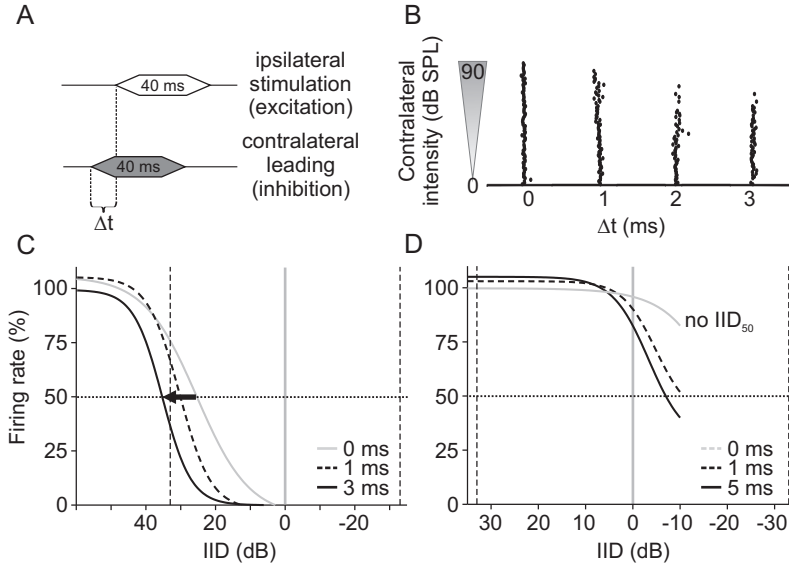
Supplementary Table A: Fitting parameters of 4-parametric sigmoidal fit of IID functions: $$y = y_0 + \frac{a}{1 + e^{-(\frac{x - x_0}{b})}}$$

	wild-type								knockout							
***Kcna1*$^{+/+}$ unit-ID**	**threshold**	**Ipsilateral level (above threshold)**	**a**	**b**	**x_0**	**y_0**	**Fit quality r^2**		***Kcna1*$^{-/-}$ unit-ID**	**threshold**	**Ipsilateral level (above threshold)**	**a**	**b**	**x_0**	**y_0**	**Fit quality r^2**
Kv01404	45	25	265.51	1.60	19.45	1.75	0.99		Kv14701	30	30	39.12	4.78	9.59	-0.38	0.99
Kv01405	55	25	32.06	0.20	25.10	4.99	0.97		Kv15701	62	18	213.80	6.08	26.96	-1.24	1.00
Kv01418	25	30	31.64	10.65	4.85	13.41	0.98		Kv15708	54	21	346.33	4.17	11.26	-6.98	1.00
Kv05007	20	20	212.37	5.99	14.21	4.35	0.99		Kv15709	66	14	195.26	6.04	12.50	-8.95	1.00
Kv05013	30	20	55.98	7.25	-20.03	-4.45	0.98		Kv15711	66	19	67.67	7.58	25.38	-3.30	0.99
Kv05105	38	22	83.02	7.08	-7.26	0.18	0.97		Kv15716	72	18	69.16	4.70	23.87	-0.41	0.99
Kv05107	50	20	182.10	5.61	-9.82	-8.55	0.98		Kv15717	66	19	69.88	5.42	7.53	-7.47	0.96
Kv05109	30	20	102.97	6.93	10.07	5.95	0.98		Kv16107	63	22	156.90	3.97	14.43	-5.06	1.00
Kv05110	58	22	319.18	4.94	24.79	0.93	1.00		Kv16108	54	26	196.88	6.69	8.92	1.02	0.99
Kv05111	50	20	250.82	3.62	7.28	0.04	1.00		Kv16111	40	20	128.12	9.60	23.16	2.02	1.00
Kv05112	45	20	169.71	3.54	4.96	-0.86	1.00		Kv17101	20	20	137.03	10.64	0.82	6.22	0.99
Kv05113	5	20	217.19	7.88	-0.14	54.98	0.97		Kv17103	50	30	324.46	10.32	0.15	-26.05	0.99
Kv06605	46	20	238.20	4.07	5.26	1.75	0.99		Kv17104	40	20	119.40	8.11	12.11	3.41	1.00
Kv06610	66	20	73.36	4.61	18.99	2.59	0.96		Kv17105	30	20	156.40	9.34	5.53	33.78	0.98
Kv06611	72	18	80.02	3.65	20.58	3.33	0.95		Kv18104	60	20	86.55	5.99	11.11	-2.33	0.98
Kv06612	57	18	129.14	2.48	25.89	-0.16	0.98		Kv18107	63	17	449.88	4.15	16.56	-9.17	1.00
Kv08503	20	25	103.28	2.93	7.12	-0.27	1.00		Kv18109	60	20	235.13	3.52	12.79	-3.18	1.00
Kv08504	50	20	293.65	2.64	26.64	0.34	1.00		Kv18115	64	16	224.73	4.23	19.67	-0.92	1.00
Kv08505	50	20	242.84	3.47	16.93	3.16	1.00		Kv18116	63	17	182.73	3.77	15.86	0.75	0.99
Kv11109	72	8	56.77	4.80	16.98	3.78	0.96		Kv23507	45	25	29.84	5.43	13.10	24.13	0.97
Kv11115	40	20	85.36	3.82	-0.59	17.06	0.98									
Kv11116	54	16	42.93	4.76	4.83	14.80	0.96									
Kv18204	66	19	158.87	5.80	20.91	-4.49	0.99									
Kv18206	63	17	247.46	3.35	5.46	4.51	1.00									
Kv18207	60	20	201.74	4.66	0.93	5.75	0.99									

