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Title	Periodontal wound healing by collagen hydrogel scaffold and FGF2 in class II furcation defects in dog [an abstract of entire text]
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Description	この博士論文全文の閲覧方法については、以下のサイトをご参照ください。 https://www.lib.hokudai.ac.jp/dissertations/copy-guides/
Degree Grantor	北海道大学
Degree Name	博士(歯学)
Dissertation Number	甲第11724号
Issue Date	2015-03-25
Doc URL	https://hdl.handle.net/2115/59239
Type	doctoral thesis
File Information	Takehito_Momose_summary.pdf



学位論文内容の要約

学位論文題目

Periodontal wound healing by collagen hydrogel scaffold and FGF2 in class II furcation defects in dog

(イヌ根分岐部Ⅱ級骨欠損におけるコラーゲンハイドロゲルスキャフォールドと FGF2
による歯周組織治癒)

博士の専攻分野名称 博士（歯学） 氏名 百瀬 赳人

Background and objective: A three-dimensional scaffold consisting of collagen hydrogel and sponge has exhibited good biocompatibility and enhanced tissue healing. Fibroblast growth factor-2 (FGF2) promotes cell proliferation, angiogenesis, and wound healing. Accordingly, we evaluated the effects of collagen hydrogel scaffold in combination with FGF2 on periodontal wound healing in class II furcation defects in beagle dogs.

Materials and Methods: The collagen hydrogel was prepared from bovine type I collagen with an ascorbate-copper ion cross-linking system. Collagen hydrogel was mingled with FGF2 and injected into sponge-form collagen. Subsequently, Class II furcation defects (of 5 mm depth and 3 mm width) were surgically created in beagle dogs. The exposed root surface was planed and demineralized with EDTA. Defects were divided into three groups; FGF2 (50 µg)/ collagen hydrogel scaffold, collagen hydrogel scaffold alone, and no implantation as control. Histometric parameters were assessed 10 days and 4 weeks after surgery.

Result: FGF2 application to scaffold considerably promoted cell and tissue ingrowth containing fibroblastic cells and blood vessels at day 10. In addition, collagen hydrogel scaffold displayed high biocompatibility and biodegradability. At 4 weeks, reconstruction of alveolar bone was stimulated by implantation of collagen hydrogel scaffold including FGF2. Furthermore, cementum-like tissue, periodontal ligament-like tissue was also repaired, indicating that FGF2-loaded scaffold guided self-assembly and then re-established the function of periodontal organs. There were no instances of aberrant healing involving ankylosis and root resorption.

Conclusion: FGF2-loaded collagen hydrogel scaffold possessed excellent biocompatibility and strongly promoted periodontal tissue engineering, including periodontal tissue re-organization.