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Modifying titanium surfaces with nanosized hydroxyapatite and simvastatin to enhance bone formation and osseointegration

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Introduction: The aim of the present study is to evaluate whether coating pristine titanium (Ti) with nano-sized hydroxyapatite (HAp) and simvastatin could enhance bone formation and osseointegration *in-vitro* and *in-vivo* because, both HAp and simvastatin have the characteristic of osteogenetic induction.

Methods & Materials: Pristine Ti was sequentially surface-treated with NaOH,1,1-carbonyldiimidazole (CDI), β-cyclodextrin-immobilized HAp powders (-CD/HAp), and simvastatin before analysis using scanning electron microscopy (SEM), X-ray photoelectron microscopy (XPS), and static contact angle measurement.

Results: Simvastatin was released continually for 28 days. Modification of the Ti surface with nano-sized HAp and simvastatin (Ti/_-CD/HAp/Sim) discs enhanced the osteogenic differentiation of MC3T3-E1 cells *in-vitro*. Furthermore, Ti/-CD/HAp/Sim of screw type enhanced bone formation between the screw and the host bone, when the screw implanted to the proximal tibia and femoral head of rabbits.

Conclusion: These results suggest that surface modification of nanosized HAp and simvastatin are effective tools for developing attractive dental implants.

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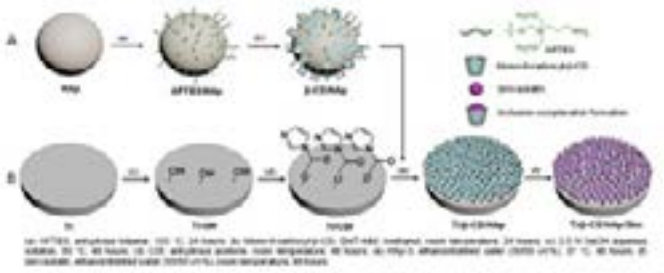

Fig. 1 Scheme of Ti/β -CD/HAp/Sim synthesis.

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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