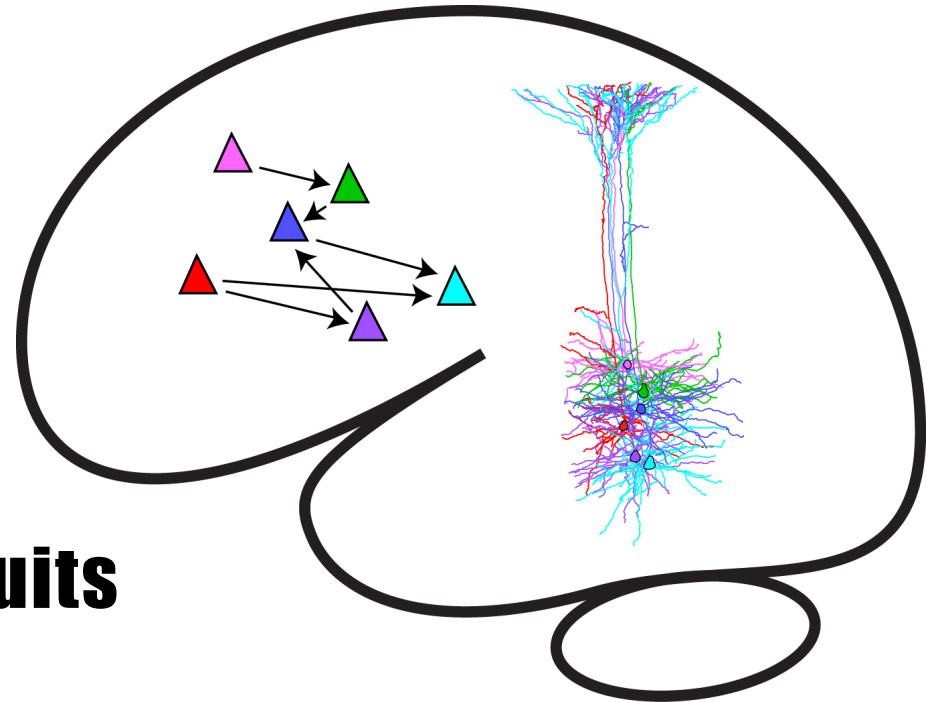




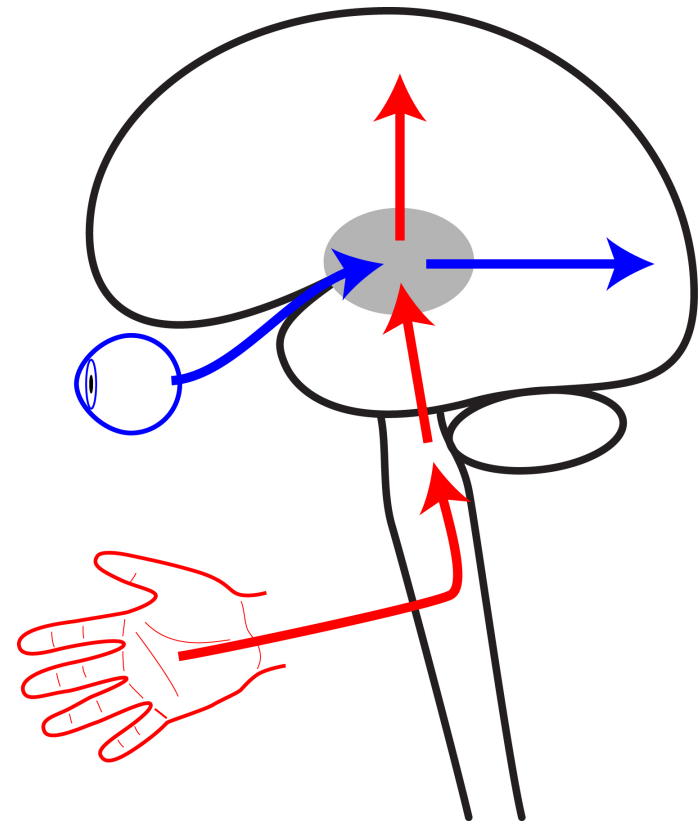
4.3 Glutamatergic circuits

Cellular Mechanisms of Brain Function

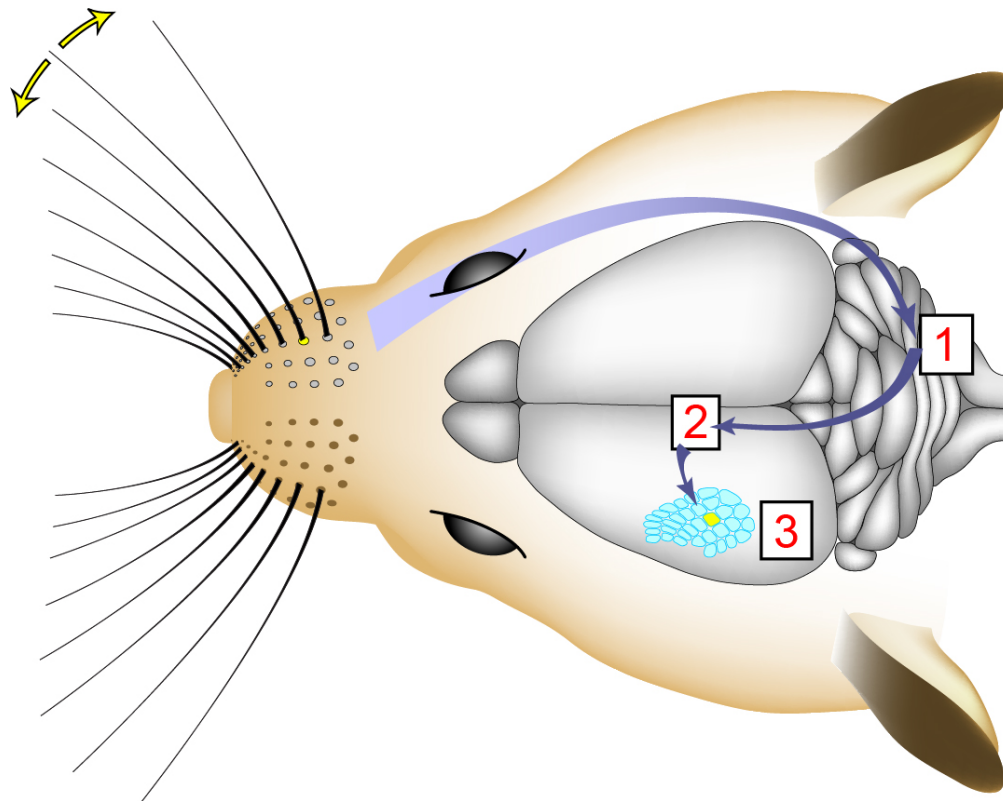
Prof. Carl Petersen

