**Data file list and description for all source data used to generate figures in:**

**Dewey et al. (2021), Cochlear outer hair cell electromotility enhances organ of Corti motion on a cycle-by-cycle basis at high frequencies *in vivo*, *PNAS*.**

All source data for plots in the manuscript are provided as MATLAB .mat files. For each figure, the relevant file names are listed below. Following this is a description of the contents of each .mat file, with the files listed in alphabetical order.

**Figure panel Source data**

**Figure 1D-E** WT\_ex\_Fig1D\_E.mat

**Figure 1F-I** WT\_DIAGONAL.mat (individual data shown for ‘m052’)

**Figure 2A** WT\_DIAGONAL.mat

**Figure 2B** WT\_VS\_F\_70dB.mat

**Figure 2C** WT\_9kHz\_VS\_L.mat

**Figure 3A-C** WT\_DIAGONAL.mat (individual data shown for ‘m052)

**Figure 3D** PR499KI\_DIAGONAL.mat (individual data shown for ‘m001’)

**Figure 3E** WT\_DIAGONAL.mat, PR499KI\_DIAGONAL.mat

**Figure 3F** WT\_VS\_F.mat

**Figure 3G** PR499KI\_VS\_F.mat

**Figure 3H** WT\_VS\_F.mat, PR499KI\_VS\_F.mat

**Figure 3I** WT\_TONIC\_5kHz\_90dB.mat

**Figure 3J** PR499KI\_TONIC\_5kHz\_90dB.mat

**Figure 3K** WT\_TONIC\_5kHz\_90dB.mat, PR499KI\_TONIC\_5kHz\_90dB.mat

**Figure 4A** WT\_ex\_Fig4A.mat

**Figure 4B** WT\_VS\_F\_FINE.mat, WT\_TONIC\_VS\_F\_70dB.mat

**Figure 4C** WT\_VS\_F\_FINE\_BM8nm.mat, WT\_TONIC\_VS\_F\_BM8nm.mat

**Figure 4D** WT\_VS\_F\_BMpt5nm.mat

**Figure 5A** WT\_VS\_F\_70dB.mat

**Figure 5B** WT\_9kHz\_VS\_L.mat

**Figure S1D-I** WT\_VS\_F.mat

**Figure S3C-D** WT\_ex\_FigS3C\_D.mat

**Figure S4A** WT\_DIAGONAL.mat

**Figure S4B** WT\_RADIAL\_RL.mat

**Figure S4C** WT\_RADIAL\_BM.mat

**Figure S5** WT\_DIAGONAL.mat

**Figure S6A-C** WT\_VS\_F\_70dB.mat

**Figure S6D-F** WT\_9kHz\_VS\_L.mat

**Figure S6G-L** WT\_VS\_F\_wTM.mat

**Figure S7A-B** WT\_DIAGONAL.mat

**Figure S7C-E** WT\_ex\_FigS7C\_E.mat

**Figure S8** PR499KI\_DIAGONAL.mat

**Figure S9** PR499KI\_VS\_F\_wTM.mat

**Figure S10A,D** WT\_VS\_F.mat, MODEL\_OUTPUT\_VS\_F.mat

**Figure S11** WT\_9kHz\_VS\_L\_FINE.mat, WT\_TONIC\_9kHz\_VS\_L.mat, MODEL\_OUTPUT\_9kHz\_VS\_L\_FINE.mat

**DATA FILE DESCRIPTIONS**

**Data file:** MODEL\_OUTPUT\_9kHz\_VS\_L\_FINE.mat

**Associated figures:** Fig. S11B-C

**Description:** Loads ‘model’ structure containing output of a model in which sinusoids with the magnitudes and phases of BM displacements are given as inputs to a first-order Boltzmann function, with the Boltzmann’s output then being passed through a first-order low-pass filter. In this case, average BM responses to 9 kHz tones varied in level (0-96 dB SPL in 3 dB steps) were used to generate the input to the model. The ‘model’ structure includes:

‘boltz\_params’ (Boltzmann parameters)

‘lpf\_cfs’ (low-pass filter corner frequency used to produce the model output)

‘f1s’ (stimulus frequencies in Hz)

‘L1s’ (stimulus levels in dB SPL)

and the ‘output’ substructure, which contains the output of the model both before and after low-pass filtering for the different response components. For the response at the stimulus frequency (‘f1’) and its harmonics (e.g., ‘f1h2’ for the second harmonic) the unfiltered magnitude and phase are given by ‘mag’ and ‘phi’, and the low-pass filtered magnitude and phase are given by ‘mag\_lp’ and ‘phi\_lp’. The unfiltered and filtered tonic component (‘tonic’) magnitude (‘mag’ and ‘mag\_lp’) are also provided. Magnitudes are in normalized units (the maximum output of the Boltzmann is 1) and phase is in radians relative to the input phase at low stimulus levels.

**Data file:** MODEL\_OUTPUT\_VS\_F.mat

**Associated figures:** Fig. S10D

**Description:** Loads ‘model’ structure containing the output of a model in which sinusoids with the magnitudes and phases of BM displacements are given as inputs to a first-order Boltzmann function, with the Boltzmann’s output then being passed through a first-order low-pass filter. In this case, average BM frequency responses across a wide range of stimulus levels were used to generate the input to the model. The ‘model’ structure includes:

‘boltz\_params’ (Boltzmann parameters)

‘lpf\_cfs’ (low-pass filter corner frequencies used to produce different model outputs)

‘f1s’ (stimulus frequencies in Hz)

‘L1s’ (stimulus levels in dB SPL)

and the ‘output.f1’ substructure, which contains the magnitude (‘mag’) in normalized units (the maximum output of the Boltzmann is 1) and phase (‘phi’) in radians of the model output for all stimulus frequencies, levels, and low-pass filter corner frequencies. There is no unfiltered output in this data file.

**Data file:** PR499KI\_DIAGONAL.mat

**Associated figures:** Fig. 3D (data from ‘m001’), Fig. 3E, Fig. S8

**Description:** Loads ‘data’ structure containing displacements measured along the diagonal track connecting the BM to the TM in live and dead Prestin 499 knockin (Pr499KI) mice. For a given measurement condition (e.g., ‘LIVE’), stimulus level (e.g., ‘L\_70dB’), stimulus frequency (‘e.g., ‘f\_5kHz’), and mouse (e.g., ‘m001’), data are stored in: ‘data.LIVE.L\_70dB.f\_5kHz.m001’, which contains the following fields:

‘mouseID’ (mouse ID)

‘dist\_re\_bm’ (distance of the measurement location from the BM in mm)

‘rl\_dist\_re\_bm’ (distance between RL and BM in mm)

and substructures containing displacement data at each ‘dist\_re\_bm’ for responses at the stimulus frequency (‘f1’) and second through fifth harmonics (‘f1h2’ to ‘f1h5’), as well as ‘tonic’ displacement data. For responses at the stimulus frequency and harmonics, each substructure (e.g., ‘data.LIVE.L\_70dB.f\_5kHz.m001.f1h2’) contains the following:

‘f’ (response frequency in Hz)

‘mag’ (peak displacement magnitude in nm)

‘nf’ (average noise floor, in nm, for nearby frequency bins)

‘nfsd’ (standard deviation of noise floor, in nm, for nearby frequency bins)

‘phi’ (phase in radians)

The ‘tonic’ displacement field contains only ‘mag’ (magnitude in nm).

Also included for each mouse is the ‘phi\_diff’ structure, which has fields ‘f1’ through ‘f1h5’ containing the analyzed phase differences (in radians) between the RL and OHC-DC junction motion for responses at the stimulus frequency and its harmonics.

