

## 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 No software was used.

Data analysis The statistical analyses were performed with SPSS software 20.0 .

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 datasets generated during the current study are available from the corresponding author upon reasonable request.

## Human research participants

Policy information about [studies involving human research participants and Sex and Gender in Research](#).

|                             |                                                                                                                                      |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Reporting on sex and gender | N/A                                                                                                                                  |
| Population characteristics  | Age,comorbidity                                                                                                                      |
| Recruitment                 | N/A                                                                                                                                  |
| Ethics oversight            | The research ehics committee of Beijing Tiantan Hospital affiliated to Capital Medical University.(KYSQ 2019-058-01M KY 2022-032-03) |

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](https://www.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     | No simple size calculation. Previous study have shown that a sample size of more than 100 paitents is sufficient to draw reliable conclusion. |
| Data exclusions | One patient had poor image quality, and 2 patients had a Hamilton Depression Scale score 8.                                                   |
| Replication     | N/A                                                                                                                                           |
| Randomization   | N/A                                                                                                                                           |
| Blinding        | N/A                                                                                                                                           |

## Behavioural & social sciences study design

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

|                   |  |
|-------------------|--|
| Study description |  |
| Research sample   |  |
| Sampling strategy |  |
| Data collection   |  |
| Timing            |  |
| Data exclusions   |  |
| Non-participation |  |
| Randomization     |  |

# Ecological, evolutionary & environmental sciences study design

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

|                          |                      |
|--------------------------|----------------------|
| Study description        | <input type="text"/> |
| Research sample          | <input type="text"/> |
| Sampling strategy        | <input type="text"/> |
| Data collection          | <input type="text"/> |
| Timing and spatial scale | <input type="text"/> |
| Data exclusions          | <input type="text"/> |
| Reproducibility          | <input type="text"/> |
| Randomization            | <input type="text"/> |
| Blinding                 | <input type="text"/> |

Did the study involve field work? ☐ Yes ☐ No

## Field work, collection and transport

|                        |                      |
|------------------------|----------------------|
| Field conditions       | <input type="text"/> |
| Location               | <input type="text"/> |
| Access & import/export | <input type="text"/> |
| Disturbance            | <input type="text"/> |

## 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                                 | Involvement in the study                               |
|-------------------------------------|--------------------------------------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Antibodies                    |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Eukaryotic cell lines         |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Palaeontology and archaeology |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Animals and other organisms   |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> Clinical data      |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Dual use research of concern  |

### Methods

| n/a                                 | Involvement in the study                                   |
|-------------------------------------|------------------------------------------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> ChIP-seq                          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Flow cytometry                    |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> MRI-based neuroimaging |

## Antibodies

|                 |                      |
|-----------------|----------------------|
| Antibodies used | <input type="text"/> |
| Validation      | <input type="text"/> |

## Eukaryotic cell lines

Policy information about [cell lines and Sex and Gender in Research](#)

|                                                                      |                      |
|----------------------------------------------------------------------|----------------------|
| Cell line source(s)                                                  | <input type="text"/> |
| Authentication                                                       | <input type="text"/> |
| Mycoplasma contamination                                             | <input type="text"/> |
| Commonly misidentified lines<br>(See <a href="#">ICLAC</a> register) | <input type="text"/> |

## Palaeontology and Archaeology

|                                                                                                                                                 |                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Specimen provenance                                                                                                                             | <input type="text"/> |
| Specimen deposition                                                                                                                             | <input type="text"/> |
| Dating methods                                                                                                                                  | <input type="text"/> |
| <input type="checkbox"/> Tick this box to confirm that the raw and calibrated dates are available in the paper or in Supplementary Information. |                      |
| Ethics oversight                                                                                                                                | <input type="text"/> |

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

## Animals and other research organisms

Policy information about [studies involving animals](#); [ARRIVE guidelines](#) recommended for reporting animal research, and [Sex and Gender in Research](#)

|                         |                      |
|-------------------------|----------------------|
| Laboratory animals      | <input type="text"/> |
| Wild animals            | <input type="text"/> |
| Reporting on sex        | <input type="text"/> |
| Field-collected samples | <input type="text"/> |
| Ethics oversight        | <input type="text"/> |

