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Migration of bone marrow progenitor cells in the adult brain of rats and rabbits

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Abstract

Neurogenesis takes place in the adult mammalian brain in three areas: subgranular zone (SGZ) of the dentate gyrus (DG); subventricular zone (SVZ) of the lateral ventricle; olfactory bulb (OB). Different molecular markers can be used to characterize the cells involved in adult neurogenesis. It has been recently suggested that a population of bone marrow (BM) progenitor cells may migrate to the brain and differentiate into neuronal lineage. To explore this hypothesis, we injected recombinant SV40-derived vectors into the BM and followed the potential migration of the transduced cells. Long-term BM-directed gene transfer using recombinant SV40-derived vectors leads to expression of the genes delivered to the BM firstly in circulating cells, then after several months in mature neurons and microglial cells, and thus without central nervous system (CNS) lesion. Most of transgene-expressing cells expressed NeuN, a marker of mature neurons. Thus, BM-derived cells may function as progenitors of CNS cells in adult animals. The mechanism by which the cells from the BM come to be neurons remains to be determined. Although the observed gradual increase in transgene-expressing neurons over 16 months suggests that the pathway involved differentiation of BM-resident cells into neurons, cell fusion as the principal route cannot be totally ruled out.

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