THE STUDY OF GENE POLYMORPHISM OF DNA REPAIR IN COAL MINERS IN UKRAINE

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In Ukraine 6-8 thousand occupational diseases are registered annually. 70% of those are bronchopulmonary diseases. In living organisms, there are various systems that protect from exogenous damaging agents, such as DNA repair. There are 4 basic DNA repair systems: base-excision repair; nucleotide excision repair; double-strand break repair, which is divided into homologous recombination and non-homologous end joining; mismatch repair. There are a lot of data on DNA repair of SNPs associated with high risk factors for lung carcinogenesis due to tobacco smoke; therefore we decided to study these molecular markers in people occupationally exposed to industrial aerosols [1-4]. The aim of the work was to identify allelic polymorphisms affecting the formation of resistance or an increased risk of developing bronchopulmonary diseases.

Materials and Methods. 120 coal miners were surveyed, the mean age was 51.75 ± 6.5 years, and the average length of coal mining was 22.0 ± 5.4 years. 44 people with chronic types of bronchopulmonary diseases formed study group and 76 people, miners of the same professions but without chronic diseases of the respiratory system formed control group. Bronchopulmonary diseases included: chronic bronchitis, chronic obstructive pulmonary disease, pneumoconiosis. To determine SNP we used polymerase chain reaction in real time: XPD (rs13181, rs799793), ERCC1 (rs11615), XRCC3 (rs861539), XRCC1 (rs25487), ATM (rs664677), XRCC7 (rs7003908) and MLH1 (rs1799977) on the 7500 Fast Real-Time PCR System Appliter (Applied Biosystems, USA) and using TaqMan Assays. The clinical data were analyzed for the normality of distribution using the Shapiro-Wilk test, as well as the Levine Leuven test, the assumption of the equality of dispersions was checked, after which a Student’s statistical criterion was used to determine the differences between the groups (P<0.05 was calculated by statistically significant results). The materials used in the study did not violate the principles of bioethics and the results can be published, all patients participating in the study gave their consent and signed an informational agreement (excerpt from the protocol №2 of the meeting of the Bioethics Commission of the State Institution “Institute of Occupational Health of the National Academy of Medical Sciences of Ukraine “, February 29, 2016).

Results. The frequency division of alleles and genotypes of genes of different DNA repair systems in the study and the control group of coal miners was studied. It should be noted that the received values of frequencies of genotypes of DNA repair genes were close to the frequencies of the population of the European race. The frequencies of allele gene polymorphisms: XPD (rs799793), ERCC1 (rs11615), XRCC3 (rs861539), XRCC1 (rs25487), ATM (rs664677), XRCC7 (rs7003908) and MLH1 (rs1799977) did not show any significant differences between the experimental and control groups (P>0.05). In analyzing the frequency of genotypes of allelic polymorphisms of the DNA repair genes it has been established that the frequencies of dominant allele XPD•A (rs13181) (OR=0.51; RR=0.51; 95% CI: 0.29–0.90; P=0.010; \( \chi^2 = 6.08 \)) contributes to resistance to development of bronchopulmonary pathology. And minor allele XPD•C (rs13181) (OR=1.95; RR=1.98; 95% CI: 1.11–3.46; P=0.010; \( \chi^2 = 6.08 \)) and minor genotypes of XPD•CC (rs13181) (OR=3.85; RR=3.88; 95% CI: 1.38–10.90; P=0.003; \( \chi^2 = 8.55 \)) are associated with the risk of developing respiratory diseases. These polymorphisms were previously considered by researchers...
as markers of carcinogenesis of various types and localizations, including lung cancer, and most studies were simulated on smokers. This article presents the results of the survey of the respondents of main professions of coal miners. The obtained results indicate the existence of a link between certain DNA repair alleles with the risk of bronchopulmonary disease developing under the influence of industrial aerosols. For the first time the results were obtained on the association of allelic polymorphisms of the DNA repair genes with predisposition or resistance to the development of bronchopulmonary disease in coal miners.

Conclusions. The polymorphism of XPD (rs13181) were considered by researchers as markers of carcinogenesis of various types and localizations, including lung cancer. The obtained results indicate the existence of a link between certain alleles of DNA repair genes with the risk of developing bronchopulmonary pathology under the exposure to industrial aerosols.

References.


Key words: bronchopulmonary disease, SNP, DNA repair, coal miners.

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VASCULAR ENDOTHELIAL GROWTH FACTOR: AN IMPORTANT BIOMARKER IN PEDIATRIC ISCHEMIC STROKE

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Vascular endothelial growth factor (VEGF) is recently considered to be an important biomarker in the stroke. VEGF has been shown to be involved in atherosclerotic processes, arteriogenesis, cerebral edema, neuroprotection, neurogenesis, angiogenesis, in processes after cerebral ischemia and in the regeneration of vessels, as well as in the effects of transplanted stem cells and in experimental stroke. Assessment of vascular endothelial growth factor (VEGF) serum values in children with ischemic stroke to evaluate the role of this biomarker in brain metabolic processes.

Materials and Methods. 52 children with ischemic stroke aged from 4 weeks to 10 years of age were investigated. The diagnosis was established on the basis of imaging investigations. VEGF was determined in samples of blood serum collected in the first 3 days after admission. For comparing VEGF values, it was determined also in 30 practically healthy children.

Results: Serum VEGF levels were elevated in patients with ischemic stroke, i. e., mean value was 626 pg/mL, compared to healthy children, mean value was 211 pg/mL. Higher levels of VEGF were associated with cases of ischemic stroke with more