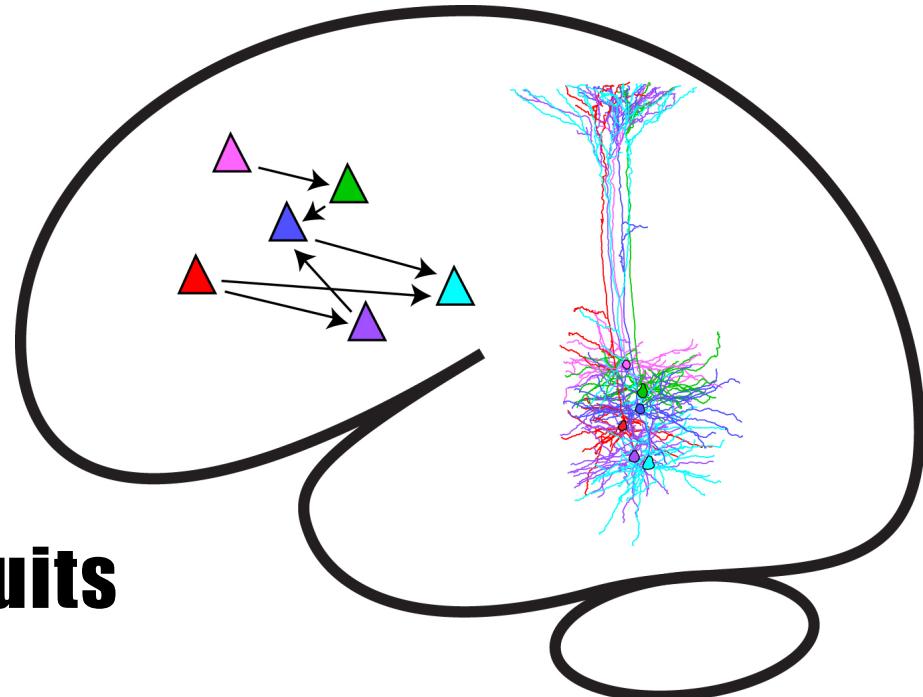


## 4.3 Glutamatergic circuits

**Cellular Mechanisms of Brain Function**

Prof. Carl Petersen

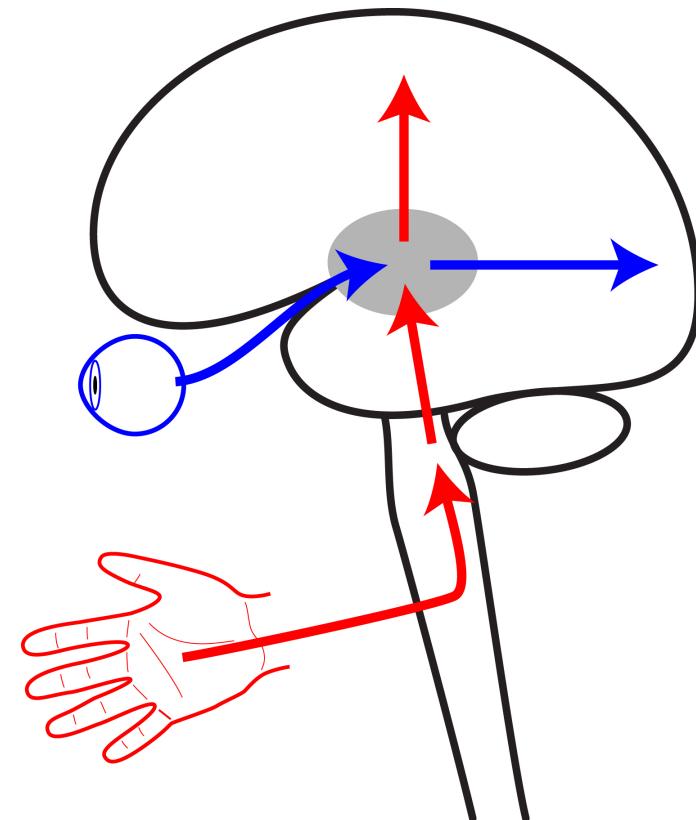


# **Glutamatergic excitatory neuronal circuits**



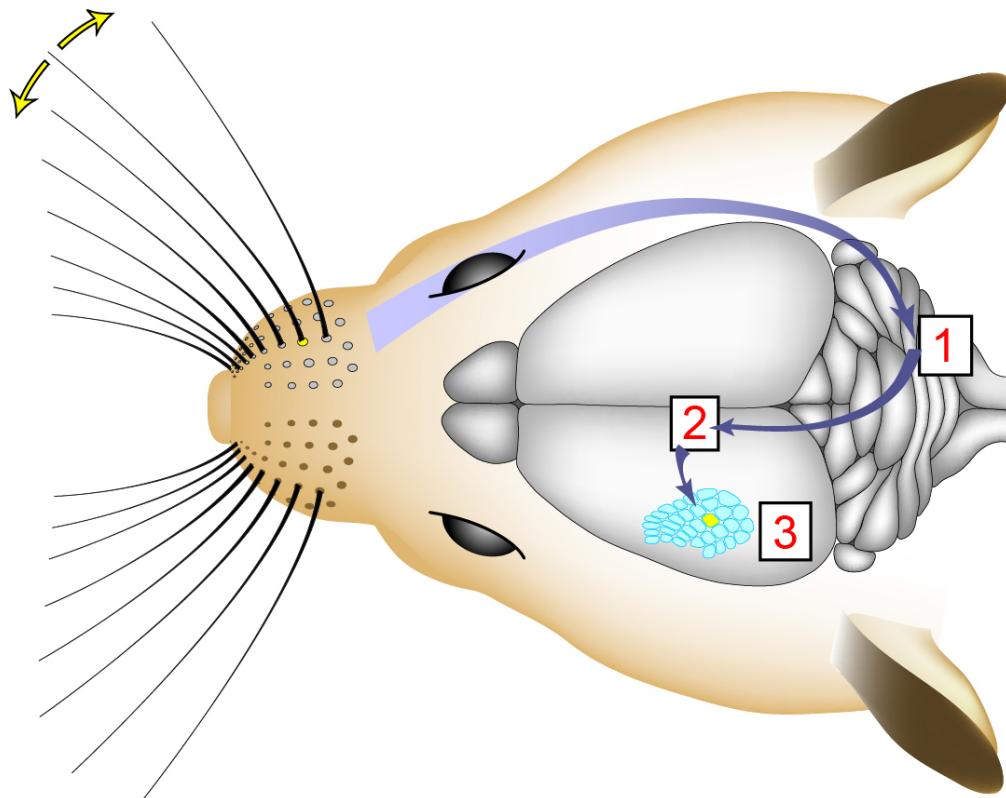
