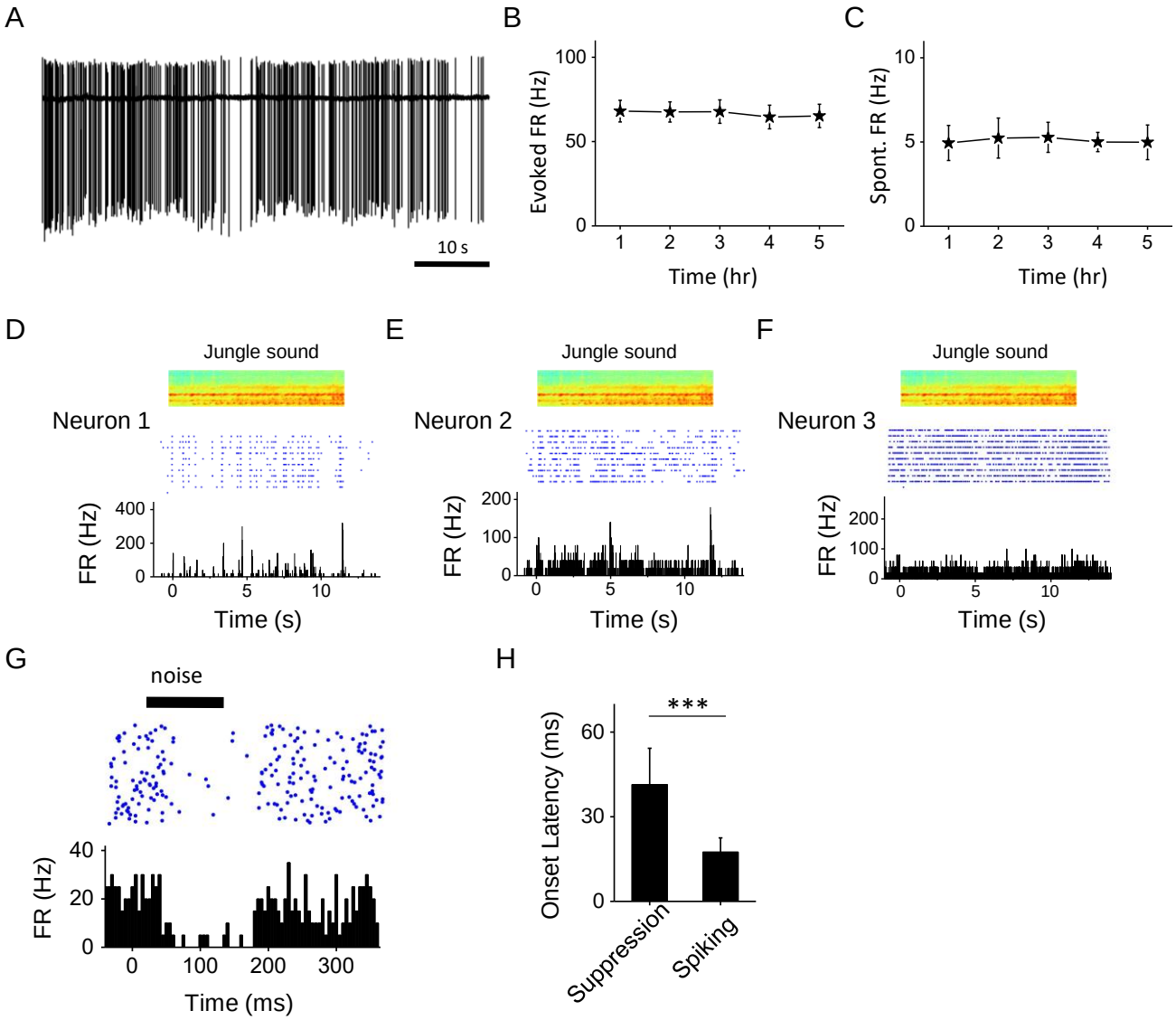

Figure S1. Loose-patch recording in the awake A1. (Associated with Figure 1)
(A) Example trace of recorded spikes in a L2/3 neuron.
(B) Average firing rate evoked by the best tone for the same cell over 5 hours.
(C) Average spontaneous firing rate of the same cell over 5 hours.
(D) Raster plot and PSTH for spikes of neuron 1 to jungle sound. Top, spectrogram of the sound.
(E) Raster plot and PSTH for spikes of neuron 2 to jungle sound.
(F) Raster plot and PSTH for spikes of neuron 3 to jungle sound.
(G) Raster plot and PSTH for an example neuron suppressed by noise.
(H) The onset latency of suppression (n = 28) as compared with normal spiking responses in R cells. ***P < 0.001, t test.

