Long Lasting Proteins
Long Lasting Memories

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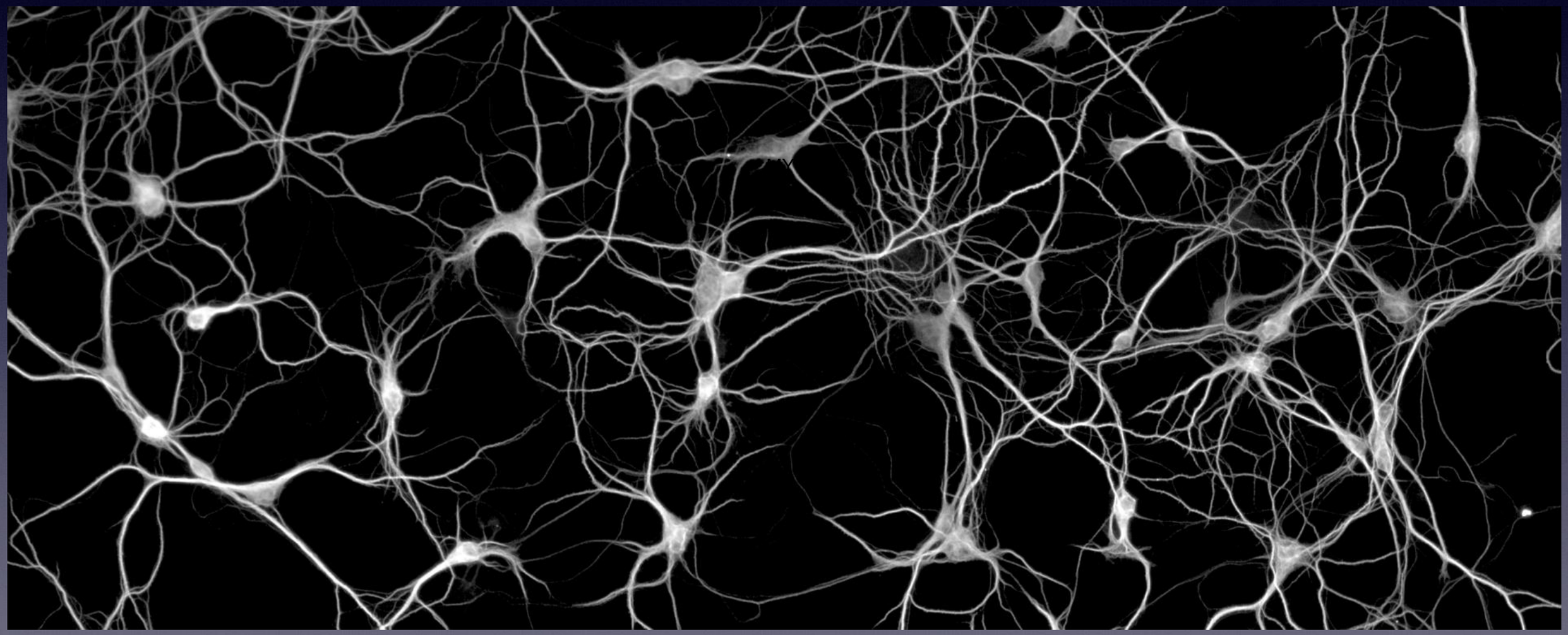
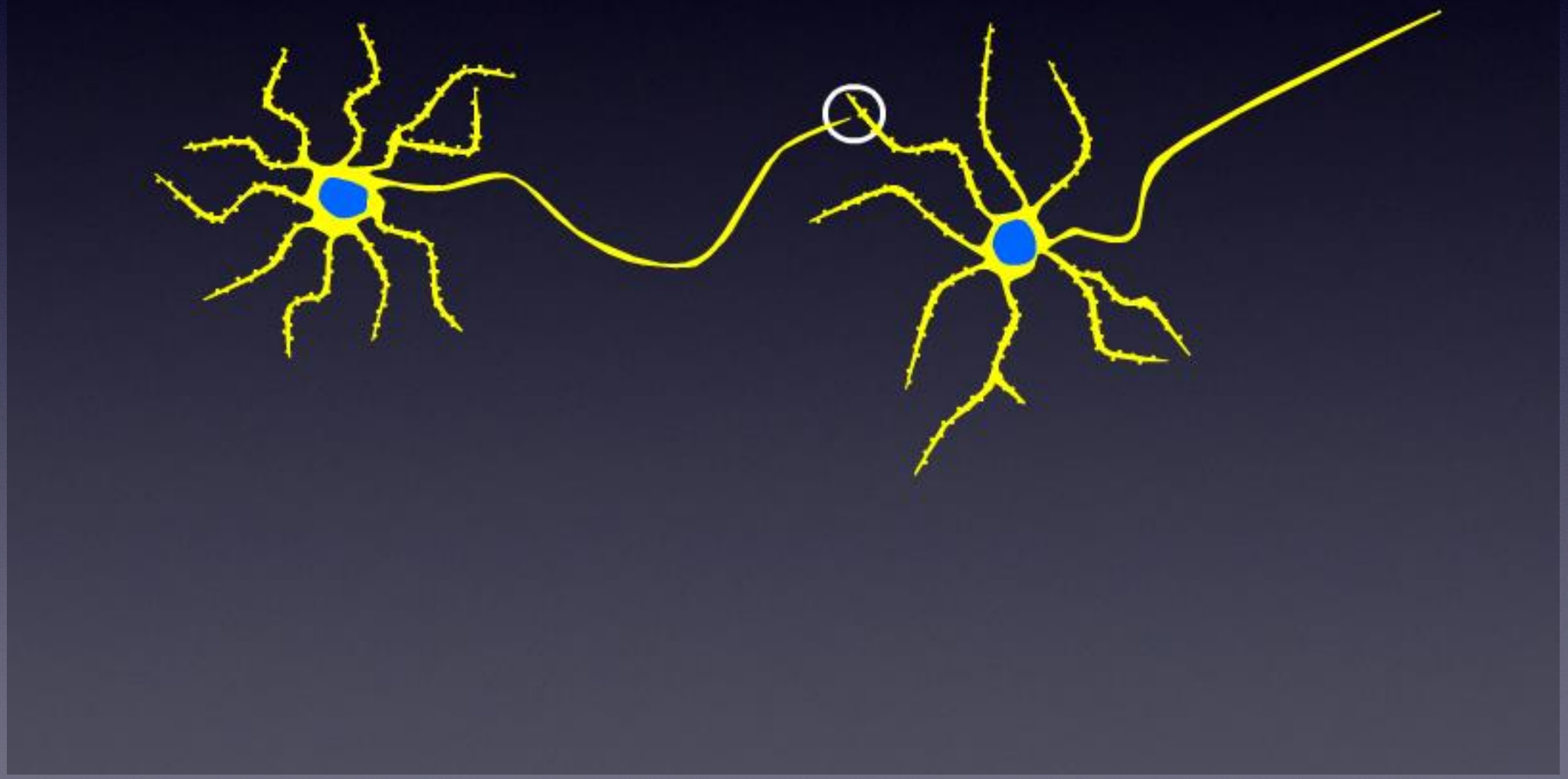


