R-8. The Effects of Alendronate on healing of the calvarial defect in rats

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Ⅰ. Introduction

The bisphosphonates, which inhibit bone resorption by osteoclasts, are chemically analogs of pyrophosphates. The P-C-P bond instead of P-O-P bond is stable to heat and most chemical reagents and completely resistant to enzymatic hydrolysis and has strong affinity for hydroxyapatite. For the application of dentistry, Topical delivery that overcomes the absorption problem`s encountered as well as any potential adverse effects on other tissues is reasonable. Some authors reproted that topical delivery of bisphophonates may be used for suppression of alveolar bone resorption by periodontitis, for decrease of alveolar bone resorption after mucoperiosteal flap surgery, for increase of bone formation rate and bone to implant contact in the regenerative treatment of periimplant defects, and for preventing the movement of anchorage tooth or relapse in the orthodontic treatment. but these studies are an elementary phase, thus additional experiments about method, carrier, concentration and durability of topical delivery are needed For the application of dentistry, Topical delivery that overcomes the absorption problem`s encountered as well as any potential adverse effects on other tissues is reasonable. Some authors reproted that topical delivery of bisphophonates may be used for suppression of alveolar bone resorption by periodontitis, for decrease of alveolar bone resorption after mucoperiosteal flap surgery, for increase of bone formation rate and bone to implant contact in the regenerative treatment of periimplant defects, and for preventing the movement of anchorage tooth or relapse in the orthodontic treatment. but these studies are an elementary phase, thus additional experiments about method, carrier, concentration and durability of topical delivery are needed Therefore we investigated, in this study, the effects of topical application of alendronate with collagen membrane on healing of the calvarial defect in rats, which has a good experimental design to regeneration of tissue destruction,

Ⅱ. Materials and Methods

A total of 18 Sprague-Dawley rats were used for experimental animals in this study. It was settled that Defects of right side was testing group, defects of left side was control groups. Two full-thickness bone defects with a diameter of 5mm trephined in the dorsal part of the parietal bone lateral to the sagittal suture. Collagen membrane(CollaTape®, Sulzer Calcitek. INC.) absorbing 20㎕ Alendronate (Yu Yu Pharm. Korea) solution was inserting in the defects of right side and 6mm diameter Collagen membrane(CollaTape®, Sulzer Calcitek. INC.) absorbing 20㎕ physiologic saline was inserting in the defects of left side. the periosteum and scalp were sutured with 5-0 vicryl® All animals were sacrificed on 1, 2, 4 weeks by heart perfusion, and specimens were taken at the site of parietal bone around the calvarial

defect areas. Specimens from alendronate or control site were stained with hematoxylin and eosin (H&E). To evaluate ostetoclastic activity, tartrate resistant acid phosphatase (TRAP) staining was done. On 2, 4 weeks the hardnesses of specimens from test or control site were estimated by the hardness measurement instrument

III. Results

1. There was similar bony healing aspect between test and control groups each weeks. on 1 weeks inflammatory cell infiltrated around the marginal bone of the defect and new bone formation was not shown, on 2 weeks New bone formation was shown on the marginal bone of the defect, on 4 weeks Osteogenic repair was abserved on most area of the defect
2. Test groups were shown significant less TRAP-positive cells than control group in 1 weeks($p<0.01$), while there was similar aspect between test and control groups in 2 weeks and 4weeks There was statistically significant difference on control group between 1 week and 2 weeks ($p>0.05$) and not test group. There was also statistically significant difference on control group between 1 week and 4 weeks($p>0.05$) and not test group.
3. Test groups were shown significant higher hardness than control group in 2 weeks ($p<0.01$), while there was similar hardness between test and control groups in 4 weeks groups, There was statistically significant difference on control group($p>0.05$) between 2 weeks and 4 weeks and not test group.