tropenic patient with aplastic anemia and rhino orbital zygomycosis was cured without surgery. The second patient, with liver transplantation and wound zygomycosis, died due to extensive necrosis of the bowel. Previous experience with this preparation of liposomal amphotericin B in the treatment of zygomycosis is extremely limited, but there is one report of successful treatment of rhino orbital zygomycosis in a patient with diabetic ketoacidosis (8).

Renal damage is the most significant potential toxic effect of amphotericin B administration. Impairment of renal function occurs early during treatment and may occur in 60 % to more than 80 % of patients receiving therapy. Although renal function may return to pretreatment levels after a brief cessation of therapy, return to pretreatment values may take several months in some patients, and a minority may suffer irreversible renal dysfunction (2). In our experience treatment with liposomal amphotericin B was associated with little nephrotoxicity, with a mean increase of baseline serum creatinine of 0.38 mg/dl (range -1.2 to 2.6 mg/dl). This finding is especially remarkable because four patients were treated simultaneously with cyclosporine A, a drug with known synergistic nephrotoxicity when used with amphotericin B (3). Only one patient had a substantial increase in serum creatinine from baseline (2.6 mg/dl), which was attributable to prerenal failure due to postoperative cardiac tamponade caused by clots, and that resolved after surgical decompression of the pericardial sac.

Hypokalemia is common in the majority of patients treated with amphotericin B. It may be either a consequence of enhanced excretion or a direct result of distal tubular damage. It is estimated that 90 % or more of patients treated with amphotericin B will require potassium supplementation (2). We found that most of the patients in this study developed hypokalemia with liposomal amphotericin B treatment, with a mean decrease of baseline potassium serum levels of 0.90 mEq/l. Nevertheless, this electrolyte disturbance was easily corrected in all patients with parenteral supplementation of potassium.

In summary, liposomal amphotericin B treatment was well tolerated and was associated with a favorable outcome in half of the patients with severe underlying conditions and life-threatening deep fungal infections. Further studies are needed in order to clarify the full spectrum of mycoses amenable to liposomal amphotericin B treatment as well as the optimal daily dosage and treatment duration. Randomized studies are also needed in order to assess the comparative efficacy and safety of amphotericin B and liposomal amphotericin B in the treatment of deep fungal infections.

References

Evaluation of a Commercial Kit in the Identification of Arcanobacterium haemolyticum and Actinomyces pyogenes

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Listeria-Zym is a commercial kit designed to identify Listeria spp. within 4 h. Its ability to identify two clinically important aerobic catalase-
negative, gram-positive rods, *Arcanobacterium haemolyticum* and *Actinomyces pyogenes*, was evaluated. Xylose fermentation and alpha-mannosidase tests differentiated *Arcanobacterium haemolyticum* (n = 49) from *Actinomyces pyogenes* (n = 24) strains.

*Arcanobacterium haemolyticum* (formerly * Corynebacterium haemolyticum*) (1) is an aerobic gram-positive rod that has been isolated from patients with pharyngitis, skin infections, sepsis, central nervous system infections, endocarditis or osteomyelitis (2). *Actinomyces pyogenes* is primarily a pathogen of domestic animals, but infections in humans have been reported (3, 4). *Arcanobacterium haemolyticum* and *Actinomyces pyogenes* are closely related. While both are catalase negative and often beta-haemolytic, the reactions that differentiate the two are xylose fermentation, gelatin hydrolysis and the reverse CAMP test (5). Commercially available identification systems vary in their ability to differentiate *Arcanobacterium haemolyticum* and *Actinomyces pyogenes* (6, 7). The Listeria-Zym (Rosco Diagnostica, Denmark) identification system includes tests that might be useful in the identification and differentiation of *Arcanobacterium haemolyticum* and *Actinomyces pyogenes*. We evaluated the ability of the Listeria-Zym system to identify these two organisms.

**Materials and Methods.** *Arcanobacterium haemolyticum* strains tested (n = 49) were clinical isolates from patients with pharyngitis or wound infections. They were identified as described by Krech and Hollis (5), i.e. on the basis of beta-haemolysis, Gram stain, catalase, nitrate reduction, urease, gelatin hydrolysis, motility and reverse CAMP tests and by fermentation of glucose, maltose, sucrose, mannitol and xylose. A black opaque dot could be seen at the centre of *Arcanobacterium haemolyticum* colonies after 48 h of incubation. As described, the black dot remained in the agar when the colony was scraped away (2). *Arcanobacterium haemolyticum* ATCC 9345 was used as a control strain. *Actinomyces pyogenes* strains (n = 24) were isolated from infected domestic animals and kindly given to us by the National Veterinary and Food Research Institute, Helsinki, Finland. *Actinomyces pyogenes* ATCC 19411 was used as a control. The bacteria were cultured on horse blood agar plates for 48 h at 35 °C in a humidified atmosphere of 5 % CO₂ in air and suspended in distilled water to obtain a turbidity equivalent to a McFarland no. 8 nephelometer standard before testing in the Listeria-Zym system (Rosco Diagnostica).

The Listeria-Zym kit is composed of ten tests (glucose, trehalose, salicin, mannitol, rhamnose and xylose, alpha-mannosidase and esculin hydrolysis, Voges-Proskauer and nitrate reduction) in tablets placed in mini-tubes attached to each other in a plastic cartridge. The results were read after 4 and 24 h of incubation at 35 °C in ambient air (8). The tests requiring addition of reagents (Voges-Proskauer, nitrate reduction) were read only after 4 h. For interpretation of the results, the colour chart supplied by the manufacturer was used.

**Results and Discussion.** The reactions of *Arcanobacterium haemolyticum* and *Actinomyces pyogenes* in the Listeria-Zym are given in Table 1. The reaction profiles are in good agreement with published results of conventional tests (9, 10). The two tests differentiating *Arcanobacterium haemolyticum* and *Actinomyces pyogenes* were

<table>
<thead>
<tr>
<th>Strain</th>
<th>Incubation time</th>
<th>Substrate</th>
<th>Percent positive reactions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>GLU</td>
<td>TRE</td>
</tr>
<tr>
<td><em>Arcanobacterium haemolyticum</em> (n = 49)</td>
<td>4 h</td>
<td>100</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>24 h</td>
<td>100</td>
<td>61</td>
</tr>
<tr>
<td><em>Actinomyces pyogenes</em> (n = 24)</td>
<td>4 h</td>
<td>100</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>24 h</td>
<td>100</td>
<td>96</td>
</tr>
</tbody>
</table>

GLU, glucose; TRE, trehalose; SAL, salicin; MAN, mannitol; RHA, rhamnose; XYL, xylose; αMAN, alpha-mannosidase.