nature portfolio

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Reporting Summary

Nature Portfolio wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Portfolio policies, see our Editorial Policies and the Editorial Policy Checklist.

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a	Confirmed	
☐	☒	The exact sample size (*n*) for each experimental group/condition, given as a discrete number and unit of measurement
☒	☐	A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
☒	☐	The statistical test(s) used AND whether they are one- or two-sided *Only common tests should be described solely by name; describe more complex techniques in the Methods section.*
☐	☒	A description of all covariates tested
☒	☐	A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
☐	☒	A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
☒	☐	For null hypothesis testing, the test statistic (e.g. *F*, *t*, *r*) with confidence intervals, effect sizes, degrees of freedom and *P* value noted *Give P values as exact values whenever suitable.*
☒	☐	For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
☒	☐	For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
☒	☐	Estimates of effect sizes (e.g. Cohen's *d*, Pearson's *r*), indicating how they were calculated

Our web collection on statistics for biologists contains articles on many of the points above.

Software and code

Policy information about availability of computer code

Data collection	eCRF data collected using Medidate Rave
Data analysis	PET images: SPM12; MRI segmentation and PET : FMRIB software Library FSL; Report summaries were generated using validated Base SAS software, version 9.4 or higher.

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio guidelines for submitting code & software for further information.

Data

Policy information about availability of data

All manuscripts must include a data availability statement. This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our policy

Data and source data supporting the findings of this study, including de-identified participant-level data, are provided within the manuscript and its supplementary information and source data. The study protocol and statistical analysis plan are also included in the supplementary information.

For further information on exploratory endpoints that are not described in this manuscript, investigators who provide a methodologically sound proposal may submit a request to medinfo@bluerocktx.com. Requests will be assessed and responded to within 30 days of receipt.

Research involving human participants, their data, or biological material

Policy information about studies with human participants or human data. See also policy information about sex, gender (identity/presentation), and sexual orientation and race, ethnicity and racism.

Reporting on sex and gender	The study described was open to all genders. Gender data included; 75% of patients (n=9) were male; 25% of patients (n=3) were female.
Reporting on race, ethnicity, or other socially relevant groupings	Ethnicity data included. Low dose group: 3 white, 1 "other", 1 multiple ethnicities; High dose group: 5 white, 1 "other", 1 Asian.
Population characteristics	Age data is provided in the manuscript. The trial targeted age 45-75
Recruitment	The trial was registered in the Clinicaltrials.gov database and recruitment open in the US and later in Canada. Patients were referred by neurologists, self-referred or previously enrolled in an observation study. There is likely bias in that the patients are self-selected and this was an unblinded small study. It is difficult to estimate the impact on outcomes, but a larger blinded study is planned.
Ethics oversight	The study design included ethicists. An institutional review board at Memorial Sloan Kettering Cancer Center and Weill Cornell Medicine reviewed and approved the clinical protocol (submitted with the article) and the patient consent form. All participants signed the informed consent. (MSKCC: IRB no. 18-518 on 6/8/2021; WCM IRB no: 1810019690 on 1/14/2019). A data safety monitoring committee and the institutional review boards monitored trial progression and data handling. The Tri-Institutional Human Embryonic Stem Cell Research Oversight committee (ESCRO) approved the study and the consent on 10/11/2019

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☒ Life sciences ☐ Behavioural & social sciences ☐ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see nature.com/documents/nr-reporting-summary-flat.pdf

Life sciences study design

All studies must disclose on these points even when the disclosure is negative.

Sample size	Phase 1. Predetermined sample size of 12;No sample size calculation was performed. The sample size of approximately 12 evaluable subjects has been chosen to allow 2 doses to be explored in a small number of subjects
Data exclusions	No data were excluded
Replication	Human study. Each patient was an n
Randomization	None. Sequential enrollment in a 2-dose study
Blinding	This was an open label study

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involved in the study
☒	☐ Antibodies
☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☒	☐ Animals and other organisms
☐	☒ Clinical data
☒	☐ Dual use research of concern
☒	☐ Plants

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☐	☒ MRI-based neuroimaging

Clinical data

Policy information about clinical studies

All manuscripts should comply with the ICMJE guidelines for publication of clinical research and a completed CONSORT checklist must be included with all submissions.

Clinical trial registration	NCT04802733
Study protocol	The complete study protocol and any revisions were uploaded with the manuscript
Data collection	Recruitment: Subjects enrolled and underwent surgery between May 3 2021 and March 30 2022. Data collection of clinical and radiographic parameters occurred at pre-set intervals as detailed in the study protocol, and is ongoing.
Outcomes	Primary endpoints: Safety and tolerability of the procedure and the cells. Secondary objectives included the feasibility of stereotactic transplantation; survival of transplanted cells by 18F-DOPA uptake on PET imaging; motor effects measured by Movement Disorder Society Unified Parkinson's Disease Rating Scale (MDS-UPDRS) Part III OFF scores and Good ON times (without dyskinesia and with non-troublesome dyskinesia) based on adjusted PD diaries; and continued safety and tolerability by the incidence of SAEs and adverse events i

Plants

Seed stocks	NA
Novel plant genotypes	NA
Authentication	NA

Magnetic resonance imaging

Experimental design

Design type	Standard Clinical MRI, including T1, T2, Flair sequences
Design specifications	Each subject underwent a postoperative MRI and other MRIs at pre-set intervals (3 months, 6 months, one year, 18 months)
Behavioral performance measures	NA

Acquisition

Imaging type(s)	Structural
Field strength	1.5 or 3 Tesla
Sequence & imaging parameters	T1, Flair
Area of acquisition	Whole brain

Diffusion MRI ☐ Used ☒ Not used

Preprocessing

Preprocessing software	NA
Normalization	NA
Normalization template	NA
Noise and artifact removal	NA
Volume censoring	NA

Statistical modeling & inference

Model type and settings	NA
Effect(s) tested	NA

Specify type of analysis: ☒ Whole brain ☐ ROI-based ☐ Both

Statistic type for inference (See Eklund et al. 2016)	NA
Correction	NA

Models & analysis

n/a	Involved in the study
☒	☐ Functional and/or effective connectivity
☒	☐ Graph analysis
☒	☐ Multivariate modeling or predictive analysis