**Data file:** PR499KI\_TONIC\_5kHz\_90dB.mat

**Associated figures:** Fig. 3J-K

**Description:** Loads ‘data’ structure containing an example displacement waveform and quantified tonic displacements for 5 kHz, 90 dB SPL tones in live, Pr499KI mice. The ‘data’ structure includes:

‘mouseIDs’ (mouse IDs)

‘ex\_t’ (time vector (s) for example waveform)

‘ex\_td’ (time-domain waveform, displacement in nm)

‘ex\_td\_lp’ (low-pass filtered waveform)

‘tonic\_mag\_init’ (initial tonic displacement magnitudes for all mice)

**Data file:** PR499KI\_VS\_F.mat

**Associated figures:** Fig. 3G-H

**Description:** Loads ‘data’ structure containing frequency responses of the BM and OHC-DC junction in live and dead Pr499KI mice. The ‘data’ structure includes:

‘mouseIDs’ (mouse IDs)

‘f1s’ (stimulus frequencies in Hz)

‘L1s’ (stimulus levels in dB SPL)

Displacement responses at the stimulus frequency (‘f1’) for a given measurement condition (e.g., ‘LIVE’) and location (e.g., ‘OHC\_DC’) are found in ‘data.LIVE.OHC\_DC.f1’, which contains:

‘f’ (response frequency in Hz)

‘mag’ (peak displacement magnitude in nm)

‘nf’ (average noise floor, in nm, for nearby frequency bins)

‘nfsd’ (standard deviation of noise floor, in nm, for nearby frequency bins)

‘phi’ (phase in radians referenced to ear canal stimulus pressure)

(dimensions = frequency x level x mouse)

**Data file:** PR499KI\_VS\_F\_wTM.mat

**Associated figures:** Fig. S9

**Description:** Loads ‘data’ structure containing frequency responses of the BM,OHC-DC junction, and TM in live and dead Pr499KI mice. The ‘data’ structure includes:

‘mouseIDs’ (mouse IDs)

‘f1s’ (stimulus frequencies in Hz)

‘L1s’ (stimulus levels in dB SPL)

Displacement responses at the stimulus frequency (‘f1’) for a given measurement condition (e.g., ‘LIVE’) and location (e.g., ‘OHC\_DC’) are found in ‘data.LIVE.OHC\_DC.f1’, which contains:

‘f’ (response frequency in Hz)

‘mag’ (peak displacement magnitude in nm)

‘nf’ (average noise floor, in nm, for nearby frequency bins)

‘nfsd’ (standard deviation of noise floor, in nm, for nearby frequency bins)

‘phi’ (phase in radians referenced to ear canal stimulus pressure)

(dimensions = frequency x level x mouse)

**Data file:** WT\_9kHz\_VS\_L.mat

**Associated figures:** Fig. 2C, Fig. 5B, Fig. S6D-F

**Description:** Loads ‘data’ structure containing displacements of the BM, OHC-DC, and RL in live, WT CBA/CaJ mice for 9 kHz tones varied in 10 dB steps. The ‘data’ structure includes:

‘mouseIDs’ (mouse IDs)

‘f1s’ (stimulus frequency in Hz)

‘L1s’ (stimulus level in dB SPL)

Displacement responses of the BM, OHC-DC, and RL are stored are in the ‘BM’, ‘OHC\_DC’, and ‘RL’ structures, respectively, within ‘data.LIVE’. For a given measurement location (e.g., ‘OHC\_DC’), responses at the stimulus frequency (‘f1’) are found in ‘data.LIVE.OHC\_DC.f1’, which contains the following fields:

‘mag’ (peak displacement magnitude in nm)

‘nf’ (average noise floor, in nm, for nearby frequency bins)

‘nfsd’ (standard deviation of noise floor, in nm, for nearby frequency bins)

‘phi’ (phase in radians relative to ear canal stimulus pressure)

(dimensions = frequency x level x mouse)

