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Reporting Summary

Nature Research 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 Research policies, see Authors & Referees 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 ( ) 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 for Real Time PCR data collection, GeneSys for Western Blot and agarose gel imaging, xCELLigence RTCA DP software for cell barrier permeability, ZEN2 for microscopy imaging, Attune software for flow cytometry, moorLDI2-IR software for Laser Doppler Imaging.
Data analysis	GraphPad Prism 5 for Real Time PCR data analysis, xCELLigence RTCA DP software for cell barrier permeability analysis, Image J for measurement of vascular tube length, meshed area and counting of adherent THP-1 cells, Attune software for flow cytometry analysis, moorLDI2-IR software for evaluation of hind limb reperfusion.

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/reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Research 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 list of figures that have associated raw data
- A description of any restrictions on data availability

The authors declare that the data supporting the findings of this study are available within the paper and its supplementary information files.

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	Two-tailed Student's t test was performed for two groups or ANOVA for more than two groups. Each group included three samples of mean values from three repeats, which were adequate for calculation of mean, standard deviation and p value to decide statistical significance.
Data exclusions	No data were excluded from the analyses.
Replication	All the experiments were carried out in triplicate. All the replicates were successful.
Randomization	The animals of same age, gender and weight were randomly allocated into experimental groups by facility staffs. Diabetic patient donors for iPS reprogramming and non-diabetic volunteer controls are age- and sex-matched.
Blinding	Blinding was not relevant to my study because all the parameters applied were objective and no subjective assessment was involved.

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
☐	☒ Animals and other organisms
☐	☒ Human research participants
☒	☐ Clinical data

Methods

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

Antibodies

Antibodies used: QKI-7 (UC Davis/NIH NeuroMab Facility 73-200), CD144 (St John's Laboratory STJ96234), CD31 (Abcam AB28364), KDR (R&D Systems MAB3571), FLK-1 (Thermo Fisher Scientific MA5-15157), eNOS (Abcam AB76198), NLGN1 (Abcam ab153821), TSG6 (Sigma-Aldrich RAB1092), ZO-1 (Thermo Fisher Scientific 40-2200), -actin (R&D Systems MAB8928), CUG-BP (Millipore PA5-85997), hnRNPM (Thermo Fisher Scientific MA1-91607). CD144-APC (Thermo Fisher Scientific 17-1449-42), Mouse IgG1 kappa Isotype Control-APC (Thermo Fisher Scientific 17-4714-82), HRP-conjugated secondary antibodies (Bio-Rad 170-6515, 170-6516), Alexa Fluor secondary antibodies (Thermo Fisher Scientific A21202, A11057, A28175, A11004, A11055, A11008).

Validation

QKI-7 (UC Davis/NIH NeuroMab Facility 73-200): Applications:Immunoblot, Immunocytochemistry and Immunohistochemistry; Species Reactivity: human, mouse.
CD144 (St John's Laboratory STJ96234): Applications: ELISA, IHC, WB; Reactivity: Human, Mouse.
CD31 (Abcam AB28364): Applications: IHC-Fr, IHC-P, ICC/IF, IHC-FoFr, WB; Reactivity: Mouse, Human, Pig.
KDR (R&D Systems MAB3571): Applications: ELISA, Western blot; Reactivity: Human.
FLK-1 (Thermo Fisher Scientific MA5-15157): Applications: IHC-Fr, IHC-P, ICC/IF, WB, IP; Reactivity: Human, Mouse.
eNOS (Abcam AB76198): Applications: IHC-P, ICC/IF, Flow Cyt, WB, ELISA; Reactivity: Mouse, Rat, Human.
NLGN1 (Abcam ab153821): Applications: WB; Reactivity: Human, predicted Mouse, Cow.
TSG6 (Sigma-Aldrich RAB1092): Applications: WB, ELISA; Reactivity: Human, Mouse.
ZO-1 (Thermo Fisher Scientific 40-2200):Applications: IHC-Fr, IHC-P, ICC/IF, WB; Reactivity: Dog, Human, Mouse, Rat.
-actin (R&D Systems MAB8928): Applications: WB, ICC; Reactivity: Human, Mouse Rat.
CUG-BP (Millipore PA5-85997):Applications: WB, ICC; Reactivity: Human, Mouse Rat.
hnRNPM (Thermo Fisher Scientific MA1-91607):Applications: WB, ICC/IF; Reactivity: Bovine, Human, Mouse, Pig, Rat.
CD144-APC (Thermo Fisher Scientific 17-1449-42):Applications: Flow Cytometry; Reactivity: Human, Mouse, Non-human primate.
Mouse IgG1 kappa Isotype Control-APC (Thermo Fisher Scientific 17-4714-82):Flow Cytometry; Reactivity: NA
HRP-conjugated secondary antibodies (Bio-Rad 170-6515, 170-6516):Applications: WB; Reactivity: Mouse, Rabbit.
Alexa Fluor secondary antibodies (Thermo Fisher Scientific A21202, A11057, A28175, A11004, A11055, A11008): Applications: IHC, ICC/IF; Reactivity: Mouse, Rabbit, Goat.

