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Supplementary Materials for

Lamellar cells in Pacinian and Meissner corpuscles are touch sensors

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This PDF file includes:

Figs. S1 to S6

Supplementary Material

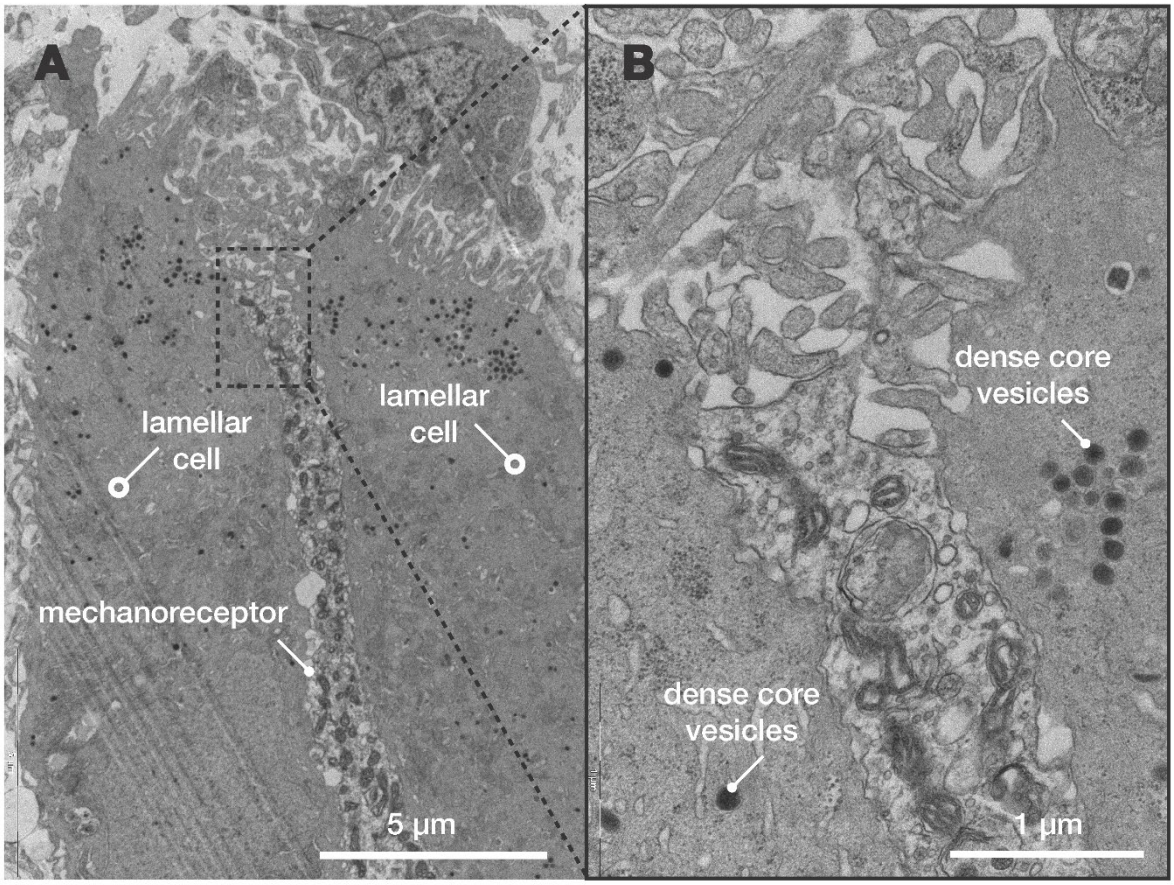

Fig. S1. Electron microscopy images of a Meissner corpuscle from duck bill skin. Meissner lamellar cells contain numerous dense core vesicles distributed in the cytoplasm, and in close proximity to the lamellar cell plasma membrane facing the mechanoreceptor afferent.

