Impact of Intrathecal Cell Therapy with Autologous Stromal Cells on Short-Term Memory Binding in Early Alzheimer’s Disease: One-Year Follow-up Assessment

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We had previously reported that the administration of bone marrow mesenchymal stromal cells (MSCs) therapy to patients with mild AD dementia, led to a global increase in cerebral glucose metabolism, which was accompanied by significant improvement of visual short-term memory binding (VSTMB), a function known to be a marker of AD (Fernández-Guinea et al., 2019). We suggested that intrathecal administration of MSCs could be considered a new therapeutic strategy for AD dementia (Vaquero et al., 2019). We were interested in investigating the post-intervention durability of such cognitive improvements.

Method
Clinical procedures and experimental task:

2 patients received every three months 100 million of autologous MSCs by intrathecal route, until a total dose of 300 million. None received any other medication for its disease at the time of receiving cell therapy.

Participants:
N=6 Diagnosis of Alzheimer’s disease. 2 of them received cellular therapy. Without medication
Detection of beta-amyloid neuritic plaques (18F-Flutemetamol-PET).
Brain glucose metabolism studied with 18F-FDG-PET

Neuropsychological assessment:

- MMSE
- Addenbrooke’s Cognitive Examination
- Barthel ADL Scale
- Lawton and Brody ADL
- Clinical Dementia Rating Scale
- Rey Complex Figure Test
- VSTMB Test: It requires subjects to inspect whether or not two combinations of shape and colour change across two sequential arrays

Results

Changes in 18F-FDG-PET in case 1 and case 2 from Vaquero et al. 2019.

Conclusions

Intrathecal cell therapy with autologous MSCs increases cerebral glucose metabolism, being associated with neuropsychological improvements in patients experiencing early stages of AD. Improvements of memory functions known to be marker for AD in patients who underwent stem cell therapy remained stable after one year post-intervention. This type of cell therapy is safe, allowing distribution of donor cells in the whole brain. Administration of autologous MSCs should be considered as a new therapeutic strategy for Alzheimer’s dementia and deserves further studies.


Single case statistics revealed that benefits drawn from treated patients from the therapy remained a year after. Using a more taxing version of the VSTMB test (memory load of 3 items) we observed that, after the therapy, the chance that an untreated AD patient would show more impairment was 75.45% (p=0.24) for Case 1 and 89.23% (p=0.11) for case 2. This chance remained after 1 year post-treatment for Case 1 (75.45%, p=0.24) and increased for Case 2 (96.89%, p=0.031).