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# Circuits for processing sensory information



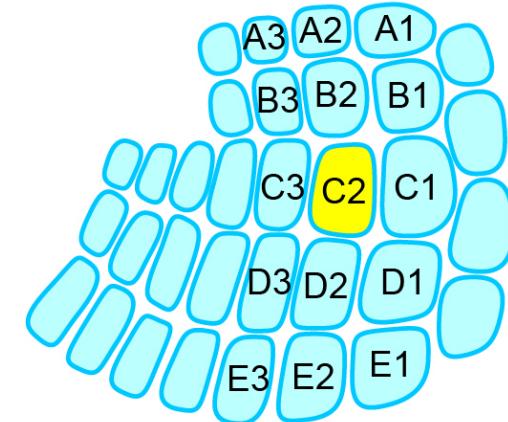
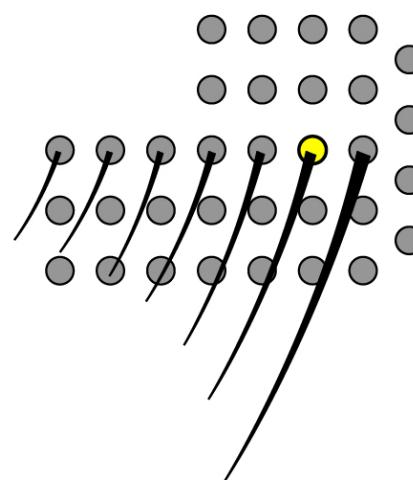
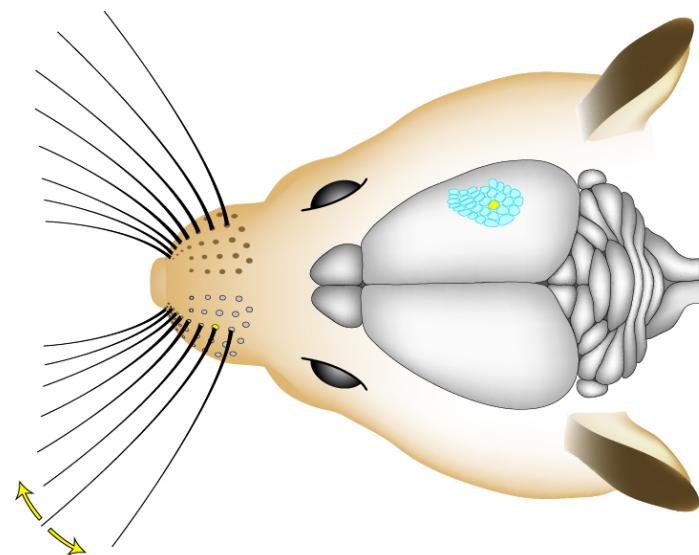
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# Mouse whisker sensation



