Results: The breaking strength of elastin group (25.2 ± 10.22 N) was stronger than those of control group (11.0 ± 6.99 N) after 6 weeks ($p < 0.01$). There were no significant differences in the elongation between elastin group (3.99 ± 1.51 N) and control group (3.74 ± 2.00 N). At 12 weeks after surgery, we couldn't get effective data about the breaking strength and the elongation because of decline in strength by 3-0 PDS absorption. Histologically, we found cartilage formation and bone formation around bone tunnels in elastin group 6 weeks postoperatively. After 12 weeks, cartilage formation and bone formation occurred around bone tunnels in both groups.
Discussion and Conclusion: Biomechanical properties of ligament-bone junction was significantly improved by artificial ligament coated with elastin. Upregulation of cartilage formation and bone formation in bone tunnels was observed in elastin group, and it might result in bone tunnel healing. Although further studies are needed about administration form and dosage, elastin might be useful for promoting ligament-bone junction healing.

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THE *IN VITRO* BIOCOMPATIBILITY AND OSTEOINDUCTIVE ACTIVITY STUDY OF MAGNESIUM COMPOSED PLGA/TCP POROUS SCAFFOLD FOR BONE REGENERATION

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Introduction: Magnesium is a kind of biodegradable metal and widely concerned for its good mechanical properties and bioactivity ability in biomedical fields, but limited with low corrosion resistance for clinical application. Bioactive ceramic alkaline calcium phosphate (TCP) was proven helpful to bone healing due to its biocompatibility and osteoconductivity. In this study, magnesium powder was incorporated into the mixed solution of poly lactide-co-glycolic acid (PLGA) and TCP, then fabricated PLGA/TCP/Mg composited porous scaffold by low-temperature 3D printing technology to optimized the initial mechanical properties of PLGA/TCP scaffold and yield osteogenesis potential of the scaffold for bone regeneration.
Materials & Methods: The porous PLGA/TCP/Mg composite scaffolds were fabricated at −30 °C using an advanced low-temperature rapid-prototyping machine (CLRF-2000-II, Tsinghua University, China) following previously published procedure. The TCP powders and Mg powders were then added into the PLGA solution. Scaffolds with different ratio of Mg (PLGA/TCP/5Mg: 5%, PLGA/TCP/10Mg: 10%, (PLGA/TCP/15Mg: 15%) were designed to estimate the effect of Mg in osteoinductive activity. PLGA/TCP scaffolds were served as control group. The structure of PLGA/TCP/Mg porous scaffolds was observed by SEM and determined by ethanol method. Amebocyte Lysate, (V = L/λ = 2.15 EU/λ) were used to detected the bacterial endotoxin by the gel method. Simultaneously, the MC3T3-E1 cells were cultured with leaching diluents of PLGA/TCP, PLGA/TCP/5Mg PLGA/TCP/10Mg and PLGA/TCP/15Mg scaffolds for 1, 3, 5 and 7d, CCK-8 assay was performed to evaluate the proliferation. The relative ratio between absorbance of ALP and total protein was taken as an indicator of representing the quantity of ALP in the unit quantitative cells. The mRNA expression of OC and OST of MC3T3-E1cells cultured was evaluated by RT-qPCR.
Results & Discussion: The PLGA/TCP/Mg scaffolds possess porous structure with porosity of 81.6% and almost 100% pore connectivity, and the average pore size was about 200 μm. PLGA/TCP/Mg porous scaffold could not occur coagulation within 24 hours when exposure to Limulus Amebocyte Lysate (LAL) reagent, and the results were in conformity with biosafety requires of the National Standard (GB/T14233.2-2005). Meanwhile, the CCK-8 results further demonstrated that MC3T3-E1 cells grew well on the surface of the composite scaffold. The expression levels of ALP, OC and OST were significantly improved. Compared with PLGA/TCP scaffold, alkaline phosphatase, OC and OST expressions were higher in PLGA/TCP/Mg scaffolds respectively.
Conclusions: PLGA/TCP/Mg is a kind of biocompatible and high osteogenic activity material which is expected to be a promising scaffold material for bone tissue engineering. The low-temperature 3D printing technology helps to yield a unique osteoconductive structure of PLGA/TCP/Mg scaffold for bone regeneration. The addition of magnesium improved the biocompatibility and osteoinductive activity of PLGA/TCP scaffold.
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PREPARATION AND STUDY OF CALCIUM PHOSPHATE-SILK FIBROIN CEMENT INCORPORATED WITH N-ACETYL CYSTEINE

