect immunofluorescence, precipitation in agar gel, passive hemagglutination, and counterimmunoelectrophoresis (2, 8, 9, 11, 16). Agglutination and indirect immunofluorescence usually are used to detect antibodies to one or more surface antigens, including both thermolabile and thermostable antigens. Sensitive tests such as passive hemagglutination may give complementary results. Tests like precipitation in agar gel and counterimmunoelectrophoresis are performed mainly with extracted antigen and hence may not be as specific as the others for detecting an immune response. Various antigens have been demonstrated for the different species of *Bacteroides* and *Fusobacterium* (9); e.g., capsular and surface antigens have been demonstrated for *B. fragilis* (12) and *B. melaninogenicus* (9). Agglutination tests may be highly useful for detecting this. The antigen of *B. ureolyticus* involved in the immune response described in the present report is certainly thermolabile and possibly capsular in nature.

The MAT used for demonstrating the immune response in our patient showed a high titer of antibodies to *B. ureolyticus*, and this correlated with active infection. MAT is a simple and specific test and may be adopted for early diagnosis of anaerobic infections where the conventional isolation and identification tests may be time consuming and expensive. A better understanding about the antigenic makeup of *Bacteroides* is needed in this connection.

LITERATURE CITED