ALLELIC IMBALANCE OF GENES IN SPONTANEOUS TUMOR AND IN TUMOR OF PERSONS EXPOSING LONG-TERM OCCUPATIONAL RADIATION

O.O. Goncharik 1, 2, N.V. Lityakoy 1, 2, S.A. Mezhiritsky 1, 2, E.N. Albach 1, 2, E.O. Vasilyeva 1, 2, A.B. Karpov 1, 2, R.M. Takhauov 1, 2
1. Seversk Biophysical Research Centre of the Russian Federal Medical and Biological Agency, Seversk, Russia
2. Problem Research Laboratory “Radiation Medicine and Radiobiology” of Tomsk Scientific Centre SB RAMS, Tomsk, Russia
3. Seversk Biophysical Research Center, Kommunisticheskii av. 87, Seversk, Tomsk Region, 630670, Russia

1. INTRODUCTION

The allelic imbalance and LOH cases have been shown for many genes in sporadic tumors of various organs. The allelic imbalance at radiation carcinogenesis has not been practically studied. As such, the study will assess the distinctive features of radiation compared to spontaneous carcinogenesis and identify marker genes that can be used to identify radiation carcinogenesis. In this study, the allelic imbalance in the tumor tissues on the background of low-level radiation was examined.

2. METHODS

Extracting DNA from paraffin blocks
The real-time PCR method
Genotyping SNP-markers

XPDI rs13181, hOGG1 rs1052133, TP53 rs1042522, RB1CC1 rs2305427, PTEN rs701845; CYP2C19 rs4244285; ADBC rs10456642; BAX rs1805419, MTHFR rs1801133

3. RESULTS

The purpose: To compare the genotype distribution of polymorphic loci in cancer patients

Two group of cancer patient were analyzed
Employees of Siberian Group of Chemical Enterprises (SGCE) which was professionally exposed to radiation (10–154 mSv), at 99 samples.
Non-exposed residents of Seversk as well as non-exposed SGCE employees, at 157 samples.

normal tissues | cancer tissues

5.4

normal tissues | cancer tissues

5.4

According to our data, the Arg/Arg genotype TP53-119C>G Arg72Pro is a risk marker for the development of tumors on the background of the radiation with OR = 1.51 (1.05–2.77), and Pro/Pro genotype has a protective anti-tumor effect.

4. CONCLUSION

1. Our studies have shown the phenomenon of the allelic imbalance in tumor tissues appeared on the background of low-level exposure and spontaneous tumors for the selected SNPs that indicates the universality of the mechanism inactivating heterogeneous genotypes.
2. The directions of mutations at the heterogeneous loci are different between sporadic tumors and tumors with the irradiation background indicating that there are genetic differences between spontaneous and radiation carcinogenesis.
3. The distinct direction of the vector of mutations at the heterogeneous locus in tumor tissues coincides with the associative model of data. Evaluation of allelic imbalance in tumor tissues may be used as an additional criterion to evaluate either the risk significance of polymorphic loci or the verifiability principle.