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Life Sciences Reporting Summary

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Please do not complete any field with "not applicable" or n/a. Refer to the help text for what text to use if an item is not relevant to your study.
For final submission: please carefully check your responses for accuracy; you will not be able to make changes later.

Experimental design

1. Sample size

Describe how sample size was determined.

We did not perform a formal sample-size calculation. However, our sample sizes (n=8 animals, n=67 electrodes for endovascular stimulation, and n= 6 animals, n=154 locations and n=4 animals, n=114 locations for subdural and penetrating electrodes, respectively) exceed the standards in the field. As electrode locations vary across animals, a minimum of 6 animals were needed for endovascular stimulation to maximize the spread and number of electrodes that can be used to stimulate. Most animal studies evaluating stimulation responses from surface electrode arrays use 3–5 animals.

2. Data exclusions

Describe any data exclusions.

Data were excluded from stent-mounted electrodes that were confirmed to be non-functioning due to mechanical breakage or electrical short-circuiting to the stent scaffold, in accordance with previously determined methodology (Opie et al. Journal of Neural Engineering, 2016).

3. Replication

Describe the measures taken to verify the reproducibility of the experimental findings.

Repeated animal studies were conducted to verify reproducibility of the experimentation findings, with electrode positions maintained throughout the experiments where possible. A schematic representation of the electrode locations is included in the manuscript.

4. Randomization

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

Animals were randomly allocated into the different stimulation groups, selected from a pen containing multiple animals by the animal technicians and veterinarians.

5. Blinding

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

Data collection and analysis were not blinded. Analyses were conducted using quantitative, pre-established analysis procedures.

Note: all in vivo studies must report how sample size was determined and 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 *Only common tests should be described solely by name; describe more complex techniques in the Methods section.*
☐	☒ A description of any assumptions or corrections, such as an adjustment for multiple comparisons
☐	☒ Test values indicating whether an effect is present *Provide confidence intervals or give results of significance tests (e.g. P values) as exact values whenever appropriate and with effect sizes 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 in all relevant figure captions (with explicit mention of central tendency and variation)

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.	GraphPad Prism 7.00 was used for statistical analysis and construction of graphical data representations.

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 third party.	All unique materials used in the construction of stent-electorde arrays using in this study are available from standard commercial sources (listed in the manuscript).

9. Antibodies

Describe the antibodies used and how they were validated for use in the system under study (i.e. assay and species).	No antibodies were used.

10. Eukaryotic cell lines

a. State the source of each eukaryotic cell line used.	No eukaryotic cell lines were used.
b. Describe the method of cell line authentication used.	No eukaryotic cell lines were used.
c. Report whether the cell lines were tested for mycoplasma contamination.	No eukaryotic cell lines were used.
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.	No commonly misidentified cell lines were used.

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 all relevant details on animals and/or animal-derived materials used in the study.	As reported in the manuscript text, all animals were Corriedale ewes (female), aged between 2–6 years weighing 40–65kg.

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.	The study did not involve human research participants.