

## R-10. Development of Silk fibroin nanofibrous membrane for guided bone regeneration

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### 연구배경

Guided bone regenerative (GBR) therapy based on the application of membranes has achieved significant bone augmentation efficiency in clinical trials. These membranes have been used in bone augmentation even in complicated and localized bone defects such as alveolar ridge defects and lower skeletal borders. Here in, the authors prepared nanofibrous membranes by electrospinning silk fibroin solution. Silk fibroin (SF) was chosen as a candidate materials for GBR applications, as it has several distinctive biological properties including good biocompatibility and stability compared to currently utilized materials. In addition, nanofibrous structures were of considerable interest for GBR since nanofibrous surface would provide high surface area with increased porosity. The purpose of this study was to evaluate the bone regenerative effect using membrane made of electrospun SF nanofibers through examining osteoblastic cell proliferation, differentiation on the membrane, and bone formation capacity in the rabbit calvarial defect model.

### 연구방법 및 재료

The SF membranes were prepared by electrospinning SF solutions followed by collecting on a target drum. The membranes were further dried under vacuum for 24 h. To examine the biocompatibility of the electrospun SF nanofibers, MC3T3-E1 cells seeded on the SF nanofiberous membrane. Cell morphology on SF nanofiberous membrane was examined by SEM and cell proliferation and differentiation was evaluated at 1, 4 and 7 days. Bone regenerative efficacy of the fibers were examined in the calvarial defect of rabbit for 4 weeks.

### 연구결과

The SEM observation reveals the morphology of attached osteoblast showed stellate shape and broad cytoplasmic extension at 1day. Most of the electrospun SF nanofibers surface were covered with the cells at 7day. Cell proliferation level to the electrospun SF nanofiberous membrane demonstrated

increase in bone cell attachment and proliferation. *In vivo* test, the electrospun SF nanofiberous membrane shows high osteogenic effect.

## 결론

The electrospun SF nanofiberous membrane show increased osteoconductive and osteoinductive action *in vitro* and *in vivo test*. Taken together, the membranes may have osteogenic applications for periodontal and bone regeneration.

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