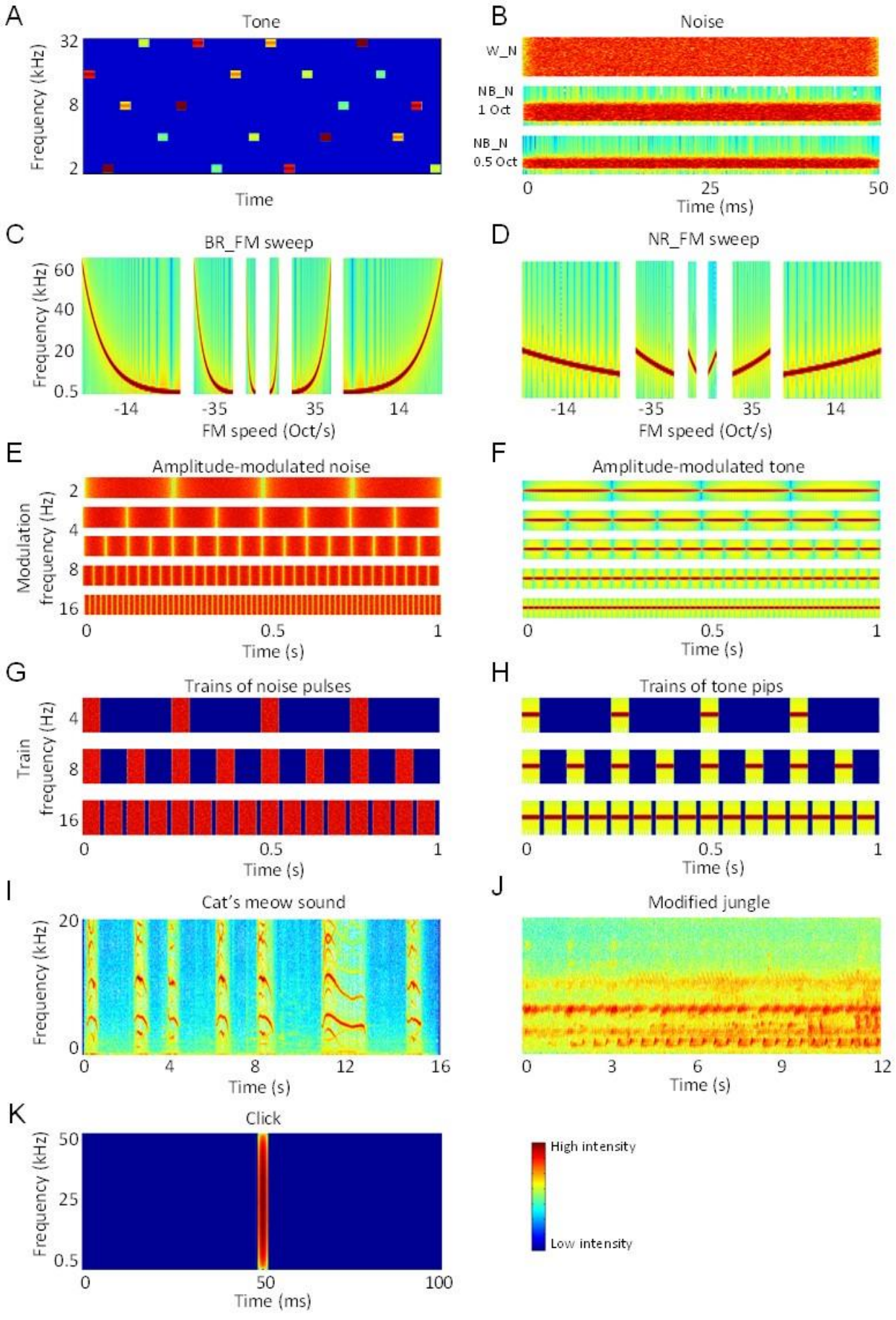
A
Tone
Frequency (kHz)
32
8
2
Time
B
Noise
W_N
NB_N
1 Oct
NB_N
0.5 Oct
0
25
50
Time (ms)
C
BR_FM sweep
Frequency (kHz)
60
40
20
0.5
-14
-35
35
14
FM speed (Oct/s)
D
NR_FM sweep
-14
-35
35
14
FM speed (Oct/s)
E
Amplitude-modulated noise
Modulation frequency (Hz)
2
4
8
16
0
0.5
1
Time (s)
F
Amplitude-modulated tone
0
0.5
1
Time (s)
G
Trains of noise pulses
Train frequency (Hz)
4
8
16
0
0.5
1
Time (s)
H
Trains of tone pips
0
0.5
1
Time (s)
I
Cat's meow sound
Frequency (kHz)
20
0
0
4
8
12
16
Time (s)
J
Modified jungle
0
3
6
9
12
Time (s)
K
Click
Frequency (kHz)
50
25
0.5
0
50
100
Time (ms)
High intensity
Low intensity

