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## rhBMP-2-immobilized titanium via click reaction enhances MC3T3-E1 osteogenic differentiation

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**Introduction:** We report about the efficacy of titanium surface-immobilized with bone morphogenetic protein-2 (BMP-2) via click reaction on enhanced osteogenic differentiation of MC3T3-E1 cells.

**Methods & Materials:** Surface propargylation (Ti-3), surface heparinization (Ti-6) was done. Scanning electron microscope observation, static contact angle measurements, surface chemical composition measurements, quantitative analysis of heparin, practical immobilizing amount of rhBMP-2 on Ti-6, release kinetics of rhBMP-2 from Ti-6, MC3T3-E1 cell proliferation assay, alkaline phosphatase (ALP) activity assay, calcium deposition assay, and real-time polymerase chain reaction (RT-PCR) were initiated. All experiments were carried out three times.

**Results:** The surface was characterized by static contact angles and XPS measurements, which indicated that pristine titanium (Ti-1) was successfully surface-modified via click chemistry (aminated titanium, Ti-4). By quantitative analysis of heparin immobilized on aminated titanium (Ti-4), we found that the Ti-4 can be used as a good candidate to immobilize biomolecules such as heparin. BMP-2 from titanium immobilized with BMP-2 (Ti-6) was released for a period of 28 days in a sustained manner. The highest proliferation rate of MC3T3-E1 cells was observed in Ti-6.

**Conclusion:** Through in-vitro tests including alkaline phosphatase (ALP) activity, calcium deposition and real-time polymerase chain reaction (RT-PCR), we found that Ti-6 can be used as a good implant to enhance the osteogenic differentiation of MC3T3-E1 cells.

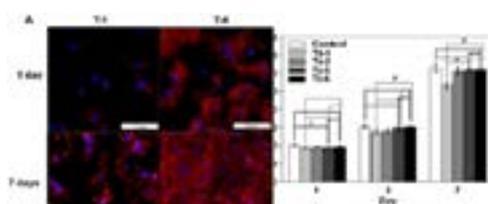


Fig. 3: Proliferation of MC3T3-E1 cells cultured on control (48-well plate), Ti-1-2, and Ti-5-6 for 1, 3 and 7 days, examined by (A) fluorescence microscope and (B) CCK-8assays.

### Biography

Deok-Won Lee is an Oral and Maxillofacial Surgery Specialist and Associate Professor of Kyung Hee University College of Dentistry. His expertise is in treating and improving the oral and maxillofacial health and wellbeing of people. His research on dental implant materials creates new pathways for improving healthcare. He is continually building and investigating on adequate material for implantation through in-vivo and in-vitro models based on years of experience in research, evaluation, teaching and administration both in hospital and education institutions.

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