LINEAGE® Cell Therapeutics

Delivery of Oligodendrocyte Progenitor Cells for Spinal Cord Injury: Study Design for Evaluation of a Novel Device (DOSED) Study

Lauw, Michael [1] | **Ohashi, Duke** [1] | Jones, Linda [2] | Ben Shabat, Avi [3] | Hogge, Gary [1] | Halinan, Jessica [1] | Bahr- Davidson, Jennifer [1]

[1] Lineage Cell Therapeutics, [2] Thomas Jefferson University, [3] Cell Cure Neurosciences

Ten-Year Safety Of Pluripotent Stem Cell Transplantation In Acute Thoracic Spinal Cord Injury

Publication Date: 01 Apr 2022
Page Range: 321–330
Volume/Issue: Volume 37: Issue 3

A Phase 1/2a Dose-Escalation Study Of Oligodendrocyte Progenitor Cells In Individuals With Subacute Cervical Spinal Cord Injury

Publication Date: 08 Jul 2022
Page Range: 812–820
Volume/Issue: Volume 37: Issue 6

BACKGROUND LCTOPC1

- Propriety, oligodendrocyte progenitors derived from pluripotent stem cells
- Two Phase 1b studies in thoracic (n=5) and cervical SCI (n=25) demonstrated safety
- Intraparenchymal delivery
- Updates to the device for cell delivery required (prior device was table mounted thus ventilation had to be stopped, current device is person mounted)

The study will evaluate the safety of a new device to deliver oligodendrocyte progenitor cells (LCTOPC1) **intra-parenchymally.**

STUDY FLOW

1. **Complete** Chronic or Subacute **Thoracic** SCI ASIA Impairment **Scale A**
2. **Incomplete** Chronic or Subacute **Thoracic** SCI ASIA Impairment **Scale B**
3. **Complete** or **Incomplete** Chronic or Subacute **Thoracic** SCI ASIA Impairment **Scale A** or **B**
4. **Complete** Chronic or Subacute **Cervical** SCI ASIA Impairment **Scale A**
5. **Open Enrollment** Chronic or Subacute **Cervical** or **Thoracic** ASIA Impairment **Scale A** or **B**

DSMB review

DEVICE CHANGES

The original delivery system (called the Syringe Positioning Device or SPD) used for earlier clinical trials was effectively a stereotactic frame built around the patient, with a syringe holder that allowed fine adjustments to the syringe position.

This system was sufficient to conduct the initial studies but is not compatible in several aspects with the current clinical development needs.

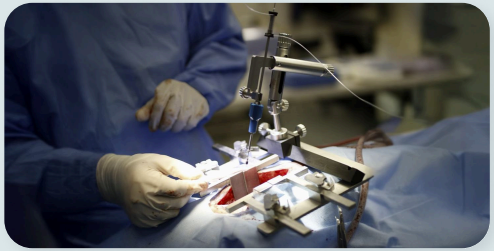
- Technically challenging to set up
- Extensive training necessary prior to use
- SPD was table mounted
- Injections (requiring use of the table mounted SPD) used a rigid needle requiring ventilator be stopped while the needle was within the spinal cord

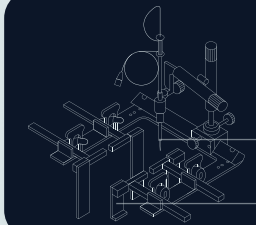
The new system called the **Manual Inject Parenchymal Spinal Delivery (MI PSD)** system was re-designed to address some of these limitations.

Device offers stability and control
- Eliminates potential movement of injection needle during injection

Device requires no cessation of ventilation
- Attaches directly to the participant, syncs with participant breathing motion
- Magnetic needle provides stabilization from micromotion due to heartbeats

Device is easier to use in clinical setting
- Smaller and uses fewer components
- Easily assembled prior to surgery
- Single hand operation for needle positioning
- Accurate needle depth insertion
- Straightforward cleaning and sterilization





STUDY DESIGN

Phase 1, open label, multicenter (n=10), C4-T10, subacute (21-42 days post injury) or chronic (1-5 years post injury)

Single dose, 10 year follow-up

ENDPOINTS

Primary Endpoint
Frequency and severity of device or injection procedure related treatment emergent adverse events (AEs) through 30 days post injection

Secondary Endpoint
Frequency and severity of LCTOPC1 and/or the concomitant immunosuppression treatment emergent AEs through 90 days; safety parameters evaluated by MRI

IMPACT

Critical next step in development of LCTOPC1

Enables
- Consistency of cell delivery
- Scalability in larger studies