1. Brainstem
2. Thalamus
3. Neocortex

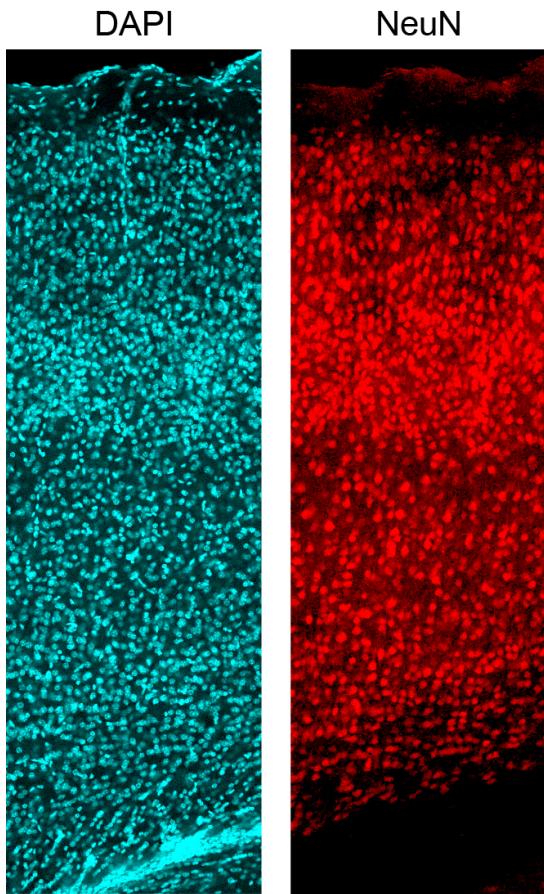
# Whisker map in somatosensory neocortex



