

NOTES

Ciprofloxacin in the Treatment of Pneumonia

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The use of ciprofloxacin as the sole agent in the treatment of 25 patients with pneumonias caused by susceptible organisms resulted in rapid cure. No side effects, superinfections, or recurrences were observed.

Ciprofloxacin (Bay 09867) is a new fluoroquinolone which is active against both gram-negative and gram-positive bacteria. The drug has been extensively tested in vitro and in animals with impressive results and little toxicity (1, 4, 5; N. Chin and H. C. Neu, *Abstr. Annu. Meet. Am. Soc. Microbiol.* 1983, A18, p. 4; K. Jules and H. C. Neu, *Program Abstr. 24th Intersci. Conf. Antimicrob. Agents Chemother.*, abstr. no. 27, 1984). Tests in healthy human volunteers showed it to be well tolerated, with no serious adverse reactions (2). We now report the use of ciprofloxacin in patients with acute pneumonias.

Twenty-nine patients were entered in the study. Four patients were dropped from the study when they were found not to have pneumonia on a reevaluation of chest roentgenograms done within 24 to 48 h after admission to the hospital. Of these four patients, one had septicemia and three had bronchitis. None of these four patients developed signs of drug toxicity. Twenty-five completed the course of therapy. Of those enrolled, five were alcoholics, two had seizure disorders, eight were intravenous drug addicts, one had asthma, one had lung cancer, and one had congestive heart failure. The remaining seven enrolled patients had no significant underlying illnesses.

All patients in the study were hospitalized at the Bronx-Lebanon Hospital Center between October 1984 and May 1985. Adult males and females admitted consecutively to the institution with the diagnosis of mild-to-moderately-severe lower-respiratory-tract infection caused by ciprofloxacin-susceptible bacteria were enrolled in the study. None of the enrolled patients had received antibiotics for their present illnesses. Informed written consent was obtained from all patients enrolled in the study.

All 25 patients who completed the study had clinical signs and symptoms of pneumonia and a pretreatment chest roentgenogram that was interpreted by at least two independent observers as demonstrating a parenchymal infiltrate. Roentgenographic evidence of the involvement of one pulmonary lobe was found in 16 patients, 8 patients had two lobes involved, and 1 patient had three lobes involved. The mean age of the patients enrolled was 40 years (range, 23 to 81 years). There were 8 males and 17 females.

Patients with overwhelming respiratory-tract infections requiring intensive care, patients with renal impairment, patients with a history of allergy to fluoroquinolone derivatives, and pregnant women were excluded from the study.

Also to be excluded were patients with isolated organisms that were resistant to ciprofloxacin, although no such patients or organisms were found.

Before therapy was begun, appropriate cultures (sputum and blood), complete blood cell counts, blood chemistry studies, and urinalysis were obtained. Appropriate follow-up cultures, chest films, and blood studies were obtained during the course of treatment and at its end. Sputum samples were obtained after patients had coughed deeply or, in some cases, by transtracheal aspiration. Sputum samples were considered acceptable if they contained more than 15 polymorphonuclear cells and fewer than 5 epithelial cells per high-power field. Sterile brushings of the involved pulmonary lobes were obtained in two cases by using a sterile protected catheter passed through a fiberoptic bronchoscope. Bacterial species and the sites from which they were isolated are listed in Table 1. Three patients had more than one organism isolated, and no pathogenic organism was found in six patients.

The vital signs of each patient were obtained several times a day throughout the study, and each patient was examined daily with particular emphasis placed on the status of the pneumonia and whether adverse side effects from ciprofloxacin appeared.

Organisms were considered susceptible to ciprofloxacin if an inhibitory zone equal to or greater than 18 mm was produced by a 5- μ g ciprofloxacin-susceptibility disk by using the modified Bauer-Kirby procedure (3).

All patients received 750 mg of ciprofloxacin orally every 12 h until both clinical and roentgenographic responses were obtained. A clinical response was defined as the resolution of fever, cough, sputum production, pleuritic chest pain, and malaise. A roentgenographic response was defined as a partial (at least 50%) or complete resolution of the initial pulmonary infiltrate.

The mean time for defervescence after the start of therapy with ciprofloxacin was 1.6 days (range, 1 to 7 days). Three patients were afebrile at the start of therapy. The patients were treated with ciprofloxacin for a mean of 8.2 days (range, 5 to 15 days). The mean total dose was 12 g (range, 7.5 to 22.5 g). Sputum production ceased after a mean of 3 days (range, 1 to 7 days). The mean initial leukocyte count was 14,500/mm³ (range, 3,300 to 24,400/mm³), and the mean leukocyte count at the end of treatment was 7,600/mm³ (range, 4,800 to 13,800/mm³). Chest films taken at the completion of therapy were completely normal in 14 patients. Marked improvement (clearing of at least 50% of the

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TABLE 1. Bacterial etiology of 19 cases of pneumonia and the sites from which the organisms were isolated

Organism	No. of patients from whom organism(s) was isolated from:				
	Sputum alone	Sputum and blood	Sputum, blood, and joint fluid	Blood alone	Sterile brush
<i>Streptococcus pneumoniae</i>	4		1		1
<i>Staphylococcus aureus</i>	1			1	
<i>Haemophilus influenzae</i>	4	1			
<i>Klebsiella pneumoniae</i>	1	1			1
<i>Streptococcus pneumoniae</i> and <i>Haemophilus influenzae</i>	3				

infiltrate) occurred in 10 others, while 1 patient with a pneumonia distal to an obstructing carcinoma had no improvement in her chest film. No patient, not even the one with the postobstructive pneumonia, failed to respond to treatment. No patient had to be treated with other antibiotics, either together with or after ciprofloxacin treatment. No adverse reaction of any kind to the drug was noted. Blood chemistries, including liver and renal functions, remained normal (or did not worsen) in all of the patients. No patient

came to our attention with a recurrence of pneumonia. There were no superinfections.

The therapeutic results obtained with oral ciprofloxacin in all the patients with pneumonia were excellent. Of 25 patients, 19 had organisms isolated from either blood or sputum or both. None had any adverse reactions, and none had to be withdrawn from the study.

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