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Selenium and human cancer: From epidemiological data to molecular biology study

There is a growing interest in the biological role of selenium (Se) with respect to both protection of human health and prevention of diseases, among others to cancer prevention. Epidemiological studies, including retrospective, prospective and intervention ones, show that a low Se level may increase the risk of certain cancers. However, it should be noted that there is also a relatively large number of studies, in which no effect of Se on cancer has been observed. In the light of recent studies, it may be assumed that not only low but also high Se status may be associated with an elevated cancer risk. Thus, evidence for the chemopreventive role of Se, based on the current epidemiological data, seems to be conflicting. To find an accurate explanation of this divergence, researchers have begun to study the role of Se in the development of cancer at the molecular level. It has been found that certain genetic variants of the selenoproteins' encoding genes may modify cancer risk. However, the results of these studies also remain conflicting. To sum up, most of studies on the relationship between selenium and cancer focus either on the association between Se status and cancer risk or on the association between genetic polymorphism of selenoproteins' genes and cancer risk. Combining both types of data (concerning both dietary and genetic factors) would be more informative and valuable in the assessment of cancer risk development, which was indicated in our recent study. In the case-control study, lung cancer risk associated with Se status was compared between individuals possessing different genetic variants of 15 kDa selenoprotein (Sep15), the protein possibly involved in cancer development due to its redox activity. The preliminary results of the study indicated that Sep15 polymorphism significantly modified lung cancer susceptibility associated with Se status. Based on our findings, we conclude that studies on the relationship between diet and cancer should focus on the interactions between dietary and genetic factors rather than on the study of each factor separately. Data from such studies would be especially interested in view of the intervention trial planning. Prior to supplementation, DNA genotyping should be first performed to select individuals with certain genetic background. This would allow to avoid (at least to some extent) the study bias associated with genetic variation and to identify individuals who, due to the specific gene and nutrient interaction, are susceptible to cancer.

Biography

Wojciech Wasowicz is a full Professor at Nofer Institute of Occupational Medicine. He is the Head of the Biological and Environmental Monitoring department. He has a background in Biochemistry, Analytical Chemistry and Toxicology. He has wide experience with Toxicology of metals and its interactions with microelements, oxidative stress markers and antioxidant enzymes. The next field of interest is potential protective role of some antioxidants against chemicals. He has experience in engineered nanomaterials, nanoparticles and health effect of nanoparticles. He shows a great scientific activity confirmed by numerous publications, and active participation in symposia, conferences and scientific meetings organized in Poland (Polish Society of Toxicology) and abroad (EUROTOX, IUTOX), and has given numerous lecturers as keynote and plenary speaker in international congresses. He is a Member of Polish MAK Value Expert Commission and a Member of OECD Expert in working party on manufactured nanomaterials. Since 2008, he is the President of Polish Society of Toxicology. He has 240 scientific papers published, mainly in journals of international recognition (more than 2000 citation).

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