Figure S2. Spectrograms for different sounds applied. (Associated with Figure 1)
(A) A sequence of tones at different frequencies and intensities.
(B) 50 ms noise. W_N, white noise (top); NB_N, narrow band noise (1 octave, middle; 0.5 octave, bottom) centered on the CF of the recording site.
(C) Broad range frequency-modulated sweeps. The speed of modulation is indicated underneath.
(D) Narrow range frequency-modulated sweeps centered on the CF of the recording site. The speed of modulation is indicated underneath.
(E) Amplitude-modulated noise at different modulation frequencies.
(F) Amplitude-modulated CF tone.
(G) Trains of noise pulses at different frequencies.
(H) Trains of tone pips.
(I) A cat's meow sound.
(J) Modified jungle sound so that it fits into mouse hearing range.
(K) Click sound.

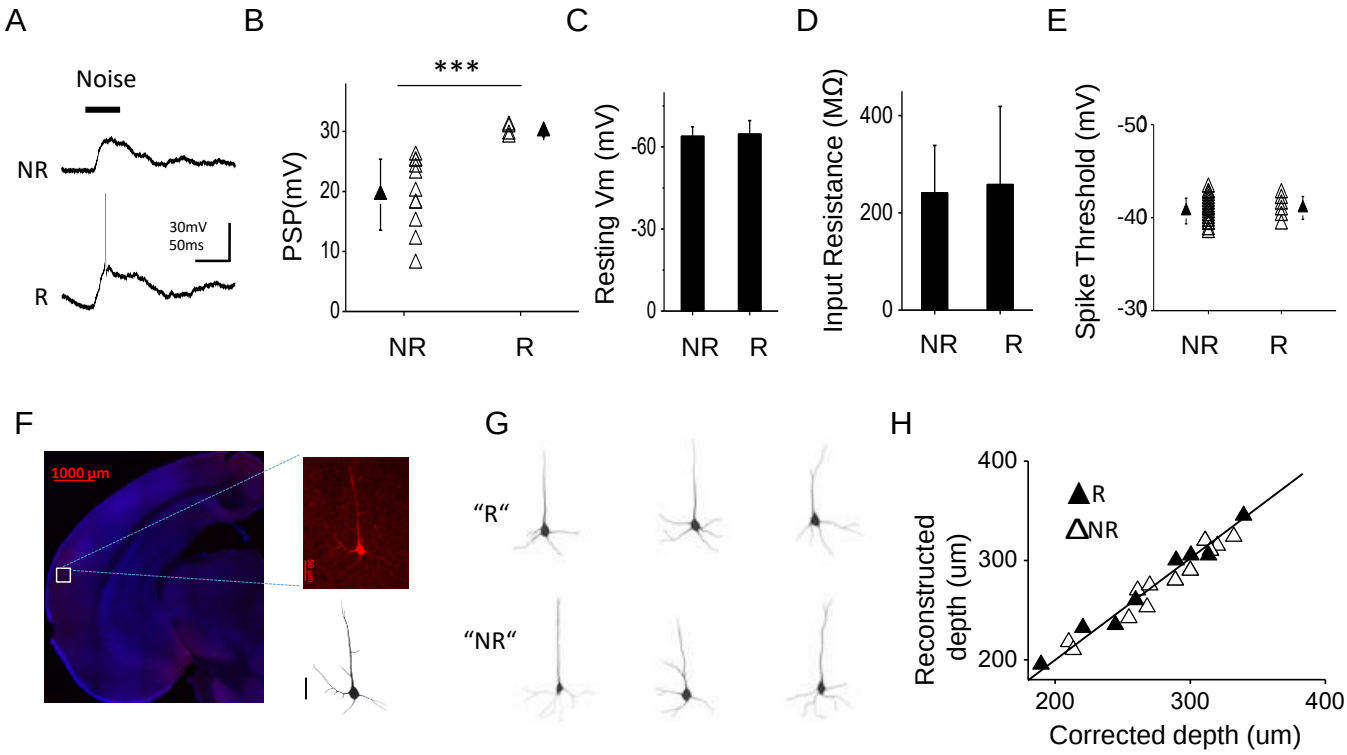

Figure S3. Membrane properties and morphological reconstruction.
(Associated with Figure 3)
(A) Noise evoked membrane potential changes in a representative NR and R cell.
(B) Comparison of peak amplitudes of noise-evoked PSP responses between NR (n = 11) and R (n = 4) groups. Solid symbol represents mean ± SD. ***P < 0.001, t test.
(C) Comparison of input resistance between NR and R cells. There is no significant difference between noise and adult groups (P > 0.05, t test).
(D) Comparison of resting membrane potential between NR and R cells. There is no significant difference between noise and adult groups (P > 0.05, t test).
(E) Comparison of spike threshold between NR and R cells. There is no significant difference between noise and adult groups (P > 0.05, t test).
(F) Confocal image of a recorded neuron labeled by biocytin and the morphological reconstruction (right bottom). Scale: 50 um.
(G) Reconstructed morphology for 3 example R and NR cells.
(H) Cortical depth based on reconstruction versus expected cortical depth after correction. Black line is the identity line.