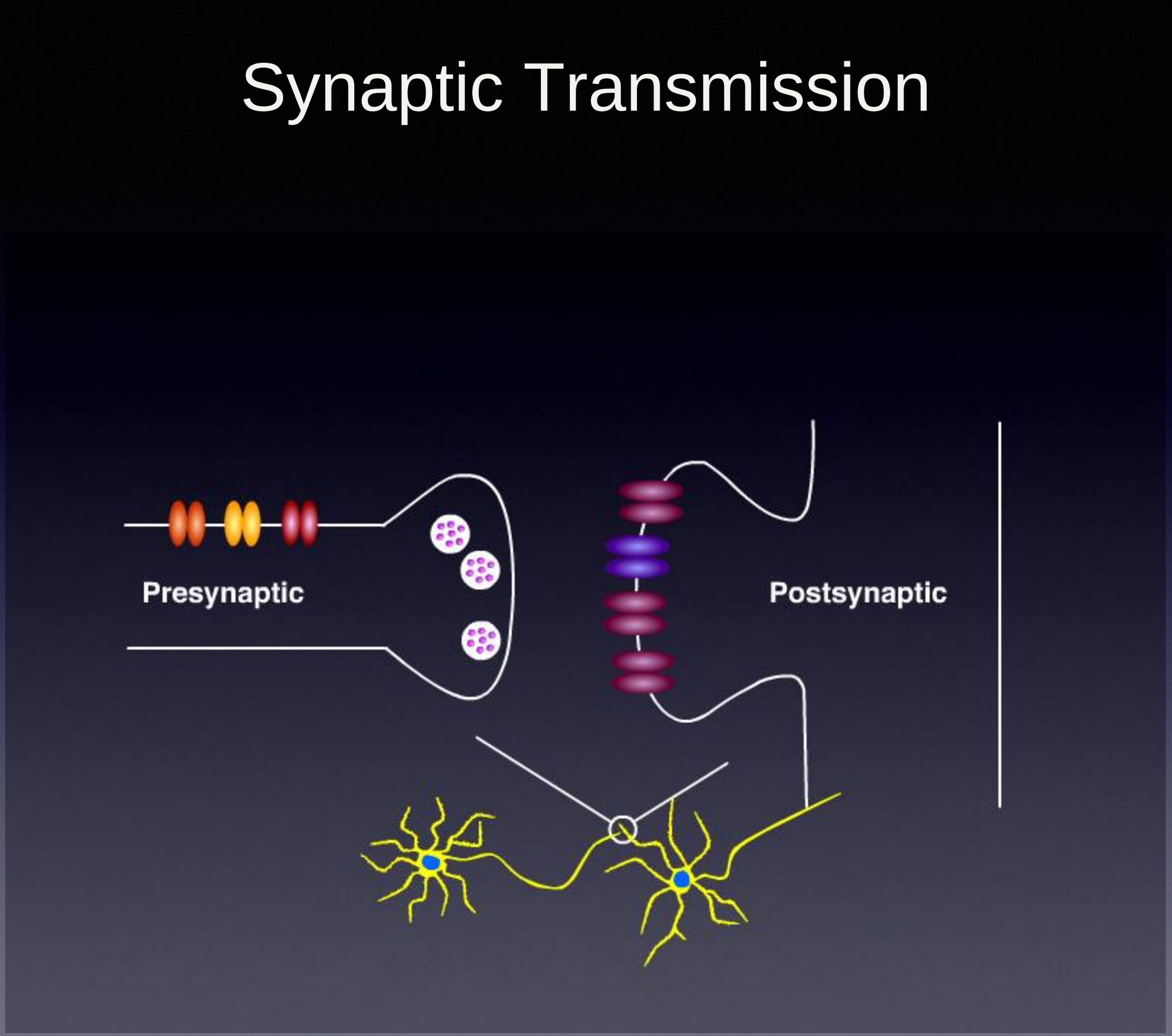
The Brain is a Network of 100 Billion Neurons

