Septicemia Due to a Maltose-Positive, Glucose-Negative Strain of Group C Neisseria meningitidis

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A glucose-negative, maltose-positive strain of group C Neisseria meningitidis was isolated from the blood of a 63-year-old man. Interestingly, maltose degradation was detected by radiometric methods but not by growth methods.

Neisseria meningitidis is an aerobic, gram-negative coccus which produces catalase and cytochrome-oxidase, does not produce DNase, and generally produces acid from glucose and maltose (1, 6). Meningococci cause a variety of infections, including meningitis and meningococcemia. We describe here a 63-year-old man with meningococcemia caused by a group C N. meningitidis which did not degrade glucose or maltose by growth methods but did degrade maltose by a radiometric nongrowth method. The isolate agglutinated in group C meningococcal antisera.

A 63-year-old man presented to the hospital with the chief complaints of vomiting and chills followed by fever. He denied cough or chest pain. On examination, he had a temperature of 40.5°C, a blood pressure of 144/70 mmHg, a pulse of 110/min, and a respiration rate of 26/min. His neck was supple. There were rales over the lower half of both lung fields and a grade 1/6 systolic ejection murmur at the left sternal border and apex. There was marked ankle edema. He also had mild diabetes mellitus.

Results of pertinent laboratory tests included a hemoglobin level of 13.8 g/dl; hematocrit 40.7%; erythrocyte count of 5.11 x 10^6/mm^3; leucocyte count of 6,800/mm^3, with 88% neutrophils, 1% stab forms, 10% lymphocytes, and 1% monocytes; and an erythrocyte sedimentation rate of 35 mm/h.

Two blood cultures were obtained. The patient was given 500 mg of erythromycin intravenously every 6 h. The next day he was much better, being afebrile by afternoon, and remained so throughout his hospital course. On hospital day 3, the laboratory reported that gram-negative diplococci were growing in both of the blood cultures. Erythromycin was discontinued, and therapy with 4 x 10^8 U of penicillin G intravenously every 4 h was started. A lumbar puncture showed normal cerebrospinal fluid findings. There was no growth on culture. After 4 days, the penicillin G therapy was changed to oral 500 mg of penicillin orally every 6 h. The patient did well and was discharged on hospital day 12.

The gram-negative diplococcus was identified as Neisseria meningitidis group C by usual laboratory methods (6). The characteristics of this isolate are listed in Table 1. Initial testing occurred after approximately 3 subcultures on blood agar, and repeat testing was done after approximately 10 subcultures on blood and chocolate agars. Smooth, moist colonies typical of meningococci were repeatedly tested with both cystine-Trypticase agar (two separate lots; BBL Microbiology Systems, Cockeysville, Md.) and radiometric methods with consistent results. The identification and biochemical characteristics were confirmed by the Section of Clinical Microbiology, Mayo Clinic, Rochester, Minn. The isolate was susceptible to ampicillin, penicillin, tetracycline, cephalothin, chloramphenicol, and erythromycin; immediately resistant to naftcilin; and resistant to clindamycin and vancomycin by standard disk diffusion susceptibility tests (7).

This aberrant group C N. meningitidis strain could easily have been misidentified. We initially thought it was Branhamella catarrhalis because of the negative carbohydrate degradation tests (growth method). Our experience suggests that the DNase test should be used to differentiate B. catarrhalis from Neisseria spp., and meningococcal antisera is necessary to definitively identify biochemically aberrant strains.

Instances of biochemically unusual meningococci have been reported. Lactose-fermenting group B (5), maltose-negative (4), and glucose-negative (3) N. meningitidis isolates have been described. More recently, clinical isolates of maltose-negative group Y (2) and glucose-negative group B (8) meningococci have been reported. Our isolate is unique in that it is only the
second glucose-negative clinical isolate reported and has the additional property of being maltose negative by growth methods and maltose positive by radiometric nongrowth methods. The radiometric procedure is stated to be more sensitive than the cystine-Trypticase agar technique (6). Our report supports this conclusion.

Kingsbury (4), in reviewing sulfadiazine-resistant, maltose-negative N. meningitidis, discussed the enzymology of maltose utilization by this species. Once in the cell, maltose is split by maltose phosphorylase, and the resulting products, glucose-1-phosphate and free glucose, are further degraded in the same manner as added glucose. This finding suggests that our aberrant strain was unable to transport glucose into the cell but could transport small amounts of maltose.

In conclusion, biochemically atypical meningococci are encountered in clinical laboratories and are capable of causing disease, as illustrated in our example of a 63-year-old man with sepsis. Identification requires careful interpretation of carbohydrate utilization tests, inclusion of a DNase test to differentiate B. catarrhalis, and use of grouping sera to definitively identify N. meningitidis.

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LITERATURE CITED


