Susceptibility of *Escherichia coli* with Capsular Antigen K1 Isolated from Urinary Tract Infection on the Joint Action of Cefotaxime and Normal Human Serum

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Dear Sir,

Escherichia coli strains with capsular antigen K1 are characterized by increased pathogenicity. They play an important role in etiology of urinary tract infection (UTI) [1], bacterial meningitis and bacteremia in new-borns [2]. Numerous studies confirm participation of the K1 antigen in protecting *E. coli* bacilli against phagocytosis and bactericidal action of sera [3,4]. Resistance to sera is considered as an important feature for the complex phenomenon of virulence. In our laboratory we detect *E. coli* K1 strains, isolated from UTI cases, using K1A bacterio-phage (the titer of phage suspension is 109 PFU/ml), according to the method described by Devine et al. [5]. About 11% of *E. coli* strains isolated from patients with UTI produced capsular antigen K1. Our findings indicate that the percentage of *E. coli* K1 strains isolated from homogeneous infections (caused by only single pathogen), at a concentration of bacteria in urine 10⁶ cells/ml, was 13%. On the other hand, the percentage of *E. coli* K1 strains isolated from mixed infections, at a concentration of *E. coli* bacilli in urine lower than 10⁶ cells/ml, was 8%. Cefotaxime (CTX) is often used in the treatment of serious bacterial infections because of its strong activity against gram-negative bacteria [6]. The susceptibility of the bacteria to sera in vitro studies can be increased by an addition of subinhibitory concentrations of certain antibiotics [7,8]. Results obtained in our experiments demonstrate that CTX at subminimal inhibitory concentration

(sub-MIC) and normal human serum (NHS)

showed synergistic action in the bactericidal reaction against *E. coli* K1 strains resistant to the serum. The results presented in table 1

Table 1. Synergistic effect of sub-inhibitory concentrations of CTX and NHS in bactericidal action against *E. coli* K1 strains

show that sub-MIC concentrations of CTX in thermally inactivated 50% NHS (NHS 56°C) did not inhibit the bacterial growth, whereas the incubation in 50% NHS in the presence of CTX at the same concentrations caused a significant decrease of viability of tested strains, which range from 0.8% (strain 91) to 12% (strain 711). Lack of synergistic effect of thermally inactivated serum with subinhibitory concentration of CTX indicated participation of complement system in

this reaction. The influence of different sub-MIC concentrations of CTX on this process was examined in detail using E.coli K1 strain No. 440. In case of joint action of NHS and CTX at 0.05 and 0.03 µg/ml concentrations, the number of colony-forming units after 3 h incubation at 37°C was considerably reduced. Moreover, this synergistic action of NHS and CTX in bactericidal reaction was not observed when less (0.01 µg/ml) was used.

The antibiotic used in subinhibitory concentration caused significant elongation of E.coli bacilli. The changed bacterial forms were susceptible to the lytic action of K1A phage to the same degree as the control bacteria. This finding indicates that capsular antigen K1 does not protect bacteria against the synergistic action of serum and CTX.

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Bactericidal Action of Cefotaxime and Serum against E.coli K1