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Mesenchymal stem cell transplantation in patents with amyotrophic lateral sclerosis and multiple sclerosis

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Abstract

Background: Stem cell transplantation is suggested to be the most promising therapeutic strategy for degenerative and progressive diseases, among which the most significant are amyotrophic lateral sclerosis (ALS) and multiple sclerosis (MS). Human mesenchymal stem cells (MSCs) are thought to be multipotent cells that have the potential to differentiate to lineages of mesenchymal tissues including bone, muscle, neurons, and oligodendrocytes.

Materials and methods: In this study autologous MSCs were isolated from the bone marrow of 10 patients with ALS (5F, 5M, aged 40–63 ys, duration 18–57 mths, 32–20 points of ALSSS scale) and 3 patients with MS (1F, 2M, aged 30–37 ys, duration 4–14 ys, SP course (2 pts) and RR course (1 pt), EDSS 3.5–6.5). Growth kinetics, immunophenotypes, and karyotypes were evaluated during in vitro expansion. The in vitro expanded MSCs did not show any bacterial or fungal contamination, hemopoietic cell contamination, chromosomic alterations, or early cellular senescence. The patients received monthly intravenous injections of autologous MSCs in doses of 2 x 10^6 cells/kg for 3–20 months. No signs of abnormal cell proliferation were observed.

Results: No significant acute or late side effects were evidenced. Minor adverse events were headaches and transient hyperthermia after MSC infusion in two ALS patients, reversible after 10 hours. Four ALS patients died 3–6 mths after start of therapy due to conditions not directly related with MSC therapy: 1 pt committed suicide (had not had any positive results from therapy), 2 pts died of cardiac arrest (both had a long history of ischemic cardiac disease), 1 pt died of disease progression and of refusing mechanical ventilation. Three ALS patients show a significant (for 4–10 mths), 2 –doubtful (for 1–3 mths), and 5 lack of progression slowing. The EDSS scores of all 3 MS patients show a decrease in 1 point despite repeated relapses every 3 mths in 1 pt.

Conclusion: Our results seem to demonstrate that MSCs represent a good chance for stem cell therapy in MS, but are considerably less preferable in ALS patients. MSC therapy was safe for the observed treatment period.

Keywords: stem cell, cell therapy, multiple sclerosis, lateral sclerosis, transplantation

<-- Previous abstract Contents Next abstract -->