

Supplemental Information

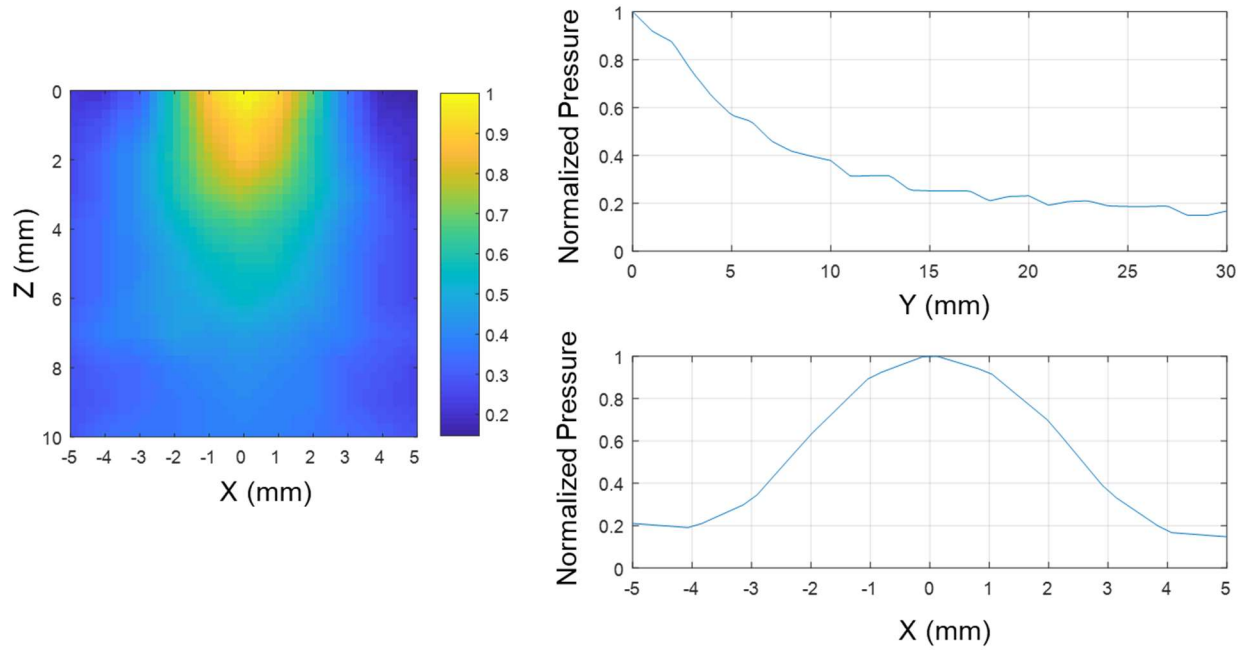


Figure S1. Characterization of the 0.22 MHz transducer. The intended focus zone at 1 mm below the tip of the plastic cone, where X, Y, and Z are all at 0 mm. These pressure field were measured using a high sensitive hydrophone (HNR 0500 ONDA Corp, Sunnyvale, CA, USA) positioned directly underneath the cone tip in a tank filled with deionized water under free-field conditions.

