

# **The comparison of autoclaved autogenous bone and fibrin glue as BMP carriers for bone generation in a critical-size segmental defect in the Rat fibula.**

Authors: Nam J.W., Kim H.J.

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## **Abstract:**

Bone morphogenic proteins (BMPs) have been shown to play an important role in bone formation during development and wound healing. Despite the good prospects for BMP applications, an ideal carrier system for BMPs has yet to be determined. The purpose of this study was to evaluate the possibility of an autoclaved autogenous bone (AAB) as a carrier for recombinant human BMP-2 (rhBMP-2) and compare it to well known BMP carriers, AAB and fibrin glue (FG), in a rat fibula defect model. A critical size defect (6mm) of fibula was created in each of 24 male Sprague-Dawley rats. They were placed in two groups, 6 rats each group, as follows. Group A: 6 rats with right resected and repositioned fibula segmental bones (autoclaved under 123°C, 0.2MPa, 10min.) with 10 rhBMP-2 on the (experimental) and without rhBMP-2 on left side (control). Group B: Prefabricated rhBMP-2/FG and FG blocks in size 1.5 x 1.5 x 6 mm were positioned on 12 fibula bony defect site (6 right bone defects: experimental, 6 left bone defects: control). The groups were evaluated using histologic, radiologic, and Micro-CT methods following 2-, 4-, and 8-week healing intervals. Group A. Group B. Among the observed results for both A and B experimental groups we can highlight the following: I. In the gross and radiographic findings a complete union with ectopic bone was noticeable by the 2nd week and remodeling of the newly formed bone was observed in the 8th week. II. In the histomorphological and Micro-CT findings the formation from an immature to a mature bone was observed. From a low and irregular to normal bone morphology and density surrounded by a dense cortical bone and finally connecting to the pre-existing fibula. Among the two

BMP carriers evaluated in this study, in terms of emission control and maintenance of the BMPs, the FG was more effective than AAB for bone regeneration. But, in terms of space maintenance the AAB showed a higher advantage over the FG. Therefore, we suggest the clinical applications of BMP carriers in a combination, FG-AAB, in order to use as much as possible the advantages offered by the BMP's osteoinductivity and these carriers' osteoconductivity and expect a faster wound healing, as well as functional, esthetic, and economic benefits.