*Matsumoto Dental University*
*Graduate School of Oral Medicine*

1780 Gobara, Hirooka, Shiojiri,
Nagano 399-0781, Japan

# 第 318 回松本歯科大学大学院セミナー

日　時: 2015 年 4 月 30 日(木)　17 時 30 分～19 時 00 分

場　所: 実習館 2 階 総合歯科医学研究所セミナールーム

演　者: Wilhelm Hofstetter 教授(ベルン大学臨床医学講座)

タイトル: Biofunctionalization of bone substitute materials – is there progress beyond L51P?

Wilhelm Hofstetter 教授は、2012 年 4 月から 5 ヶ月間、客員研究員として本学に滞在し、私たちと共同研究を行いました。その後、βTCP を骨補てん剤として利用する研究を進めております。今回 Hofstetter 教授は、第 13 回国際骨形態計測学会(東京, 4 月 27 日-29 日)に出席するために来日します。その機会に本学において、骨補てん剤の研究結果を発表していただきます。

講演要旨

Skeletal defects arising from resections of bone tumors, trauma, or total joint arthroplasties with bone deficiencies need to be filled with suitable grafting materials. While autologous bone is still the best material available to augment bone healing and to reconstruct bone defects, its scarcity and the need for a second intervention are considerable drawbacks. This opens the field for CaP-based bone-substitute materials, of which β-tricalcium phosphate (βTCP) is approved for clinical use. In large bone defects, however, the substitution of βTCP by authentic bone is inadequate to provide sufficient long-term mechanical stability. Previously, we have demonstrated that the specific inhibition of the family of Bone Morphogenetic Proteins (BMP) antagonists with a modified BMP2 protein (L51P) stimulates osseointegration of a porous βTCP ceramic in a rat femoral critical size defect. We have also shown that different release kinetics of Vascular Endothelial Growth Factor (VEGF) from βTCP ceramics affects vascularization of the biomaterial, a critical step in osseointegration, vascularization being a prerequisite for bone formation. Since osseointegration and vascularization of βTCP ceramics can be modulated by adding specific growth factors to the βTCP, the question remained, whether turnover of the material can be modulated as well. For this purpose, Receptor Activator of NF-κB Ligand (RANKL) was either adsorbed onto the surface of βTCP shapes, or was incorporated in a precipitated amorphous layer of CaP on the ceramics, the latter leading to a low level, long term release of the growth factor. Upon surface-binding, RANKL was not able to support osteoclastogenesis in vitro. In contrast, long-term release of co-precipitated RANKL allowed for the development of mature osteoclasts that actively would resorb a CaP substrate. During the resorption process, osteoclasts further liberate co-precipitated RANKL, perpetuating their differentiation and activation. It will be the subject of further studies to investigate, whether variation of release kinetics of RANKL will affect osseointegration and turnover of CaP ceramics in vivo as well.

担当:硬組織疾患制御再建学講座　小林　泰浩