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THE IMPACT OF BIOMATERIAL'S COMPONENTS ON THE CELLULAR AND HUMORAL IMMUNITY

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

Biomaterials are commonly characterized as materials used to construct artificial organs, rehabilitation devices, or implants to replace natural body tissues. In general, materials fall into the three categories: metals, ceramics and polymers. The use of biomaterials in clinical practices depends on solving the following problems: 1) toxicity, 2) biological compatibility (biocompatibility), 3) mechanical properties. Biocompatibility has been defined as the ability of a material to perform with an appropriate host response in a specific application. The corrosion of metal is the main problem in construction of implants. Metals commonly used for implants are: cobalt-chromium alloys, stainless steel, titanium alloys, gold, platinum, silver-tin-copper alloys. These elements could be accumulated at the highest doses in the adjacent tissues and bone marrow and could circulate in bloodstream and penetrate to other organs in the body. These released metal ions may cause type IV inflammatory and hypersensitivity reactions, and alternations in bone modeling that lead to aseptic loosening and implant failure. The ions of metals released from the surface of the implant are absorbed by present macrophages which are involved in many of the processes associated with phagocytose orthopaedic biomaterials particles and release the pro-inflammatory mediators as interleukin-1 (IL-1), interleukin-6 (IL-6), tumor necrosis factor (TNF- α) and prostaglandin. The pro-inflammatory cytokines such as IL-1 α and β stimulate resorption of bone and then they act synergistically to the tumor necrosis factor TNF- α . Moreover, macrophages release matrix metalloproteinases (MMPs), and chemokines. Another investigation has shown that Cr and Co ions inhibit osteoblasts, osteoclasts and T and B cell proliferation.

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