**Data file:** WT\_9kHz\_VS\_L\_FINE.mat

**Associated figures:** Fig. S11

**Description:** Loads ‘data’ structure containing displacements of the BM and OHC-DC in live, WT CBA/CaJ mice for 9 kHz tones varied in fine (3 dB) steps. The ‘data’ structure includes:

‘mouseIDs’ (mouse IDs)

‘f1s’ (stimulus frequency in Hz)

‘L1s’ (stimulus level in dB SPL)

Displacement responses of the BM and OHC-DC are stored are in the ‘BM’ and ‘OHC\_DC’ substructures, respectively, within ‘data.LIVE’. For a given measurement location (e.g., ‘OHC\_DC’), responses at the stimulus frequency (‘f1’) and its harmonics (e.g., ‘f1h2’ for the second harmonic) are found in ‘data.LIVE.OHC\_DC’. For each response component, the following are provided:

‘f’ (response frequency in Hz)

‘mag’ (peak displacement magnitude in nm)

‘nf’ (average noise floor, in nm, for nearby frequency bins)

‘nfsd’ (standard deviation of noise floor, in nm, for nearby frequency bins)

‘phi’ (phase in radians relative to ear canal stimulus pressure)

(dimensions = level x mouse)

**Data file:** WT\_DIAGONAL.mat

**Associated figures:** Fig. 1F-I (data from ‘m052’), Fig. 2A, Fig. 3A and C (data from ‘m052’), Fig. 3E, Fig. S4A, Fig. S5, Fig. S7A-B

**Description:** Loads ‘data’ structure containing displacements measured along the diagonal track connecting the BM to the TM in live and dead WT CBA/CaJ mice. For a given measurement condition (e.g., ‘LIVE’), stimulus level (e.g., ‘L\_60dB’), stimulus frequency (e.g., ‘f\_9kHz’), and mouse (e.g., ‘m052’), data are stored in: ‘data.LIVE.L\_60dB.f\_9kHz.m052’, which contains the following fields:

‘mouseID’ (mouse ID)

‘dist\_re\_bm’ (distance of the measurement location from the BM in mm)

‘rl\_dist\_re\_bm’ (distance between RL and BM in mm)

and substructures containing displacement data at each ‘dist\_re\_bm’ for responses at the stimulus frequency (‘f1’) and second through fifth harmonics (‘f1h2’ to ‘f1h5’), as well as the ‘tonic’ displacements. For responses at the stimulus frequency and its harmonics, each substructure (e.g., ‘data.LIVE.L\_60dB.f\_9kHz.m052.f1h2’) contains the following:

‘f’ (response frequency in Hz)

‘mag’ (peak displacement magnitude in nm)

‘nf’ (average noise floor, in nm, for nearby frequency bins)

‘nfsd’ (standard deviation of noise floor, in nm, for nearby frequency bins)

‘phi’ (phase in radians)

The ‘tonic’ displacement substructure contains only ‘mag’ (magnitude in nm).

Also included is the ‘phi\_diff’ structure, which has fields ‘f1’ through ‘f1h5’ containing the analyzed phase differences (in radians) between the RL and OHC-DC junction motion for responses at the stimulus frequency and its harmonics.

**Data file:** WT\_ex\_Fig1D\_E.mat

**Associated figures:** Fig. 1D-E

**Description:** Loads ‘data’ structure containing time-domain waveforms and FFT magnitude spectra of responses from an individual mouse to a 9 kHz tone presented at 60 dB SPL. Time-domain waveforms were obtained with 7 ms tones while spectra were obtained for 102 ms tones for improved frequency resolution. The ‘data’ structure includes the following fields:

‘mouseID’ (mouse ID)

‘f1’ (stimulus frequency in Hz)

‘L1’ (stimulus level in dB SPL)

Responses measured from the BM, OHC-DC, RL, TM, and ear canal (EC) are stored in the ‘LIVE’ substructure. Each location substructure (e.g., ‘data.LIVE.BM’) contains the following fields:

