

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

LightCycler® 480 software (version 1.5.1.62) was used to collect qPCR data
Amersham Imager 680 (version 2.0.0) was used to collect Western Blot images
Pannoramic Scanner (version 2.0.5.93613) was used to collect immunohistochemistry, CarlZeiss LSM 710 was used to collect immunofluorescence
SoftMax® Pro 7 (version 7.0.3) was used for collect the results of ELISA assay.
NovoExpress (version 1.6.1) was used for analysis of FACS.

Data analysis

Image J (version 10.7.1) was used for analysis Western Blot images
Image-Pro Plus (version 6.0) was used for analysis immunohistochemistry
ZEN Light Edition (version 3.5) was used for analysis immunofluorescence
R (version 4.3.1) and R studio were used for statistic analysis
NovoExpress (version 1.6.1) was used for analysis of FACS.

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 mass spectrometry proteomics data have been deposited to the ProteomeXchange Consortium via the iProX partner repository with the dataset identifier PXD047695. IP-MS datasets are available via ProteomeXchange with identifiers PXD047694. All sequencing data generated in this study have been deposited in the NCBI Sequence Read Archive under the BioProject ID PRJNA1050581 for Ribo-seq, PRJNA1050631 for RIP-seq. All other data are available in the article and its Supplementary files or from the corresponding author upon request. Source data are provided with this paper.

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	Participants were Chinese male.
Reporting on race, ethnicity, or other socially relevant groupings	Race and ethnicity were not linked to the studies.
Population characteristics	Human AAA tissues from ten patients undergoing surgical repair for AAA in the Beijing Anzhen Hospital (N=10) were donated by Dr. Wen-jian Jiang. The detailed information on the ten patients is listed in Extended Data Table S1. Patient consent was obtained for the use of this tissue. Age-matched Non-AAA segments acquired from organ donors were harvested during explantation (N=10) of Shandong provincial hospital.
Recruitment	Human AAA tissues from ten patients undergoing surgical repair for AAA in the Beijing Anzhen Hospital (N=10) and age-matched Non-AAA segments acquired from organ donors were harvested during explantation (N=10) of Shandong provincial hospital.
Ethics oversight	Ethics Committee of Beijing anzhen hospital capital medical university (#2018004) and Ethics Committee of Shandong First Medical University (#2022-303).

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	Due to the novelty of the hypothesis, power analysis is based on speculation and on preliminary data, pertinent to specific endpoints. The N number for all experiments, including animal experiments and in vitro experiments were listed in the figure legends.
Data exclusions	No data were excluded from the analysis.
Replication	Findings were replicated multiple times, as indicated by the sample size numbers, reflecting independent experiments.
Randomization	Allocation to experimental groups was random.
Blinding	Investigators performing functional, histological or molecular analysis were blinded to the experimental conditions and to the genotype of the mice.