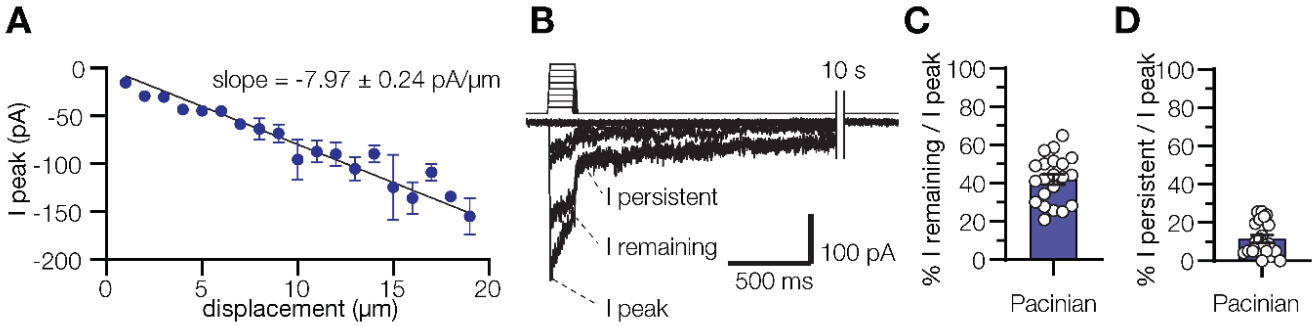

Fig. S2. Mechanically-activated currents in lamellar cells within Pacinian corpuscles. (A) A) Quantification of peak MA current amplitude in Pacinian lamellar cells in response to indentation with a glass probe, fitted to the linear equation. Data are the same as in Fig. 2E *left*, presented as means ± s.e.m. from 19 cells. **(B)** Exemplar MA current traces from a Pacinian lamellar cell showing the decay of MA current to baseline. **(C, D)** Quantification of MA current amplitude in Pacinian lamellar cells immediately before (*C*) and 10 ms after retraction of the probe (*D*) relative to peak MA current amplitude. Data are means ± s.e.m. from at least three independent skin preparations. Open circles denote individual cells.

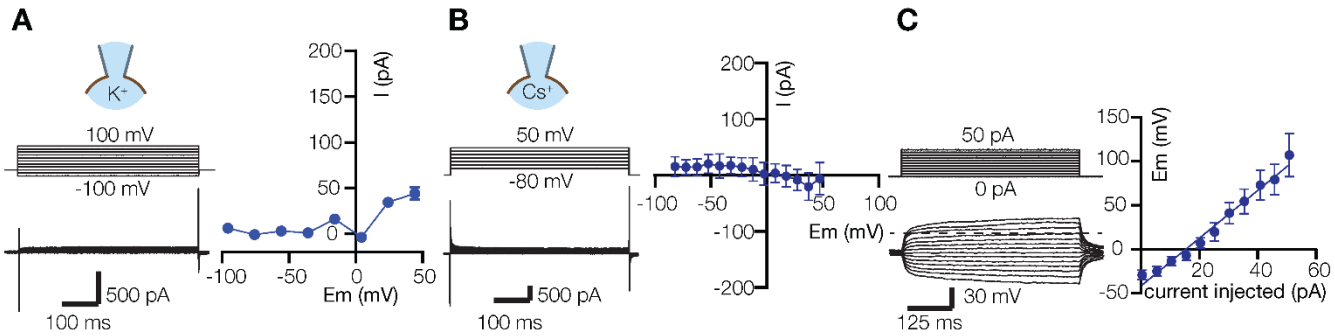

Fig. S3. Lamellar cells from Pacinian corpuscles lack voltage-gated currents. (A, B) Exemplar current-voltage relationships recorded in response to voltage steps with K^+-based (*A*) or Cs^+-based (*B*) internal solution. Data are means ± s.e.m. from 5 and 7 Pacinian lamellar cells, respectively. In *A*, the error bars are smaller than the symbols. **(C)** Exemplar voltage traces in Pacinian lamellar cells and quantification of membrane potential change in response to current injection, fitted to the linear equation (n=7 cells). Data are means ± s.e.m., collected from at least three independent skin preparations.

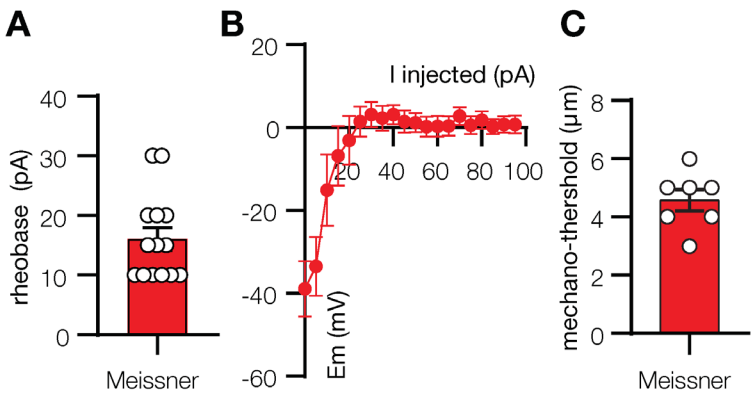

Fig. S4. Lamellar cells from Meissner corpuscles are excitable. (A) Quantification of Meissner lamellar cell firing threshold in response to current injection. Data are means ± s.e.m. Each dot represents an individual cell. **(B)** Quantification of peak membrane potential of Meissner lamellar cells in response to current injection. Data are presented as means ± s.e.m. from 8 individual cells. **(C)** Quantification of action potential firing threshold evoked in Meissner lamellar cells by mechanical indentation. Data are means ± s.e.m. Each dot represents an individual cell.

