Injection of neural stem cells in a rat model of amyotrophic lateral sclerosis

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Amyotrophic lateral sclerosis (ALS) is a progressive and terminal neuroinflammatory and neurodegenerative disease specifically affecting motoneurons. Death caused by paralysis occurs only 3 to 4 years after the first observed symptom. Although genetic background of 90% of the cases is not defined, uniformity of pathological features in familial superoxide dismutase 1 (SOD1) mutation yielded high interest for this mutation and corresponding animal model. As recent publications suggested that several molecules (cytokines) which are involved in inflammatory process attract neural stem cells, we decided to test whether cells injected in the rat blood stream will be attracted by pathological process within CNS. Moreover, as undifferentiated neural stem cells express only tumor necrosis factor receptor type 2 (TNF-R2), which protects them from induction of apoptosis by $TNF\alpha$, we wanted to test whether injection of TNFa will increase their migration to CNS. Rational was the well known permeabilization of blood brain barrier by TNFa. After injection of 10 millions of wild type nestin/GFP positive cells, some were found scattered in the brain cortex. More cells were found in both disease affected animals and TNF α treated wild type animals than in untreated wild type animals. This suggests that increased levels of cytokines in the CNS of ALS affected animal might increase chemo-attraction of neural stem cells towards the inflamed neural tissue.