Petersen, 2007

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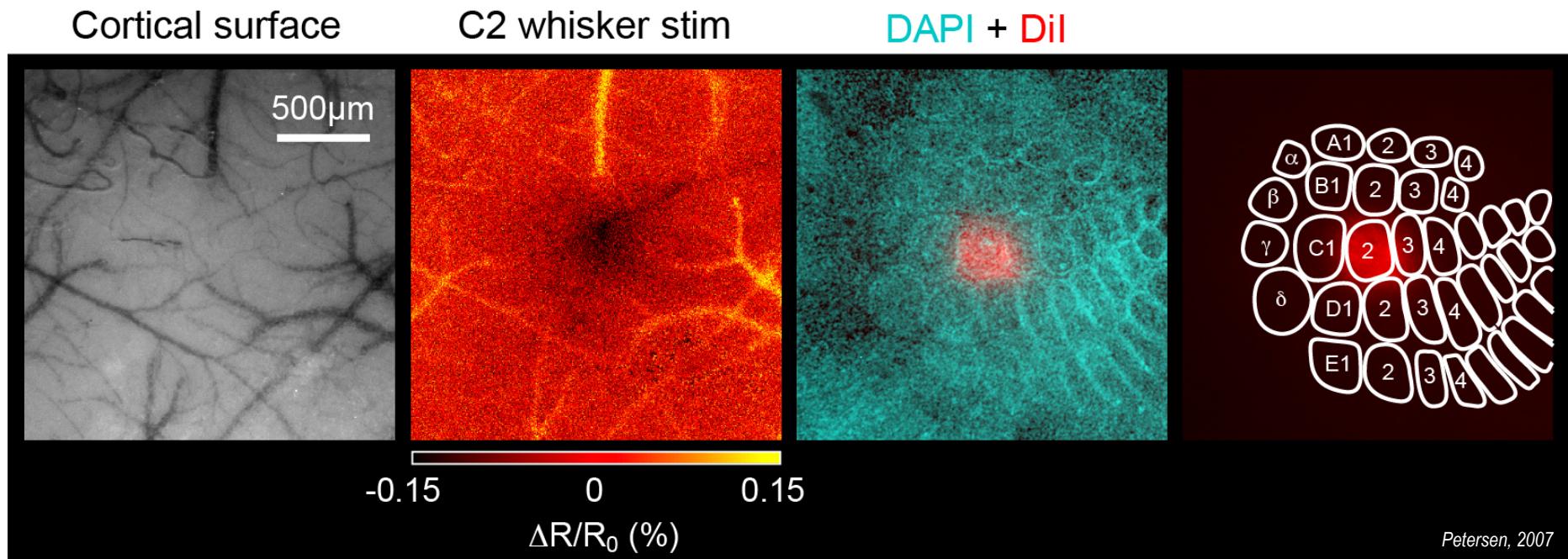
# Excitatory neurons of the C2 barrel column



