The associations between a smoking and interleukin-4 gene polymorphism in patients with multi-drug-resistant tuberculosis

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Background and objective.Determine IL-4 gene polymorphism in smokers with multi-drug-resistant tuberculosis **(**MDR-TB) in lungs on the background of the respective cytokine production of blood.

Methods.The study included 170 people in Kharkiv region of Ukraine including 60 patients with MDR-TB and smoking (1stgroup), 36-without MDR-TB and smoking (2ndgroup), 14-with MDR-TB and non-smoking (3rdgroup) 30-without MDR-TB and non-smoking (4thgroup) and 30 healthy donors (5thgroup). Serum levels of IL-4 were evaluated by ELISA. Investigations of gene polymorphisms of this cytokine were performed using restriction analysis of the amplification products of specific regions of the genome, i.e., promoter region C-589T of IL-4 gene.

Results. In the 1st group the levels of IL-4 were (7.35±0.27)pg/L, 2nd –(10.19±0.42) pg/L, 3rd–(10.58±0.66) pg/L, 4th–(12.61±0.50) and 5th–(29,99±1,27)pg/L. Differences between the 1st and 3rd, 2nd and 4th, TB patients and 5th groups were significant ($p<0.001$).

Normal homozygote genotype IL-4 predominated in healthy donors was 56.67±9.05%(N=17) compared to patients with TB: 1st group–11.67±4.14%(N=7), 2nd-8.33±4.61%(N=3), 3rd–21.43±11.38%(N=3) and 4th–26.67±8.07%(N=9). Heterozygous genotype IL-4 was observed in 83.33±4.81%(N=50) in 1st, 22.22±6.93%(N=8) in 2nd, 21.43±11.38%(N=3) in the 3rd, 3.33±3.28%(N=1) in 4th and 23.33±7.72%(N=7) in 5th groups. Mutation homozygous genotype IL-4 was 5.00±2.81%(N=3) in the 1st group, in 2nd–69.44±7.68%(N=25), 3rd–57.14±13.73% (N=8), 4th–66.67±8.61%(N=20) and 5th–20.00±7.30% (N=6). Differences between the 1stand 3rd,2nd and 4th, TB patients and 5thgroups were significant ($p<0.05$).

Conclusion. Smoking contributes to significant activation polymorphism C-589T gene IL-4 heterozygous type that may lead to changes in the immune system making susceptible to MDR-TB. Compared to healthy controls patients with TB had significantly decreases levels of serum IL-4. This coincided with greater frequency of heterozygous and heterozygous genotype polymorphism C-589T of IL-4 gene. In addition, these studies revealed a significant influence of the polymorphism C-589T gene IL-4 (with polymorphism IL-2 and IL-10 genes, which we also studied) on the changes in the population of Th-lymphocytes, clinical symptoms, relapse of tuberculosis, formation destructions in the lung, which may treatment outcomes in patients with MDR-TB.