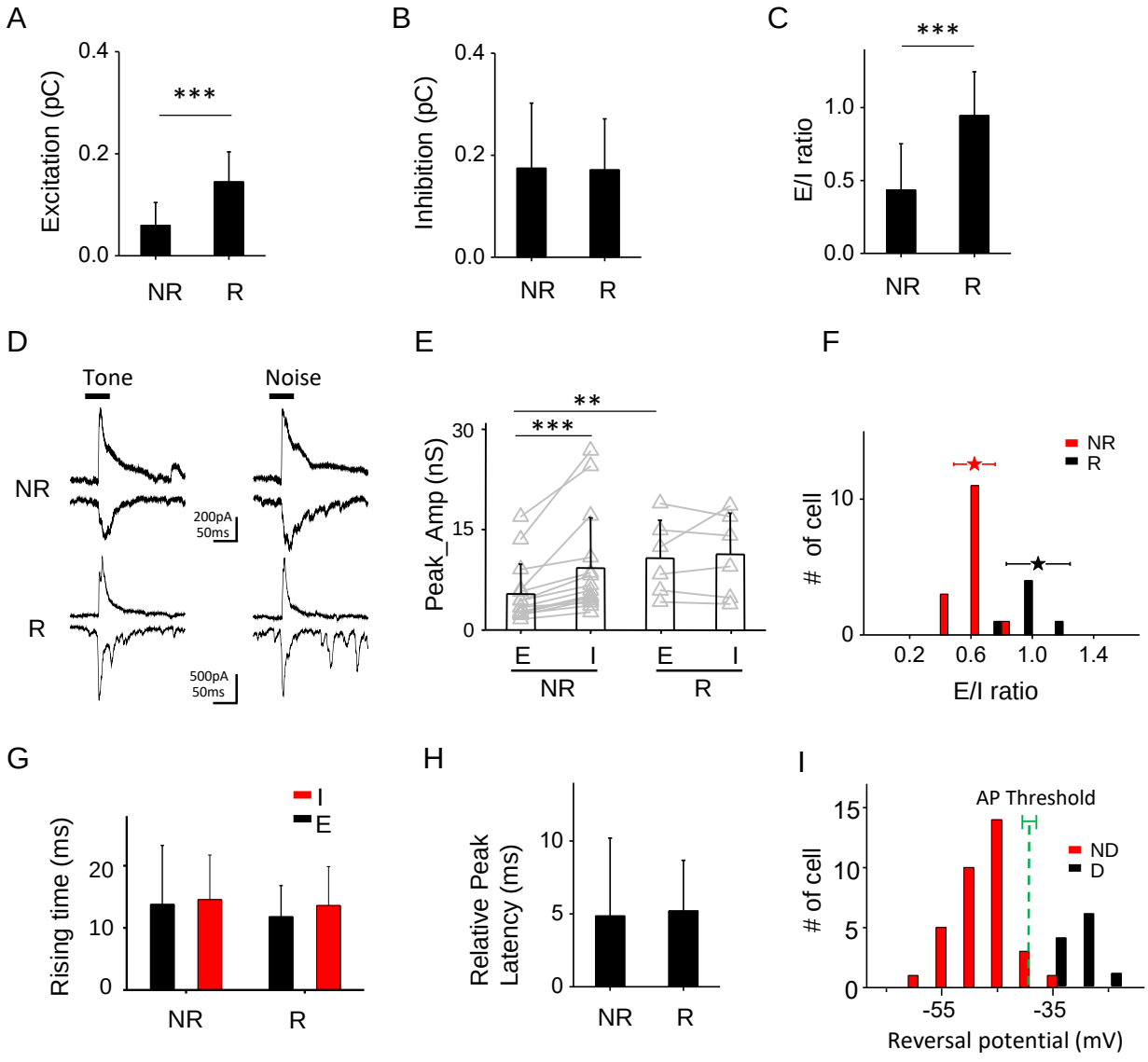
A
Excitation (pC)
0.4
0.2
0.0
***
NR
R
B
Inhibition (pC)
0.4
0.2
0.0
NR
R
C
***
E/I ratio
1.0
0.5
0.0
NR
R
D
Tone
Noise
NR
R
200pA
50ms
500pA
50ms
E
**
***
Peak_Amp (nS)
30
15
0
E
I
E
I
NR
R
F
NR
R
# of cell
10
0
0.2
0.6
1.0
1.4
E/I ratio
G
I
E
Rising time (ms)
20
10
0
NR
R
H
Relative Peak
Latency (ms)
10
5
0
NR
R
I
AP Threshold
ND
D
# of cell
15
10
5
0
-55
-35
Reversal potential (mV)

Figure S4. Synaptic mechanisms for the differential responsiveness of excitatory neurons. (Associated with Figure 3)
(A) Comparison of total charge of evoked excitatory current between NR and R cells.
(B) Comparison of total charge of evoked inhibitory current between NR and R cells. *** $P < 0.001$, t test.
(C) Comparison of E/I ratio calculated from total charge between NR and R cells. *** $P < 0.001$, t test.
(D) Average inhibitory (I) and excitatory (E) currents evoked by the best tone (left) and noise (right) for a NR and R cell.
(E) Peak amplitudes of excitation and inhibition of NR and R cells. Column = mean $\pm$ SD. Individual cells are represented by gray symbols. Data points for the same cell are connected with a gray line. N = 15, and 6 cells for the NR and R groups respectively. *** $P < 0.001$, ** $P < 0.01$, Wilcoxon signed-rank test.
(F) Distribution of E/I ratios in the NR and R groups. Stars represent mean $\pm$ SD. NR: 0.59 ± 0.13; R: 1.01 ± 0.20. There is a significant difference between NR and R groups ($P < 0.001$, t test).
(G) Average rising time (10% to 90% of peak) of synaptic currents in the NR and R groups. There is no significant difference ($P > 0.05$, t test).
(H) Average interval between peak excitation and peak inhibition for the NR and R groups. There is no significant difference ($P > 0.05$, t test).
(I) Distribution of synaptic reversal potential calculated based on E/I ratio at the time of peak PSP derived from integration excitation and inhibition. Amplitudes of excitation and inhibition were averaged within a 5-ms window centered on the PSP peak. Green dash line marks the mean observed spike threshold.

