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Fund “Nauka” Project № 22003 Resume – Competition-based Session 2022:

“A comparative study of the biological effects of sulfur natural sources on human intestinal cells”

Project leader: Assoc. prof. Milka Asparuhova Nashar, MD, PhD

This project is in support of a dissertation for the obtaining of the educational and scientific degree “PhD” of a doctoral student from the department of “Biochemistry, molecular medicine and nutrigenomics”.

The topic is a continuation of the research carried out in the last few years by the department team focused on the health benefits of sulfur-containing mineral water from the Varna basin and revealing the molecular mechanisms supporting these effects. The main research objective of the project proposal is to compare and analyze the biological effects of sulfur-containing biologically active compounds from food and water on human intestinal epithelial cells. The effect of sulfur-containing mineral water on markers of redox status, inflammation, and potential to activate xenobiotic metabolizing enzymes will be compared to that of plant-derived organosulfides and also with sulfur-containing amino acids. With the successful implementation of the project, new data on the biological effects of sulfur-containing mineral waters, compared to the beneficial effects of other natural sources of sulfur is to be obtained. A doctoral student will participate in the development of the project, as well as students from the Medical University of Varna, with a strong interest in science. All the members of the team have the necessary qualification and experience for the successful completion of the project’s scientific program.

Expected results:

There is lack of data in the scientific literature about effects of sulfur-containing mineral water on markers of oxidative status and inflammatory response in cell cultures. These effects, along with the potential of the water to activate xenobiotic-metabolizing enzymes, will be compared with the effects of organosulfides extracted from broccoli and garlic, and also with sulfur-containing amino acids commonly ingested in the diet. In a previous project funded by the Medical University of Varna (Fund “Nauka”), data were obtained on the stimulating effect of sulfur-containing mineral water on the expression of sulfotransferases in human intestinal cells. Such an effect on enzymes of Phase II metabolism of xenobiotics was also found for sulforaphane and allicin. The antioxidant and anti-inflammatory effects of organosulfides and taurine are well established. For sulfur-containing mineral water, such data were obtained in a human intervention study.

Based on the above mentioned, we believe that a comparative study of the biological effects of the food sources of sulfur in human intestinal cells will contribute to our knowledge about their effects on important cellular functions and in particular about the role of sulfur-

containing mineral water as a nutritional source of sulfur. New data on the biological effects of sulfur-containing mineral water, comparable to other natural sources of sulfur, in terms of antioxidant and anti-inflammatory effects is to be obtained. The expected results will be the first scientific data about the mechanisms by which the active components in sulfur-containing mineral water could influence important cellular processes.