Supplementary Table B: Response features of individual IID sensitive LSO neurons.

	wild-type										knockout									
Kcna1$^{+/+}$ unit-ID	CF_{exc} (kHz)	CF_{inh} (kHz)	Q_{10}	spont. rate (spikes/s)	max. rate (spikes/s)	thr_{exc} (dB SPL)	thr_{inh} (dB SPL)	latency (ms)	jitter (ms)	ISI_{onset} (ms)	*Kcna1*$^{+/+}$ unit-ID	CF_{exc} (kHz)	CF_{inh} (kHz)	Q_{10}	spont. rate (spikes/s)	max. rate (spikes/s)	thr_{exc} (dB SPL)	thr_{inh} (dB SPL)	latency (ms)	jitter (ms)	ISI_{onset} (ms)
Kv01404	41.4	41.4	3.04	1.0	229.3	45	50	-	-	-	Kv03503	12.6	14.6	0.35	4.8	280.0	50	75	3.2	1.9	3.2
Kv01405	41.4	-	3.16	0.0	104.0	55	-	-	-	-	Kv03504	10.5	-	0.31	13.2	58.0	55	-	5.7	4.8	5.0
Kv01418	19.6	-	1.59	1.3	50.7	25	-	14.1	6.0	10.5	Kv09807	5.7	8.3	2.88	0.4	96.0	46	40	3.5	0.9	12.4
Kv05007	10.0	10.0	1.90	7.6	158.0	20	20	3.8	0.1	2.1	Kv10610	22.4	-	1.72	0.0	79.3	68	-	5.9	4.4	10.7
Kv05013	16.5	-	3.73	2.5	34.0	30	-	3.9	0.1	1.4	Kv14701	13.5	9.2	6.66	0.0	26.0	30	50	5.8	0.2	1.6
Kv05105	42.9	10.5	4.22	0.0	97.3	38	70	3.7	0.2	2.0	Kv15701	27.0	-	2.55	0.0	160.7	62	-	5.8	0.7	2.9
Kv05107	39.3	10.5	2.22	0.0	72.7	50	70	3.9	0.2	3.0	Kv15703	13.0	42.9	0.76	0.0	32.0	70	75	7.1	1.6	3.9
Kv05109	22.1	23.8	3.66	0.1	70.7	30	30	3.3	0.2	2.1	Kv15706	27.1	39.2	1.36	48.4	132.7	78	72	10.0	4.2	7.7
Kv05110	7.7	8.1	0.67	1.9	262.7	58	45	3.9	0.1	1.3	Kv15708	12.6	-	1.77	5.4	285.3	54	-	4.2	0.4	1.8
Kv05111	13.5	7.7	0.32	6.0	231.3	50	50	3.7	0.1	2.6	Kv15709	10.6	25.0	1.07	0.0	198.0	66	65	5.7	1.6	4.0
Kv05112	41.4	28.5	0.96	16.6	163.3	45	45	5.2	0.5	4.6	Kv15711	10.5	23.6	1.56	0.0	46.0	66	45	4.3	0.3	1.8
Kv05113	12.1	16.9	2.39	0.3	318.0	5	20	3.4	0.1	4.1	Kv15714	11.5	26.4	0.55	31.6	334.7	58	70	3.9	0.7	3.0
Kv06601	31.5	23.2	4.64	25.6	69.3	50	70	10.0	17.9	9.1	Kv15716	10.2	9.1	0.53	0.0	31.3	72	66	5.9	2.2	2.7
Kv06605	7.7	41.4	0.18	1.6	252.0	46	30	3.7	0.8	1.4	Kv15717	14.7	10.2	1.44	0.4	26.0	66	75	4.6	0.2	1.5
Kv06610	10.5	-	1.18	0.6	68.0	66	-	4.4	0.6	4.3	Kv16107	12.6	23.6	1.34	0.0	233.3	63	55	9.2	0.8	6.7
Kv06611	10.5	-	1.17	0.0	60.7	72	-	5.9	1.0	3.2	Kv16108	31.5	-	1.03	0.0	228.7	54	-	-	-	-
Kv06612	10.5	22.9	1.41	0.0	232.0	57	20	4.5	0.3	-	Kv16111	8.6	9.0	2.20	0.3	128.0	40	35	5.7	1.2	5.8
Kv06614	12.0	9.7	2.84	0.0	172.0	30	60	3.4	0.1	12.0	Kv17101	8.8	8.8	1.33	1.1	213.3	20	25	4.1	0.3	6.9
Kv08503	14.7	21.0	1.12	0.1	280.0	20	20	4.0	0.3	3.5	Kv17103	15.3	23.9	0.73	0.0	267.3	50	50	-	-	-
Kv08504	13.4	17.6	1.84	3.3	256.7	50	20	4.4	0.4	2.1	Kv17104	6.2	7.3	1.75	0.1	88.7	40	30	4.3	0.6	7.9
Kv08505	10.2	14.6	0.91	0.9	175.3	50	45	4.1	0.2	1.7	Kv17105	5.4	7.3	2.18	1.3	148.0	30	45	3.7	0.2	8.6
Kv11109	27.6	-	2.07	0.1	60.7	72	-	-	-	-	Kv18104	23.2	-	1.03	0.1	47.3	60	-	-	-	-
Kv11115	12.6	14.6	1.48	0.6	152.7	40	50	2.8	0.1	2.9	Kv18106	15.2	-	0.92	0.0	12.7	60	-	3.4	0.2	3.0
Kv11116	12.1	15.5	1.74	0.1	156.7	54	55	2.9	0.2	2.7	Kv18107	26.3	37.7	0.72	0.0	368.0	63	55	5.8	0.2	1.5
Kv18204	10.5	-	1.21	0.0	221.3	66	-	4.2	1.0	2.2	Kv18109	27.1	-	0.83	0.8	210.0	60	-	-	-	-
Kv18206	26.4	-	1.04	0.0	261.3	63	-	5.7	0.4	2.3	Kv18110	5.6	31.3	0.27	0.9	64.0	60	75	3.8	0.2	1.6
Kv18207	8.7	-	0.88	0.6	232.0	60	-	4.4	0.3	2.4	Kv18113	27.0	-	1.15	0.0	12.7	76	-	4.3	0.4	1.5
Kv18208	16.5	-	1.35	0.0	264.0	63	-	5.7	0.6	3.4	Kv18115	26.4	27.1	2.53	0.8	154.7	64	65	4.5	0.3	1.2
											Kv18116	14.1	27.0	0.59	0.0	191.3	63	60	3.9	0.2	3.2
											Kv21201	7.4	11.0	1.48	0.3	70.7	36	30	6.3	1.5	3.4
											Kv23507	8.8	8.8	2.67	0.6	30.7	45	65	5.4	0.1	6.3

