

Abstract

The contemporary orthopaedics and traumatology of the musculoskeletal system and stomatology have been witnessing a substantial increase in the number of surgeries using metallic implants. The issue of reconstruction of bone defects covers a large area of study, where the surface properties of the implants are extremely important. Bone defects often occur as a result of open fractures, radical cancer treatment or limb lengthening, which is very common in paediatric orthopaedics. In the treatment of these conditions, the surface of the applied materials should provide a favorable environment for bone cells and support bone formation. In endoprosthetics it is highly desirable to achieve the strongest possible fixation between the implant surface and the bone. During the surgery, primary stability of the implant fixation is ensured by the proper positioning of the implant, based on the appropriate shape of the implant and the quality of bone cut. The initial stability is only temporary, being estimated to last approximately three months. After this period, the secondary stability starts, determined by the bone ingrowth into the implant surface structure. Osteogenic differentiation and extracellular matrix (ECM) mineralization can be enhanced by the presence of bone morphogenetic proteins (BMPs), especially BMP-7. These agents induce osteoblast maturation through specific surface receptors. The implantation may result in a rejection response to the implant by the host organism. The study of potential activation of immune cells is important particularly in order to prevent rejection of the implant by the host immune system.