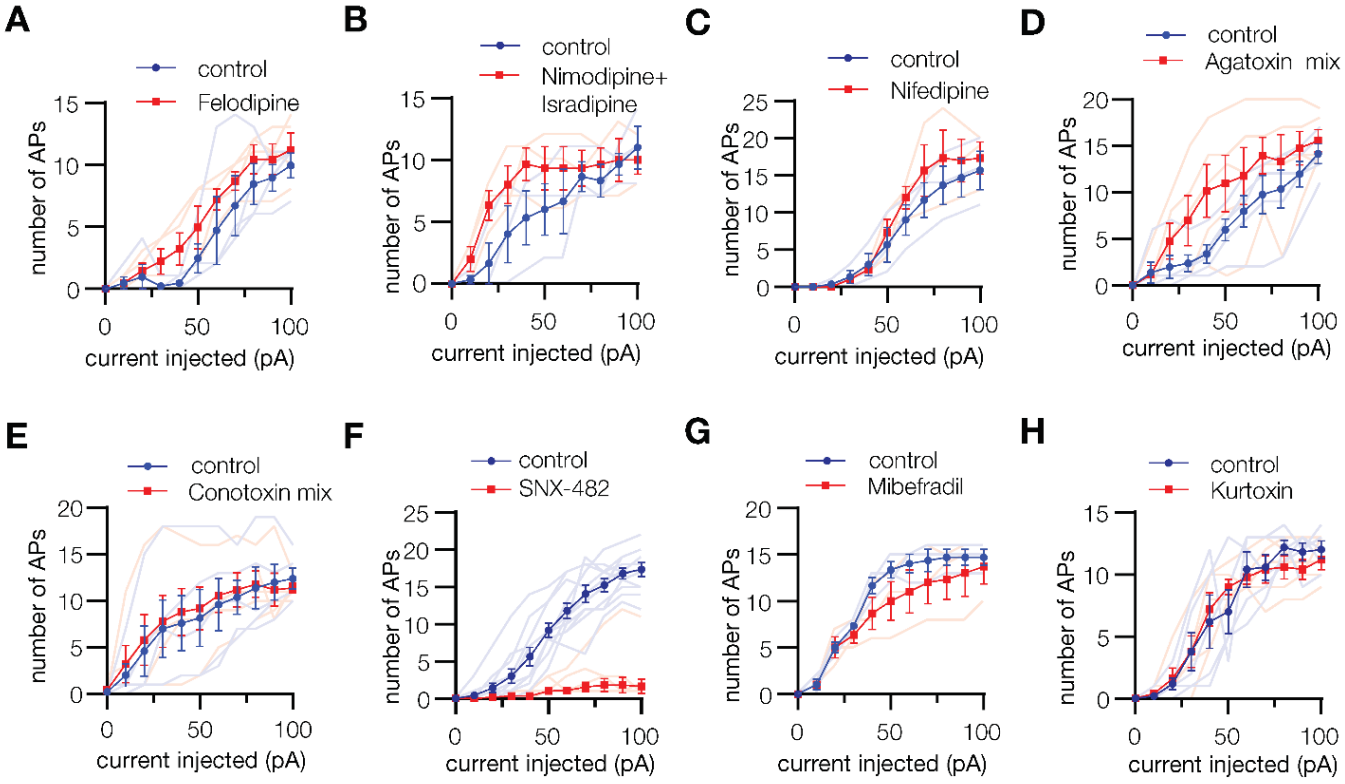

Fig. S5. Pharmacological profile of Meissner lamellar cell firing. Quantification of the number of action potentials in response to current injection in the presence of indicated pharmacological agents: 10 µM Felodipine, a mix of 10 µM Nimodipine and 5 µM Isradipine, 10 µM Nifedipine, Agatoxin mix (1 µM ω-Agatoxin IVA and 1 µM ω-Agatoxin TK), Conotoxin mix (5 µM ω-Conotoxin CnVIIA, 10 nM ω-Conotoxin CVIB, 10 nM ω-Conotoxin CVIE, 1 µM ω-Conotoxin MVIIC and 1 µM ω-Conotoxin MVIID), 1 µM SNX-482, 5 µM Mibefradil, 200 nM Kurtoxin. Thin lines represent individual cells, thick lines connect means ± s.e.m. Data were obtained from at least three independent experiments.

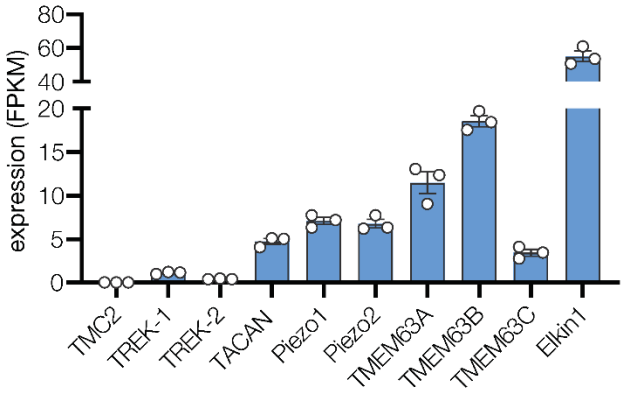

Fig. S6. Expression of mechanically gated ion channels in duck bill skin. Quantification of expression of mRNA for established and putative mechanically-gated ion channels in duck bill skin, presented as the mean of the number of mRNA fragments per kilobase of exon per million fragments mapped (FPKM) ± s.e.m. Open circles represent samples from individual animals.