The Brain is a Network of 100 Billion Neurons that Form Millions of Neuronal Circuits

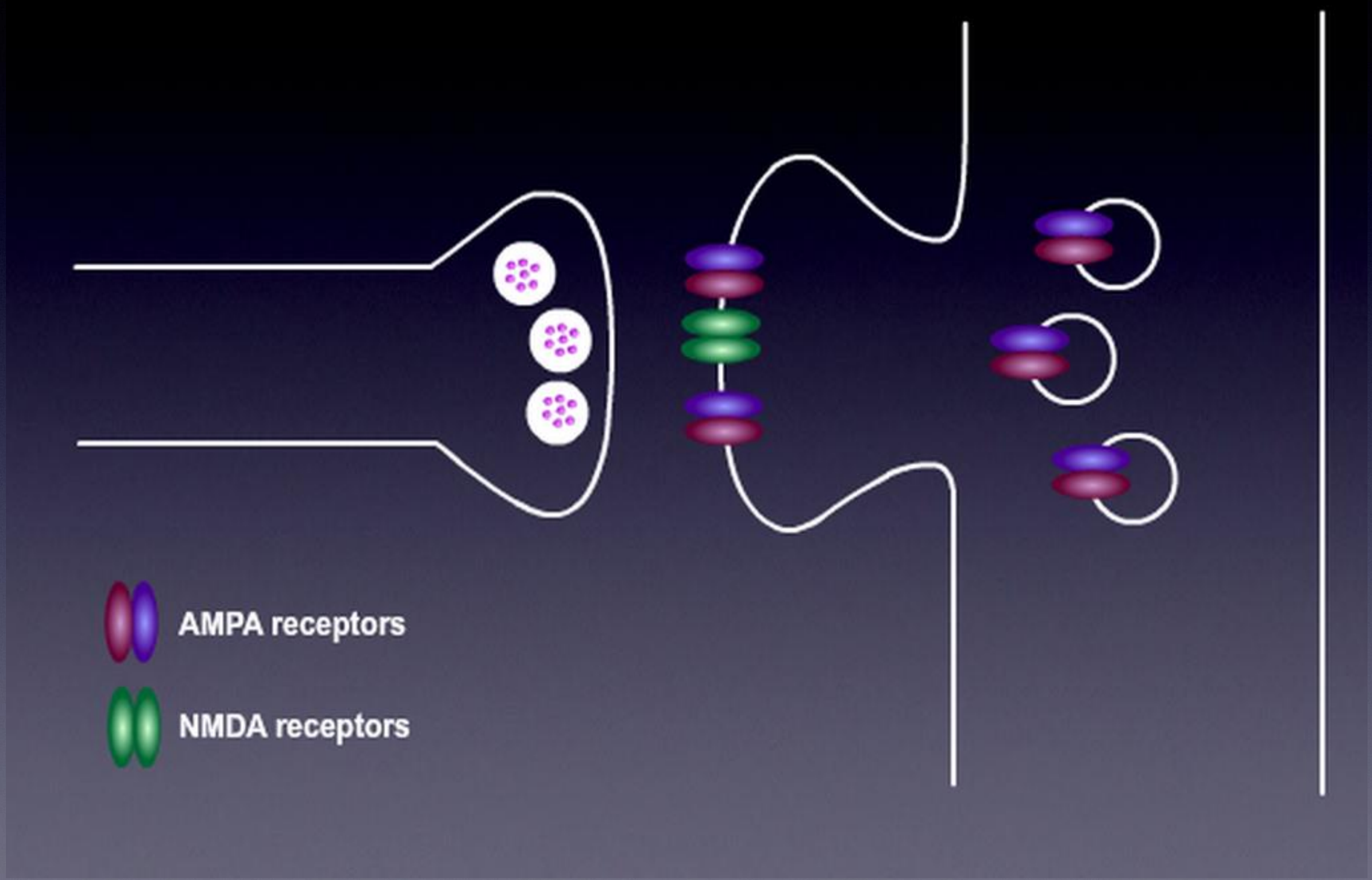