‘fs’ (sampling rate in samples/s)

‘t’ (time vector in s)

‘td’ (time-domain waveform of the displacement (in nm) or pressure (in Pa) response)

‘td\_lp’ (low-pass filtered waveform)

‘fft\_f’ (FFT frequency axis in Hz)

‘fft\_mag’ (FFT magnitude for the displacement (in nm) or pressure (in Pa) response)

**Data file:** WT\_ex\_Fig4A.mat

**Associated figures:** Fig. 4A

**Description:** Loads ‘data’ structure containing an example OHC-DC time-domain displacement response to an 8 kHz tone presented at 70 dB SPL. The ‘data’ structure includes:

‘mouseID’ (mouse ID)

‘f1’ (stimulus frequency in Hz)

‘L1’ (stimulus level in dB SPL)

and the ‘LIVE.OHC\_DC’ substructure containing:

‘fs’ (sampling rate in samples/s for time-domain data)

‘t’ (time vector in s)

‘td’ (time-domain displacement waveform in nm)

‘td\_lp’ (low-pass filtered waveform)

**Data file:** WT\_ex\_FigS3C\_D.mat

**Associated figures:** Fig. S3C-D

**Description:** Loads ‘data’ structure containing time-domain waveforms and FFT magnitude spectra of responses from an individual mouse to a 9 kHz tone presented at 60 dB SPL. The ‘data’ structure includes the following fields:

‘mouseID’ (mouse ID)

‘f1’ (stimulus frequency in Hz)

‘L1’ (stimulus level in dB SPL)

Responses measured from the BM, OHC-DC, RL, and TM are stored in the ‘LIVE’ substructure. Each location substructure (e.g., ‘data.LIVE.BM’) contains the following fields:

‘fs’ (sampling rate in samples/s)

‘t’ (time vector in s)

‘td’ (time-domain displacement waveform in nm)

‘td\_lp’ (low-pass filtered waveform)

‘fft\_f’ (FFT frequency axis in Hz)

‘fft\_mag’ (FFT magnitude for the displacement in nm)

**Data file:** WT\_ex\_FigS7C\_E.mat

**Associated figures:** Fig. S7C-E

**Description:** Loads ‘data’ structure containing time-domain waveforms and FFT magnitude spectra of responses from an individual mouse to 7 kHz tones presented at 90 dB SPL in the live condition and at 90 and 100 dB SPL after death. The ‘data’ structure includes the following fields:

‘mouseID’ (mouse ID)

‘f1’ (stimulus frequency in Hz)

‘L1’ (stimulus level in dB SPL)

Responses measured from the OHC-DC and RL are stored in the ‘LIVE’ and ‘DEAD’ substructures. The middle ear (ME) response is also included for the ‘DEAD’ condition. For a given condition (e.g., ‘DEAD’), location (e.g., ‘RL’), and stimulus level (e.g., ‘L\_90dB’), data are found in ‘data.DEAD.RL.L\_90dB.f\_7kHz’, which contains the following:

‘fs’ (sampling rate in samples/s)

‘t’ (time vector in s)

‘td’ (time-domain displacement waveform in nm)

‘td\_lp’ (low-pass filtered waveform)

‘fft\_f’ (FFT frequency axis in Hz)

‘fft\_mag’ (FFT magnitude for the displacement in nm)

**Data file:** WT\_RADIAL\_BM.mat

**Associated figures:** Fig. S4C

**Description:** Loads ‘data’ structure containing displacements measured along the BM in live WT CBA/CaJ mice for 9 kHz, 60 dB SPL tones. For each mouse (e.g., ‘m053’), data are stored as ‘data.LIVE.L\_60dB.f\_9kHz.m053’, which includes the following:

‘mouseID’ (mouse ID)

‘dist\_re\_ipc’ (approximate distance of the measurement location from the inner pillar cell in mm)

and substructures containing displacement data at each ‘dist\_re\_ipc3’ for responses at the stimulus frequency (‘f1’) and second through fifth harmonics (‘f1h2’ to ‘f1h5’), as well as ‘tonic’ displacement data. Data for each response component are formatted as described for ‘WT\_DIAGONAL.mat’.