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Introduction: N-acetyl cysteine (NAC), precursor of glutathione, could regulate differentiation in various types of cell. This study aims to evaluate the biocompatibility, physico-chemical, mechanical and osteogenic properties.
Methods: After mixing α-TCP with silk fibroin aqueous solution containing different concentration of NAC (0, 10, and 25 mM) with the L/P ratio of 0.4, the setting time, washout resistance, compressive strength of the cement were tested. Also, XRD and SEM were performed. MTS and LDH assay were performed to evaluate the cytotoxicity. The ALP assay and RT-PCR of osteogenic related gene were conducted to analyse the osteogenic property.
Results: The setting time of the cement was slightly prolonged when NAC was added to the cure liquid. NAC had no influence on the washout resistance property. Also, NAC did not affect the hydration of α-TCP. However, NAC could impressively enhance the compressive strength of the cement, improving from (29.86 ± 4.17) MPa to (49.39 ± 1.68) MPa.
Conclusion: Supplement NAC to calcium phosphate-silk fibroin cement could enhance the mechanical and osteogenic properties of the cement, while the cement remains biocompative.

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COVALENT IMMOBILIZATION OF ENOXACIN ON TITANIUM SURFACE BY APTES SILANIZATION FOR ANTI-BACTERIA AND IN VIVO PROPHYLAXIS OF MRSA INFECTION

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Background: Infection is the main reason of titanium implant failure in vivo. Antibiotics especially vancomycin had been chemically immobilized on surface of titanium implant to render them with antimicrobial properties. However, vancomycin is not sensitive to the *Escherichia coli* (*E. coli*), in other words, the vancomycin tethered Ti may be of no effect to the E. coli. In this study, enoxacin was covalently bond to the amine-functionalized Ti surface through a polyethylene glycol (PEG) spacer and the anti-infective of this composite was investigated in vitro and in vivo.
Materials and Methods: The titanium surface was amine-functionalized with 3-aminopropyltriethoxysilane (APTES) to introduce amine group on the surface. PEG was covalent immobilization onto titanium to act as a spacer, subsequently the enoxacin was bonded to the PEGylated Ti surface. X-ray photoelectron spectrometer (XPS) was used to characterize the efficiency of covalent procedure. Spread plate method, Confocal Laser Scanning Microscopy (CLSM) and Scanning Electron Microscopy (SEM) were used to characterize the surface antimicrobial activity. The Ti implant were infected with MRSA in vitro, followed by implantation in the femoral medullary cavity of rats, signs of infection 3 weeks post-operation was assessed by radiograph, micro-CT, counts of bacteria adherent to the Ti rod and bone tissue.
Results: Our data demonstrated that enoxacin modified Ti surface could effectively prevent colonization of bacteria including *Staphylococcus aureus*, Methicillin-resistant *Staphylococcus aureus* (MRSA), *Staphylococcus epidermidis*, methicillin resistant *Staphylococcus epidermidis* and *Escherichia coli*, and did not show cytotoxicity to the human bone marrow mesenchymal stem cells (hBMSCs). The hBMSC adhesion and proliferation was also not affected. Furthermore, it could prevent Ti implant to be infected by MRSA in vivo.
Discussion and Conclusion: Tethered antibiotic surfaces are promising with respect to inhibiting bacterial colonization. In this study, enoxacin was covalently immobilized on the PEGylated Ti surface. PEG, on one hand, could act as a flexible spacer, which allowed the enoxacin to react with the bacteria, and on the other hand, PEGylated Ti could improve the cytocompatibility of the Ti. The advantage of enoxacin functionalized Ti over vancomycin functionalized Ti was that the Ti-EN could effectively prevent both Gram-positive and Gram-negative bacteria colonization. When hBMSCs were cultured on the tethered enoxacin surfaces, there was little change in morphology, size and density of adherent cells. In conclusion, covalent immobilization of enoxacin onto