

INTERVERTEBRAL SPINAL FUSION WITH HYBRID BIODEGRADABLE NANOCOMPOSITE POROUS IMPLANT: PRE-CLINICAL STUDY

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Due to the degenerative spinal diseases, comminuted fractures of vertebral body, spine malformations, and bone defects after tumor resection, lumbar fusion procedures has rapidly increased over the last decade in the USA and Europe. Successful fusion depends on a number of surgical and host factors including the selection of a bone graft or bone substitute with adequate osteoconductive, osteoinductive and osteogenic properties. In the proposed work, novel biomimetic hybrid biodegradable porous implant based on the mixture of inorganic calcium phosphates and organic proteins including growth factors were developed. Cytotoxicity of implants was tested on human mesenchymal stem cells and biocompatibility was preclinically evaluated *in vivo* on large white pig. The important aim was to compare tested hybrid biodegradable implant with bone autograph in terms of spinal fusion creation as well as of bone quality connection between vertebrae. Significant differences were visible on regenerated spines after either 8 or 16 weeks of healing whereas bone autograph caused very slow fibrous bone healing and perivertebral fibrous scarring, novel hybrid porous implant fully produced vertebral fusion from bone tissue without any perivertebral fibrous reaction. Results were proved by techniques like micro-CT, histology and spine biomechanical measurement. The novel technique utilizing tissue engineering should reduce complications of currently used auto- and allografts or metallic, PEEK or titanium cages.

Biography

Lucy Vojtova has completed her PhD from Brno University of Technology, Czech Republic and 3-years Postdoctoral Studies from Columbia University in the City of New York, USA. After habilitation, she is currently posted as a Senior Researcher and Leader of Biomaterials Group at Central European Institute of Technology, Brno, Czech Republic. She has obtained eight patents and published more than 45 papers in reputed journals dealing with biomaterials, polymer synthesis and functionalization, nanostructured scaffolds, tissue engineering and regenerative medicine of both hard and soft tissues

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