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## **The response of HMSC-bm, SaOS-2 and immuno competent cells to Calcium Phosphate doped alginate coatings on Titanium surfaces**

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The release of calcium and phosphate ions into interface around orthopedic and dental implants may improve the bone healing. Human mesenchymal stem cells derived from the bone marrow (HMSC-bm), mononuclear cells obtained from buffy coat and connective tissue cell lines (SaOS-2) were used for testing of alginate hydrogel coatings on titanium grade 2, which were doped with inorganic hydroxyapatite (Ti/ALG/HAP) or  $\beta$ -tricalcium phosphate (Ti/ALG/TCP) nanoparticles. Uncoated titanium (Ti) and pure alginate (Ti/ALG) served as control surfaces. Samples were cultivated for 3 and 7 days and cytokine production was assessed by multiplex proteomic analysis Ray Bio Human Inflammation Array (Ray Biotech, USA). Each cell type produces a different spectrum of cytokines. Mononuclear cells produce the most frequently factors of nonspecific immunity (MIP, RANTES, MCP-1, IL-6 and IL-8) in a dose higher than for the positive control. The cytokine production declined in the order Ti/ALG/HAP  $\rightarrow$  Ti  $\rightarrow$  Ti/ALG/TCP  $\rightarrow$  Ti/ALG. HMSC-bm produced mostly chemokines activating predominantly chemotaxis and activating monocytes, granulocytes and neutrophils, but in doses lower than mononuclear cells. SaOS-2 cells produced the broadest spectrum of cytokines but in low doses and with no significant difference between Ti/ALG/HAP and Ti/ALG/TCP surfaces. The immune response of mononuclear and stem cells showed differences between materials, whereas SaOS-2 cells weren't sufficiently sensitive. Therefore, besides SaOS-2 cells, HMSC-bm and mononuclear cells should be also considered for in vitro evaluation of overall inflammatory response induced by presence of the implant.

### **Biography**

Lucie Himmlova has completed her PhD at First Faculty of Medicine, Charles University, Prague. She is teacher and research fellow at School of Dentistry and she was principal investigator of 6 projects. Her specialization is the surface treatment of implant and dental biomechanics. She has published more than 40 papers in international journals: This work was supported by IGA MH CR, project No. 13297-4 and by the European Regional Development Fund (project BIOCEV No. CZ.1.05/1.1.00/02.0109).

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