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A comparative study of the immunological activity of sensitive and resistant *E. coli* on production of IL-1 β , IL-6 and TNF- α by monocytes and mononuclear cells of human peripheral blood

Antibiotics and the immune system are two forces that cope with bacterial infections. There is a large amount of scientific literature devoted to the reactions of innate and acquired immunity to induction by living and inactivated, virulent and avirulent, pathogenic and non-pathogenic bacteria. However, information on the immune response to resistant and antibiotic-sensitive pathogens is not so much. Given that the treatment of a patient with antimicrobial drugs is based on a complex immunobiological reaction of the body, it is important to study the nature of the specificity of the immune response to sensitive and antibiotic-resistant pathogens. The determination of the differential role of immunocompetent cells in initiating an immune response to a stimulus by a sensitive and resistant culture gives an understanding of the entire picture of the relationship between infectious diseases caused by pathogens with drug resistance, induction and regulation of the innate and adaptive immune response, and antibiotics. Knowledge of this kind can open new avenues to cope with such public health problems as drug resistance of pathogens, by developing more effective approaches to complex immunotherapy for infectious diseases. In this paper, immunocompetent cells involved in a congenital immune response to bacteria have been studied. A comparative analysis of the mononuclear (PBMC) and monocytic cytokine response on the induction of an antibiotic-sensitive and resistant strain of *Escherichia coli* has been performed. In the experiment, PBMC was isolated from the peripheral blood of six healthy male and female donors (aged 28 to 38 years), and monocytes isolated from the PBMC of the same donors by immunomagnetic separation. Test cultures of microorganisms were the sensitive strain *Escherichia coli* ATCC 8739 and the resistant strain *Escherichia coli* ATCC BAA-2523 obtained from the American Collection of Typical Cultures. Bacteria were grown until the middle of the log phase, after which 0.5% formalin was fixed. Then bacterial suspensions corresponding to minimal inducing concentrations were prepared: for a resistant *E. coli* strain - 103 CFU/ml, for a sensitive strain - 104 CFU/ml. The isolated immunocompetent cells were scattered into 96-well plates at a concentration 1×10^5 cells/yr. A specific *E. coli* strain was then added to the cells in a volume of 100 μ l/yr. Incubated 4 hours in a CO₂ incubator at 37°C, 5% CO₂ and 95% humidity. After incubation, the supernatant was collected and the amount of IL-1 β , IL-6 and TNF- α was determined by ELISA. According to the data obtained, it was found that monocytes react more than PBMC to the stimulus of the resistant *E. coli* cell by a significantly larger ($P < 0.05$) release of IL-1 β , IL-6, and TNF- α cytokines. When exposed to a sensitive strain, there was no significant difference in the production of IL-1 β , IL-6 and TNF- α by monocytes and PBMC. Thus, monocytes and PBMC react equally to the sensitive *E. coli* strain, whereas monocytes react more strongly to the resistant *E. coli* strain.

Biography

Samal Kassymbekova has completed her Master's degree from Department of Microbiology, Faculty of Biological, Al-Farabi Kazakh National University, in 2011. Since 2008, she has been working as a Senior Researcher in the Laboratory of Immunology of the Scientific Centre for Anti-Infectious Drugs. She is the creator of a collection of microorganisms in the Laboratory of Microbiology. She has published more than 20 papers and is the owner of six patents for invention.

s_kassymbekova@mail.ru

Samal Kassymbekova

Scientific Centre for
Anti-Infectious Drugs, Kazakhstan

Co-Authors

Tamara Bukeyeva¹, Sholpan Tursunova¹, Indira Bishimova¹, Sabina Murzageldinova¹, Tigran Davtyan² and Alexander Ilin¹

¹Scientific Centre for Anti-Infectious Drugs, Kazakhstan

²Scientific Centre of Drug and Medical Technology
Expertise JSC, Republic of Armenia

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