A Brain Abscess Due to Multiply-Resistant *Enterobacter cloacae* Successfully Treated with Meropenem

SIR—Brain abscess due to Enterobacteriaceae in children is rare and is mostly seen as a complication of neurosurgical procedures or trauma to the head [1]. Antibiotic treatment of this condition is known to be difficult. Third-generation cephalosporins have been used with success; however, some gram-negative rods (*Enterobacter*, *Citrobacter*, and *Serratia*) have become resistant because of production of derepressed type 1 β-lactamase [2, 3]. Emergence of resistance was associated with higher mortality and with prior administration of third-generation cephalosporins [2, 3]. We describe the successful use of meropenem (ICI 194660, Zeneca Pharmaceuticals, Cheshire, United Kingdom) for medical management of a child with a brain abscess due to multiply-resistant *Enterobacter cloacae*.

A 7-year-old boy with acute lymphoblastic leukemia that was diagnosed in May 1986 had been in remission after receiving chemotherapy. The disease relapsed in his testis in June 1993; orchidectomy was performed and reinduction therapy was started. During therapy the patient developed a sore throat and high fever; he was treated initially with amoxicillin and later with ceftazidime. Throat cultures yielded *E. cloacae*, which was susceptible to ceftazidime. Fecal cultures 1 week later also yielded *E. cloacae*. After recovery the patient was sent home with oral ciprofloxacin (15 mg/[kg · d]) for selective gut decontamination before his next cycle of chemotherapy. One month later he was admitted with headache, seizures, and hemianopia, but he did not have a fever or a history of trauma. Physical examination revealed increased intracranial pressure with papilledema.

The patient's WBC count was 6.9×10^9/L, and the erythrocyte sedimentation rate was 92 mm/h. Examination of CSF disclosed pleocytosis with a WBC count of 32/mm^3 and a protein level of 130 mg/dL; gram staining was negative. CT of the head revealed a large mass process in the left occipital region, which suggested lymphoma or an abscess. Because surgery was not considered to be urgent, empirical therapy was started with ceftazidime (100 mg/kg), amphotericin B (1 mg/kg), and amoxicillin (100 mg/kg). After 14 days without improvement in the patient's condition, a diagnostic puncture of the cerebral lesion revealed an abscess. Gram stains showed many leukocytes but no microorganisms. After 3 days, broth cultures yielded a multiply-resistant *E. cloacae* that was susceptible only to imipenem (MIC, < 1 mg/L), meropenem (MIC, < 0.5 mg/L), and ciprofloxacin (MIC, < 1 mg/L).

Because of the reported neurotoxicity of imipenem/cilastatin [4], we requested a supply of meropenem from Zeneca Pharmaceuticals on a compassionate-use basis. Meropenem was given intravenously at a dose of 1.5 g thrice daily (120 mg/kg) for 6 weeks. Within 1 week the headache subsided and the patient recovered. No side effects were noted. At the end of treatment the patient was clinically and radiologically cured.

Our patient was colonized with *E. cloacae* before the cerebral abscess developed. We speculate that an unrecognized bacteremia from the throat or the intestine might have seeded the brain. Ceftazidime therapy may have contributed to induction of β-lactamase and multiple resistance. Alternative agents to treat infections by β-lactamase-producing *Enterobacter* species include imipenem-cilastatin, ciprofloxacin, aminoglycosides (amikacin), and trimethoprim-sulfamethoxazole. However, these agents are not suitable for use in children with cerebral infections because of side effects [4] and because sufficiently high concentrations can not be reliably achieved in brain tissue.

Meropenem, a new carbapenem with comparable activity to that of imipenem/cilastatin, has been reported to be useful in the treatment of meningitis in adults [5, 6] and children [7] and does not show neurotoxicity. Meropenem is not hydrolyzed by repressed chromosomal β-lactamases of *E. cloacae* and is therefore a suitable alternative therapy for infections by multiply-resistant organisms that are difficult to treat.

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