

**МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ  
БУКОВИНСЬКИЙ ДЕРЖАВНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ»**



## **МАТЕРІАЛИ**

**104-ї підсумкової науково-практичної конференції  
з міжнародною участю  
професорсько-викладацького персоналу  
БУКОВИНСЬКОГО ДЕРЖАВНОГО МЕДИЧНОГО УНІВЕРСИТЕТУ  
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**Conclusions.** These salts show the highest antibacterial activity against Gram-positive microorganisms – *Staphylococcus aureus* (*S.aureus* ATCC 25923) and vegetative cells of spore-forming bacilli (*B.subtilis* 8236 F 800). *E.faecalis* ATCC 29213 showed much lower sensitivity to the action of these compounds. Gram-negative microorganisms (*E.coli* ATCC 25922 and *P. aeruginosa* ATCC 27853) were significantly more resistant to the action of naphthalene-containing phosphonium salts. The results of our research obtained testify of the expediency of further synthesis and study of antimicrobial activity among naphthalene-containing phosphonium compounds.

**Iftoda O.M.**

**CYTOKINES' MECHANISMS OF IMMUNOLOGICAL DISORDERS  
IN CHILDREN WITH HEARING LOSS DEPENDING ON GENE POLYMORPHISM  
INTERLEUKIN-4 (rs2243250)**

*Department of Hygiene and Ecology  
Bukovinian State Medical University*

**Intoduction.** Nowadays, about 360 million people worldwide suffer from hearing loss. Hearing loss can be caused by genetics, birth defects, certain infectious diseases, chronic ear infections, certain medications, exposure to excessive noise, etc. About 100 genes in the human body are responsible for the hearing organ formation and function. However, there are currently no guidelines for using of molecular genetic tests in the early diagnosis of deafness. The question of the impact of genetic factors on the features of the immune response depending on the type of deafness is also debatable.

**The aim of the study.** To evaluate some immunological mechanisms of sensorineural (SNHL) and conductive hearing loss (CHL) development in children after pro- and anti-inflammatory cytokine levels depending on gene polymorphism of interleukin-4 (IL-4, C-590T) (rs 2243250).

**Material and methods.** The prospective study included 102 children aged 8 to 18 years with hearing impairments, whose parents signed an informed consent to participate in the study, followed by a set of anamnestic-clinical and laboratory-instrumental examinations (otoscopy, speech audiometry, tone audiometry). Among the examined children 68 (66.7%) once had SNHL, 34 (33.3%) - CHL. The control group consisted of 30 practically healthy children. Levels of cytokines: tumor necrosis factor-alpha (TNF- $\alpha$ ), IL-1 $\beta$ , IL-4, IL-10 and IL-13 in plasma were determined by ELISA. Study of gene polymorphism of IL-4 (C-590T) performed by polymerase chain reaction. Statistical processing was performed with Statistica® 7.0 software. The differences were considered significant at  $p < 0.05$ .

**Results.** The analysis of the obtained results showed that the SNHL and CHL course in children is associated with a decreased concentration of IL-1 $\beta$  in the peripheral venous blood plasma by 36.06% and 29.53%, increased of IL-4 1.69 ( $p < 0.05$ ) and 2.68 times ( $p = 0.013$ ) and different changes of TNF $\alpha$  content (increases in CHL children, reduces in SNHL cases), IL-10 and IL-13 (contrary, it increases in SNHL children and decreases in CHL subjects).

The imbalance of the immune response in children with SNHL is characterized by inhibition of cellular immunity and activation of humoral answer caused by low TNF- $\alpha$  and IL-1 $\beta$  content in CT, TT-genotype carriers of IL-4 gene – 2.42 ( $p = 0.032$ ) and 2.02 times ( $p = 0.042$ ) with the anti-inflammatory IL-4 and IL-10 cytokines hyperproduction 4.4-16.45 times ( $p \leq 0.005$ ).

In children with the TT-genotype of the IL-4 gene, CHL occurs with an increase in TNF- $\alpha$  by 1.69 times ( $p = 0.033$ ) and IL-4 35.71 times ( $p < 0.001$ ), a decrease in the level of IL-10 by 3.11-4.44 times ( $p \leq 0.01$ ) and IL-13 – 1.66-2.72 times ( $p \leq 0.026$ ) respectively which is generally evidence of an acute inflammatory process of a predominantly infectious nature.

**Conclusions.** Sensorineural hearing loss in the T-allele carriers' children is characterized by decreased activity of anti-infectious nonspecific immune defense factors, whereas conductive hearing loss course is associated with cell immune response activation (mainly) and humoral part (less) as well.