Treatment of Peri-implant Defects in the Rabbit's Tibia with Adipose and Bone Marrow-Derived Mesenchymal Stems Cells

Özgür Erdogan[1]*,Nuttawut Supachawaroj*[1]*,Pakpoom Kheolamai*[2]*,Kumpanart Soontornvipart*[3]

1) Rangsit University, Department of Oral Surgery, Faculty of Dental Medicine, Thailand
2) Thammasat University, Department of Pre-clinic Sciences, Faculty of Medicine, Thailand
3) Chulalongkorn University, Department of Surgery, Faculty of Veterinary Medicine, Thailand

Aim: The purpose of this *in vivo* study was to evaluate the success of bone regeneration capacity of adipose-derived and bone marrow derived mesenchymal stem cells (MSCs) for the treatment of peri-implant bone defects when applied with Beta-Tricalcium Phosphate(TCP)/Collagen based scaffolds.

Material Methods: Forty implants were placed into the tibiae of 10 rabbits bilaterally. The implants were placed so that four threads were exposed at all aspects. The defects around the implants were treated with one the following treatment modalities; 1) Scaffold loaded with adipose derived MSCs + collagen membrane 2) Scaffold loaded with bone marrow derived MSCs + collagen membrane 3) Autogenous bone + collagen membrane 4) Collagen membrane only. The bone regeneration capacity of each technique was determined by histomorphometry, microCT scans and measuring the implant stability by resonance frequency analysis (RFA).

Results: One limb of one rabbit was excluded because of fracture and another limb was excluded because of infection. Histomorphometric parameters, microCT analyses and RFA measurements on 36 implants revealed that both sources of MSC can form equivalently new bone that is comparable to autogenous bone. The defects treated with membrane only had significantly less bone formation compared to other groups.

Conclusion: Both adipose-derived and bone marrow-derived MSCs are feasible alternatives to autogenous bone grafts in the treatment of peri-implant osseos defects.

Keywords : Dental implants, Mesenchymal stem cells, Rabbit, Guided bone regeneration