

ELECTRON MICROSCOPIC INVESTIGATIONS OF *Escherichia coli* PROBIOTIC STRAINS AND X-RAY ANALYSIS OF ITS MEMBRANES

**Karlen Hovnanyan, Maria Karagyozyan, Anahit Manvelyan, Astghik Pepoyan
Institute of Molecular Biology of NAS RA, Yerevan, 375014, Armenia**

E-mail: past@rambler.ru

KEY WORDS: *E.coli*, probiotic, membrane, X-ray diffraction, electron microscopy, lipopolysaccharide

The use of probiotics is thought to be associated with beneficial effects on human health and recently attention is turned to *E.coli* to use it as a probiotic. On the other hand, bacterial cell wall components such as lipopolysaccharides (LPS) are known as potent effectors of toll-like receptors and can play a great role on probiotic effects of bacteria.

The aim of the present research was to study morphologic properties of *E. coli* pathogenic and commensal strains and its membranes by the electron microscopy and X-ray diffraction method. The cellular filamentation of these strains as well as comparative role of LPS from their membrane on bacterial cell wall biophysical properties such as hydrophobicity and adhesion were investigated.

We used 29 enteropathogenic strains, 4 probiotic commensal strains and 6 *E. coli* strains isolated by us, candidates for probiotic use.

The transmission electronic microscope Tesla – 500 was used for investigating *E. coli* strains' cellular filamentation. For studying the bacterial external structure it was used the method of negative contrast coloring by using 1% salt solution of phosphor-wolfram. pH of solution was 6,0-7,0. Bacterial suspensions were dropped on the support of copied net, which was covered with phormvar's membrane. After drying bacterial preparation was colored in the drop of phosphowolframics' acid solution.

The role of LPS on bacterial cell wall biophysical properties was investigated by using the X-ray diffraction method under the small and big angles. The reflexes from the bacterial cell walls in the 0.01 M phosphate-buffer on untreated cells and on a sample of *E. coli* treated with 100 mM ethylenediaminetetraacetic acid (EDTA), which removes approximately 80% of the LPS molecules, were obtained. For finding out the legitimacies of changes of midline distances of small-angle reflexes and the definition of membrane's both characteristics and intermembrane distances d for more expressed reflexes, the dependence from the ratio of the water concentration and membranes were obtained.

The electron microscopic investigations of morphology of *E. coli* strains have not revealed any salience peculiarities connected with their pathology. On the same time, as showed the results of X-ray diffraction method, the reflexes from the investigated *E. coli* cell walls after LPS removal are different. Also it was revealed the difference of *E. coli* strains by their hydrophobicity and adhesion.

As showed the investigations the structure of *E. coli*' membranes can be decisive for finding out new probiotic strains and the X-ray diffraction method can be used for revealing efficient probiotic strains.