***eLife’s* transparent reporting form**

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**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 pre-determined sample size was estimated. As described in the methods, all electrophysiological experiments were performed on a minimum of 4 cells on oocytes from at least two batches. The number of recordings was primarily based on the variability and is reported in the figure legends and the tables in the Supplementary Files.

**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:

This information is detailed in the supplementary tables. As described in the methods, traces were used for further analysis only if the final pH 5.6 application resulted in currents that were ≥ 80 % of the same pH applied prior to the SSD protocol.

**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.

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This information is detailed in the figure legends. Source data is provided for all plots.

(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:

Not applicable

**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:

Figures 1-5, Supplementary Tables 1a-i

Figure 1B-D: Figure 1-source data 1

Figure 1 E-H incl Figure 1-figure supplement 2: Figure 1-source data 2

Figure 1-figure supplement 1: Figure 1-figure supplement 1-source data 1 & 2

Figure 2A incl. Figure 2-figure supplement 1A, B: Figure 2-source data 1

Figure 2B, C: Figure 2-source data 2

Figure 2 E-H incl Figure 2-figure supplement 1D, E: Figure 2-source data 3

Figure 3B, C: Figure 3-source data 1

Figure 3D, E: Figure 3-source data 2

Figure 3F-H: Figure 3-source data 3

Figure 4B, C incl Figure 4-figure supplement 2B: Figure 4-source data 1

Figure 4D, E: Figure 4-source data 2

Figure 4F, G incl. Figure 4-figure supplement 2C: Figure 4-source data 3

Figure 5: Figure 5-source data 1

Figure 5-figure supplement 1: Figure 5-figure supplement-source data 1