

Local Expression of Osteoprotegerin (OPG) 3 and 6 Months after Implantation of Biphasic Calcium Phosphate (HAp/TCP) Granules in Osteoporotic Hip Bone of Rabbits

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Introduction. Despite achievements in systemic prevention and treatment of osteoporosis, fragility fractures remain a clinical problem. Local treatment strategies could be developed for reinforcement of bone in critical sites of osteoporosis to treat fragility fractures. Calcium bioceramics as bone graft beside osteoconductive potency activates endogenous growth factors, improving bone remodeling and fracture healing. Osteoprotegerin (OPG) is a member of tumour necrosis factor receptor superfamily and is of major importance in bone homeostasis disturbed in osteoporosis as activated osteoclastogenesis.

Aim, Material and Methods. The aim of the study was immunohistochemical analysis of OPG in osteoporotic bone after implantation of calcium bioceramics. Experimental osteoporosis was induced in 16 female rabbits after ovariectomy followed by administration of methylprednisolon for 8 weeks. In experimental group of 13 animals, bone defect in hip bone was created and filled with HAp/ β -TCP (90/10) granules in size 1.0–1.4 mm developed in RTU Rudolfs Cimdins Riga Center for Development and Innovations of Biomaterials. After 3 or 6 months animals were euthanased, bone samples collected and proceeded for OPG immunohistochemically.

Results. Control group samples from osteoporotic bone without bioceramic implantation showed dominantly few OPG positive cells found in visual field as it could be characteristic to osteoporotic bone. In comparison, in experimental group of seven animals, 3 months after bioceramics implantation the increase of OPG expression was found twice as much, on average in moderate amount of cells in visual field. In experimental group of six animals, 6 months after bioceramics implantation the results were similar – in four rabbits we found moderate amount of OPG positive cells and even better, because in two cases there were numerous cells with OPG expression.

Conclusions. Granules of new developed biphasic calcium phosphate (HAp/ β -TCP 90/10) bioceramics in osteoporotic bone of experimental animals have a positive effect on local bone remodelling by decrease of osteoclast activation (suppression of bone resorption) showing increased expression of OPG in bone cells 3 and 6 months after implantation and may be *in vivo* based recommendation to clinical trial in local use for treatment of fractures of osteoporotic bone.