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 | <input type="text" value="ChiCTR2200058251"/>                     |
| Study protocol              | <input type="text" value="www.chictr.org.cn"/>                    |
| Data collection             | <input type="text" value="April 1,2018 to June 1,2024"/>          |
| Outcomes                    | <input type="text" value="Stroke or transient ischemic attack."/> |

## 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                                                 |
|--------------------------|-----------------------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> Public health              |
| <input type="checkbox"/> | <input type="checkbox"/> National security          |
| <input type="checkbox"/> | <input type="checkbox"/> Crops and/or livestock     |
| <input type="checkbox"/> | <input type="checkbox"/> Ecosystems                 |
| <input type="checkbox"/> | <input type="checkbox"/> Any other significant area |

## Experiments of concern

Does the work involve any of these experiments of concern:

| No                       | Yes                                                                                                  |
|--------------------------|------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> Demonstrate how to render a vaccine ineffective                             |
| <input type="checkbox"/> | <input type="checkbox"/> Confer resistance to therapeutically useful antibiotics or antiviral agents |
| <input type="checkbox"/> | <input type="checkbox"/> Enhance the virulence of a pathogen or render a nonpathogen virulent        |
| <input type="checkbox"/> | <input type="checkbox"/> Increase transmissibility of a pathogen                                     |
| <input type="checkbox"/> | <input type="checkbox"/> Alter the host range of a pathogen                                          |
| <input type="checkbox"/> | <input type="checkbox"/> Enable evasion of diagnostic/detection modalities                           |
| <input type="checkbox"/> | <input type="checkbox"/> Enable the weaponization of a biological agent or toxin                     |
| <input type="checkbox"/> | <input type="checkbox"/> 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.*

Files in database submission

Genome browser session

(e.g. [UCSC](#))

### Methodology

Replicates

Sequencing depth

Antibodies

Peak calling parameters

Data quality

Software

## 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        |  |
| Instrument                |  |
| Software                  |  |
| Cell population abundance |  |
| Gating strategy           |  |

☐ 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                     | N/A |
| Design specifications           | N/A |
| Behavioral performance measures | N/A |

### Acquisition

|                               |                                                                                                                                                                                                                                                                       |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Imaging type(s)               | Structral                                                                                                                                                                                                                                                             |
| Field strength                | 3T                                                                                                                                                                                                                                                                    |
| Sequence & imaging parameters | FLAIR TR 4800 8500 ms TE 256(166)ms,Ti 1650(2100)ms,Flip angle =90(111)°, matrix size =220*218(288*224), FOV=220*218(288*224), yielding 1*1*1 mm3 voxels. Slice thickness = 1mm without a gap. Other Sequece and imaging parameters could be found in the manuscript. |
| Area of acquisition           | A whole brain.                                                                                                                                                                                                                                                        |
| Diffusion MRI                 | <input type="checkbox"/> Used <input checked="" type="checkbox"/> Not used                                                                                                                                                                                            |

### Preprocessing

|                            |                                                                                                                                                 |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Preprocessing software     | SPM12.<br>UBO Detector( <a href="https://cheba.unse.edu.an/group/neroimagingpipeline">https://cheba.unse.edu.an/group/neroimagingpipeline</a> ) |
| Normalization              | DARTEL                                                                                                                                          |
| Normalization template     | MNI152                                                                                                                                          |
| Noise and artifact removal | N/A                                                                                                                                             |
| Volume censoring           | SPM12                                                                                                                                           |

### Statistical modeling & inference

|                                                                           |                                                                                                                  |
|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Model type and settings                                                   | N/A                                                                                                              |
| Effect(s) tested                                                          | N/A                                                                                                              |
| Specify type of analysis:                                                 | <input checked="" type="checkbox"/> Whole brain <input type="checkbox"/> ROI-based <input type="checkbox"/> Both |
| Statistic type for inference<br>(See <a href="#">Eklund et al. 2016</a> ) | N/A                                                                                                              |
| Correction                                                                | N/A                                                                                                              |

## Models & analysis

| n/a                                 | Involvement in the study                                              |
|-------------------------------------|-----------------------------------------------------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Functional and/or effective connectivity     |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Graph analysis                               |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Multivariate modeling or predictive analysis |

Functional and/or effective connectivity

Graph analysis

Multivariate modeling and predictive analysis