The Brain has Quadrillions of Synapses



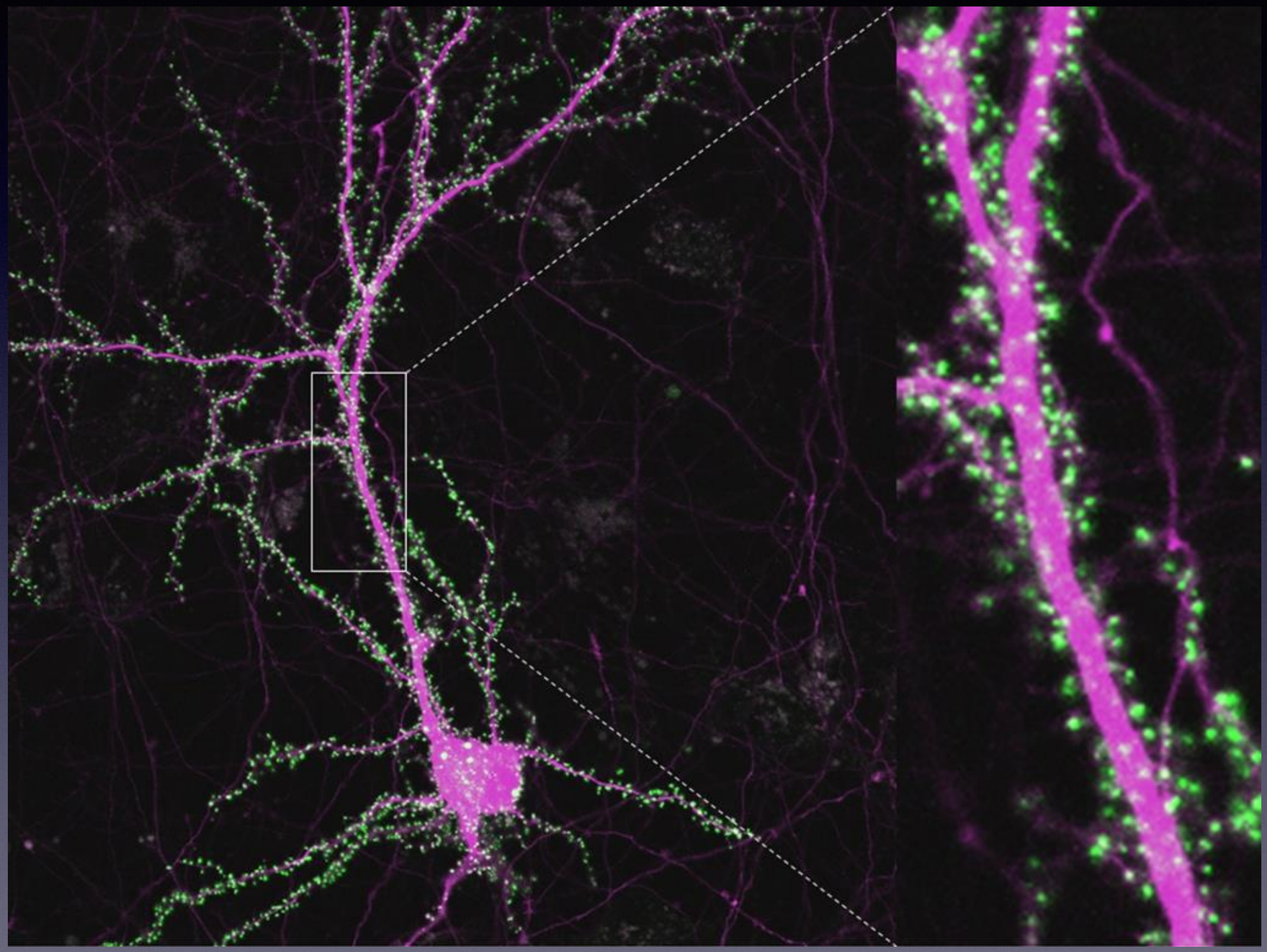
