

Supplementary Information

# Title

## Decoding Vagus-Nerve Activity with Carbon Nanotube Sensors in Freely Moving Rodents

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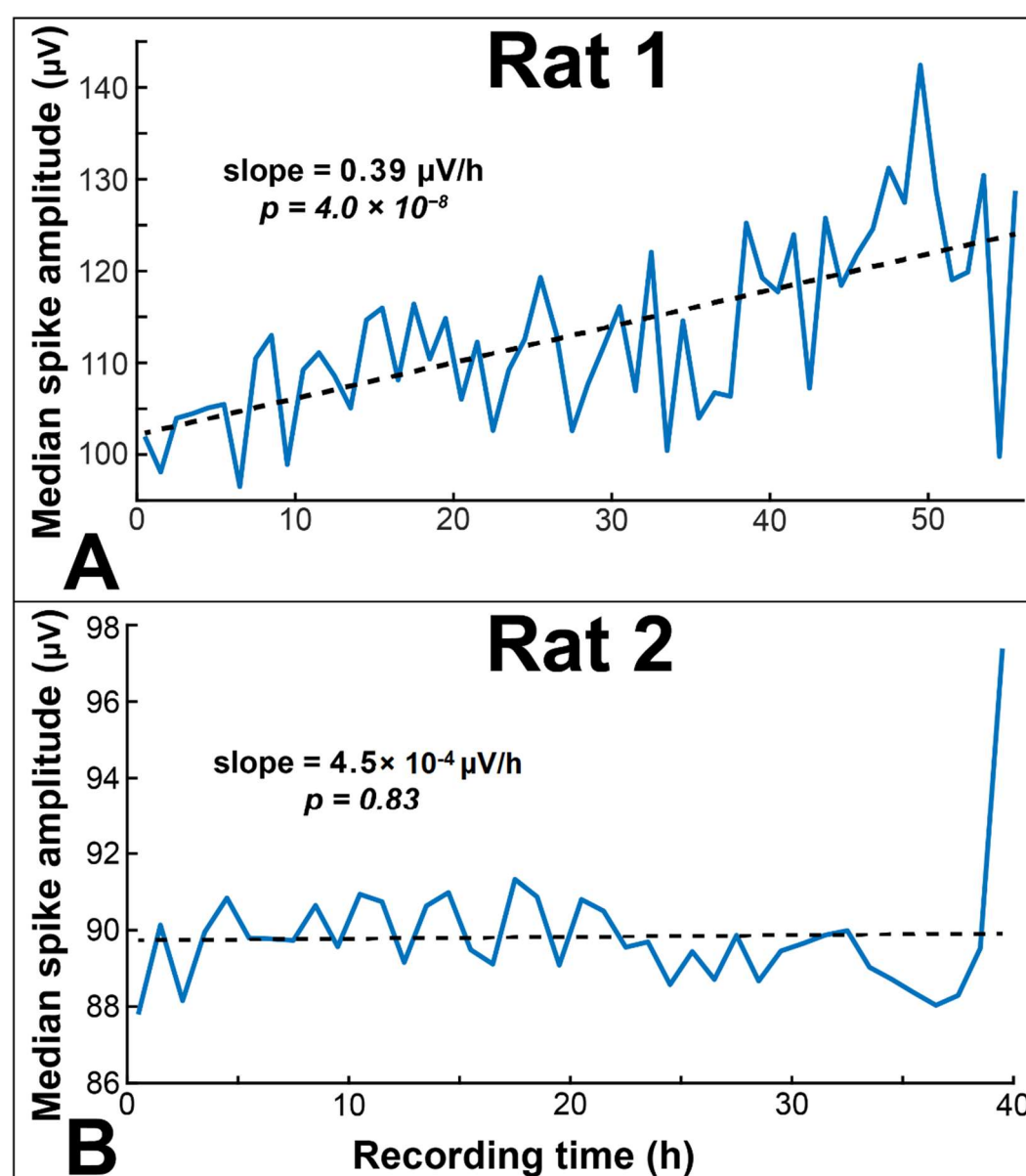
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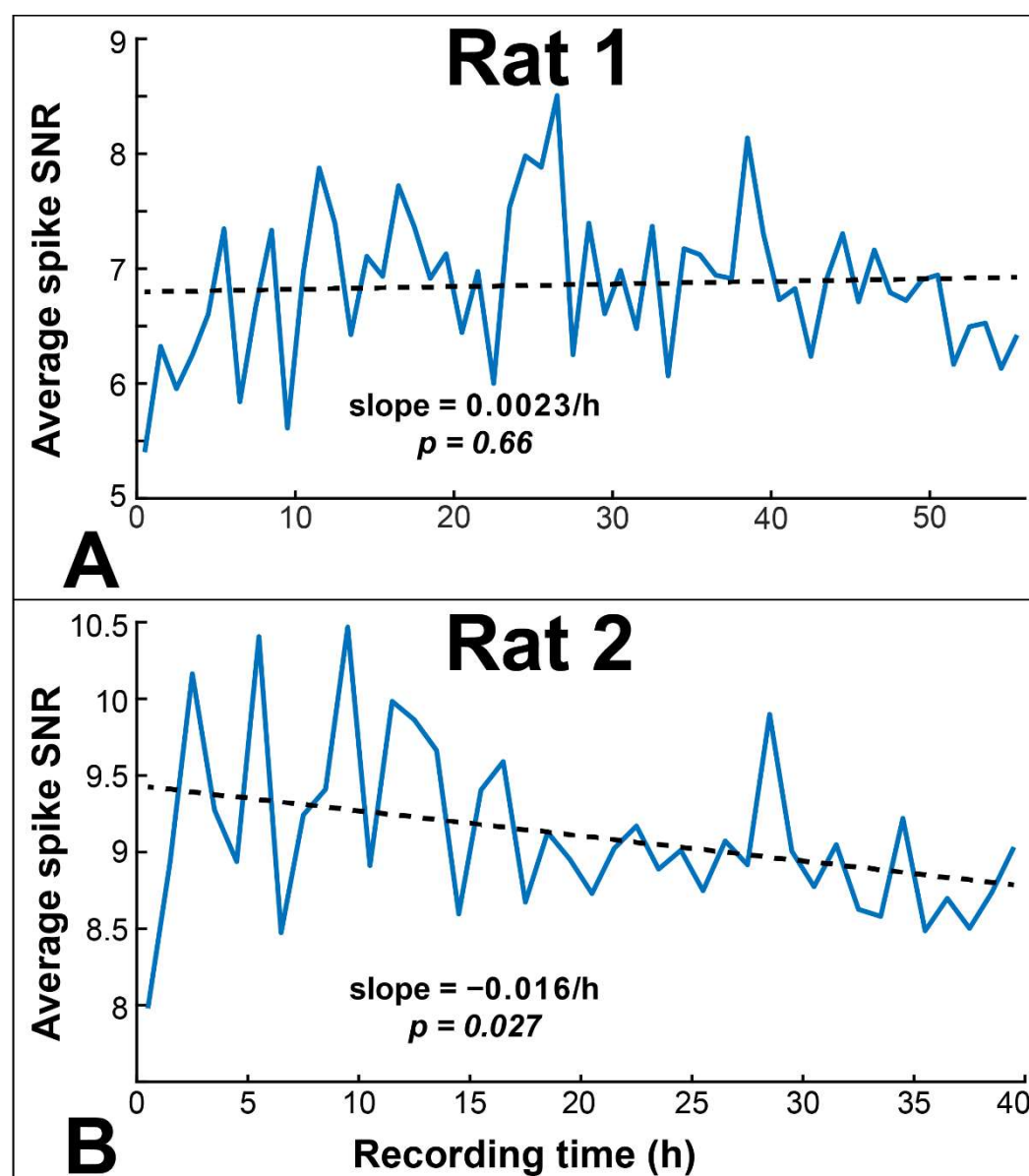


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**Supplementary Figure S1.** Median spike amplitude over time.  $\times 10^{-4} \mu\text{V/h}$  (A). Median spike amplitude for spikes recorded in Rat 1 slightly increase over the recording time, with a statistically

significant slope of  $0.39\mu\text{V}$  per hour. (B). Median spike amplitude of spikes recorded in Rat 2 did not change over the recording time.

