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Life Sciences Reporting Summary

Nature Research wishes to improve the reproducibility of the work that we publish. This form is intended for publication with all accepted life science papers and provides structure for consistency and transparency in reporting. Every life science submission will use this form; some list items might not apply to an individual manuscript, but all fields must be completed for clarity.

For further information on the points included in this form, see Reporting Life Sciences Research. For further information on Nature Research policies, including our data availability policy, see Authors & Referees and the Editorial Policy Checklist.

Experimental design

1. Sample size

Describe how sample size was determined.

The justification of sample size determination was described in the Method section of the manuscript. To determine and confirm sample sizes (N), we performed a power analysis. The values for the power (1-beta) and the type I error rate (alpha) were 0.8 and 0.05 (or 0.01), respectively. We described this in the Method section of the manuscript.

2. Data exclusions

Describe any data exclusions.

Exclusion criteria for mice were based on abnormal health conditions including weights below 15g at 6 weeks and noticeably reduced activity or feeding as used in previous studies (Wang, C.Y. & Liao, J.K. A mouse model of diet-induced obesity and insulin resistance. Methods Mol Biol 821, 421-433 (2012); Festing, M.F. & Altman, D.G. Guidelines for the design and statistical analysis of experiments using laboratory animals. ILAR J 43, 244-258 (2002)). We described this in the Method section of the manuscript.

3. Replication

Describe whether the experimental findings were reliably reproduced.

We repeated each experiment more than three times and reproduced the results. We utilized more than three sets of cultures or tissues from more than three animals for each experiment. We described animal numbers and statistics in the legend section of the manuscript. We also performed each experiment using different methodologies to confirm the results.

4. Randomization

Describe how samples/organisms/participants were allocated into experimental groups.

Each experiment in this study was performed randomized. Animals were assigned randomly to the various experimental groups, and data were collected and processed randomly. The allocation, treatment, and handling of animals were the same across study groups. We described randomization in the Method section of the manuscript.

5. Blinding

Describe whether the investigators were blinded to group allocation during data collection and/or analysis.

Each experiment in this study was performed blind. The individuals conducting the experiments were blinded to group allocation and the allocation sequence. We described blinding in the Method section of the manuscript.

Note: all studies involving animals and/or human research participants must disclose whether blinding and randomization were used.

6. Statistical parameters

For all figures and tables that use statistical methods, confirm that the following items are present in relevant figure legends (or in the Methods section if additional space is needed).

n/a	Confirmed
☐	☒ The exact sample size (*n*) for each experimental group/condition, given as a discrete number and unit of measurement (animals, litters, cultures, etc.)
☐	☒ A description of how samples were collected, noting whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
☐	☒ A statement indicating how many times each experiment was replicated
☐	☒ The statistical test(s) used and whether they are one- or two-sided (note: only common tests should be described solely by name; more complex techniques should be described in the Methods section)
☐	☒ A description of any assumptions or corrections, such as an adjustment for multiple comparisons
☐	☒ The test results (e.g. *P* values) given as exact values whenever possible and with confidence intervals noted
☐	☒ A clear description of statistics including central tendency (e.g. median, mean) and variation (e.g. standard deviation, interquartile range)
☐	☒ Clearly defined error bars

See the web collection on statistics for biologists for further resources and guidance.

Software

Policy information about availability of computer code

7. Software

Describe the software used to analyze the data in this study.	Data were analyzed using the GraphPad Prism and presented as means ± SEM. Normal distribution was tested using the Kolmogorov-Smirnov test and variance was compared. Unless otherwise stated, statistical significance was determined using two-tailed unpaired Student's t-tests for two population comparison or one-way ANOVA followed by the Bonferroni's post hoc test for multiple comparisons. We described this in the Method section of the manuscript.

For manuscripts utilizing custom algorithms or software that are central to the paper but not yet described in the published literature, software must be made available to editors and reviewers upon request. We strongly encourage code deposition in a community repository (e.g. GitHub). *Nature Methods* guidance for providing algorithms and software for publication provides further information on this topic.

Materials and reagents

Policy information about availability of materials

8. Materials availability

Indicate whether there are restrictions on availability of unique materials or if these materials are only available for distribution by a for-profit company.	There is no restriction on availability of materials.

9. Antibodies

Describe the antibodies used and how they were validated for use in the system under study (i.e. assay and species).

