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	Wrist-worn accelerometer data were generated by the commercial product Parkinson KinetiGraph (PKG®), which is produced and marketed by Global Kinetics Corp., Melbourne, Australia (https://pkgcare.com.au), for assessment of motor dysfunction in Parkinson's disease. These data were processed by the PKG® software of the manufacturer to provide median motor dysfunction scores. Scores were translated into motor diary categories as described in the Methods section of the manuscript in detail.
Data analysis	IBM SPSS® statistics software, version 27, and/or Microsoft Excel® software for statistics and diagrams; CorelDRAW® software, version 21, to arrange diagrams into figures

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

The main data supporting our results in this study are almost all available in the manuscript and Supplementary Information. We are sorry that the data from the hospitals cannot be made publicly available because of hospital regulation restrictions and privacy concerns to protect our patients. Anonymized data might be accessible for research purposes from the corresponding authors upon reasonable request.

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	96 participants were screened, 91 participants were included into the study, 63 participatns were included into the analyses according to prespecified inclusion criteria.
Data exclusions	Data from 28 participants were excluded as specified in detail in the Methods section according to prespecified criteria.
Replication	Replication was not performed.
Randomization	Randomization was not performed.
Blinding	Analysers of the PKG(R) data were blinded to clinical data and observer/participants diary entries.

Behavioural & social sciences study design

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

Study description	not applicable
Research sample	not applicable
Sampling strategy	not applicable
Data collection	not applicable
Timing	not applicable
Data exclusions	not applicable
Non-participation	not applicable
Randomization	not applicable

Ecological, evolutionary & environmental sciences study design

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

Study description	not applicable
Research sample	not applicable
Sampling strategy	not applicable
Data collection	not applicable
Timing and spatial scale	not applicable
Data exclusions	not applicable
Reproducibility	not applicable
Randomization	not applicable
Blinding	not applicable

Did the study involve field work? ☐ Yes ☒ No

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
☐	☒ Human research participants
☐	☒ Clinical data
☒	☐ Dual use research of concern

Methods

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

Antibodies

Antibodies used: not applicable

Validation: not applicable

Eukaryotic cell lines

Policy information about cell lines

Cell line source(s): not applicable

Authentication: not applicable

Mycoplasma contamination: not applicable

Commonly misidentified lines (See ICLAC register): not applicable

Palaeontology and Archaeology

Specimen provenance: not applicable

Specimen deposition: not applicable

Dating methods: not applicable

☐ Tick this box to confirm that the raw and calibrated dates are available in the paper or in Supplementary Information.

Ethics oversight: not applicable

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

Animals and other organisms

Policy information about studies involving animals; ARRIVE guidelines recommended for reporting animal research

Laboratory animals: not applicable

Wild animals: not applicable

Field-collected samples: not applicable

Ethics oversight: not applicable

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

Human research participants

Policy information about studies involving human research participants

Population characteristics	Advanced Parkinson's disease patients, for details refer to Table 1
Recruitment	Strategic recruitment of inpatients and outpatients (day care patients) of the Movement disorder clinics of the authors as decribed in Löhle et al. (2022) npj Parkinson's Disease 8:69 (https://doi.org/10.1038/s41531-022-00331-w)
Ethics oversight	The study was approved by the institutional review boards of all participating centers (ethic committee registry numbers A 2017-0115 for Rostock, AS 84(bB)/2018 for Beelitz-Heilstätten and the Regional Ethics Review Board, Lund, Sweden (2017/936). All participants gave written informed consent to participate in the study and were advised both orally and in writing of the nature of the study.

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

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	N/A
Study protocol	Study protocol has been described by Löhle et al. (2022) npj Parkinson's Disease 8:69 (https://doi.org/10.1038/s41531-022-00331-w) and in further detail and specification in the Materials and Methods section.
Data collection	Digital, clinical and diary data were collected by healthcare professionals at the inpatient and outpatient clinics of the authors as decribed by Löhle et al. (2022) npj Parkinson's Disease 8:69 (https://doi.org/10.1038/s41531-022-00331-w) and in further detail and specification in the Materials and Methods section.
Outcomes	Wrist-worn accelerometer-based digital Parkinson Motor Diary (adPMD) data, patient diary data (PD home diary data) and clinical observers rating according to PD Home diary.

Dual use research of concern

Policy information about dual use research of concern

Hazards

Could the accidental, deliberate or reckless misuse of agents or technologies generated in the work, or the application of information presented in the manuscript, pose a threat to:

No	Yes	
☒	☐	Public health
☒	☐	National security
☒	☐	Crops and/or livestock
☒	☐	Ecosystems
☒	☐	Any other significant area

Experiments of concern

Does the work involve any of these experiments of concern:

No	Yes	
☒	☐	Demonstrate how to render a vaccine ineffective
☒	☐	Confer resistance to therapeutically useful antibiotics or antiviral agents
☒	☐	Enhance the virulence of a pathogen or render a nonpathogen virulent
☒	☐	Increase transmissibility of a pathogen
☒	☐	Alter the host range of a pathogen
☒	☐	Enable evasion of diagnostic/detection modalities
☒	☐	Enable the weaponization of a biological agent or toxin
☒	☐	Any other potentially harmful combination of experiments and agents

ChIP-seq

Data deposition

☐ Confirm that both raw and final processed data have been deposited in a public database such as GEO.

☐ Confirm that you have deposited or provided access to graph files (e.g. BED files) for the called peaks.

Data access links *May remain private before publication.*	*For "Initial submission" or "Revised version" documents, provide reviewer access links. For your "Final submission" document, provide a link to the deposited data.*
Files in database submission	*Provide a list of all files available in the database submission.*
Genome browser session (e.g. UCSC)	*Provide a link to an anonymized genome browser session for "Initial submission" and "Revised version" documents only, to enable peer review. Write "no longer applicable" for "Final submission" documents.*

Methodology

Replicates	not applicable
Sequencing depth	not applicable
Antibodies	not applicable
Peak calling parameters	not applicable
Data quality	not applicable
Software	not applicable

Flow Cytometry

Plots

Confirm that:

☐ The axis labels state the marker and fluorochrome used (e.g. CD4-FITC).

☐ The axis scales are clearly visible. Include numbers along axes only for bottom left plot of group (a 'group' is an analysis of identical markers).

☐ All plots are contour plots with outliers or pseudocolor plots.

☐ A numerical value for number of cells or percentage (with statistics) is provided.

Methodology

Sample preparation	not applicable
Instrument	not applicable
Software	not applicable
Cell population abundance	not applicable
Gating strategy	not applicable

☐ Tick this box to confirm that a figure exemplifying the gating strategy is provided in the Supplementary Information.

Magnetic resonance imaging

Experimental design

Design type	not applicable
Design specifications	not applicable
Behavioral performance measures	not applicable

Acquisition

Imaging type(s): not applicable

Field strength: not applicable

Sequence & imaging parameters: not applicable

Area of acquisition: not applicable

Diffusion MRI ☐ Used ☐ Not used

Preprocessing

Preprocessing software: not applicable

Normalization: not applicable

Normalization template: not applicable

Noise and artifact removal: not applicable

Volume censoring: not applicable

Statistical modeling & inference

Model type and settings: not applicable

Effect(s) tested: not applicable

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

Statistic type for inference (See Eklund et al. 2016): not applicable

Correction: not applicable

Models & analysis

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