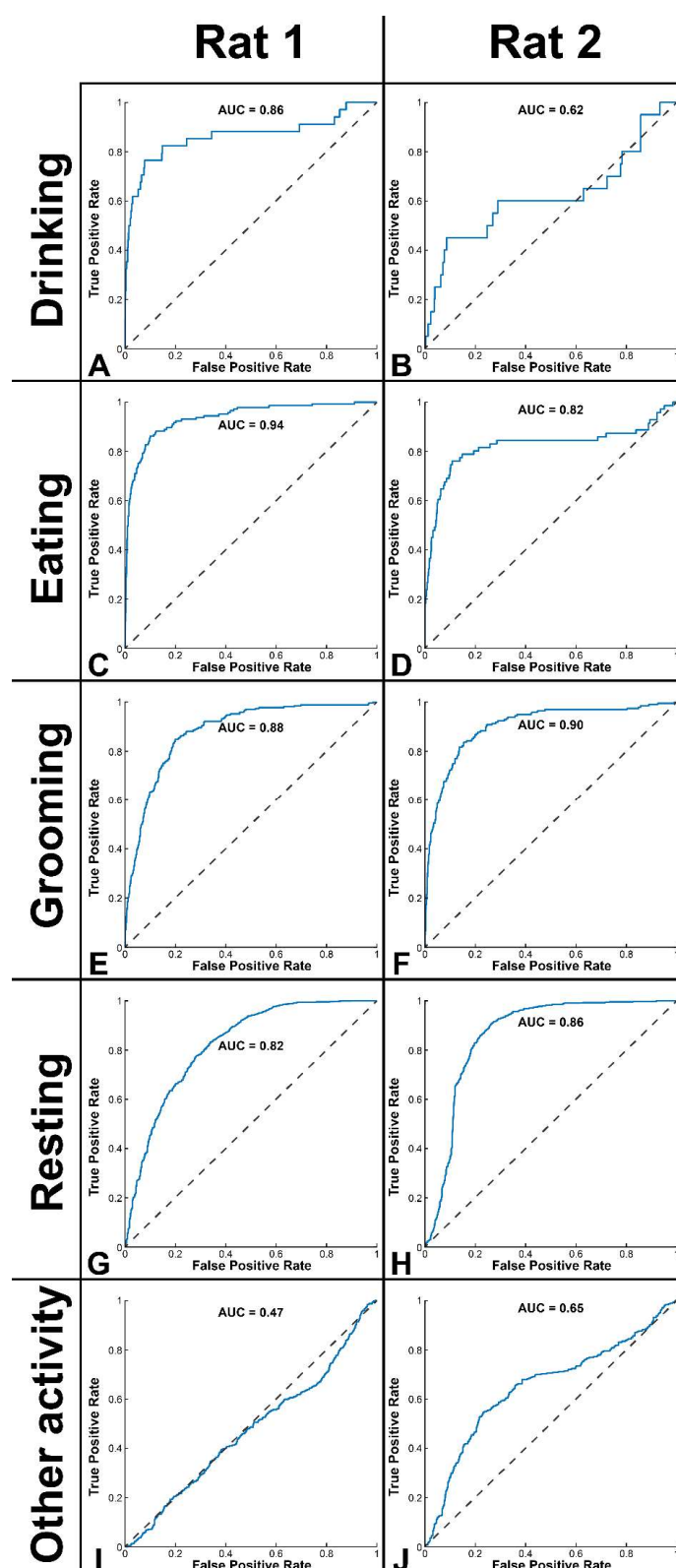


**Supplementary Figure S2.** Average spike SNR (spike RMS divided by noise RMS) over time. (A). SNR of spikes recorded in Rat 1 did not change over the recording time. (B). SNR of spikes recorded in Rat 2 did not change over the recording time.