Immunoprecipitation: rabbit-anti-H3K9ac antibody (Abcam, ab4441), rabbit anti-CBP (Cell Signaling Technology, #7389) and rabbit anti-PCAF (Cell Signaling Technology, #3378).
Western blotting: mouse anti-ARID1B (Abcam, ab57461 and Abnova, H00057492-M02), mouse anti-GAD67 (Millipore, MAB5406), rabbit anti-calbindin-D28k (Millipore, AB1778), mouse anti-calretinin (Millipore, MAB1568), rabbit anti-H3K9ac (Abcam, ab4441), rabbit anti-H3K4me3 (Cell Signaling Technology, #9751), rabbit anti-H3K27me3 (Cell Signaling Technology, #9733), rabbit anti-H3 (Cell Signaling Technology, #4499), rabbit anti-Acetyl-CBP/p300 (Cell Signaling Technology, #4771), rabbit anti-CBP (Cell Signaling Technology, #7389), rabbit anti-PCAF (Cell Signaling Technology, #3378), rabbit anti-HDAC4 (Sigma-Aldrich, H9411), rabbit anti-beta-catenin (Cell Signaling Technology, #8480), rabbit anti-p-beta-catenin (Phospho Solution, P120-3337), rabbit anti-Cyclin D1 (Cell Signaling Technology, #2922), rabbit anti-HA (Cell Signaling Technology, #3724) or rabbit anti-GAPDH (Millipore, MAB374).
Immunostaining:mouse anti-ARID1B (Abcam, ab57461 and Abnova, H00057492-M02), rabbit anti-GABA (Sigma, A2052), mouse anti-parvalbumin (Millipore, MAB1572), rabbit anti-cleaved caspase-3 (Cell Signaling Technology, #9664), mouse anti-BrdU (BD Biosciences, #555627), rabbit anti-Phospho-Histone H3 (Cell Signaling Technology, #9701), rabbit anti-VGAT (Phosphosolution, 2100-VGAT), guinea pig anti-VGLUT1 (Millipore, AB5905), rat anti-GAD65 (Developmental Studies Hybridoma Bank, GAD6), rat anti-somatostatin (Millipore, MAB354), rabbit anti-calbindin-D28k (Millipore, AB1778), mouse anti-calretinin (Millipore, MAB1568), rabbit anti-Cux1 (Santa Cruz, sc-13024), mouse anti-NeuN (Millipore, MAB377), rabbit anti-TBR1 (Millipore, AB10554), rabbit anti-Olig2 (Millipore, AB9610), rabbit anti-GFAP (DAKO, Z0334), rabbit anti-PSD95 (Abcam, ab18258) and chicken anti-GFP (Invitrogen, A10262).
These antibodies were described in the Method section of the manuscript. Validation data are available from the commercial providers.

10. Eukaryotic cell lines

a. State the source of each eukaryotic cell line used.

N/A

b. Describe the method of cell line authentication used.

N/A

c. Report whether the cell lines were tested for mycoplasma contamination.

N/A

d. If any of the cell lines used are listed in the database of commonly misidentified cell lines maintained by ICLAC, provide a scientific rationale for their use.

N/A

Animals and human research participants

Policy information about studies involving animals; when reporting animal research, follow the ARRIVE guidelines

11. Description of research animals

Provide details on animals and/or animal-derived materials used in the study.

The ES cell clone used for creating the Arid1b mouse model was the JM8.N4 strain obtained from the European Conditional Mouse Mutagenesis program (EUCOMM) and contains a "knockout first" design (https://www.mousephenotype.org/data/alleles/MGI:1926129/tm1a(EUCOMM)Hmgu/ IKMC project ID: 25129). Exon 5 of the Arid1b gene was targeted to create a deletion allele. The knockout first allele for the Arid1b locus was created by injecting the targeted ES cell clones into the blastocysts derived from an albino C57BL6 strain (Jackson Laboratory, #000058) in the Mouse Genome Engineering Core Facility at the University of Nebraska Medical Center. The chimeras were first bred to a Flpo mouse strain (MMRRC UCD, stock # 036512) to delete the knockout first cassette in the intron 4-5 and convert the allele to the floxed allele. Elimination of the neomycin cassette was confirmed by PCR genotyping. The heterozygous floxed mice were crossed with appropriate Cre drivers for tissue-specific Arid1b deletion. To generate the global Arid1b KO allele, the knockout first allele was crossed with a CMV-Cre mouse strain (Jackson laboratory, #006054), and the resulting Arid1b KO allele in which the neo cassette, one FRT, one loxP, and exon 5 were removed was selected by genomic PCR and sequencing using appropriate primers. Based on the lack of protein in the null mice, we presume that the transcript from the deleted allele undergoes nonsense-mediated decay. The Mice were housed in a cage with 12:12h light-dark cycle. No more than 5 mice were housed in a cage. Mice were handled according to a protocol approved by the University Nebraska Medical Center Institutional Animal Care and Use Committee. We described this in the Method section of the manuscript.

Policy information about studies involving human research participants

12. Description of human research participants

Describe the covariate-relevant population characteristics of the human research participants.

N/A