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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 (*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	Data was collected in Microsoft Excel 365
Data analysis	Data was analysis was performed in GraphPad Prism 7

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 data supporting the findings of this study are available within the paper and its supplementary information files. Any additional data if needed will be provided upon request.

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

Life sciences study design

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

Sample size	The goal of this proof of concept study was to demonstrate that subzero organ preservation by supercooling of human livers is possible. Therefore, no sample size calculations were performed. Given the limited availability of discarded human donor livers, we used 5 consecutively offered livers that matched the inclusion criteria to demonstrate feasibility and repeatability of supercooling preservation.
Data exclusions	No data were excluded.
Replication	Reproducibility of supercooling preservation is ensured by 5 consecutive experiments using human livers that were rejected for transplantation and met the inclusion criteria of this study. All attempts at replication were succesfull and the data of all 5 repetitions are included in the manuscript.
Randomization	Randomization of group allocation was not relevant for this study since the research design consists of one experimental group that contains a pre- and post-preservation viability measurement.
Blinding	Blinding to group allocation was not relevant for this study since the research design consists of one experimental group that contains a pre and post-preservation viability measurement. Data analysis was blinded where appropriate; i.e. histology assessment and quantification.

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

Human research participants

Policy information about studies involving human research participants

Population characteristics	The mean donor age was 52 years, ranging from 32 to 60. 20% of the donors were male. The mean donor BMI was 29, ranging from 23 to 36. The donation type was 20% donation after brain death (DBD) and 80% donation after cardiac death (DCD).
Recruitment	Human livers were procured by the organ procurement organizations (OPO) New England Donor Services (NEDS, Waltham, MA, USA) and LiveOnNY (New York, NY, USA). Informed consent was obtained by the OPO. After the livers were rejected for transplantation, they were transported to our lab under conventional hypothermic preservation (HP) conditions in University of Wisconsin Solution (UW). We excluded livers based on the following criteria: warm ischemic time >60 min, cold ischemic time >18 hours, >20% macro steatosis, donor history of liver fibrosis and any grade of liver laceration.
Ethics oversight	This study was approved by Massachusetts General Hospital (Partners IRB as an exempt protocol), New England Donor Services and LiveOn New York

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