

## The International Young Scientists Conference

### “NEW TRENDS IN LIFE SCIENCES”

*Dedicated to the 50<sup>th</sup> anniversary of the Institute of Molecular Biology  
NAS RA*

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## ANALYSIS OF ALLELIC VARIANTS ASSOCIATIONS OF GENES *TLR2*, *TLR6* AND *TNF A* WITH NEWBORN INTRAUTERINE INFECTION

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Mechanisms of infection in the fetus depend on many factors, mainly on the body's immune response, determined by genetics. According to modern concepts, the pregnancy develops in the suppression of the mother's specific immune response and is compensated by the activation of innate immunity, where toll-receptors are crucial. The aim of the current study was to investigate the association of marker genes and their polymorphisms with increased risk of intrauterine infection and the development of the nervous system lesions of varying severity. The study involved 75 newborn with intrauterine infection, followed by hypoxic lesions of the central nervous system. Newborn were divided into 4 equal groups depending on the severity of the lesions: easy pathology (EP), medium (MP) and heavy (HP). Allelic variants of *Arg753GlnTLR 2* gene, *Ser249ProTLR 6* gene and -*308G/A TNF α* gene were investigated by allele-specific PCR. The study found that the gene frequency distribution of genotypes *TLR 2* was similar to that of healthy newborns in the city of Rostov-on-Don. There was a predominance of homozygotes for the normal allele 753Arg in all groups (91-95%), and the complete absence of polymorphic homozygote GlnGln. The frequency of polymorphic alleles for different groups ranged from 2 to 5%. Genotyping *TLR 6* gene showed the predominance of homozygotes for the polymorphic variant 249Pro (42-58%). Its frequency varied from 61 to 72%. The distribution frequencies of genotypes of the TNF α gene polymorphism were similar to those of healthy residents of Rostov-on-Don with a prevalence of homozygotes for the normal allele 308G for all groups (61-79%). The frequency of the polymorphic allele 308A was 11-22%. The frequency tends to reduce with the progression of the pathology. A statistically significant difference in the frequency of allele 308A in the MP group was found, which determines a slight protective effect, OR=0.41, 95%CI: 0.17-0.97. A combined analysis of the studied polymorphisms frequency showed the presence of significant interaction models for the studied genes. The comparison of newborn groups revealed combinations of

genotypes, which determine the progression of CNS diseases. It was found that an increased risk of severe CNS pathology is associated with genotype Ser249Pro *TLR 6* / G-308A *TNF α*.

## **THE COMBINED EFFECTS OF ELECTROMAGNETIC WAVES AND SULFUR DIOXIDE ON WINE LACTIC ACID BACTERIA**

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The main function of wine lactic acid bacteria (LAB) is to process malic-lactic fermentation (MLF) and to produce secondary metabolites resulting in favorable sensory outcomes. Meanwhile, some bacterial metabolites result in contamination of wine with LAB. Sulfur dioxide (SO<sub>2</sub>) (from K<sub>2</sub>S<sub>2</sub>O<sub>5</sub> (potassium metabisulphite)) is used in winemaking to inhibit oxidation processes and growth of undesirable microorganisms including LAB. Even though SO<sub>2</sub> is toxic for human organism, no effective replacement for it has been suggested. Recently, non-thermal inhibitory effects of extremely high frequency electromagnetic irradiation (EMI) of low intensity have been established with LAB and other bacteria. Moreover, EMI has enhanced the effects of antibiotics and the other chemicals on bacteria. Thus, investigation of combined effects of EMI, at 51.8 GHz and 53 GHz frequencies (the flux capacity of 0.06 mW/cm<sup>2</sup>) and K<sub>2</sub>S<sub>2</sub>O<sub>5</sub> (E-224) of different concentrations on the growth and survival of wine LAB, specifically *Lactobacillus paracasei subsp. paracasei*, was of interest. It was shown that EMI at both frequencies has enhanced the effects of K<sub>2</sub>S<sub>2</sub>O<sub>5</sub> (120 mg/l) at early logarithmic growth phase of bacteria (4<sup>th</sup> h) 1.3 and 1.2 fold, compared with non-irradiated samples. Moreover, after 2 days treatment of irradiated bacteria in salt medium, in the presence of 120 mg/l and 240 mg/l K<sub>2</sub>S<sub>2</sub>O<sub>5</sub>, number of colony forming unit has decreased ~1.5 and 1.8 fold, respectively, compared with non-irradiated controls. Thus, the combination with EMI might decrease the concentration of SO<sub>2</sub> used to avoid its toxicity without minimizing its antibacterial effects. The results obtained can be applied in food, particularly, in wine industry.