Glutamatergic excitatory neuronal circuits

Circuits for processing sensory information



Mouse whisker sensation

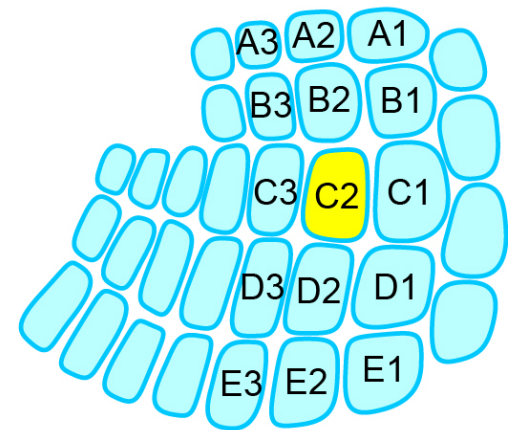
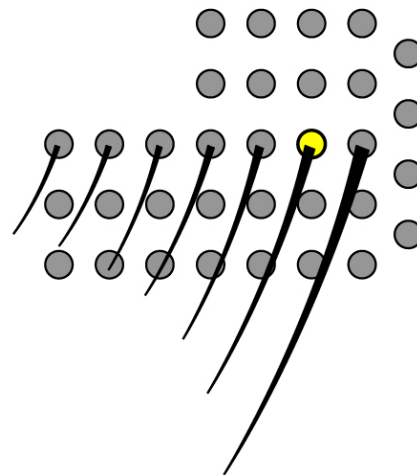
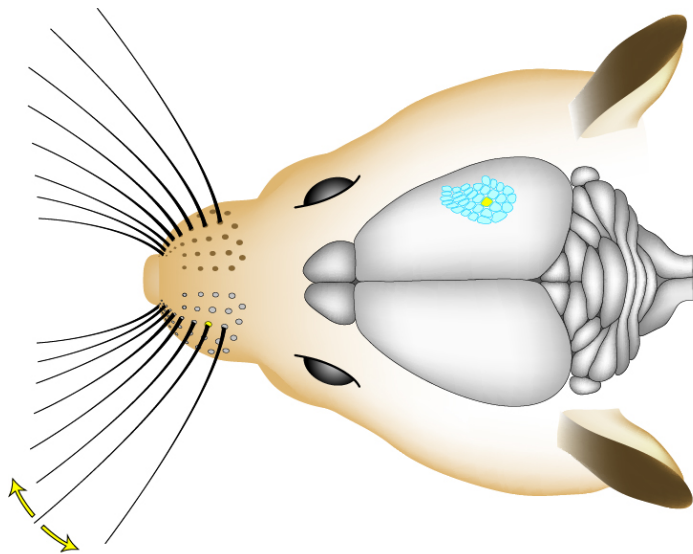


