



Title: Therapeutic effect of menstrual blood derived endometrial stem cells on neurodegenerative diseases

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Abstract

Accumulating evidences showed stem cells have therapeutic effect on various diseases. Recently, menstrual blood derived endometrial stem cells (MenSCs) have been identified as a kind of stem cells having satisfactory immunomodulatory property. The improvement effect of MenSCs on [multiple sclerosis](#) (MS) and Parkinson's disease (PD) were studied on both cellular and animal levels and the therapeutic mechanisms were further explored.

MS is an autoimmune neurodegenerative disease without effective treatment methods. MenSCs were transplanted into MS mice model at different stages of the disease and the effect was detected at indicated time points. From the perspective of the host, the changes of inflammatory/regulatory T cells in the MS mice and their infiltration into myelin sheath were detected before and after cell transplantation. The results showed MenSCs could significantly reduce the severity of the disease.

We also found MenSCs and the conditional medium (MenSCs-CM) could improve PD. After co-culture MenSCs-CM with PD models at cell and brain slice levels, MenSCs-CM effectively improved the viability of cells and brain slices, reduced the level of inflammatory factors, oxidative stress and apoptosis. After MenSCs were transplanted into substantia nigra of PD mice, the cells could survive for at least 28 days, reduce the content of superoxide in striatum, and increase the expression of Nrf-2 and its downstream genes. These results suggest Nrf-2 signaling pathway may be involved in the antioxidant effect of MenSCs. Protein microarray was used to detect the factors inside MenSCs-CM. KEGG analysis showed that more than 100 factors secreted by MenSCs were involved in activating PI3K/Akt signaling pathway, and PI3K/Akt pathway had been reported to activate Nrf-2 antioxidant pathway. Therefore, we speculate that MenSCs may regulate Nrf-2 antioxidant pathway by activating PI3K/Akt signaling pathway, so as to exert antioxidant function and improve PD symptoms.

In conclusion, MenSCs has the potential to be developed into conveniently used allogeneic MSCs for the treatment of MS and PD.