CNS 2016 ANNUAL MEETING San Diego CALIFORNIA SEPTEMBER 24-28, 2016

Injection of Autologous Adipose-derived Stromal Vascular Fraction (ADSVF) into the Human Brain Ventricular System for Neurodegenerative Disorders: 2-year Results of a Phase 1 Study in 20 Patients

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Introduction

Adipose-derived (AD) stem cells can differentiate into neuroectodermal elements based on environmental cues. We tested the safety of intraventricular brain injections of non-genetically-modified ADSVF in the human.

Methods

IRB-directed animal studies were deemed safe to proceed with a Phase 1 human trial. From 5/22/14-4/19/16, 20 patients underwent ADSVF injection into the lateral ventricle via a reservoir or their ventriculo-peritoneal shunts. All patients had exhausted conventional therapies. Five patients had Alzheimer's Disease (ALZ), 5 ALS, 5 progressive MS (MS-P), 3 multiple system atrophy (MSA), 1 Traumatic Brain Injury (TBI), and 1 stroke. Median age:66 (range: 41-82). ADSVF was procured using an IDE-pending liposuction and cell-separation technique. Twenty patients had at least one injection, 17 at least 2, 6 at least 4 injections for a total of 69 injections. Patients received intraventricular injection volumes of 3.5-10cc (median:4cc) containing 4.05 X 105 to 6.2 X 107 cells/cc.

Results

Median f/u: 1.5 years. Five of 69 injections (7.2%) led to 1-2 days of transient meningismus, headache and temperature elevation. No patient had seizure or infection. MRIs were unchanged, except for one ALZ patient whose hippocampal volume increased from 6th to 28th percentile. Of the ALZ patients, 4 are stable or improved in tests of cognition. None showed change in tau or ß-amyloid levels in CSF testing. Four ALS patients are deceased, and 1 is stable; Five MS-P patients are stable or improved. Two of the MSA patients are deceased. Deaths were considered related to natural disease progression. Disease stability or improvement was seen in 90% of the combined AD and MS-P population.

Conclusions

ADSVF was safely injected into the human brain ventricular system. The secondary endpoints of clinical improvement or stability were promising in the AD and MS-P groups in particular. The ALS and MSA patients may need earlier intervention. A phase 2 study is being considered.

Learning Objectives

To understand how autologous stem cells may be administered into the human ventricular system. To understand the potential risks and safety of this technique. To understand potential positive secondary endpoints of clinical stability and improvement using this technique.

References

None

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