and simultaneously. Heavy and toxic elements can be identified in environmental samples (geological and ecological, plants, herbs, soil, etc.) using XRF. 26 elements like K, Ca, Ti, Cr, V, Mn, Fe, Ni, Cu, Zn, As, Se, Br, Rb, Sr, Y, Zr, Nb, Mo, Ag, Sn, Sb, Cs, Ba, La, Pb can be determined simultaneously in a sample. Detection limits for the different elements are between 1 and 5 mkg/g, depending on the matrix and Z of the element. Relative errors between 1 and 10% are typical for trace element analysis. A certain advantage of this method is the relatively simple sample preparation procedure.

The main task of our study was to investigate the main principles of XRFA; to prepare samples for analysis and XRF-spectrometer measurement; construct ~~a~~ calibration curves for the Cd-109 source, considering matrix effects; and realize the qualitative and quantitative analysis of samples.

Multi-elemental analysis of the samples was carried out at the Flerov Laboratory of Nuclear Reactions (JINR, Dubna, Russia). The experimental material used in this study was received from Unal tailing, located in North Osetia-Alania. This study was conducted in collaboration with State University "Dubna" and GUP "Basis stock" (North Osetia-Alania).

The samples were analyzed by an X-ray fluorescence spectrometer with Si (Li) detector (area 30 $mm^2$ surface, 3 mm thickness, Be window thickness 25 um, full width at half maximum (FWHM) resolution – 145 eV at 5.9 keV energy).

Standard ring-shaped radioisotope sources Cd-109 (E = 22,16 keV, T1/2 = 453 days) and Am-241 (Eg = 59.6 keV, T1/2 = 432.2 years) were used for the excitation of X-ray radiation.

The united standard curve was used for analysis. The calibration curves for analyzed samples calculated resulted in the measurement of 10 reference samples (soil-5, SP-3, ENO and etc.).

As a result of our work the full qualitative and quantitative contents of real samples were estimated. In some samples the content of certain elements exceeds the MPC: Mn, Ni, Cu, Zn, As, Cd, Sb and Pb.

Also, some samples were rich in sulfur, likely existing in a sulfide form. This can prevent the migration of heavy elements to other areas due to its insolubility.

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## *ACE* GENE POLYMORPHISM CONTRIBUTION TO THE DEVELOPMENT OF ONCOLOGICAL PATHOLOGIES

From the viewpoint of biology, tumor transformation is the result of the gradual accumulation of genetic alterations in cells affecting different cellular regulatory mechanisms. ACE gene is a key enzyme of the renin-angeotenzin system, which is involved in the regulation of blood pressure, the number of erythrocytes in the

blood, and cardiovascular homeostasis. It was also demonstrated that ACE gene, in addition to the production of angiotensin II, is an activator of bradykinin. Bradykinin is known to be established as a factor of tumor formation due to its ability to stimulate the growth of vascular permeability.

In fact , the genes required for certain functions such as vascular alteration are known to be probably involved in primary tumor progression and metastasis. Cancer cells may disseminate early enough in relation to the period of tumor existence in the body. Angiotensin-converting enzyme is a key enzyme in the RAS and can affect the tissue angiogenesis, cell proliferation, apoptosis, and inflammation. The results of epidemiological and experimental research have shown that the RAS can contribute to paracrine regulation growth of tumor. During the studies it was found out that renin levels increased in patients with hepatic cirrhosis and hepatocellular carcinoma. ACE gene overexpression was noted in extrahepatic cholangiocarcinoma in myeloid leukemic blast cells and in macrophages of the lymph nodes in patients with Hodgkin's disease.

While the work was being performed, we collected and in analyzed the statistical data showing that the ACE gene single nucleotide polymorphism may have a significant impact on the risk of oncological pathology, in particular breast cancer. I / D-polymorphism of ACE gene was associated with a 3-year disease-free survival. Disease free survival for D / D carriers was significantly reduced compared with the I / D and I / I carriers. There is the evidence that RAS inhibitors reduce the tumor growth, progression and metastasis. Angiogenesis, cell growth and invasion of cancer cells have been the targets for new strategies for the treatment of malignant tumors in recent years.

Based on the initial data, we can summarize the following:

1. Genotyping results allow to conclude that I / D ACE gene polymorphism results in an increase of breast cancer and other forms of cancer risk of oncologic pathology.

2. People with D / D genotype of high activity are marked by an increased risk of breast cancer compared to people of II / ID genotype of low activity.

3. RAS inhibitors result in the reduced growth and angiogenesis in tumor cell lines.

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## QUANTITATIVE CHARACTERISTICS OF T LYMPHOCYTES IN PATIENTS WITH MULTIPLE SCLEROSIS

**Multiple sclerosis (MS)** is the central nervous system demyelinating disease characterized by multifocal white matter lesions and chronic paroxysmal-progressive course. The pathogenesis of MS involves an immune attack against the