

July 05-07, 2018
Vienna, AustriaAndrzej K. Siwicki et al., Insights Allergy Asthma Bronchitis 2018, Volume: 4
DOI: 10.21767/2471-304X-C1-003

THE TOXICOLOGY OF NANOPARTICLES, MICROELEMENTS AND MACROELEMENTS IN CELLULAR AND HUMORAL IMMUNITY

Sylwia Terpiłowska¹ and Andrzej K. Siwicki²¹The John Paul II Catholic University of Lublin, Poland²University Warmia and Mazury in Olsztyn, Poland

The immune response is the process of recognition of potentially harmful agents by specialized cells of the immune system. It is expressed as cellular and humoral immunity. Micro-, macro-, and nanoelements can give adverse effects in immunity. The nanoelements (e.g. Silver, TiO₂, ZnO) modulated immune responses via TLR signaling pathways. AgNP, ZnONP, PtNP, TiO₂NP, AuNP enhanced proinflammatory cytokine expression: IL-6-, IL-1, TNF- α , IFN- γ and T cell activation. TiO₂ nanoparticles dose-dependently increased histamine secretion and increased cytosolic Ca²⁺ concentration in mast cells. TiO₂ nanoparticles provoke inflammatory cytokines and increase dendritic cell maturation, expression of costimulatory molecules, and prime naive T cell activation and proliferation. The micro and macroelements on the one hand, they can be expected to increase the production of reactive oxygen species (ROS). They can initiate lipid peroxidation and cellular damage. Immune cells are particularly sensitive to oxidative stress, because their membranes contain high concentrations of polyunsaturated fatty acids which are very susceptible to peroxidation and, when stimulated, they produce large amounts of ROS. On the other hand, trace elements are involved in the antioxidant system and the deficiency of any of them may depress immunity. Uncontrolled oxidation reactions may impair the animal's immune status. Moreover, immune cells and their mechanisms of phagocytic activities are affected by microelements deficiencies. It has been proved that selenium supplementation improves neutrophil's phagocytic capacity. However, low copper status reduces neutrophil phagocytic capacity. Moreover, it has been shown that selenium deficiency affects blood levels of IgG, IgM and IgA as well as T cell function. A number of nutrients (eg Zinc, Selenium, and Chromium) have the ability to modulate immune response through the production of antibodies or cytokines. Moreover the elements are required for immune cells proliferation or activation (e.g. Iron).

Biography

Professor Andrzej K. Siwicki, VMD, Ph.D., DSc is a head of Department Microbiology and Clinical Immunology, Faculty of Veterinary Medicine, University of Warmia and Mazury and Department of Pathology and Immunology IFI in Olsztyn, Poland. He is author of over 500 original papers in reputed journals and about 200 scientific communications (index-h 32, index of citation: 4502). His fields of interest are modulation of defence mechanisms and protection against diseases by natural and synthetic products in animals, influence of pollutants on the cell-mediated immunity and restoration of immunity after suppression induced by xenobiotics. Developed a new possibility in the comparative immunotoxicology for control of effect of xenobiotics and pharmaceutical products on the defence mechanisms and protection against diseases. He attended scientific missions in USA, Japan, France and Israel, was a co-ordinator of USDA and FAO projects and he is professor conferring of 14 PhDs and 4 DSc.v.

siwicki@uwm.edu.pl