NOTES

Comparative In Vitro Activity of Cefodizime, Ceftazidime, Aztreonam, and Other Selected Antimicrobial Agents Against Neisseria gonorrhoeae

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Received 18 October 1982/Accepted 7 December 1982

The in vitro activities of three new β-lactam antimicrobial agents, cefodizime, ceftazidime, and aztreonam (formerly azthreonam), were compared with those of cefotaxime, cefuroxime, cefoxitin, and penicillin against 100 β-lactamase-negative and 42 β-lactamase-positive Neisseria gonorrhoeae strains. The three new antimicrobial agents showed excellent activity against N. gonorrhoeae regardless of β-lactamase production. Cefodizime was as active as cefotaxime and more active than the other test antimicrobial agents. It inhibited all isolates at a concentration of ≤0.016 μg/ml.

Cefodizime, ceftazidime, and aztreonam (formerly azthreonam) are new parenteral β-lactam antimicrobial agents which are highly active in vitro against a broad spectrum of microorganisms (2, 3, 5). This study was conducted to compare the in vitro activity of these three new antimicrobial agents with those of cefoxitin, cefuroxime, cefotaxime, and penicillin against β-lactamase-negative and β-lactamase-positive N. gonorrhoeae.

Standard powders with known potency were obtained from the following sources: aztreonam (SQ26,776), E. R. Squibb & Sons, Inc., Princeton, N.J.; cefodizime (HR221) and cefotaxime, Hoechst-Roussel Pharmaceuticals Inc., Somerville, N.J.; ceftazidime (GR20,263) and cefuroxime, Glaxo Inc., Research Triangle Park, N.C.; cefoxitin, Merck Sharp & Dohme, Rahway, N.J.; and penicillin, Pfizer Inc., New York.

A total of 142 N. gonorrhoeae strains were tested. One hundred β-lactamase-negative strains were collected during 1980 through 1981 from patients with analgenital infections at the Hennepin County Medical Center, Minneapolis, Minn. Forty-two β-lactamase-positive strains were obtained from the following sources: W. Harrison, Naval Regional Medical Center, San Diego, Calif.; Centers for Disease Control, Atlanta, Ga.; W. Hall, Veterans Administration Medical Center, Minneapolis, Minn.; and Minnesota Department of Health, Minneapolis.

The identity of the isolates was confirmed by growth on Thayer-Martin agar, Gram stain, positive oxidase reaction, and acidification of glucose but not of maltose, lactose, or sucrose. The organisms were frozen in Mueller-Hinton broth containing 15% glycerol and stored at −70°C. N. gonorrhoeae isolates were tested for β-lactamase activity by an acidimetric method (4).

The minimal inhibitory concentrations (MICs) of the antimicrobial agents were determined by an agar dilution technique (1). Twofold dilutions of the antimicrobial agents, from 8 to 0.004 μg/ml, were distributed into Mueller-Hinton agar supplemented with 2% hemoglobin and 1% IsoVitaleX. The frozen gonococcal isolates were thawed and grown overnight on chocolate agar and then suspended in tryptic soy broth until the turbidity matched that of a 0.5 McFarland standard. One microliter of a 1:10 dilution of the adjusted suspension (10⁴ CFU) was inoculated onto the antimicrobial agent-containing plates with a Steers replicator. The plates were incubated for 18 to 24 h at 35°C in a CO₂ atmosphere. The minimal inhibitory concentration was defined as the lowest concentration of the antimicrobial agent that inhibited visible growth on the agar surface.

The MICs of seven antimicrobial agents against the β-lactamase-negative N. gonorrhoeae strains are shown in Table 1. Cefodizime...
and cefotaxime in their activities against this group. Ceftazidime and aztreonam MICs for 90% of the isolates were twofold and fourfold higher, respectively, than those of cefodizime and cefotaxime. Cefuroxime was less active than the aforementioned antimicrobial agents; however, it was more active than cefoxitin against these isolates. As expected, β-lactamase-positive isolates were highly resistant to penicillin.

Our in vitro results demonstrate that the new β-lactam antimicrobial agents cefodizime, ceftazidime, and aztreonam are highly active against N. gonorrhoeae regardless of β-lactamase production. Their in vitro activities against N. gonorrhoeae compares favorably with those of cefotaxime, cefuroxime, and cefoxitin, which are presently in use for gonococcal infections.

In a preliminary report, aztreonam has been shown to be effective in urethritis due to β-lactamase-negative and -positive N. gonorrhoeae strains (P. L. Sanchez, L. H. Miller, S. B. Kerbs, S. W. Berg, and W. O. Harrison, Program Abstr. Intersci. Conf. Antimicrob. Agents Chemother. 22nd, Miami Beach, Fla., abstr. no. 142, 1982). Similar clinical studies with cefodizime and ceftazidime have not been reported.

In view of the excellent in vitro activity of these new β-lactam antimicrobial agents, clinical trials to verify their efficacy in treating gonococcal infections are warranted.

We are grateful to Rosemary Pellegrini for typing the manuscript.

LITERATURE CITED