Synaptic Transmission



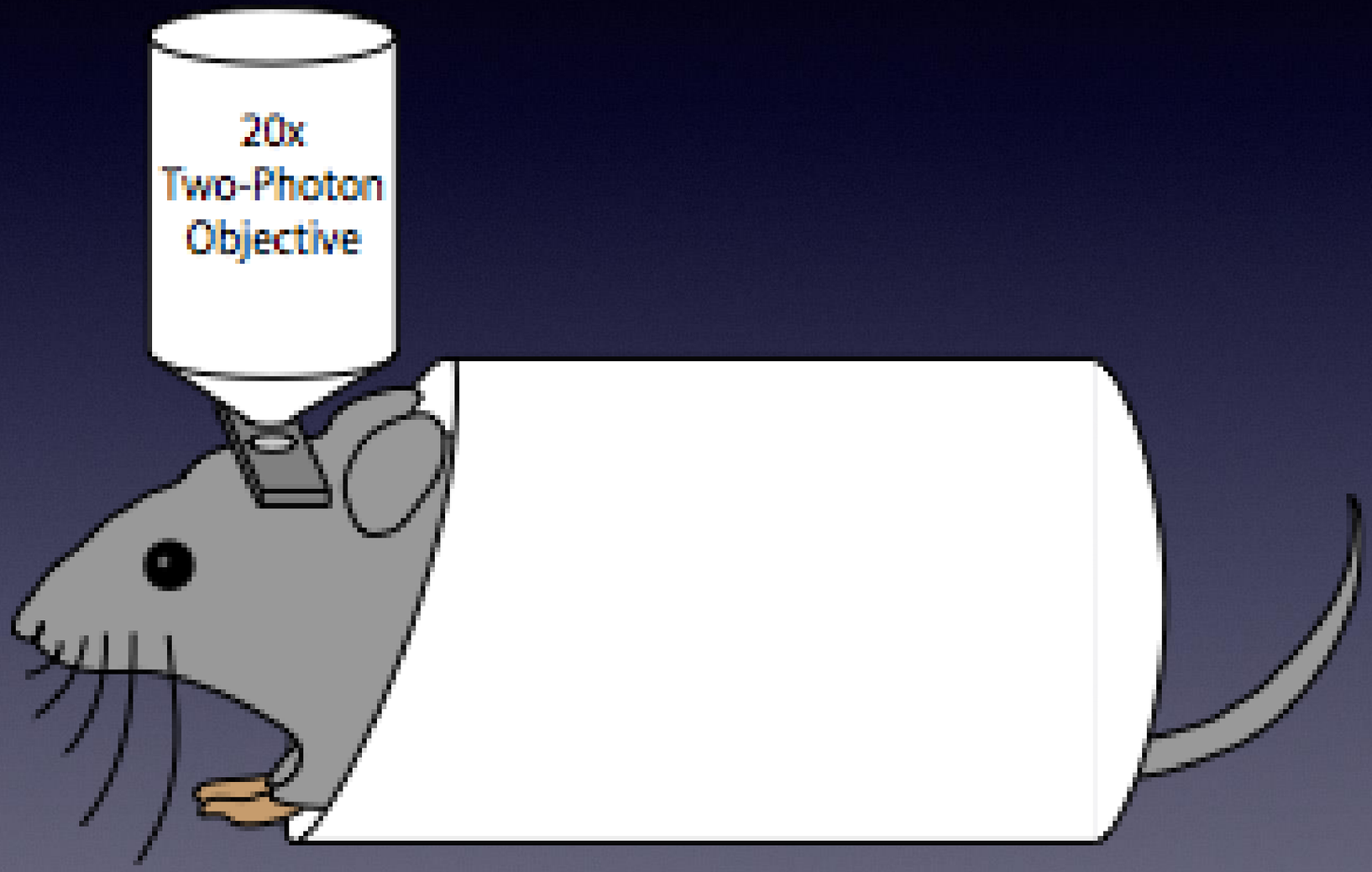
Long-Term Potentiation: Learning and Memory



