

論 文 要 旨

Elucidation of adipogenic differentiation regulatory mechanism
in human maxillary/mandibular bone marrow-derived stem cells

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Objective

This study aims to investigate the underlying molecular mechanisms that regulate the adipogenic differentiation of maxillary/mandibular bone marrow-derived mesenchymal stem cells (MBMSCs).

Design

MBMSCs and iliac bone marrow-derived MSCs (IBMSCs) were compared for osteogenic, chondrogenic, and adipogenic differentiation. Cell surface antigen expression was examined using flow cytometry, and stem cell marker expression was assessed using real-time polymerase chain reaction (PCR). Various adipogenic regulatory factors' expression was evaluated using real-time PCR and western blotting.

Results

No significant differences in cell surface antigen profiles or stem cell marker expression in MBMSCs and IBMSCs were observed. MBMSCs and IBMSCs displayed similar osteogenic and chondrogenic potentials, whereas MBMSCs showed significantly lower adipogenic potentials than those shown by IBMSCs. Expression of CCAAT/enhancer binding protein β (C/EBP β), C/EBP δ , early B-cell factor 1 (Ebf-1), and Krüppel-like factor 5 (KLF5), which are early adipogenic differentiation factors, was suppressed in MBMSCs compared to that in IBMSCs. Peroxisome proliferator-activated receptor- γ (PPAR γ) and C/EBP α , which play important roles in the terminal differentiation of adipocytes, was lower in MBMSCs than that in IBMSCs. Furthermore, the level of zinc finger protein 423 (Zfp423), which is involved in the commitment of undifferentiated MSCs to the adipocyte lineage, was significantly lower in MBMSCs than that in IBMSCs.

Conclusions

MBMSCs are negatively regulated in the commitment of undifferentiated MSCs to the adipocyte lineage (preadipocytes) as well as in the terminal differentiation of preadipocytes into mature adipocytes. These results may elucidate the site-specific characteristics of MBMSCs.