Latency is expressed as the median value of first spike times that occurred in 250 stimulus repetitions at CF/80 dB SPL. Jitter is defined as the 25-75 % quartile range of first spike latencies. The onset ISI value represents the median ISI that appeared during the first 20 ms of the stimulus.



Supplemental figure
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Time-intensity trading in IID processing. (A) Temporal relation between ipsi- and contralateral stimulation. Signal duration 40 ms, contralateral signal precedes the ipsilateral signal by 1 to 10 ms. (B) Dot raster displays of a Kcna1-/- unit responding to different IIDs (ordinate shows varying contralateral sound intensity while ipsilateral intensity was kept constant) at lead times of 0, 1, 2, 3 ms of the ipsilateral stimulus (abscissa). When both stimuli started simultaneously, no APs were inhibited even at contralateral sound intensities of 90 dB. With an increase in lead time of the contralateral stimulus, AP generation was inhibited at successively lower contralateral sound intensities. (C) IID function of neuron, that already showed an IID50 value at t=0 ms. Increasing t resulted in shifts of IID50 towards more positive IIDs as indicated by the arrow. (D) In Kcna1-/- mice, LSO units did not always receive enough inhibition to reach IID50 values. Shown here is a neuron in which inhibition preceding the excitation by 1 or 5 ms caused additional rate reductions leading to definable IID50 at negative IIDs. Thus, limitations in presenting intense enough sounds to evoke strong enough inhibition can be reduced by presenting the inhibitory tone at an earlier time.