**Data file:** WT\_RADIAL\_RL.mat

**Associated figures:** Fig. S4B

**Description:** Loads ‘data’ structure containing displacements measured along the RL in live WT CBA/CaJ mice for 9 kHz, 60 dB SPL tones. For each mouse (e.g., ‘m052’), data are stored in ‘data.LIVE.L\_60dB.f\_9kHz.m052’, which includes the following:

‘mouseID’ (mouse ID)

‘dist\_re\_ohc3’ (approximate distance of the measurement location from the third OHC in mm)

and substructures containing displacement data at each ‘dist\_re\_ohc3’ for responses at the stimulus frequency (‘f1’) and second through fifth harmonics (‘f1h2’ to ‘f1h5’), as well as the ‘tonic’ displacements. Data for each response component are formatted as described for ‘WT\_DIAGONAL.mat’.

**Data file:** WT\_TONIC\_5kHz\_90dB.mat

**Associated figures:** Fig. 3I,K

**Description:** Loads ‘data’ structure containing an example displacement waveform and quantified tonic displacements for 5 kHz, 90 dB SPL tones in live, WT CBA/CaJ mice. The ‘data’ structure includes:

‘mouseIDs’ (mouse IDs)

‘ex\_t’ (time vector (s) for example waveform)

‘ex\_td’ (time-domain waveform of the displacement in nm)

‘ex\_td\_lp’ (low-pass filtered time-domain waveform)

‘tonic\_mag\_init’ (initial tonic displacement magnitudes for all mice)

**Data file:** WT\_TONIC\_9kHz\_VS\_L.mat

**Associated figures:** Fig. S11

**Description:** Loads ‘data’ structure containing tonic OHC-DC displacements from live WT CBA/CaJ mice in response to 9 kHz tones varied in level (5 dB steps). The ‘data’ structure contains:

‘mouseIDs’ (mouse IDs)

‘f1s’ (stimulus frequency in Hz)

‘L1s’ (stimulus levels in dB SPL)

and the ‘data.LIVE.OHC\_DC.tonic’ substructure which contains the tonic displacement magnitudes (‘mag’ in nm) and estimated tonic displacement noise floor (‘nf’ in nm) for all mice. Also included are responses at the stimulus frequency, found in ‘data.LIVE.OHC\_DC.f1’, which contains the fields:

‘mag’ (peak displacement magnitude in nm)

‘nf’ (average noise floor, in nm, for nearby frequency bins)

‘nfsd’ (standard deviation of noise floor, in nm, for nearby frequency bins)

‘phi’ (phase in radians relative to ear canal stimulus pressure)

(dimensions = frequency x level x mouse)

**Data file:** WT\_TONIC\_VS\_F\_70dB.mat

**Associated figures:** Fig. 4B

**Description:** Loads ‘data’ structure containing tonic OHC-DC displacements from live, WT CBA/CaJ mice in response to 70 dB SPL tones swept in frequency. The ‘data’ structure includes:

‘mouseIDs’ (mouse IDs)

‘f1s’ (stimulus frequencies in Hz)

‘L1s’ (stimulus level in dB SPL)

and ‘data.LIVE.OHC\_DC.tonic’, which contains the tonic displacement magnitudes (‘mag’ in nm) and estimated tonic displacement noise floor (‘nf’ in nm) for all mice. Also included are responses at the stimulus frequency, found in ‘data.LIVE.OHC\_DC.f1’, which includes:

‘mag’ (peak displacement magnitude in nm)

‘nf’ (average noise floor, in nm, for nearby frequency bins)

‘nfsd’ (standard deviation of noise floor, in nm, for nearby frequency bins)

