Pro-osteogenic effects of fibrin glue in treatment of avascular necrosis of the femoral head in vivo by hepatocyte growth factor-transgenic mesenchymal stem cells.

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Abstract:

BACKGROUND: Autologous transplantation of modified mesenchymal stem cells (MSCs) is a promising candidate for the treatment of the refractory clinical disease, avascular necrosis of the femoral head (ANFH). Our previous attempts by compounding MSCs with medical fibrin glue to treat ANFH in animal model have achieved excellent effects. However, the underlying molecular mechanism is unclear, especially on the transgenic gene expression.

METHODS: Rabbit MSCs were isolated and compounded with fibrin glue. Following degrading of fibrin glue, proliferation, viability, expression of transgenic hepatocyte growth factor gene as well as osteogenic differentiation of MSCs were evaluated together with that of uncompounded MSCs. Fibrin glue-compounded MSCs were transplanted into the lesion of ANFH model, and the therapeutic efficacy was compared with uncompounded MSCs. One-Way ANOVA was used to determine the statistical significance among treatment groups.

RESULTS: Fibrin glue compounding will not affect molecular activities of MSCs, including hepatocyte growth factor (HGF) secretion, cell proliferation and viability, and osteogenic differentiation in vitro. When applying fibrin glue-compounded MSCs for the therapy of ANFH in vivo, fibrin glue functioned as a drug delivery system and provided a sustaining microenvironment for MSCs which helped the relatively long-term secretion of HGF in the femoral head lesion and

resulted in improved therapeutic efficacy when compared with uncompounded MSCs as indicated by hematoxylin-eosin staining and immunohistochemistry of osteocalcin, CD105 and HGF.

CONCLUSION: Transplantation of fibrin glue-compounding MSCs is a promising novel method for ANFH therapy.