



STEM CELLS

Donor-derived bone marrow cells become adipocytes in recipients

Bone-marrow-derived progenitor cells contribute to adipogenesis in patients who have undergone allogeneic transplantation, according to a new study. The findings add clarity to the long-standing debate as to whether bone-marrow-derived cells can form cells of a nonhaematopoietic lineage in peripheral tissues.

Mikael Rydén and colleagues studied 65 patients (aged 2–65 years) who had undergone transplantation with either bone marrow or peripheral blood stem cells (PBSCs) to treat a haematological malignancy. The patients, who were relapse-free at the start of the study, were recruited 3–31 years after the procedure, thereby enabling the contribution of bone marrow or PBSCs to adipogenesis to be evaluated over almost the entire lifespan.

Bone marrow or PBSC-derived progenitor cells were shown to contribute ~10% to the subcutaneous adipocyte population in recipients over the entire lifespan. Moreover, this contribution was profoundly influenced by patients' BMI; the donor-cell derived contribution was 2.5-fold higher in recipients with severe obesity than in those who were lean.

To determine whether donor-derived cells actually became adipocytes, the team used laser

capture microdissection to isolate single mature adipocytes from recipients and donors, followed by whole-genome sequencing. Using homozygous single nucleotide polymorphisms unique to either the donor or the recipient, a subset of single cells isolated from recipients was shown to harbour nuclei that contained only donor-derived DNA. With currently available techniques, the researchers acknowledge that this result is the closest they can come to demonstrating that bone-marrow-derived cells can become a cell of a mesodermal lineage.

“If we can identify the specific bone marrow cells that become fully functional adipocytes (as in patients in the present cohort without ongoing immunosuppression), then these cells might also be capable of forming muscle, bone or cartilage cells,” speculates Rydén. “If so, the possibility exists for treating specific conditions (for example, muscular dystrophy, complicated osteoporosis and perhaps even advanced joint diseases) in a more targeted manner.”

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Original article Rydén, M. *et al.* Transplanted bone marrow-derived cells contribute to human adipogenesis. *Cell Metab.* doi:10.1016/j.cmet.2015.06.011