1. Brainstem

2. Thalamus

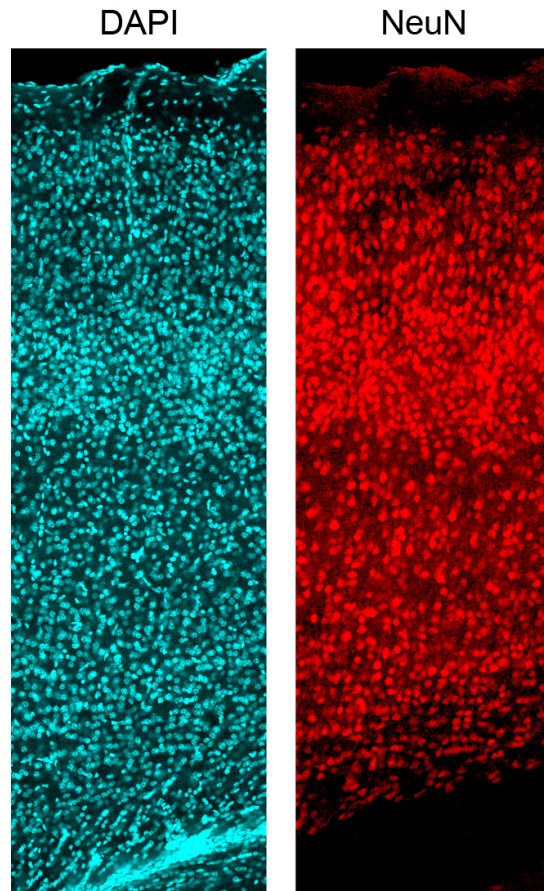
3. Neocortex

Whisker map in somatosensory neocortex



Petersen, 2007

Excitatory neurons of the C2 barrel column



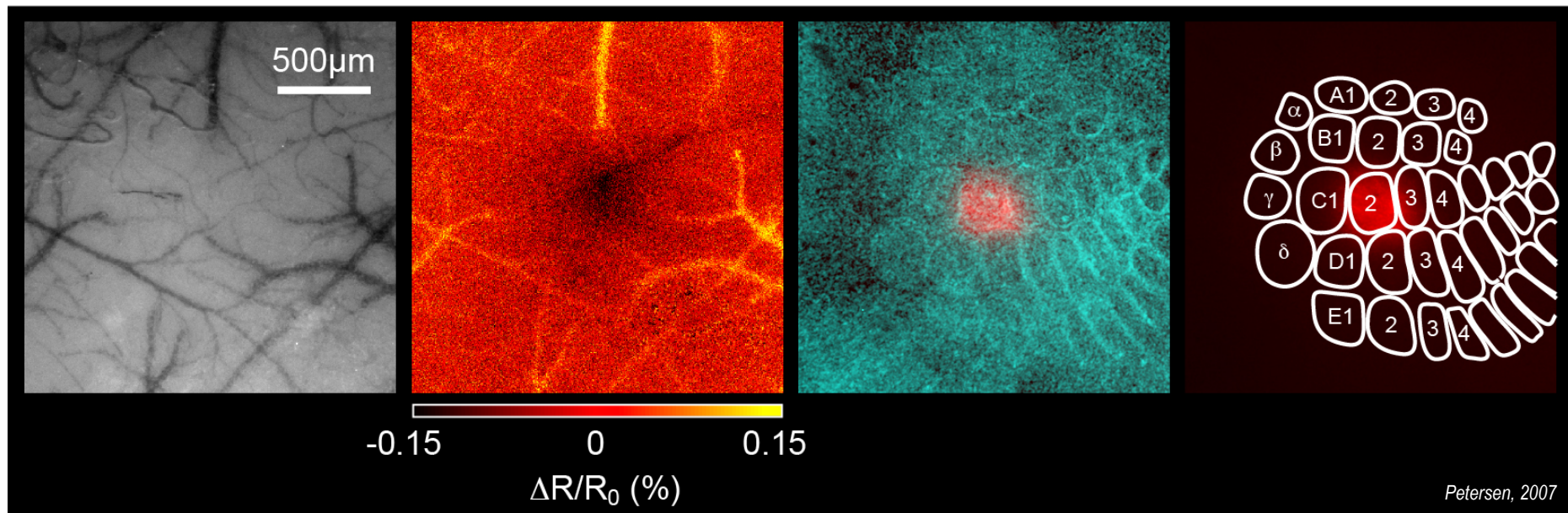
Lefort, Tómm, Sarria & Petersen, 2009

Functional mapping of barrel cortex

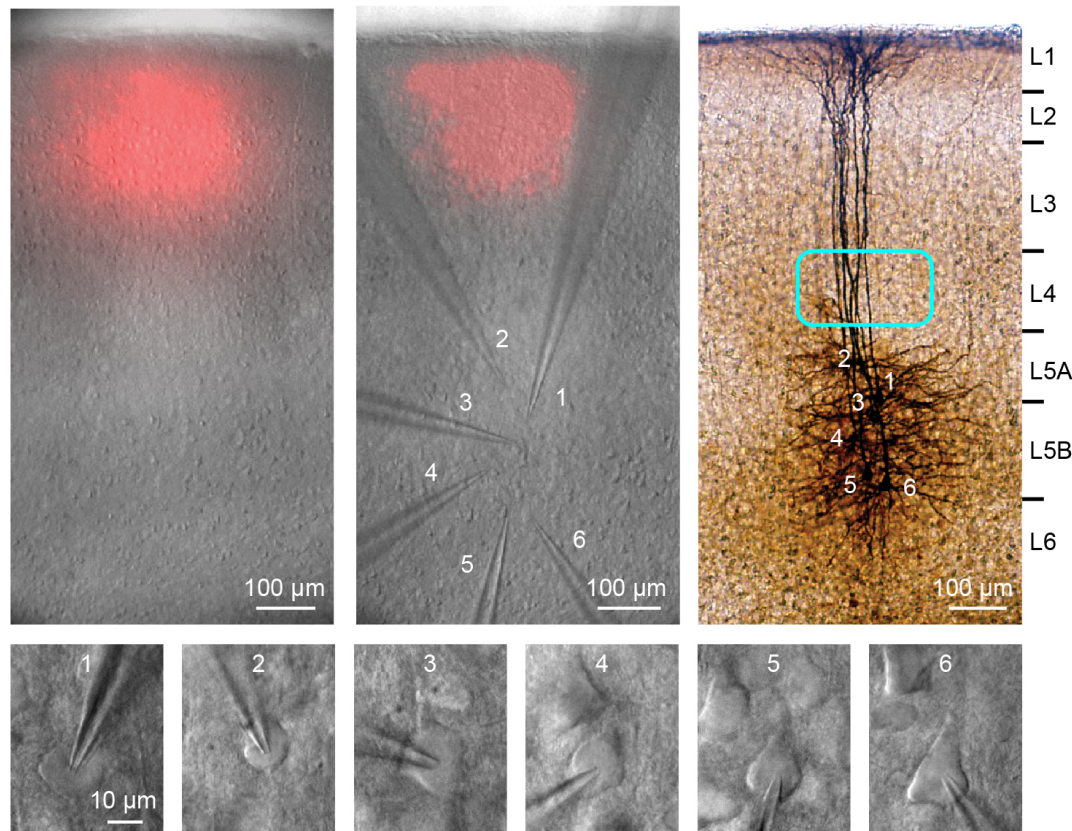
