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	ABI Prism 7500 system (Applied Biosystems, CA, United States); LSM 800 Carl (Zeiss, Germany); FV3000 (OLYMPUS, Japan); MaxQuant Search engine (v.1.6.6.0); Varioskan LUX (Thermo Scientific, MA); TC20 (Bio-Rad, MA); Transfac database (https://genexplain.com/transfac/); Harmonizome (https://maayanlab.cloud/Harmonizome/); Cistrome Data Browser (http://www.cistrome.org/); JASPAR (http:// jaspar.genereg.net/); Leica DMIL 4000 (Leica microsystem, Germany).
Data analysis	CellSens Dimension software (OLYMPUS); image J (V1.8.0); GraphPad Prism (v8.3.0.538); The UniProt-GOA database (http://www.ebi.ac.uk/GOA/); InterProScan 5.52-86.0 (v86.0); The Kyoto Encyclopedia of Genes and Genomes (KEGG) database (https://www.genome.jp/kegg/); the STRING database(v 11.0); IBM SPSS Statistics 20 (v20.0).

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

Any further data not included in the manuscript is available from the corresponding author on reasonable request. E-mail: sphou828@163.com.

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	No statistical method was used to predetermined sample size. All experiments were performed with a minimum of 3-6 biological replicates to perform statistical testing based on universal protocols with these experiments.
Data exclusions	No data was excluded from the manuscript.
Replication	All experiments were performed at least three times. Replication numbers were shown in the figures as scatter plots with bar or in the Methods section.
Randomization	All mice were age-matched and randomized into control or treated groups. For cell culture experiments, individual wells were randomly assigned treatment conditions.
Blinding	The proliferation, migration and tube formation assays were performed by X.T.W and scored by G.Q.W, W.Q.L and S.Y.H in a blinded manner.

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

Rabbit polyclonal Anti-β-Actin, 1:5000, Proteintech, # 20536-1-AP
Mouse monoclonal Anti-CD31, 1:1000, Abcam, # ab9498
Rabbit polyclonal Anti-SIRT1, 1:1000, Abcam, # ab7343
Rabbit monoclonal Anti-Ki67, 1:250, Abcam, ab16667
Rabbit polyclonal Anti-PCAF, 1:1000, Abcam , # ab12188
Goat polyclonal Anti-Iba1, 1:1000, 1:1000, Abcam , # ab5076
VeriBlot for IP Detection Reagent (HRP), 1:500, Abcam, # 131366
Mouse monoclonal Anti-YY1, 1:500, Santa Cruz Biotechnology, # sc-28386
Mouse monoclonal Anti-HDAC6, 1:500, Santa Cruz Biotechnology, # sc-28386
Mouse monoclonal Anti-FGF2, 1:500, Santa Cruz Biotechnology, # sc-74412
Mouse monoclonal Anti-P300, 1:500, Santa Cruz Biotechnology, # sc-48343
Mouse monoclonal Anti-TIP60, 1:500, Santa Cruz Biotechnology, # sc-166323
Rabbit monoclonal Anti-Iba1, 1:1000, FUJIFILM Wako Shibayagi, # 019-19741
Rabbit Pan-Kla, 1:1000, PTM BIO, # PTM-1401
Alexa Fluor 488-labelled Goat Anti-Rabbit IgG(H+L), 1:500, Beyotime, # A0423
Alexa Fluor 488-labelled Goat Anti-Mouse IgG(H+L), 1:500, Beyotime, # A0428
Cy3-labelled Donkey Anti-Goat IgG(H+L), 1:500, Beyotime, # A0502
Cy3-labelled Goat Anti-Mouse IgG (H+L), 1:500, Beyotime, # A0521
Cy3-labelled Goat Anti-Rabbit IgG (H+L), 1:500, Beyotime, # A0516

Validation	All antibodies were purchased from commercial sources and were validated by vendors for use in Western Blot and immunofluorescence.

Eukaryotic cell lines

Policy information about cell lines

Cell line source(s)	HMC3 was purchased from ATCC; HRMEC was purchased from Cell Systems.
Authentication	HMC3 and HRMEC cell lines are authenticated using STR profiling.
Mycoplasma contamination	HMC3 and HRMEC cell lines were maintained under the recommended cultured conditions and media reqirements. Mycoplasma contamination was performed in accordance with department protocols (and tested nagative).
Commonly misidentified lines (See ICLAC register)	None.

Animals and other organisms

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

Laboratory animals	C57BL/6J mice obtained from the Experimental Animal Center of Chongqing Medical University (Chongqing, China) were housed in a specific pathogen-free facility.
Wild animals	No wild animals were used in the study.
Field-collected samples	No field-collected samples were used in the study.
Ethics oversight	All protocols were approved by the Ethics Committee of the First Affiliated Hospital of Chongqing Medical University (Number: 2019-101) and conformed to the ARVO Statement for the Use of Animals in Ophthalmic and Vision Research.

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	The clinical retrospective study included preterm infants (28~33 weeks of gestational age) who were admitted to the Children's Hospital of Chongqing Medical University between June 2019 and July 2021 (matching criteria: sex, age, weight, gestational age, birth weight, multiple birth, ethnic group). We excluded preterm infants who were suffering extremely serious diseases, such as multiple organ failure, cardiac arrest, septicemia and respiratory diseases that may directly influence the concentration of lactate in blood, such as neonatal respiratory distress syndrome, respiratory failure and severe pneumonia.
Recruitment	The basic data (including sex, age, weight, gestational age, birth weight, multiple birth, ethnic group) were obtained from medical records. The levels of blood lactate were obtained from arterial blood gas analysis prior to commencing artificial ventilation treatment.
Ethics oversight	All protocols were approved by the Ethics Committee of The Children's Hospital of Chongqing Medical University.

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