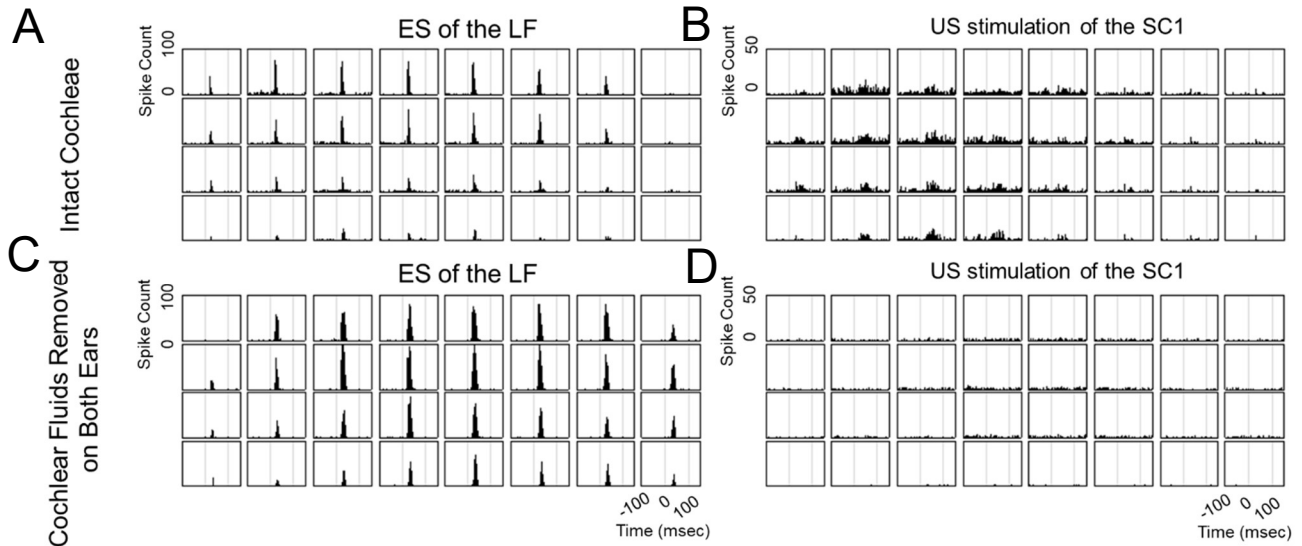


Figure S2. Removal of cochlear fluids eliminates Ultrasound (US) -evoked primary somatosensory cortex (SC1) activity in response to US stimulation of the right exposed SC1, but does not eliminate SC1 activity in response to electrical stimulation (ES) of the left foot (LF). (A, B) SC1 spike responses (PSTHs) to ES of the LF (A) and US stimulation (200 kPa, 1 kHz pulse repetition frequency (PRF), 0.5 msec pulse duration (PD), 20 pulses, 6 sec trial duration (TD)) of SC1 (B) before removal of bilateral cochlear fluids. (C, D) SC1 response to ES of the LF (C) and same US stimulation of SC1 (D) after removal of bilateral cochlear fluids. Data are obtained from a 32-site electrode array inserted into SC1 in one animal.

Pressure (kPa)	Pulse Duration (msec)	Pulse Repetition Frequency (Hz)	Number of pulses
25	1	-	1
50	1	-	1
50	10	-	1
100	1	-	1
200, 1000, 2000	0.1	-	1
200, 1000, 2000	1	-	1
200, 1000, 2000	10	-	1
200, 1000, 2000	0.2	10	3
200, 1000, 2000	0.4	10	3
200, 1000, 2000	1	10	3
200, 1000, 2000	0.2	50	12
200, 1000, 2000	0.4	50	12
200, 1000, 2000	1	50	12
200, 1000, 2000	0.2	100	24
200, 1000, 2000	0.4	100	24
200, 1000, 2000	1	100	24
200, 1000, 2000	0.2	1000	240
200, 1000, 2000	0.4	1000	240
200, 1000, 2000	0.2	1500	360
200, 1000, 2000	0.4	1500	360

Table S1. Ultrasound (US) paradigms resulting in activation of primary auditory cortex (A1) of fifteen guinea pigs. Trial durations are 500 msec for all paradigms. No pulse repetition frequency value is listed for paradigms only having a single pulse per trial. These data were obtained for US stimulation of the exposed A1. Related to Figure 1 and 2.

Pressure (kPa)	Pulse Duration (msec)	Pulse Repetition Frequency (Hz)	Number of Pulses	% Sites Activated (Nerve Cut)
100	0.1	-	1	0%
100	1	-	1	0%
100	10	-	1	0%
100	0.2	10	2	0%
100	0.4	10	2	0%
100	1	10	2	0%
100	0.2	50	10	0%
100	0.4	50	10	0%
100	1	50	10	0%
100	0.2	100	20	0%
100	0.4	100	20	0%
100	1	100	20	0%
100	0.2	1000	200	0%
100	0.4	1000	200	0%
100	0.2	1500	300	0%
100	0.4	1500	300	0%
200	10	-	1	0%
500	10	-	1	3.13%
1000	10	-	1	9.39%
2000	0.1	-	1	3.13%
2000	1	-	1	3.13%
2000	10	-	1	9.39%
2000	80	-	1	0%
2000	0.2	10	2	3.13%
2000	0.4	10	2	3.13%
2000	1	10	2	3.13%
2000	0.2	50	10	3.13%
2000	0.4	50	10	3.13%
2000	1	50	10	3.13%
2000	0.2	100	20	6.26%
2000	0.4	100	20	6.26%
2000	1	100	20	6.26%
2000	0.2	1000	200	3.13%
2000	0.4	1000	200	0%
2000	0.2	1500	300	0%
2000	0.4	1500	300	0%

Table S2. Ultrasound (US) paradigms at 2 MPa eliciting residual primary auditory cortex (A1) activity (bold) after bilateral transection of the auditory nerves. Trial durations are 500 msec for all paradigms. No pulse repetition frequency value is listed for paradigms only having a single pulse per trial. Only one animal out of three showed residual activity. These data are for US stimulation of the exposed A1. Related to Figure 4.

Pressure (kPa)	Pulse Duration (msec)	Pulse Repetition Frequency (Hz)	Number of Pulses	Trial Duration (sec)
50	0.5	1000	20	6
100	0.5	1000	20	6
200	10	-	1	6
200	2.5	200	4	3
200	2.5	200	4	6
200	0.5	1000	10	1
200	0.5	1000	10	3
200	0.5	1000	10	6
200	0.5	1000	20	6
200	0.25	2000	40	6
200	0.125	4000	80	6
200	0.0625	8000	160	6
200	0.03125	16000	320	6
400	0.5	1000	20	6
800	0.5	1000	20	1
800	0.5	1000	20	3
800	0.5	1000	20	6
1600	0.5	1000	20	3

Table S3. Ultrasound (US) paradigms resulting in activation of primary somatosensory cortex (SC1) of eleven guinea pigs. Bold represents US paradigms used in Figure 5C,D. US stimulation was applied to the exposed SC1. Related to Figure 5.