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Septicemia Caused by the Gram-Negative Bacterium CDC IV c-2 in an Immunocompromised Human

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A 37-year-old man with plasma cell leukemia developed nonfatal septicemia caused by the gram-negative bacterium CDC IV c-2. Recovery followed appropriate treatment with antibiotics. The biochemical features of this organism are reviewed.

In 1983, the Centers for Disease Control published a series of guidelines used in the identification of CDC IV c-2, an oxidase-positive, gram-negative bacillus which does not oxidize glucose (2). We recently treated a community-acquired infection caused by this species in an immunocompromised patient.

A 37-year-old man was hospitalized for fever, myalgia, and rigors that had lasted for 2 days. He had previously been well and had received no immunosuppressive medication or antibiotics. He had a rectal temperature of 40°C and a pulse rate of 140/min. Mild hepatosplenomegaly was evident. The remainder of the physical examination was unremarkable.

Laboratory studies disclosed a blood hemoglobin concentration of 7.8 g/dl and a leukocyte count of 10,500/mm^3 (38% polymorphonuclear leukocytes, 22% plasma cells, 19% lymphocytes, 13% band forms, 5% monocytes, 2% myelocytes, and 1% myeloblasts). The erythrocyte sedimentation rate was 150 mm/h. Urinalyses and chest roentgenograms were normal. An examination of bone marrow aspirates provided a diagnosis of plasma cell leukemia. Quantitative immunoelectrophoresis revealed a serum immunoglobulin G concentration of 38.0 g/liter (normal concentration, 7.0 to 19.0 g/liter), an immunoglobulin A concentration of 0.1 g/liter (normal concentration, 0.9 to 4.5 g/liter), and an immunoglobulin M concentration of 0.1 g/liter (normal concentration, 0.5 to 2.1 g/liter). A kappa paraprotein was present in the electrophoretic zone of immunoglobulin G.

After acquisition of three specimens for blood culturing, the patient was treated with intravenous erythromycin (900 mg every 8 h) and intravenous cefotaxime (1 g every 6 h). After 48 h, intravenous amikacin was added (500 mg every 12 h). The fever gradually subsided, and the patient was placed on a program of chemotherapy and plasmapheresis. He has remained well for 7 months.

Each of the three blood culture specimens grew in BACTEC 6-B medium within 48 h. Specimens were not submitted for anaerobic culturing. Small yellow colonies of a short, gram-negative, oxidase-positive rod were isolated in pure cultures on 5% human blood in tryptose agar base (Difco Laboratories, Detroit, Mich.). We tentatively identified the organism as *Pseudomonas paucimobilis*, based upon an API 20E code number of 0200004 (Analytab Products, Plainview, N.Y.). The isolate was subsequently found to be CDC IV c-2 by the Special Bacteriology Section of the Centers for Disease Control. No other isolate of this organism has been recovered in our institutions.

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Further characteristics of the isolate were as follows. The isolate was a short, gram-negative rod, occasionally in chains, and was motile (polar, lateral, and peritrichous flagella). It was negative for the following: hemolysis on rabbit blood agar; growth on salmonella-shigella agar; nitrate reduction; indole production; gelatin hydrolysis; litmus milk; hydrolysis of cetrimide, acetamide, and esculin; serine assimilation; and oxidation-fermentation of glucose, D-xylose, mannitol, lactose, sucrose, and maltose. It was positive for the following: growth at 42°C; oxidase production; utilization of citrate (Simmons); utilization of urea (Christensen); catalase production; and tartrate assimilation. H_2S (paper strip test) was produced in trace amounts. The discrepancy between our identification and that of the Centers for Disease Control resulted from a negative urease reaction in our laboratory. The organism was susceptible to cefotaxime, cefamandole, cefoxitin, colistin, carbenicillin, mezlocillin, and piperacillin but was resistant to ampicillin, chloramphenicol, cephalothin, gentamicin, tobramycin, amikacin, and sulfamethoxazole-trimethoprim in a standard disk assay (1). Gilardi reported a similar pattern of antibiotic susceptibility for this organism (G. L. Gilardi, Clin. Microbiol. Newsl. **6**:149–152, 1984).

Relatively few gram-negative bacteria share biochemical features with the present isolate. Other oxidase-positive, glucose nonoxidizers include *Alcaligenes* species, *Bordetella bronchiseptica* (2), and species of other genera. *B. bronchiseptica* may be differentiated from CDC IV c-2 by a lack of pigment and the ability of *B. bronchiseptica* to grow on salmonella-shigella agar and reduce nitrate. Another related organism, *Bordetella parapertussis*, is oxidase negative and generally unable to grow at 42°C (2).

Human infections caused by CDC IV c-2 have not been reported previously. We suspect that the rarity of this organism in clinical material reflects a relatively low pathogenic potential. The fact that our patient's infection was not acquired during hospitalization is unusual; however, opportunistic invasion of immunocompromised hosts by uncommon gram-negative bacilli can no longer be considered a rare event.

LITERATURE CITED

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