‘phi’ (phase in radians relative to ear canal stimulus pressure)

(dimensions: frequency x level x mouse)

**Data file:** WT\_TONIC\_VS\_F\_BM8nm.mat

**Associated figures:** Fig. 4C

**Description:** Loads ‘data’ structure containing tonic OHC-DC displacements from live, WT CBA/CaJ mice interpolated at stimulus levels that yield 8 nm of BM displacement across frequency. The ‘data’ structure contains:

‘mouseIDs’ (mouse IDs)

‘f1s’ (stimulus frequencies in Hz)

‘bm\_disp’ (criterion BM displacement in nm)

and ‘data.LIVE.OHC\_DC.tonic.mag’, which contains the interpolated tonic displacement magnitudes (‘mag’ in nm) and estimated tonic displacement noise floor (‘nf’ in nm) for all mice. Also included are responses at the stimulus frequency, found in ‘data.LIVE.OHC\_DC.f1’, which includes:

‘mag’ (peak displacement magnitude in nm)

‘nf’ (average noise floor, in nm, for nearby frequency bins)

‘nfsd’ (standard deviation of noise floor, in nm, for nearby frequency bins)

‘phi’ (phase in radians relative to ear canal stimulus pressure)

(dimensions = frequency x mouse)

**Data file:** WT\_VS\_F.mat

**Associated figures:** Fig. 3F, Fig. 4D, Fig. S1D-I, Fig. S10A,D

**Description:** Loads ‘data’ structure containing BM and OHC-DC frequency responses in live and dead WT CBA/CaJ mice. The ‘data’ structure includes:

‘mouseIDs’ (mouse IDs)

‘f1s’ (stimulus frequencies in Hz)

‘L1s’ (stimulus levels in dB SPL)

and the ‘LIVE’ and ‘DEAD’ substructures. For a given condition (e.g., ‘LIVE’) and location (e.g., ‘BM’), responses at the stimulus frequency (‘f1’) are found in ‘data.LIVE.BM.f1’, which includes:

‘f’ (response frequency in Hz)

‘mag’ (peak displacement magnitude in nm)

‘nf’ (average noise floor, in nm, for nearby frequency bins)

‘nfsd’ (standard deviation of noise floor, in nm, for nearby frequency bins)

‘phi’ (phase in radians relative to ear canal stimulus pressure)

(dimensions = frequency x level x mouse)

**Data file:** WT\_VS\_F\_70dB.mat

**Associated figures:** Fig. 2B, Fig. 5A, Fig. S6A-C

**Description:** Loads ‘data’ structure containing responses of the BM, OHC-DC, and RL in live, WT CBA/CaJ mice to 70 dB SPL tones swept in frequency. The ‘data’ structure includes:

‘mouseIDs’ (mouse IDs)

‘f1s’ (stimulus frequencies in Hz)

‘L1s’ (stimulus level in dB SPL)

For each measurement location (e.g., ‘OHC\_DC’), responses at the stimulus frequency (‘f1’) are stored in ‘data.LIVE.OHC\_DC.f1’, which contains the following:

‘mag’ (peak displacement magnitude in nm)

‘nf’ (average noise floor, in nm, for nearby frequency bins)

‘nfsd’ (standard deviation of noise floor, in nm, for nearby frequency bins)

‘phi’ (phase in radians relative to ear canal stimulus pressure)

(dimensions = frequency x level x mouse)

**Data file:** WT\_VS\_F\_ BMpt5nm.mat

**Associated figures:** Fig. 4D

**Description:** Loads ‘data’ structure containing BM and OHC-DC frequency responses in live, WT CBA/CaJ mice, interpolated at stimulus levels that yield 0.5 nm of BM displacement across frequency. The interpolated values were derived from BM and OHC-DC responses in ‘WT\_VS\_F.mat’. The ‘data’ structure contains:

‘mouseIDs’ (mouse IDs)