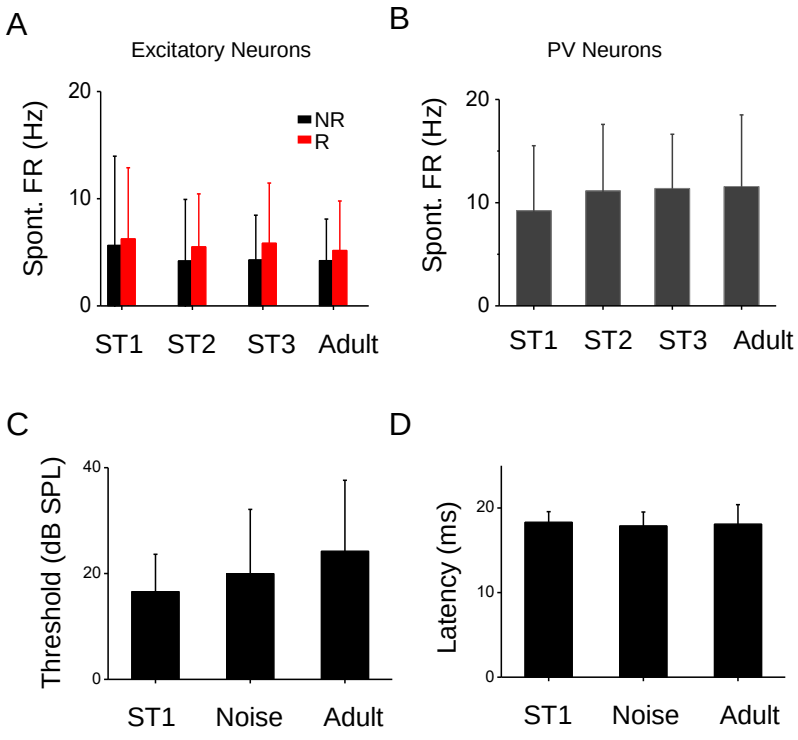

Figure S5. Comparison of response properties. (Associated with Figure 4) (A) Comparison of spontaneous firing rate for L2/3 excitatory neurons between different developmental stages. N = 24, 44; 16, 21; 31,18; 210, 100 cells respectively. There is no significant difference ($P > 0.05$, one-way ANOVA).
(B) Comparison of spontaneous firing rate for L2/3 PV inhibitory neurons between different developmental stages. N = 17, 12, 13, 75 cells, respectively. There is no significant difference ($P > 0.05$, one-way ANOVA).
(C) Intensity threshold of TRFs of L2/3 excitatory neurons. N =44, 23 and 45 cells respectively. There is no significant difference between noise and adult groups ($P > 0.05$, t test).
(D) Average response latency of excitatory neurons. Response latency here was determined from the PSTH generated from spikes responses to all test tones, as the time point at which the firing rate exceeded the average spontaneous firing rate by 2 standard deviations of baseline fluctuations. N =44, 23 and 45 cells respectively. There is no significant difference between noise and adult groups ($P > 0.05$, t test).

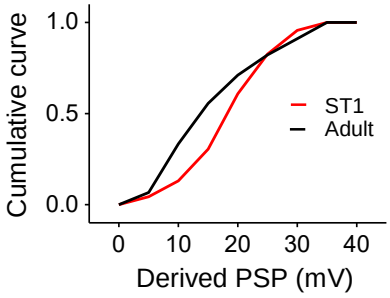

Figure S6. Cumulative distribution of derived PSP amplitudes at ST1 as compared with adult age. (Associated with Figure 5)