ANTIMICROBIAL AGENTS AND CHEMOTHERAPY, Nov. 1986, p. 769–770
0066-4804/86/110769-02$02.00/0

Vol. 30, No. 5

NOTES

In Vitro Susceptibility of *Acinetobacter* Species to Various Antimicrobial Agents

KENNETH V. I. ROLSTON* AND GERALD P. BODEY

Section of Infectious Diseases, Department of Internal Medicine, The University of Texas M. D. Anderson Hospital and Tumor Institute, Houston, Texas 77030

Received 21 July 1986/Accepted 5 August 1986

The in vitro activity of 18 antimicrobial agents against 40 clinical isolates each of *Acinetobacter calcoaceticus* subsp. *anitratum* and *Acinetobacter lwoffi* was studied. Most of the newer 4-quinolone derivatives were extremely active against these organisms. Newer β-lactam agents, such as cefpirome, BMY 28142, and BRL 36650, were also extremely active, inhibiting all strains at clinically achievable levels. Most agents were two- to fourfold more active against *A. lwoffi*.

Patients with cancer frequently develop infections, particularly when they are neutropenic. Most of these infections are caused by enteric gram-negative aerobes (*Escherichia coli*, *Klebsiella pneumoniae*, and *Pseudomonas aeruginosa*) and *Staphylococcus aureus*. In recent years, *Acinetobacter calcoaceticus* has emerged as an important pathogen in neutropenic cancer patients being treated at the M. D. Anderson Hospital and Tumor Institute, Houston, Tex. (8). Empiric antibiotic therapy in the febrile neutropenic patient often consists of aminoglycosides, penicillins, and cephalosporins, usually in combination with each other (2). During the past 5 years, several antimicrobial agents, including the 4-quinolones, the monobactams, the penams, and newer β-lactams, have been developed, and they are being or will soon be evaluated in neutropenic patients. We therefore decided to study the in vitro activity of several of these agents against *A. calcoaceticus* and to compare them with a few antibiotics used at this institution.

Susceptibility testing was performed on 40 isolates each of *A. calcoaceticus* subsp. *anitratum* and *Acinetobacter lwoffi*. All of these organisms were obtained from blood culture specimens of cancer patients being treated at the hospital during the past 5 years. Susceptibility testing was performed by a previously described microtiter broth dilution method (5). Briefly, the organisms were incubated overnight in Mueller-Hinton broth, and appropriate dilutions were made so that the final inoculum tested was 10^5 CFU/ml. Antibiotic concentrations were prepared manually in Mueller-Hinton broth and dispersed automatically with an MIC 2000 dispenser (Dynatech Laboratories, Inc., Alexandria, Va.). The range of antibiotic concentrations tested was 0.03 to 128 μg/ml. The MIC was defined as the lowest concentration of drug that prevented visible growth after 18 h of incubation at 35°C. The 18 antimicrobial agents used were obtained from their respective manufacturers in the form of standard powders for laboratory use.

The activity of the various agents against the two *Acinetobacter* organisms is shown in Tables 1 and 2. Five of the agents tested are used at this institution. Among these, imipenem and ceftazidime were the most active, inhibiting all isolates at clinically achievable levels. Piperacillin and amikacin were more active than aztreonam, although a few isolates were resistant to all three agents. The susceptibility of *Acinetobacter* spp. to these antimicrobial agents has not changed since an earlier report from this institution, despite several years of antibiotic use (4).

Most of the new 4-quinolones tested were very active against both bacteria, with MICs for 90% of the isolates generally twofold higher for *A. calcoaceticus* subsp. *anitratum*. Similar results were seen with the new cephalosporins, cefpirome, and BMY 28142 and with the new

TABLE 1. In vitro activity of 18 antimicrobial agents against 40 isolates of *A. calcoaceticus* subsp. *anitratum*

Drug	MIC (μg/ml)[a]		
	Range	50%	90%
Amifloxacin	0.125–1.0	0.5	1.0
Ciprofloxacin	≤0.03–0.5	0.125	0.25
Enoxacin	0.5–4.0	1.0	2.0
CI-934	0.125–1.0	0.25	1.0
A-56619	≤0.03–0.25	0.06	0.125
A-56620	0.03–0.25	0.06	0.25
S-25930	0.06–1.0	0.25	0.5
S-25932	1.0–8.0	2.0	4.0
Cefpirome	2.0–8.0	0.25	16.0
BMY 28142	1.0–4.0	0.25	16.0
Ceftazidime	2.0–16.0	4.0	8.0
Aztreonam	4.0–>128.0	32.0	64.0
Ro 17-2301	4.0–>128.0	16.0	32.0
Imipenem	0.125–0.5	0.25	0.25
SCH 34343	0.5–8.0	2.0	8.0
Piperacillin	4.0–128.0	16.0	32.0
BRL 36650	1.0–8.0	2.0	4.0
Amikacin	0.5–32.0	2.0	8.0

[a] 50 and 90%, MIC for 50 and 90% of the isolates, respectively.