**Supplementary Table S1.** Differences in ISI distributions for before, during, and after eating periods, compared to non-eating periods, for all clusters which had at least one group with a significant change. Cluster groups are shown for each cluster (see Table 1), and non-significant p-values are not shown.

Cluster Number	Cluster Group	Before Eating	During Eating	After Eating
1.8	II	$9.4 \times 10^{-45}$	NS	$1.4 \times 10^{-27}$
1.14	II	$3.2 \times 10^{-10}$	$2.1 \times 10^{-5}$	$7.3 \times 10^{-7}$
1.18	II	$6.9 \times 10^{-13}$	NS	NS
1.20	II	$5.7 \times 10^{-11}$	NS	NS
1.21	II	$9.9 \times 10^{-11}$	NS	NS

1.28	II	$1.9 \times 10^{-9}$	NS	NS
1.29	II	$4.4 \times 10^{-9}$	NS	NS
1.30	IV	$2.5 \times 10^{-6}$	NS	NS
1.52	IV	$4.0 \times 10^{-10}$	NS	NS
1.56	IV	$6.4 \times 10^{-13}$	$8.2 \times 10^{-9}$	$1.4 \times 10^{-11}$
2.10	IV	NS	$3.6 \times 10^{-11}$	NS
2.11	IV	NS	$4.9 \times 10^{-8}$	NS
2.12	IV	NS	$2.4 \times 10^{-8}$	NS
2.13	IV	NS	$5.1 \times 10^{-7}$	NS
2.16	IV	NS	$6.3 \times 10^{-6}$	NS
2.18	IV	NS	$9.6 \times 10^{-10}$	NS
2.21	IV	NS	$8.8 \times 10^{-9}$	NS
2.24	IV	NS	$3.9 \times 10^{-6}$	NS
2.30	IV	NS	$3.1 \times 10^{-6}$	NS
2.31	IV	NS	$1.0 \times 10^{-5}$	NS
2.33	IV	NS	$7.7 \times 10^{-12}$	NS
2.34	IV	NS	$5.5 \times 10^{-7}$	NS
2.37	IV	NS	$2.3 \times 10^{-10}$	NS
2.40	IV	NS	$2.8 \times 10^{-10}$	NS
2.42	IV	NS	$2.0 \times 10^{-5}$	NS
2.43	IV	NS	$8.2 \times 10^{-6}$	NS
2.58	IV	NS	$1.7 \times 10^{-5}$	NS
2.73	IV	NS	$2.6 \times 10^{-6}$	NS



**Supplementary Figure S3.** Receiver operating characteristic (ROC) curves and area-under-the-curve (AUC) values to assess performance of a multinomial logistic regression model to classify animal behaviors based on spike cluster firing rates. Dotted lines show the expected ROC curve for a random classifier. (A). ROC curve for classifying drinking in Rat 1, with AUC = 0.86. (B). ROC curve for classifying drinking in Rat 2, with AUC = 0.62. (C). ROC curve for classifying eating in Rat 1, with AUC = 0.94. (D).

ROC curve for classifying eating in Rat 2, with AUC = 0.82. **(E)**. ROC curve for classifying grooming in Rat 1, with AUC = 0.88. **(F)**. ROC curve for classifying grooming in Rat 2, with AUC = 0.90. **(G)**. ROC curve for classifying resting in Rat 1, with AUC = 0.82. **(H)**. ROC curve for classifying resting in Rat 2, with AUC = 0.86. **I**: ROC curve for classifying other activity in Rat 1, with AUC = 0.47. **(J)**. ROC curve for classifying other activity in Rat 2.