Adipose-derived MSC could be used as an alternative for bone marrow MSC in the treatment of acute SCI. We used the intraspinal grafting of rat adipose-derived naïve and predifferentiated MSC to improve motor function after a balloon-induced compression lesion of the rat spinal cord. Grafted cells survived for seven weeks after transplantation, improved motor activity and integrated into the host tissue. They expressed the oligodenrocyte
precursor marker NG2 and, occasionally, the astrocytic marker GFAP, but did not transdifferentiate into a neuronal phenotype.
Bone marrow MSC may change the disease course and extend lifespan in a rat model of ALS. Combined intraspinal and intravenous transplantation of rat BMSC was performed in symptomatic rats overexpressing the SOD1 G93A gene. Cell-treated animals lived longer compared with sham-treated rats and displayed significantly improved motor activity and grip strength. Rat BMSC survived until the end stage of the disease and were migrating along the white matter of the spinal cord. Grafted cells increased the number of host cells displaying positive staining for neurofilaments and significantly increased the number and also the size of the remaining spinal motoneurons 10-11 weeks after delivery, compared with vehicle-injection. The defragmentation of DNA, a sign of apoptosis, was less pronounced after combined cell therapy. The effect of intrathecal (cisterna magna) application of human BMSC on the motor function and survival of SOD1 G93A rats was evaluated after confirming the disease onset. The injection of hBMSC into the cerebrospinal fluid of symptomatic rats resulted in a slower decline of motor function and prolonged survival compared to vehicle-injected rats. Perineuronal networks are found in the extracellular matrix around neurons; the digestion of these structures with chaseABC reactivates CNS plasticity.