* Corresponding author.

TABLE 2. In vitro activity of 18 antimicrobial agents against 40 isolates of *A. lwoffi*

Drug	MIC (μg/ml)[a]		
	Range	50%	90%
Amifloxacin	0.125–4.0	0.125	1.0
Ciprofloxacin	≤0.03–0.5	0.06	0.125
Enoxacin	0.25–2.0	0.5	1.0
CI-934	0.06–1.0	0.25	0.5
A-56619	≤0.03–0.25	0.03	0.125
A-56620	≤0.03–0.25	0.06	0.125
S-25930	≤0.03–0.5	0.125	0.25
S-25932	0.5–4.0	2.0	4.0
Cefpirome	≤0.03–16.0	0.25	1.0
BMY 28142	0.06–16.0	0.5	4.0
Ceftazidime	0.5–16.0	2.0	8.0
Aztreonam	2.0–64.0	16.0	32.0
Ro 17-2301	2.0–32.0	8.0	32.0
Imipenem	≤0.03–4.0	0.06	0.25
SCH 34343	≤0.03–4.0	0.5	4.0
Piperacillin	1.0–128.0	4.0	16.0
BRL 36650	0.5–8.0	2.0	4.0
Amikacin	0.06–32.0	1.0	4.0

[a] 50 and 90%, MIC for 50 and 90% of the isolates, respectively.

penicillin BRL 36650. The new penam SCH 34343 was not as active as imipenem.

Our study showed that several of the more recently introduced antimicrobial agents are at least as effective in vitro as some of the agents now in use for the therapy of infections caused by *A. calcoaceticus*, and our data are in general agreement with those of other investigators (1, 3, 6, 7). Although clinical experience with many of these newer agents is lacking, they are likely to provide adequate antimicrobial activity, providing that favorable pharmacokinetics and tissue penetration can be demonstrated.

LITERATURE CITED

1. **Basker, M. J., R. A. Edmondson, S. J. Knott, R. J. Ponsford, B. Slocombe, and S. J. White.** 1984. In vitro antibacterial properties of BRL 36650, a novel 6α-substituted penicillin. Antimicrob. Agents Chemother. **26**:734–740.
2. **Bodey, G. P.** 1984. Antibiotics in patients with neutropenia. Arch. Intern. Med. **144**:1845–1851.
3. **Elipoulos, G. M., A. E. Moellering, E. Reiszner, and R. C. Moellering, Jr.** 1985. In vitro activities of the quinolone antimicrobial agents A-56619 and A-56620. Antimicrob. Agents Chemother. **28**:514–520.
4. **Garcia, I., V. Fainstein, B. LeBlanc, and G. P. Bodey.** 1983. In vitro activities of new β-lactam antibiotics against *Acinetobacter* spp. Antimicrob. Agents Chemother. **24**:297–299.
5. **Hoy, J. F., K. V. I. Rolston, D. H. Ho, M. Alvarez, P. Thirolf, and G. P. Bodey.** 1986. In vitro activity of BRL 36650, a new semisynthetic penicillin. Antimicrob. Agents Chemother. **29**:972–976.
6. **King, A., K. Shannon, and I. Phillips.** 1985. The in vitro activities of enoxacin and ofloxacin compared with that of ciprofloxacin. J. Antimicrob. Chemother. **15**:551–558.
7. **Mandell, W., and H. C. Neu.** 1986. In vitro activity of CI-934, a new quinolone, compared with that of other quinolones and other antimicrobial agents. Antimicrob. Agents Chemother. **29**: 852–857.
8. **Rolston, K., Z. Guan, G. P. Bodey, and L. Elting.** 1985. *Acinetobacter calcoaceticus* septicemia in patients with cancer. South. Med. J. **78**:647–651.