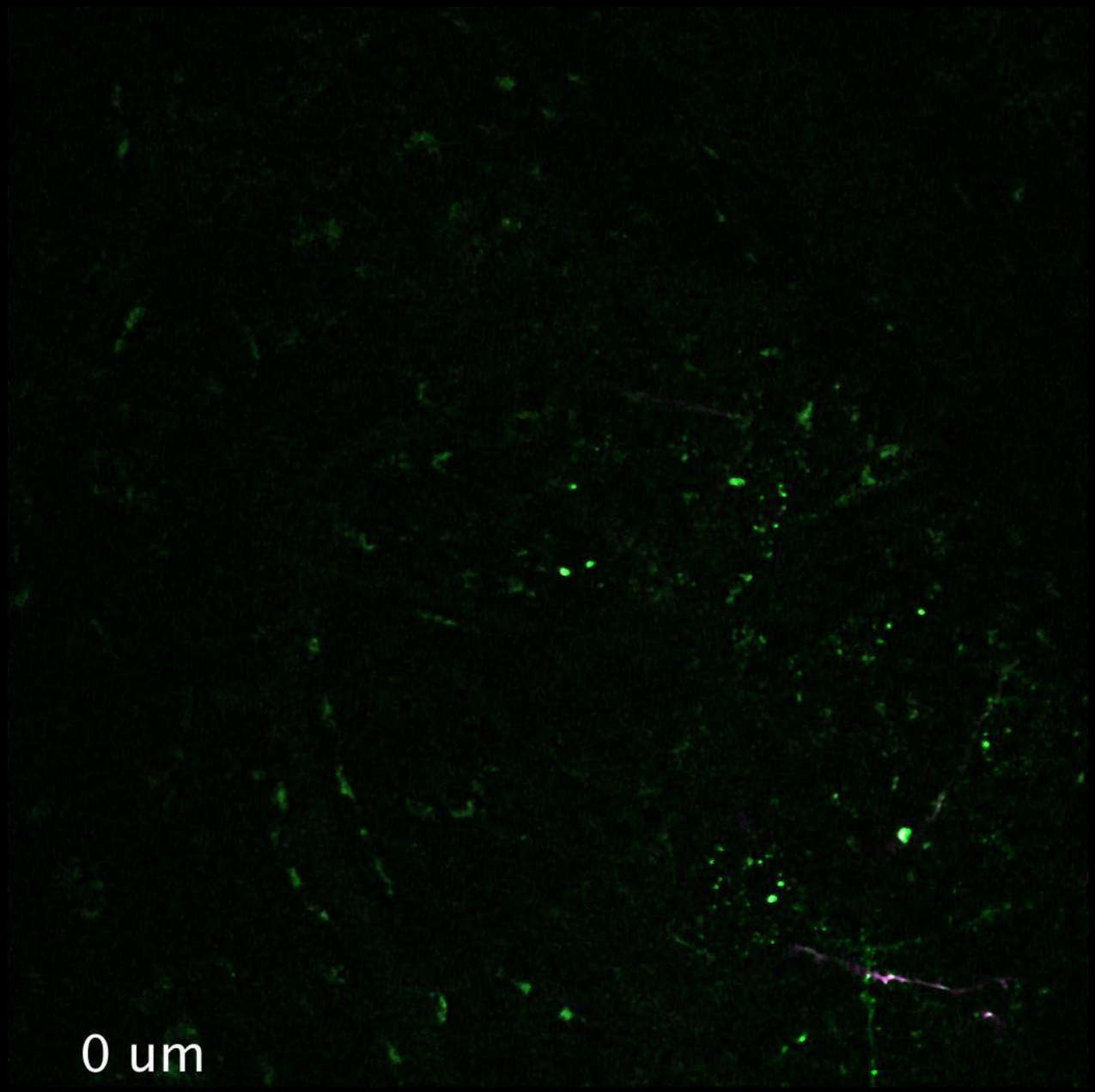
Visualizing Receptors in Neurons in a Dish