Cortical surface

C2 whisker stim

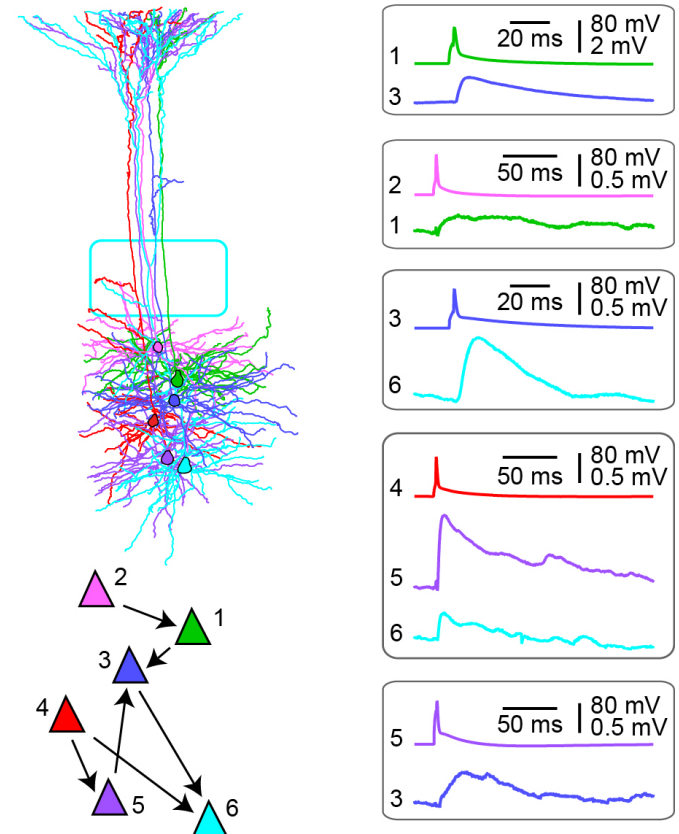
DAPI + DiI



Synaptic microcircuits in the C2 barrel column

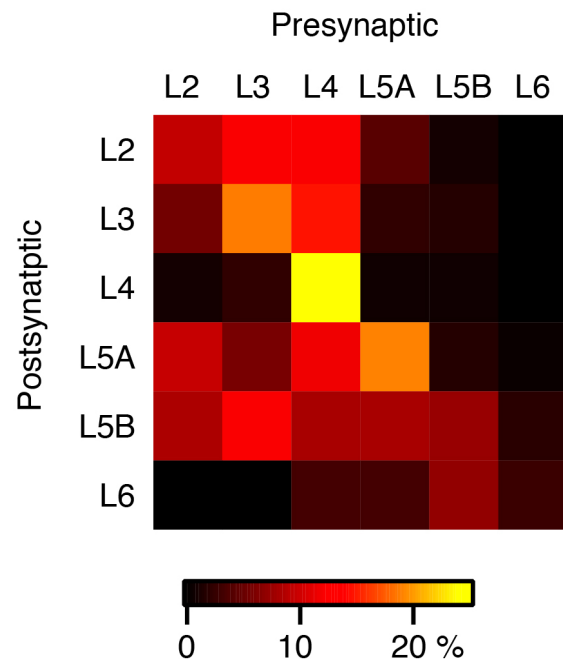


Lefort, Tómm, Sarria & Petersen, 2009

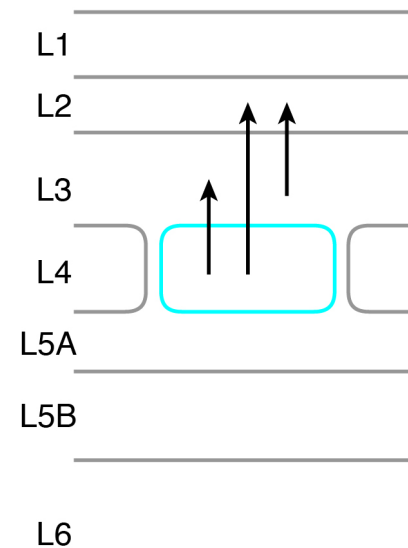


Excitatory microcircuit of the C2 barrel column

Connection probability