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

Antibodies

Antibodies used

1. #-actin, RRID: AB_2223172, Cell Signaling Technology, Catalog number: 4970, Host organism: rabbit. Target antigen: Human, Mouse, Rat, Monkey, Bovine, Pig. Applications: WB, IHC, IF, F.
2. NF- κ B1, RRID: AB_2282895, Cell Signaling Technology, Catalog number: 4717, Host organism: rabbit. Target antigen: Human, Mouse, Rat, Monkey, Mink, Bovine, Pig. Applications: WB, IP.
3. NF- κ B, RRID: AB_10859369, Cell Signaling Technology, Catalog number: 8242, Host organism: rabbit. Target antigen: Human, Mouse, Rat, Hamster, Monkey, Dog. Applications: WB, IP, IHC, IF, F, ChIP, C&R.
4. NF- κ B1, RRID: AB_2665516, Cell Signaling Technology, Catalog number: 13586, Host organism: rabbit. Target antigen: Human, Mouse, Rat. Applications: WB, IP, IHC, IF, F, ChIP, C&R.
5. NRF2, RRID: AB_2715528, Cell Signaling Technology, Catalog number: 12721, Host organism: rabbit. Target antigen: Human, Mouse, Monkey. Applications: WB, IP, IF, F, ChIP.
6. NRF2, RRID: AB_10561604, Abcam, Catalog number: ab92946. Host organism: rabbit. Target antigen: Human, Mouse, Rat, Dog. Applications: WB.
7. eIF4A1, RRID: AB_, Abcam, Catalog number: ab185946. Host organism: rabbit. Target antigen: Human, Mouse, Rat. Applications: WB, IP.
8. IL-6, RRID: AB_2927381, Abcam, Catalog number: ab259341. Host organism: rabbit. Target antigen: Human, Mouse, Rat. Applications: WB, IP.
9. MCP1, RRID: AB_448636, Abcam, Catalog number: ab25124. Host organism: rabbit. Target antigen: Mouse, Rat. Applications: WB, Neutralising, IHC-P, Flow Cyt.
10. TNF- α , RRID: AB_2935774, Abcam, Catalog number: ab215188. Host organism: rabbit. Target antigen: Mouse, Human. Applications: WB, ICC/IF, IP, Flow Cyt (Intra).
11. Keap1, RRID: AB_, Abcam, Catalog number: ab227828. Host organism: rabbit. Target antigen: Mouse, Human. Applications: WB, IHC-P.
12. IL-10, RRID: AB_2847946, Abcam, Catalog number: ab189392. Host organism: rat. Target antigen: Mouse. Applications: WB, IHC-P.
13. CD68, RRID: AB_10975465, Abcam, Catalog number: ab125212. Host organism: rabbit. Target antigen: Mouse, Rat. Applications: WB, IHC-P, IHC-Fr.
14. Keap1, RRID: AB_10903761, Abcam, Catalog number: ab119403. Host organism: mouse. Target antigen: Mouse, Human. Applications: Flow Cyt (Intra), WB, IHC-P.
15. ILF3, RRID: AB_2049804, Abcam, Catalog number: ab92355. Host organism: rabbit. Target antigen: Mouse, Rat, Human. Applications: WB, IHC-P, Flow Cyt (Intra), ICC/IF.
16. Lamin B1, RRID: AB_443298, Abcam, Catalog number: ab16048. Host organism: rabbit. Target antigen: Mouse, Rat, Human. Applications: ICC/IF, WB, IHC-P.
17. IL-6, RRID: AB_, Abcam, Catalog number: ab179570. Host organism: rabbit. Target antigen: Mouse, Rat, Human. Applications: ICC/IF, WB, IHC-P.
18. CD68, RRID: AB_307338, Abcam, Catalog number: ab955. Host organism: mouse. Target antigen: Human, Mouse, Rat, Rabbit. Applications: ICC/IF, WB, IHC-P.
19. MCP1, RRID: AB_, Abcam, Catalog number: ab308522. Host organism: rabbit. Target antigen: Mouse. Applications: WB, IHC-P, ICC/IF, IP.
20. Keap1, RRID: AB_10860776, Cell Signaling Technology, Catalog number: 8047. Host organism: rabbit. Target antigen: Human, Mouse, Rat. Applications: WB, IP.
21. ILF3, RRID: AB_10666431, Proteintech, Catalog number: 19887-1-AP. Host organism: rabbit. Target antigen: Mouse, Rat, Human. Applications: WB, RIP, IP, IHC, IF, CoIP, ELISA.
22. IL-10, RRID:

Validation

1. #-actin, RRID: AB_2223172, Cell Signaling Technology, Catalog number: 4970, <https://www.cellsignal.cn/products/primaryantibodies/b-actin-13e5-rabbit-mab/4970>
2. NF- κ B1, RRID: AB_2282895, Cell Signaling Technology, Catalog number: 4717, <https://www.cellsignal.cn/products/primaryantibodies/nf-kb1-p105-antibody/4717>
3. NF- κ B, RRID: AB_10859369, Cell Signaling Technology, Catalog number: 8242, <https://www.cellsignal.cn/products/>

primaryantibodies/
nf-kb-p65-d14e12-xp-rabbit-mab/8242
4. NF- κ B1, RRID: AB_2665516, Cell Signaling Technology, Catalog number: 13586, <https://www.cellsignal.cn/products/primaryantibodies/nf-kb1-p105-p50-d4p4d-rabbit-mab/13586>
5. NRF2, RRID: AB_2715528, Cell Signaling Technology, Catalog number: 12721, <https://www.cellsignal.cn/products/primaryantibodies/nrf2-d1z9c-xp-rabbit-mab/12721>
6. NRF2, RRID: AB_10561604, Abcam, Catalog number: ab92946. <https://www.abcam.cn/products/primary-antibodies/nrf2-4>

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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

Wild animals

Reporting on sex

Field-collected samples

Ethics oversight

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

antibody-ab92946.html

7. eIF4A1, RRID: AB_, Abcam, Catalog number: ab185946. <https://www.abcam.cn/products/primary-antibodies/eif4a1-antibodyepr14506-ab185946.html>

8. IL-6, RRID: AB_2927381, Abcam, Catalog number: ab259341. <https://www.abcam.cn/products/primary-antibodies/il-6-antibodyepr23819-11-ab259341.html>

9. MCP1, RRID: AB_448636, Abcam, Catalog number: ab25124. <https://www.abcam.cn/products/primary-antibodies/mcp1-antibodyab25124.html>