Eukaryotic cell lines

Policy information about cell lines

Cell line source(s)	Cells lines prepared in our lab: mouse iPS cell line, human iPS cells lines derived from diabetes patients (P014, P023) and healthy donors (HD19, HD22). THP-1 from ATCC.
Authentication	All the iPS lines from our lab were validated with morphology, expression of pluripotency markers using PCR, Western blot, flow cytometry and ICC; exclusion of exogenous reprogramming factors was verified by Real Time PCR, capacity of differentiation into three germ layers was verified by autonomous differentiation and ICC, genome stability was tested using hPSC Genetic Analysis Kit (Stemcell Technologies 07550), and teratoma formation in vivo. THP-1 was authenticated by ATCC.
Mycoplasma contamination	All the cell lines were tested negative for mycoplasma contamination.
Commonly misidentified lines (See ICLAC register)	No commonly misidentified cell lines were used in the study.

Animals and other organisms

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

Laboratory animals	10-week old male C57BL/6 mice.
Wild animals	The study did not involve wild animals.
Field-collected samples	The study did not involve samples collected from the field.
Ethics oversight	Animals used in these studies were all bred in-house under constant climatic conditions with free access to food and water. All experiments were performed in accordance with the Guidance on the Operation of the Animals (Scientific Procedures) Act, 1986 and approved by the Queen's University Belfast Animal Welfare and Ethical Review Body. Work was performed under the project license number PPL2821.

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	Diabetic patient-specific iPSCs were generated based on a protocol which we have recently reported. Patients with diabetes of more than 15 year standing (n=3) and age and sex-matched non-diabetic volunteers, who acted as controls, were recruited to this study.
Recruitment	Verbal and written information about the study was provided to all participants and informed consent was obtained prior to study procedures from those willing and consenting to take part.
Ethics oversight	Ethical approval was obtained from the Office for Research Ethics Committees of Northern Ireland (ORECNI) (REC 14/NI/1109).

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

Flow Cytometry

Popliteal arteries harvested from patients with diabetes undergoing lower limb amputation were used for histochemical analysis. Patients age: 72.7+/- 11.3, sex: males 87.4%, degree of atherosclerosis: ***. Arterial plaques were graded according to the Oxford grading system. No bias to be reported.

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	A total of 100,000 single cells were resuspended in 100ul PBS supplemented with 10% fetal calf serum (FCS) and stained with 5ul CD144-APC antibody (Thermo Fisher Scientific 17-1449-42) for 30min at 4 degree in the dark.
Instrument	Attune NxT Flow Cytometer.

Software	Attune NxT software v2.5
Cell population abundance	The abundance of the CD144 positive cells post sorting was over 97%
Gating strategy	The voltage setting was FSC: 70, SSC: 320. The control group cells were incubated with mouse IgG1-APC for 30min at 4 degree in the dark. The far right edge of the curve of the IgG isotype was marked as the border of negative and positive.

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