

eLife's transparent reporting form

We encourage authors to provide detailed information *within their submission* to facilitate the interpretation and replication of experiments. Authors can upload supporting documentation to indicate the use of appropriate reporting guidelines for health-related research (see [EQUATOR Network](#)), life science research (see the [BioSharing Information Resource](#)), or the [ARRIVE guidelines](#) for reporting work involving animal research. Where applicable, authors should refer to any relevant reporting standards documents in this form.

If you have any questions, please consult our Journal Policies and/or contact us: editorial@elifesciences.org.

Sample-size estimation

- You should state whether an appropriate sample size was computed when the study was being designed
- You should state the statistical method of sample size computation and any required assumptions
- If no explicit power analysis was used, you should describe how you decided what sample (replicate) size (number) to use

Please outline where this information can be found within the submission (e.g., sections or figure legends), or explain why this information doesn't apply to your submission:

No statistical methods were used to predetermine sample sizes, but our sample size estimates were based upon previous work addressing structure-function relationships of single neurons with similar techniques (e.g. Diamantaki et al., 2016; Preston-Ferrer et al., 2016; Tang et al., 2014, 2015), as reported in the Methods.

Replicates

- You should report how often each experiment was performed
- You should include a definition of biological versus technical replication
- The data obtained should be provided and sufficient information should be provided to indicate the number of independent biological and/or technical replicates
- If you encountered any outliers, you should describe how these were handled
- Criteria for exclusion/inclusion of data should be clearly stated
- High-throughput sequence data should be uploaded before submission, with a private link for reviewers provided (these are available from both GEO and ArrayExpress)

Please outline where this information can be found within the submission (e.g., sections or figure legends), or explain why this information doesn't apply to your submission:



Throughout the manuscript, the number of neurons (biological replicates) and number of repetitions within a neuron (technical replicates; e.g. light-stimulation trials in Figures 1, 2, 3 and corresponding Figure legends) are specified and indicated. For electrophysiology / optogenetic experiments: this information is to be found in the paragraph ‘Optotagging procedures’ and ‘Analysis of Electrophysiology Data’ (Materials and Methods section), in Figures 1, 2, 3 and in the corresponding Figure legends.

The “Materials and Methods” section of the manuscript describes in detail the experimental design and the exclusion/inclusion criteria adopted.

Statistical reporting

- Statistical analysis methods should be described and justified
- Raw data should be presented in figures whenever informative to do so (typically when N per group is less than 10)
- For each experiment, you should identify the statistical tests used, exact values of N, definitions of center, methods of multiple test correction, and dispersion and precision measures (e.g., mean, median, SD, SEM, confidence intervals; and, for the major substantive results, a measure of effect size (e.g., Pearson's r, Cohen's d)
- Report exact p-values wherever possible alongside the summary statistics and 95% confidence intervals. These should be reported for all key questions and not only when the p-value is less than 0.05.

Please outline where this information can be found within the submission (e.g., sections or figure legends), or explain why this information doesn't apply to your submission:

The “Materials and Methods” section of the manuscript reports all values of N (see paragraph ‘Optotagging procedures’ and ‘Analysis of Electrophysiology Data’ for opto-juxtacellular experiments). Statistical analysis methods and precision measures were reported in each figure legend and repeated in the paragraph ‘Statistical analysis’ (in Materials and Methods). Exact p values are reported throughout the manuscript. Where appropriate, information is repeated in the Result section, Figures and in the figure legends.

(For large datasets, or papers with a very large number of statistical tests, you may upload a single table file with tests, Ns, etc., with reference to sections in the manuscript.)

Group allocation

- Indicate how samples were allocated into experimental groups (in the case of clinical studies, please specify allocation to treatment method); if randomization was used, please also state if restricted randomization was applied
- Indicate if masking was used during group allocation, data collection and/or data analysis

Please outline where this information can be found within the submission (e.g., sections or figure legends), or explain why this information doesn't apply to your submission:

For juxtacellular recordings *in vivo*, cell identity groups were determined by post hoc histological analysis and/or opto-tagging procedures. Due to the nature of the *in vivo* single cell recording method, the sampling was considered “blind” to the experimenter, so masking is not relevant to juxtacellular recording experiments. Histological verification of the recorded/labelled cells was performed blind to the electrophysiology.

Additional data files (“source data”)

- We encourage you to upload relevant additional data files, such as numerical data that are represented as a graph in a figure, or as a summary table
- Where provided, these should be in the most useful format, and they can be uploaded as “Source data” files linked to a main figure or table
- Include model definition files including the full list of parameters used
- Include code used for data analysis (e.g., R, MatLab)
- Avoid stating that data files are “available upon request”

Please indicate the figures or tables for which source data files have been provided:

Key numerical data are provided for all figures: Figure 1, Figure 2, Figure 3, Figure 1 – figure supplement 1, Figure 3 – figure supplement 1 and Figure 3- figure supplement 2