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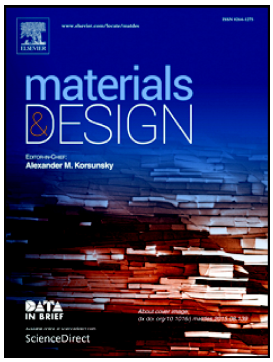

Drug release, cytocompatibility, bioactivity, and antibacterial activity of doxycycline loaded Mg-Ca-TiO2 composite scaffold

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Drug release, cytocompatibility, bioactivity, and antibacterial activity of doxycycline loaded Mg-Ca-TiO_2 composite scaffold

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Abstract

Mg-Ca-TiO_2 (MCT) composite scaffolds loaded with different concentrations of doxycycline (DC) with a network of interconnected pores with good compressive strength (5±0.1 MPa) were fabricated via space holder method for the first time. The results showed that MCT-DC scaffolds possess a porosity and pore size in the range of 65-67 % and 600–800 μm respectively. The bioactivity results exhibited the apatite formation on the MCT-DC scaffold surface, indicating that DC did not obstruct the bioactivity of MCT. The MCT-DC scaffolds drug release profiles show the initial burst and sustained drug release (55-75 %) and the release rate could be adjusted via altering the DC concentration. The MCT loaded with 1 and 5 % DC did not indicate cytotoxic behaviour against MG63 cells while further DC loading resulted in some toxicity. Antimicrobial properties of MCT-DC scaffolds against *Staphylococcus aureus (S. aureus)* and *Escherichia coli (E. coli)* bacteria were examined and the results reveal oblivious inhibition zone around each MCT-DC scaffold whereas no obvious inhibition is observed around the MCT scaffold. Therefore, MCT-DC composite scaffolds with low concentration of DC could be alternative candidates for infection prevention and bone tissue engineering.

Keywords: Mg composite scaffold; Drug delivery; Antibacterial activity; Biocompatibility; Bioactivity