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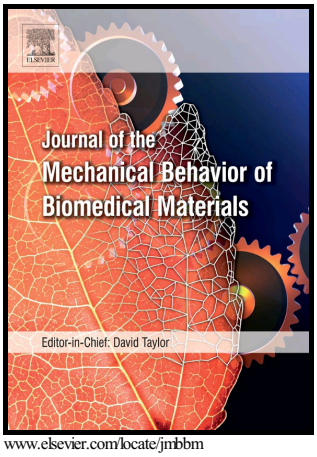

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ACCEPTED MANUSCRIPT

Enhanced bone healing in porous Ti implanted rabbit combining bioactive modification and mechanical stimulation

Yanni Zhang[1,#], Ying Chen[1,#], Hongchao Kou[2], Pengfei Yang[1], Yanen Wang[3,*],Tingli Lu[1,*]

[1] Key Laboratory for Space Bioscience and Biotechnology, School of Life Sciences, Northwestern Polytechnical University, Xi'an, 710072, China
[2] School of Materials Sciences, Northwestern Polytechnical University, Xi'an, 710072, China
[3] School of Mechanical Engineering, Northwestern Polytechnical University, Xi'an, 710072, China

Abstract:

To improve the bone healing efficiency of porous titanium implants, desired biological properties of implants are mandatory, involving bioactivity, osteoconductivity, osteoinductivity and a stable environment. In this study, bare porous titanium (abbr. pTi) with the porosity of 70% was fabricated by vacuum diffusion bonding of titanium meshes. Hydroxyapatite-coated pTi (abbr. Hap-pTi) was obtained by successively subjecting pTi to alkali heat treatment, pre-calcification and simulated body fluid. Both pTi and Hap-pTi were respectively implanted into the tibia defect model (ϕ10 mm × 6 mm) in New Zealand white rabbits, then subjected to non-invasively axial compressive loads at high-magnitude low-frequency (HMLF), which were denoted as F-pTi and F-Hap-pTi, respectively. Bone repairing efficiencies were analyzed by postoperative X-ray examination, optical observation and HE staining after 14 and 30 days of implantation. ALP and OCN contents in serum were also examined at 30 days. Results showed that the sham group and sham group with mechanical stimulation (abbr. F-sham) preferably caused bone fractures. Qualitatively,

# These two authors contribute equally to this work.
* Corresponding authors: lutinglixinxin@nwpu.edu.cn (Lu T.), wangyanen@nwpu.edu.cn (Wang Y.).

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