

# Comparison of bone regeneration in rabbit bone marrow stem cells and adipose stem cells

Daniel Seungyoul Han, M.D., Ph.D.

**Background:** The occurrence of stem cell differentiation in every mesenchymal cell is a current topic of research interest. This study analyzed stem cell-derived optimization of differentiation and efficient regeneration by harvesting bone marrow- and adipose-derived stem cells. In addition, bone regeneration in bone marrow and adipose stem cells is researched and compared.

**Methods:** Stem cells are harvested from 20 white New Zealand rabbits raised in the same environment. The experiment involved craniectomy to produce 1X1-cm-sized calvarial bone defects in the rabbits after induction of bone regeneration and injection of  $1 \times 10^6$  cells/L of marrow and adipose stem cells, respectively. Bone regeneration was noted by visible observation, volume changes of harvesting bones, 3-dimensional skull bone computed tomography and histological analysis.

**Result:** Both bone marrow stem cells and adipose stem cells are effective for bone regeneration. The amount of regenerated bone was slightly greater in bone marrow stem cells than adipose stem cells, but the difference was not significant (Table 1) (Fig. 1).

Table 1. Changes in volume of harvesting bones for 6 weeks

	Bone marrow Stem cell	Adipose derived Stem cell	P-value <sup>a</sup>
pre Volume(mm <sup>3</sup> )	159.5	160.5	
post Volume(mm <sup>3</sup> )	141.75	138.875	
Regeneration ratio <sup>b</sup> (%)	88.9	86.5	0.009

a. Statistical significances were tested by Wilcoxon Signed Ranks Test among the groups ( $p < 0.05$ )

b. Regeneration ratio is calculated as a percentage of pre and post volume.

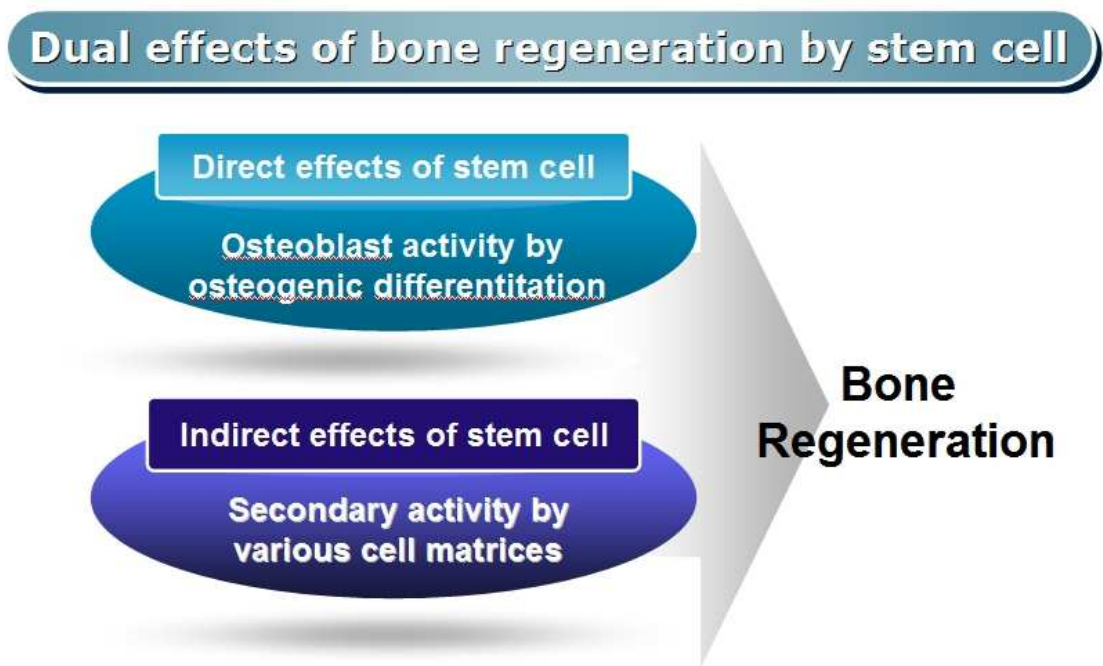


Fig. 1. Stem cells have dual effects of bone regeneration.

**Conclusion:** Compared with bone marrow stem cells, adipose stem cells are more effective bone regenerating material because of their easy accessibility, multi-differentiated ability, and capability to form multiplied stem cells through several cycles of subculture.