‘f1s’ (stimulus frequencies in Hz)

‘bm\_disp’ (criterion BM displacement in nm)

BM and OHC-DC responses at the stimulus frequency (‘f1’) are found in ‘data.LIVE.BM.f1’ and ‘data.LIVE.OHC\_DC.f1’, respectively, which contain the following fields:

‘mag’ (interpolated peak displacement magnitude in nm)

‘nf’ (interpolated average noise floor + 3 standard deviations, in nm, for nearby frequency bins)

‘phi’ (interpolated phase in radians re ear canal stimulus pressure)

(dimensions = frequency x mouse)

**Data file:** WT\_VS\_F\_FINE.mat

**Associated figures:** Fig. 4B-C

**Description:** Loads ‘data’ structure containing BM and OHC-DC frequency responses obtained in fine (200 Hz) steps in live, WT CBA/CaJ mice. Data were obtained over variable stimulus level ranges in each mouse. The ‘data’ structure includes:

‘f1s’ (stimulus frequencies in Hz)

‘L1s’ (stimulus levels in dB SPL)

and the ‘LIVE’ structure. For a given measurement location (e.g., ‘BM’), data for each response component (e.g., ‘f1h2’, for the second harmonic) are found in ‘data.LIVE.BM.f1h2’, which contains the following fields:

‘f’ (response frequency in Hz)

‘mag’ (peak displacement magnitude in nm)

‘nf’ (average displacement noise floor, in nm, for nearby frequency bins)

‘nfsd’ (standard deviation of displacement noise floor, in nm, for nearby frequency bins)

‘phi’ (phase in radians re ear canal stimulus pressure)

(dimensions = frequency x level x mouse)

OHC-DC responses were obtained in more mice than BM responses, thus the ‘mouseIDs’ are provided for each measurement location separately.

**Data file:** WT\_VS\_F\_FINE\_BM8nm.mat

**Associated figures:** Fig. 4C

**Description:** Loads ‘data’ structure containing OHC-DC responses at the stimulus frequency and its harmonics obtained in fine (200 Hz) frequency steps in live WT CBA/CaJ mice, and then interpolated at stimulus levels that yield 8 nm of BM displacement across frequency. The interpolated values were derived from BM and OHC-DC responses in ‘WT\_VS\_F\_FINE.mat’. The ‘data’ structure contains:

‘mouseIDs’ (mouse IDs)

‘f1s’ (stimulus frequencies in Hz)

‘bm\_disp’ (criterion BM displacement in nm)

and the ‘data.LIVE.OHC\_DC’ substructure, which contains branches for each response component (e.g., data for the second harmonic ‘f1h2’ are located in ‘data.LIVE.OHC\_DC.f1h2’). The response component substructures contain the following fields:

‘mag’ (interpolated peak displacement magnitude in nm)

‘nf’ (interpolated average noise floor + 3 standard deviations, in nm, for nearby frequency bins)

(dimensions = frequency x mouse)

**Data file:** WT\_VS\_F\_wTM.mat

**Associated figures:** Fig. S6G-L

**Description:** Loads ‘data’ structure containing frequency responses of the BM,OHC-DC junction, and TM in live, WT CBA/CaJ mice. The ‘data’ structure includes:

‘mouseIDs’ (mouse IDs)

‘f1s’ (stimulus frequencies in Hz)

‘L1s’ (stimulus levels in dB SPL)

Displacement responses at the stimulus frequency (‘f1’) for a given measurement location (e.g., ‘TM) are found in ‘data.LIVE.TM.f1’, which contains:

‘f’ (response frequency in Hz)

‘mag’ (peak displacement magnitude in nm)

‘nf’ (average noise floor, in nm, for nearby frequency bins)

‘nfsd’ (standard deviation of noise floor, in nm, for nearby frequency bins)

‘phi’ (phase in radians referenced to ear canal stimulus pressure)

(dimensions = frequency x level x mouse)