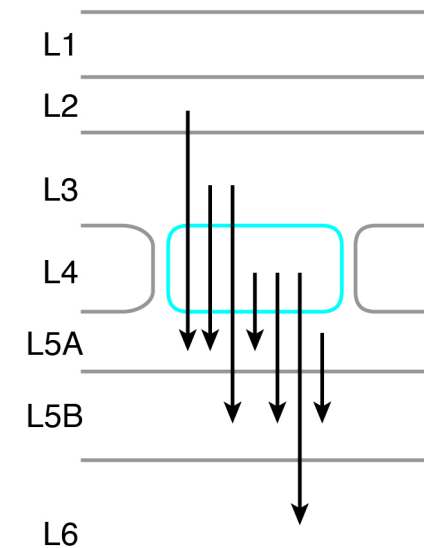


L2/3



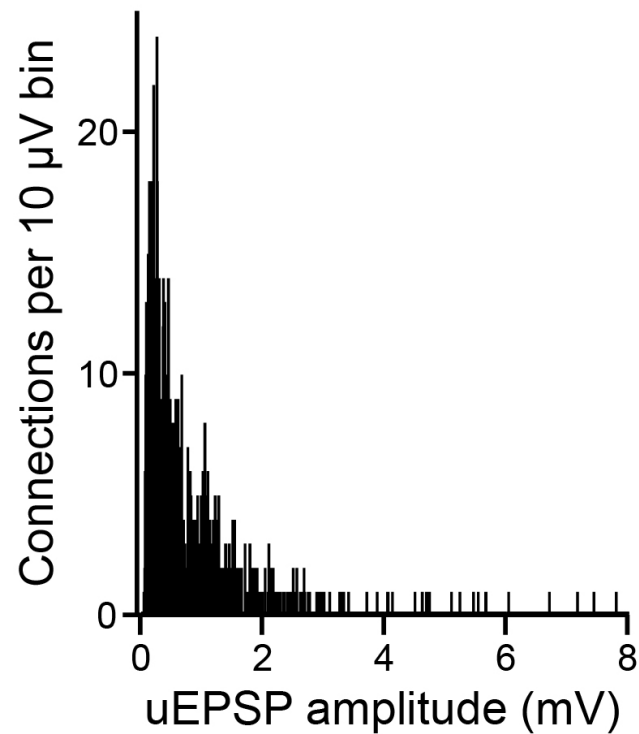
Lefort, Tómm, Sarria & Petersen, 2009

L5/6



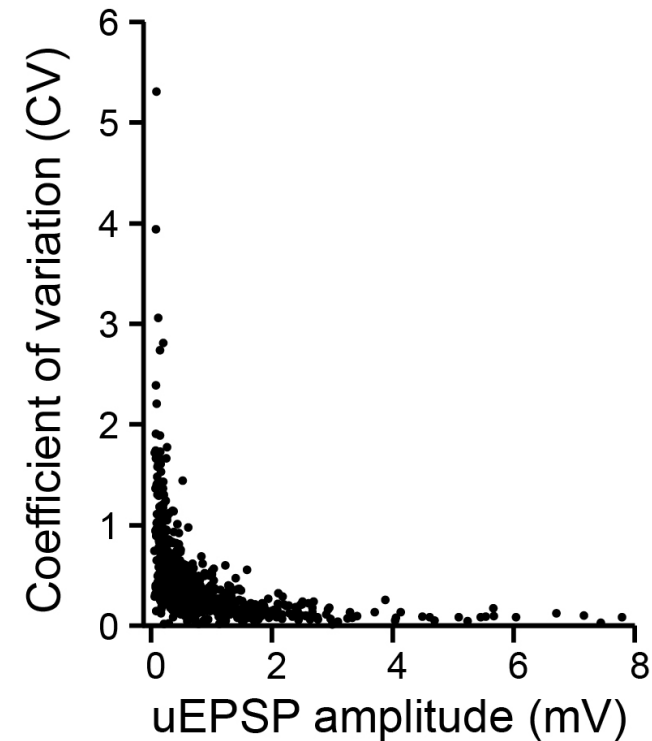
Synaptic properties

uEPSP amplitude distribution



Lefort, Tómm, Sarria & Petersen, 2009

CV vs uEPSP amplitude



Cellular Mechanisms of Brain Function

Glutamatergic synaptic circuits

- Excitatory glutamatergic neurons send long-range axons linking distant brain areas, *e.g.* glutamate synapses are involved in signaling all sensory information from periphery to cortex.
- Glutamatergic synapses in local neocortical microcircuits connect specific cell-types with diverse synaptic properties.