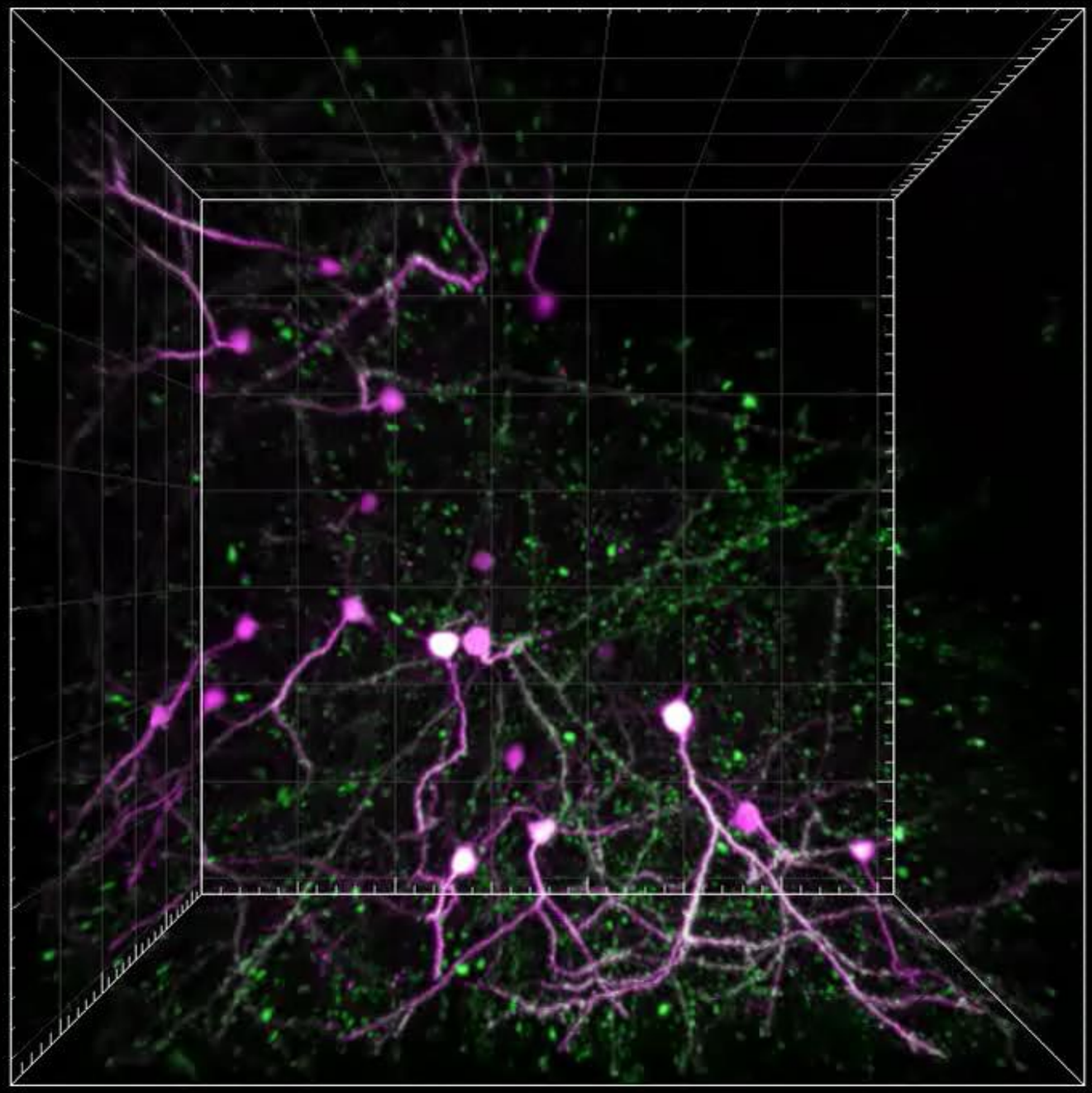
Visualizing Receptors in Neurons in a Live Mouse



