The First Report Of Autologous Embryonic Stem Cell Transplant Created by Somatic Cell Nuclear Transfer (Human Therapeutic Cloning) In Spinal Cord Injury. One Year Later.

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Introduction

Therapeutic cloning or the process of somatic cell nuclear transfer (SCNT) or therapeutic human cloning creates autologous embryos with no risk of rejection.
We aimed to treat a chronic quadriplegic patient with embryonic stem cells created by SCNT.

Methods

The subject was a 32 year male patient who had been ASIA A at the level of C5 since March 2006 following a C5/6 bi-facet dislocation in a diving accident.
Clinically - Motor: right (3-/5 bicep function), left (2/5 shoulder abduction). Sensory: complete sensory level C4 bilaterally.
MRI – demonstrated a 3.3 cm spinal cord discontinuous defect filled with scar tissue.
Autologous embryonic stem cells (AESC) were created by SCNT in the weeks preceding surgery.
In October 2012 a cervical laminectomy, durotomy and lesionectomy was performed of the intervening scar tissue with neurophysiological monitoring to limit damage to viable tissue. AESC in a gelatin matrix was used to fill the defect. AESC were augmented and a fibrin matrix added 14 days later.
Since then the patient has undergone extensive daily spinal rehabilitation at an average of 17 hours of therapy per week.

Results

October 2013:
Motor function– motor activation in 16 new motor segments (C5 - L1) and increase in power and functionality of existing motor segments.

Pre-operative scan

This is the MRI scan performed before surgery that demonstrates the defect in the spinal cord at the level of C4

Sensation - accurate reproducible awareness of sensation up to L1 and non-accurate sensory awareness up to S5.
Electromyography - normal conduction in the arms bilaterally, conduction to femoral nerves bilaterally.
MRI scan evaluation (three, six and twelve months) - no infection, tumours or any complications were detected. Neural regrowth is unclear on conventional MRI.

Conclusions

Caution should be exercised in interpreting the results in a single patient. The chronicity of the SCI (ASIA A), complete spinal cord defect and the post-operative clinical and electrophysiological results gives cause for cautious optimism.

Learning Objectives

Spinal cord injury is devastating, but new advances bring new hope in the management.

Post-operative scan

The scan performed at the one year mark demonstrates no complications and partial bridging of the defect.