10. TNF-, RRID: AB_2935774, Abcam, Catalog number: ab215188. <https://www.abcam.cn/products/primary-antibodies/tnf-alphaantibody-epr20972-ab215188.html>

11. Keap1, RRID: AB_, Abcam, Catalog number: ab227828. <https://www.abcam.cn/products/primary-antibodies/keap1-antibodyepr22664-26-ab227828.html>

12. IL-10, RRID: AB_2847946, Abcam, Catalog number: ab189392. <https://www.abcam.cn/products/primary-antibodies/il-10-antibody-jes5-2a5-ab189392.html>

13. CD68, RRID: AB_10975465, Abcam, Catalog number: ab125212. <https://www.abcam.cn/products/primary-antibodies/cd68-antibody-ab125212.html>

14. Keap1, RRID: AB_10903761, Abcam, Catalog number: ab119403. <https://www.abcam.cn/products/primary-antibodies/keap1-antibody-oti1b4-ab119403.html>

15. ILF3, RRID: AB_2049804, Abcam, Catalog number: ab92355. <https://www.abcam.cn/products/primary-antibodies/ilf3-antibodyepr3626-ab92355.html>

16. Lamin B1, RRID: AB_443298, Abcam, Catalog number: ab16048. <https://www.abcam.cn/products/primary-antibodies/lamin-b1-antibody-nuclear-envelope-marker-ab16048.html>

17. IL-6, RRID: AB_, Abcam, Catalog number: ab179570. <https://www.abcam.cn/products/primary-antibodies/il-6-antibodyepr16610-69-ab179570.html>

18. CD68, RRID: AB_307338, Abcam, Catalog number: ab955. <https://www.abcam.cn/products/primary-antibodies/cd68-antibodykp1-ab955.html>

19. MCP1, RRID: AB_, Abcam, Catalog number: ab308522. <https://www.abcam.cn/products/primary-antibodies/mcp1-antibodyepr27464-89-ab308522.html>

20. Keap1, RRID: AB_10860776, Cell Signaling Technology, Catalog number: 8047. <https://www.cellsignal.cn/products/primaryantibodies/keap1-d6b12-rabbit-mab/8047>

21. ILF3, RRID: AB_10666431, Proteintech, Catalog number: 19887-1-AP. <https://www.ptgcn.com/products/NF90,ILF3-Antibody-19887-1-AP.htm>

22. IL-10, RRID: AB_2881389,

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

ILF3Flox/Flox mice, which were generated by inserting the mouse ILF3-201 transcript between the first and the second exons of the

mouse ROSA26 locus using CRISPR/Cas9 (Viewsolid Biotech Co, Ltd; Beijing, China), were hybridized with C57BL/6 LysMCre mice to generate macrophage-ILF3 conditional overexpression mice (ILF3Flox/FloxLysMCre+; hereafter referred to as ILF3M-Tg) and its littermates (ILF3Flox/FloxLysMCre-; hereafter referred to as ILF3M-WT). ILF3flox/flox mice, possessing two loxP sites flanking exon 3 of the ILF3 gene (Viewsolid Biotech Co, Ltd; Beijing, China), were crossed with C57BL/6 LysMCre mice to generate macrophage-ILF3 knockout mice (ILF3flox/floxLysMCre+; hereafter referred to as ILF3M-KO) and controls (ILF3flox/floxLysMCre+). ApoE^{-/-} mice were purchased from Beijing Viewsolid Biotechnology (Beijing, China) and crossed with ILF3M-KO, ILF3M-Tg, and their littermates to generate macrophage ILF3 genetic-engineering mice in ApoE^{-/-} background.

Wild animals

The study did not involve wild animals.

Reporting on sex

Male mice aged eight weeks old were selected in this study.

Field-collected samples

The study did not involve field-collected samples.

Ethics oversight

The protocol was endorsed by the Institutional Animal Care and Use Committee of Shandong University (KYLL2020-454).

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

Plants

Seed stocks

NA

Novel plant genotypes

NA

Authentication

NA

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

To identify subsets of inflammatory cells in murine models, single-cell suspensions were isolated from mouse aortas following established protocols.⁵² The enzymatically digested suspensions were filtered through a 70-µm sterile mesh and centrifuged at 300g for 5 minutes at 4°C. The resulting pellet was resuspended in a buffer containing 0.5% BSA.

Instrument

Agilent biosciences Novocyte 3080

Software

NovoExpress (version 1.6.1)

Cell population abundance

No cell sorting was performed

Gating strategy

Cell viability and count were determined using trypan blue exclusion and an automated cell counter (Countess, Life Technologies). Anti-CD16/CD32 (101302, biolgend) was added and incubated for 10 minutes at room temperature to minimize nonspecific binding. Subsequently, cells were stained with specific marker antibodies. The gating strategy is also shown in supplemental figure 2.

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