

## **Abstract**

When the big joints like a knee or hip joint are damaged, the solution of this problem is an artificial substitute. The replacement of damaged joints with endoprothesis helps to reduce the pain and to move normally. In the design of the implant is necessary to fulfil all requirements on the properties of the material. The surface of implant is important, because it is directly connected to bone tissue. After implantation, the negative effect include infection, inflammation or release of the implant due to limited osseointegration, may appear. The osseointegration can be improved by modifying the material surface. This thesis is focused on development and evaluation of advanced materials imitating the bone structure, especially nanoroughness and the presence of biomimetic component, such as hydroxyapatite. In this study is evaluated adhesion, proliferation, viability, differentiation, and synthesis of specific proteins of human osteoblasts like Saos-2 on titanium modified with nanotubes and plasma sprayed hydroxyapatite compared with smooth surfaces.

**Key words:** titanium, nanotubes, osteoblasts, hydroxyapatite, nanoroughness