

# NurOwn, phase 2, randomized, clinical trial in patients with ALS

## Safety, clinical, and biomarker results

James D. Berry, MD, Merit E. Cudkovic, MD, Anthony J. Windebank, MD, et al.

Cite as: *Neurology*® 2019;93:e2294-e2305. doi:10.1212/WNL.00000000000008620

### Correspondence

Dr. Brown  
robert.brown@  
umassmed.edu

### Study objective and summary result

This study investigated the safety of neurotrophic factor-secreting mesenchymal stem cells (MSC-NTF cells; proprietary name, NurOwn) administered via combined intrathecal and intramuscular injections in patients with amyotrophic lateral sclerosis (ALS), and it found that MSC-NTF cell transplantation is safe for patients with ALS.

### Classification of evidence

Class I.

### What is known and what this paper adds

Open-label trials have provided preliminary evidence for the safety, tolerability, and efficacy of MSC-NTF cells for patients with ALS. This trial provides further evidence of safety.

### Participants and setting

The investigators recruited 48 adults with possible, probable, laboratory-supported, probable, or definite ALS at three clinical sites. These patients had ALSFRS-R  $\geq 30$ , vital capacity (VC)  $\geq 65\%$  of the predicted normal value for height, age and gender, and symptom duration of between one and two years. This trial was conducted between May 2014 and July 2016.

### Design, size, and duration

In this phase 2 double-blind trial, participants were randomized, after a 3-month run-in period, to MSC-NTF cells ( $n = 36$ ) or placebo treatment ( $n = 12$ ). Bone marrow was aspirated from all participants after randomization and MSCs were isolated from the bone marrow, expanded and differentiated to secrete NTFs using a culture-based approach. Patients received one dose of combined intrathecal and intramuscular MSC-NTF cells or placebo. They were monitored for adverse events for six months.

### Primary outcome measure

The primary outcomes were AEs over the 6-month post-treatment period.

### Main results and the role of chance

During the 6-month post-treatment period, there were no deaths, no treatment-related serious AEs, and no AEs that

**Table** Selected AE outcomes in the intervention and placebo groups

Outcome	No. (%) affected in the intervention group	No. (%) affected in the placebo group
Treatment-emergent AEs	36 (100)	12 (100)
Treatment-related treatment-emergent AEs	35 (97.2)	9 (75)
Serious AEs	9 (25)	2 (16.6)
Treatment-emergent serious AEs	8 (22.2)	1 (8.3)

prompted withdrawal from the trial. The rate of disease progression (ALSFRS-R slope change) in the overall study population was similar in treated and placebo participants.

### Bias, confounding, and other reasons for caution

This trial had a small sample size, and the participants only received a single dose of MSC-NTF cells or placebo treatment.

### Generalizability to other populations

The recruitment of participants through 3 referral centers in the US may limit the generalizability of the results.

### Study funding/potential competing interests

This study was funded by Brainstorm Cell Therapeutics. Some authors report being employees of Brainstorm Cell Therapeutics; receiving committee appointments and consulting fees from healthcare companies, including Brainstorm Cell Therapeutics; serving as investigators on studies sponsored by healthcare companies and foundations; receiving funding from the NIH and foundations; consulting for the US Federal Trade Commission; founding Apic-Bio; and holding equity in healthcare companies. Go to [Neurology.org/N](https://www.neurology.org/N) for full disclosures.

### Trial registration number

NCT02017912 on ClinicalTrials.gov.

*A draft of the short-form article was written by M. Dalefield, a writer with Editage, a division of Cactus Communications. The corresponding author(s) of the full-length article and the journal editors edited and approved the final version.*

# Neurology®

## NurOwn, phase 2, randomized, clinical trial in patients with ALS: Safety, clinical, and biomarker results

James D. Berry, Merit E. Cudkowicz, Anthony J. Windebank, et al.  
*Neurology* 2019;93:e2294-e2305 Published Online before print November 18, 2019  
DOI 10.1212/WNL.00000000000008620

**This information is current as of November 18, 2019**

<b>Updated Information &amp; Services</b>	including high resolution figures, can be found at: <a href="http://n.neurology.org/content/93/24/e2294.full">http://n.neurology.org/content/93/24/e2294.full</a>
<b>References</b>	This article cites 22 articles, 1 of which you can access for free at: <a href="http://n.neurology.org/content/93/24/e2294.full#ref-list-1">http://n.neurology.org/content/93/24/e2294.full#ref-list-1</a>
<b>Citations</b>	This article has been cited by 1 HighWire-hosted articles: <a href="http://n.neurology.org/content/93/24/e2294.full##otherarticles">http://n.neurology.org/content/93/24/e2294.full##otherarticles</a>
<b>Subspecialty Collections</b>	This article, along with others on similar topics, appears in the following collection(s): <b>Amyotrophic lateral sclerosis</b> <a href="http://n.neurology.org/cgi/collection/amyotrophic_lateral_sclerosis">http://n.neurology.org/cgi/collection/amyotrophic_lateral_sclerosis</a> <b>Anterior nerve cell disease</b> <a href="http://n.neurology.org/cgi/collection/anterior_nerve_cell_disease">http://n.neurology.org/cgi/collection/anterior_nerve_cell_disease</a> <b>Class I</b> <a href="http://n.neurology.org/cgi/collection/class_1">http://n.neurology.org/cgi/collection/class_1</a> <b>Clinical trials Randomized controlled (CONSORT agreement)</b> <a href="http://n.neurology.org/cgi/collection/clinical_trials_randomized_controlled_consort_agreement">http://n.neurology.org/cgi/collection/clinical_trials_randomized_controlled_consort_agreement</a>
<b>Permissions &amp; Licensing</b>	Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at: <a href="http://www.neurology.org/about/about_the_journal#permissions">http://www.neurology.org/about/about_the_journal#permissions</a>
<b>Reprints</b>	Information about ordering reprints can be found online: <a href="http://n.neurology.org/subscribers/advertise">http://n.neurology.org/subscribers/advertise</a>

*Neurology*® is the official journal of the American Academy of Neurology. Published continuously since 1951, it is now a weekly with 48 issues per year. Copyright © 2019 The Author(s). Published by Wolters Kluwer Health, Inc. on behalf of the American Academy of Neurology. All rights reserved. Print ISSN: 0028-3878. Online ISSN: 1526-632X.