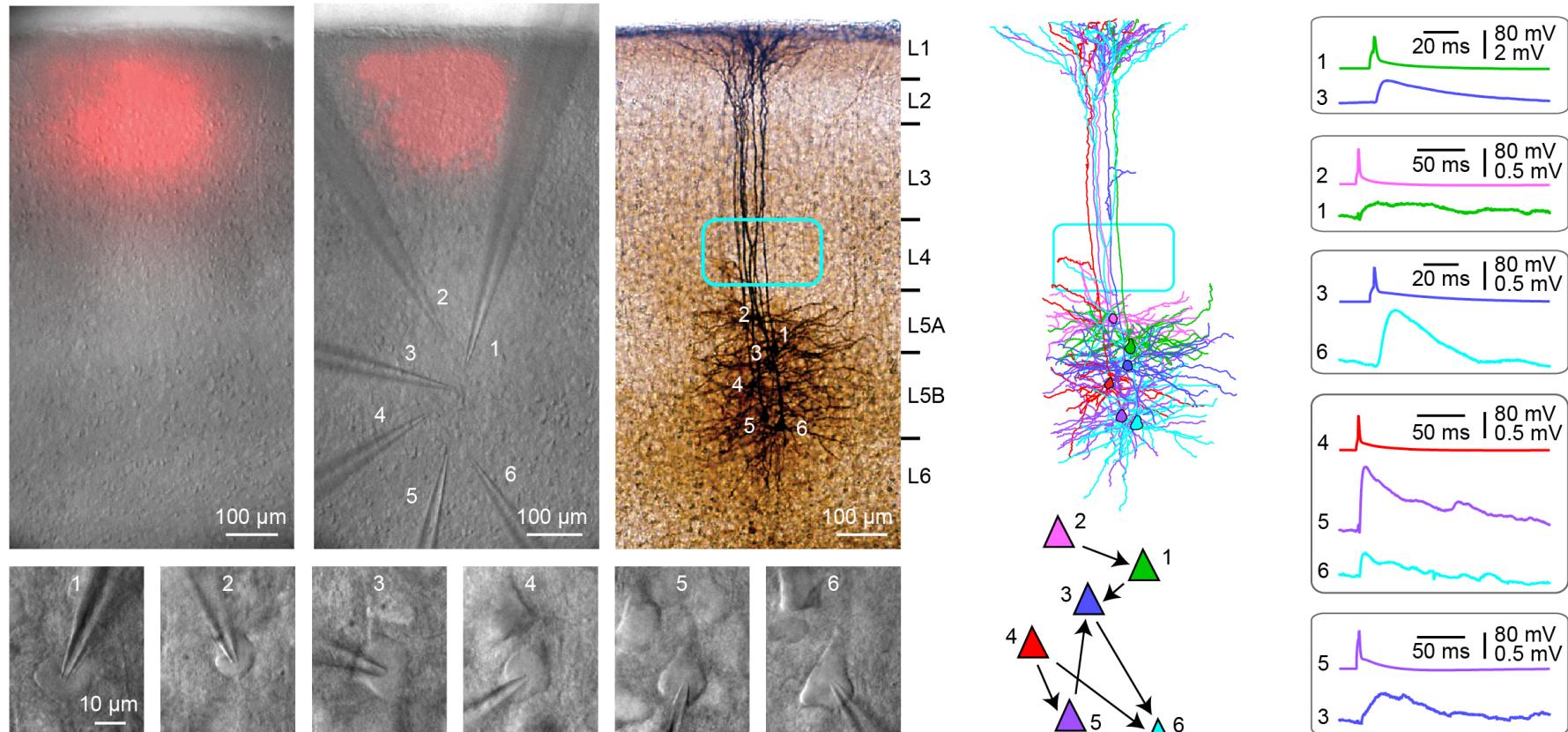
Lefort, Tomm, Sarria & Petersen, 2009

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# Functional mapping of barrel cortex

