**Osteogenic Capability of Vaterite-Coated Nonwoven Polycaprolactone Scaffolds for In Vivo Bone Tissue Regeneration**

*Mariia* Saveleva1\*, *Alexey* Ivanov2, *Anatolii* Abalymov3, *Roman* Surmenev4, *Bogdan* Parakhonskiy5, Maria Lomova1

1Saratov State University, 410012, 83 Astrakhanskaya Street, Saratov, Russia

2 Saratov State Medical University, 410012, 112 Bolshaya Kazachia Street, Saratov, Russia

3 Skolkovo Institute of Science and Technology, 121205, Bolshoy Boulevard 30, Moscow, Russia

4 Tomsk Polytechnic University, 634050, 30 Lenina Avenue, Tomsk, Russia

5 Ghent University, 9000, 653 Coupure links, Ghent, Belgium

In current orthopaedic practice, bone implants often exhibit poor osteointegration, impaired osteogenesis, and, eventually, implant failure. The new tissue engineering strategies could overcome these drawbacks by developing new hybrid materials with biomimetic structure and enhanced regenerative potential. In this study, the osteogenic potential of CaCO3 vaterite is investigated in fibrous polymeric scaffold for bone regeneration. Hybrid polycaprolactone scaffolds coated with vaterite (PCL/CaCO3) were studied in course of their 28-days implantation period in a femur defect of a rat *in vivo*. After this period, the study of tissue formation in the defected area is performed by the histological study of femur cross-sections. Immobilization of alkaline phosphatase (ALP) into PCL/CaCO3 scaffolds increased efficiency of new bone tissue formation and defect repair. PCL/CaCO3 and PCL/CaCO3/ALP scaffolds reveal 37.3% and 62.9% areas, respectively, filled with newly formed bone tissue in cross-sections compared to unmineralized PCL scaffold (17.5%). Bone turnover markers are monitored on the 7th and 28th days after implantation and reveal an increase of osteocalcin level for both PCL/CaCO3 and PCL/CaCO3/ALP compared with PCL indicating the activation of osteogenesis. These presented results demonstrate that the vaterite in the composition of polymeric nonwoven scaffolds is able to promote osteogenesis, support angiogenesis, and facilitate bone defect repair.

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