Postantibiotic Effects of Different Antimicrobial Agents on Gram-Negative Bacteria.

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Abstract

Objective: postantibiotic effects and postantibiotic subminimum inhibitory concentration effects of different antimicrobial agents on the regrowth of different types of clinical isolates.

Materials and Methods: the postantibiotic effects (PAEs) were induced in Pseudomonas aeruginosa, Escherichia coli, Proteus mirabilis, and Klebsiella pneumoniae clinical isolates after 1 h treatment with 1X-, 2X-, and 4X-MICs of fluoroquinolones (Trovafloxacin, levofloxacin and norfloxacin), amikacin, aztreonam, and β-Lactam antibiotics (cefamandole, ceftazidime, ceftriaxone, and cefepime). The postantibiotic sub-MIC effects (PA SMEs) were studied by exposing the cultures in postantibiotic period to 0.1, 0.2, and 0.3 MICs of the tested antimicrobial agents.

Results: among the tested agents, the longest PAEs were observed after treatment with fluoroquinolones. The mean PAEs of the tested fluoroquinolones at concentrations of 1X-MICs on P. aeruginosa, E. coli, P. mirabilis, and K. pneumoniae isolates were in the ranges of 0.4-0.7, 0.6-0.8, 0.5-0.8, and 0.7-1.0h, respectively, while longer-lasting PAEs were found after using the tested fluoroquinolones at a concentration of 4X-MIC (2.7-3.6, 3.0-3.9, 2.8-3.4, and 3.3-4.4h, respectively). The PAEs of amikacin are slightly weaker than that of fluoroquinolones. The PAEs values of aztreonam and the tested β-lactam antibiotics were significantly shorter than that of fluoroquinolones and amikacin (P < 0.05). In case of PA SMEs, it was observed that their values were longer than the corresponding PAE values, especially at higher sub-MICs. The longest PA SMEs were induced after treatment with fluoroquinolones. The means PA SMEs of the tested fluoroquinolones at concentration of 0.1MICs on P. aeruginosa, E. coli, P. mirabilis, and K. pneumoniae isolates were in the ranges of 2.9-3.9, 3.2-4.3, 3.1-3.7, and 3.8-4.8h, respectively, while longer PA SMEs were found after treatment with 0.3MIC. Amikacin induce shorter PA SMEs as compared to that of fluoroquinolones. In case of aztreonam and the tested β-lactam antibiotics, their PA SMEs values were significantly shorter than that of fluoroquinolones and amikacin (P < 0.05).
**Conclusion:** the possibility of using the tested fluoroquinolones and amikacin at longer dosing interval for treatment of the tested strains because the efficiency of these antimicrobial agents to prevent the bacterial growth when their serum level lowers than the MIC values.

**Key Words:** Postantibiotic effects, postantibiotic sub-MIC effects, fluoroquinolones, β-lactam antibiotics, *P. aeruginosa*, *E. coli*, *P. mirabilis*, and *K. pneumoniae*. 