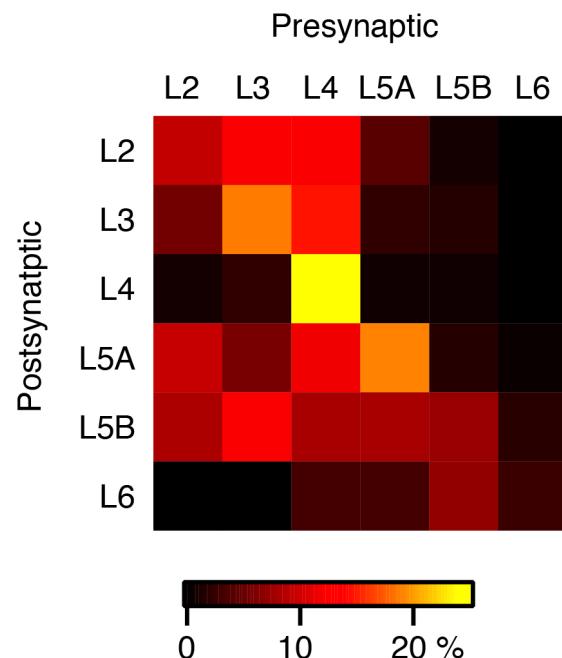


# Synaptic microcircuits in the C2 barrel column

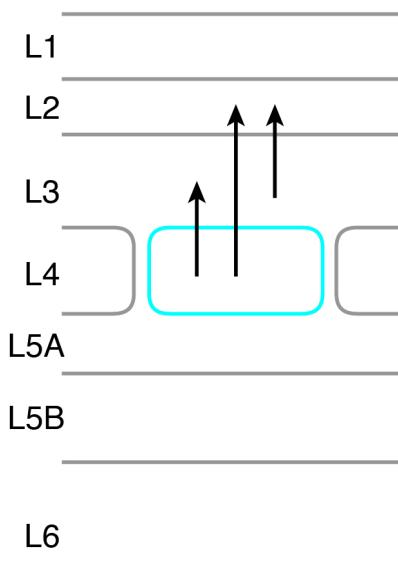


# Excitatory microcircuit of the C2 barrel column

Connection probability

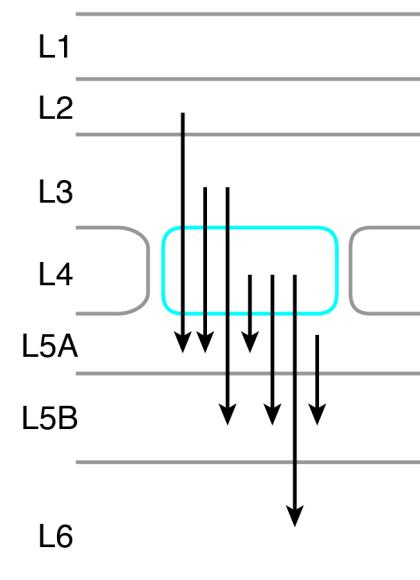


L2/3

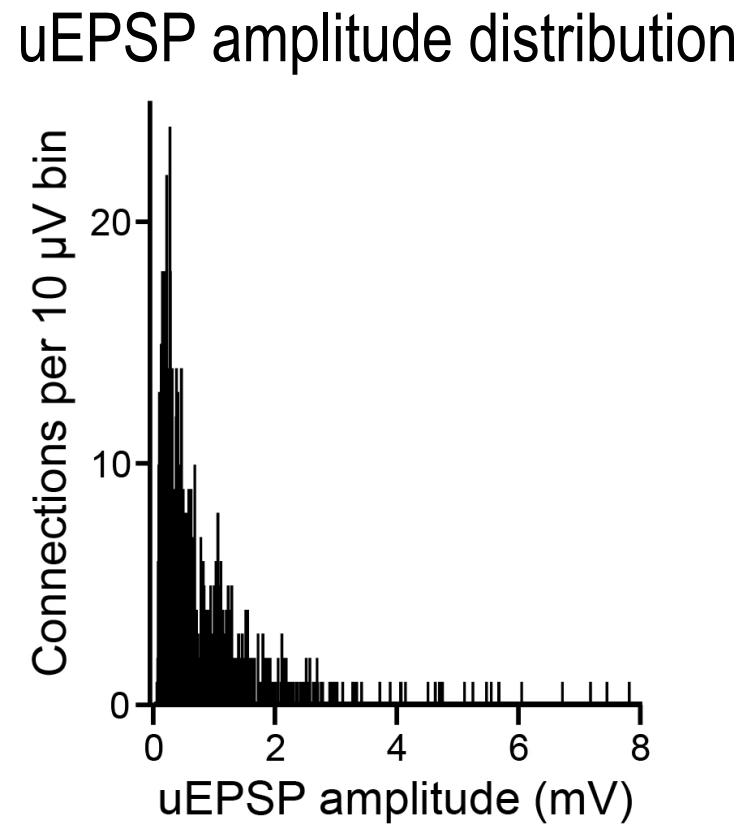


Lefort, Tomm, Sarria & Petersen, 2009

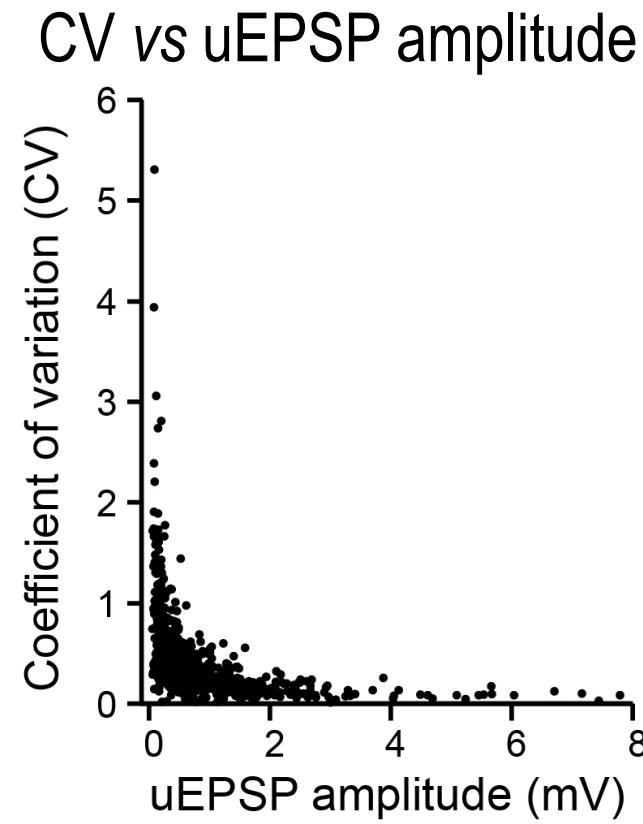
L5/6



# Synaptic properties



Lefort, Tomm, Sarria & Petersen, 2009



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# 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.