Visualizing Receptors in Neurons in a Live Mouse



Visualizing Receptors in Neurons in a Live Mouse

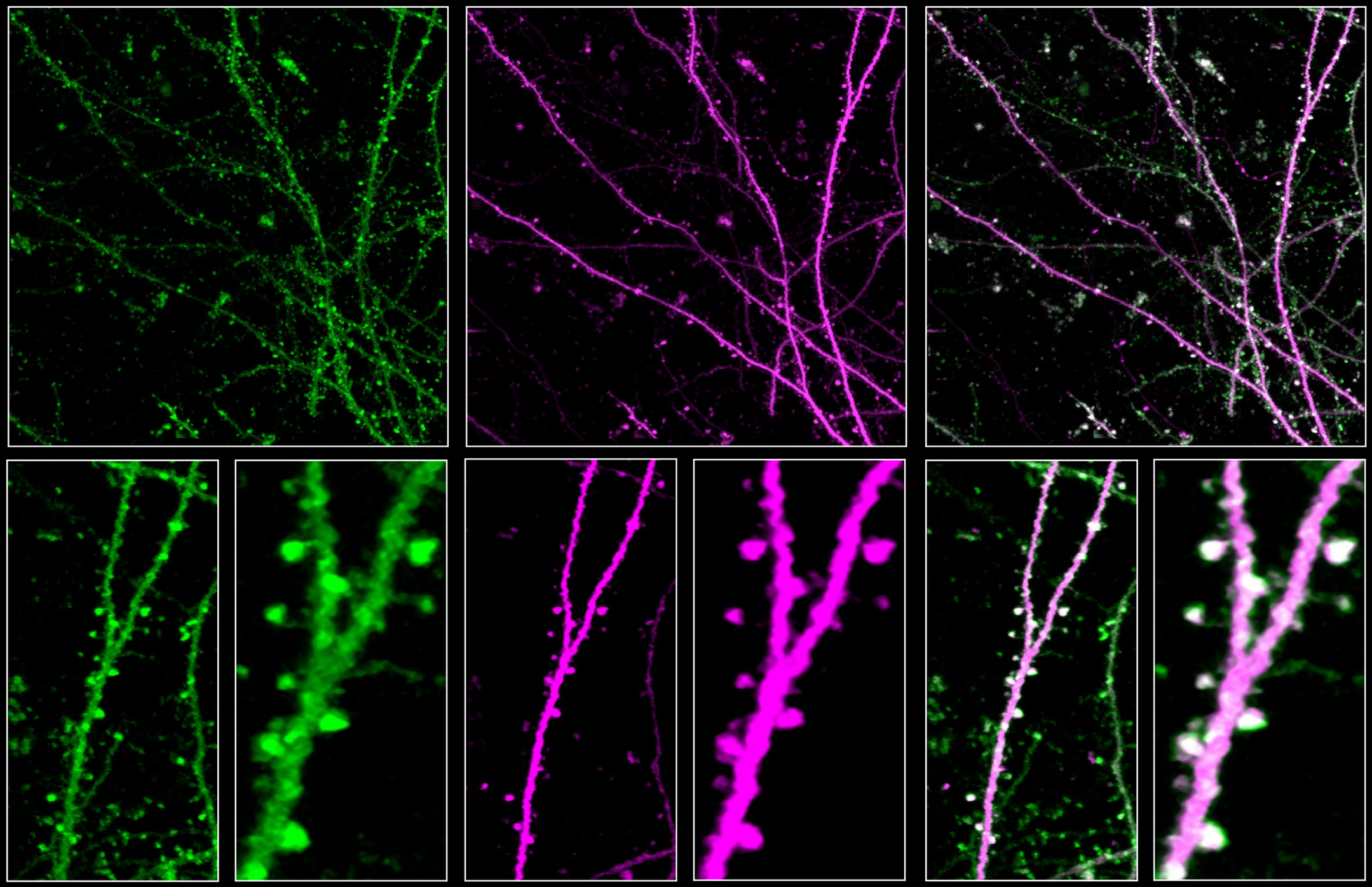


Visualizing Receptors in Neurons in a Live Mouse

Receptors

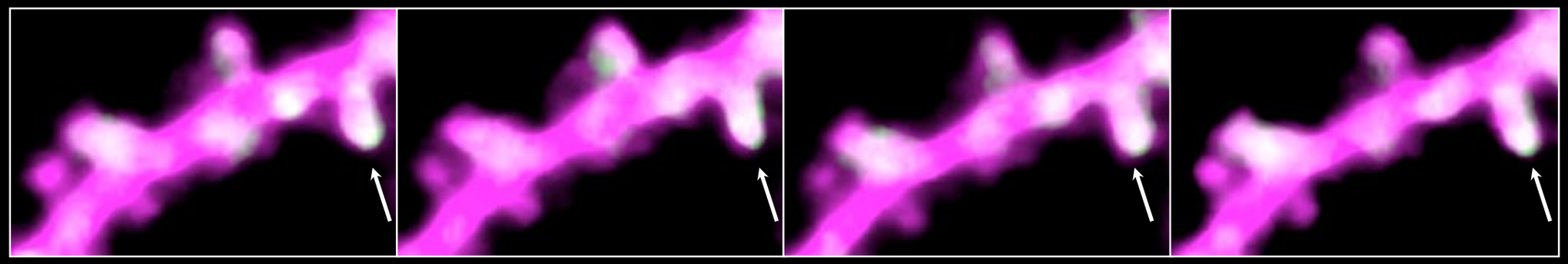
Structure

Merged

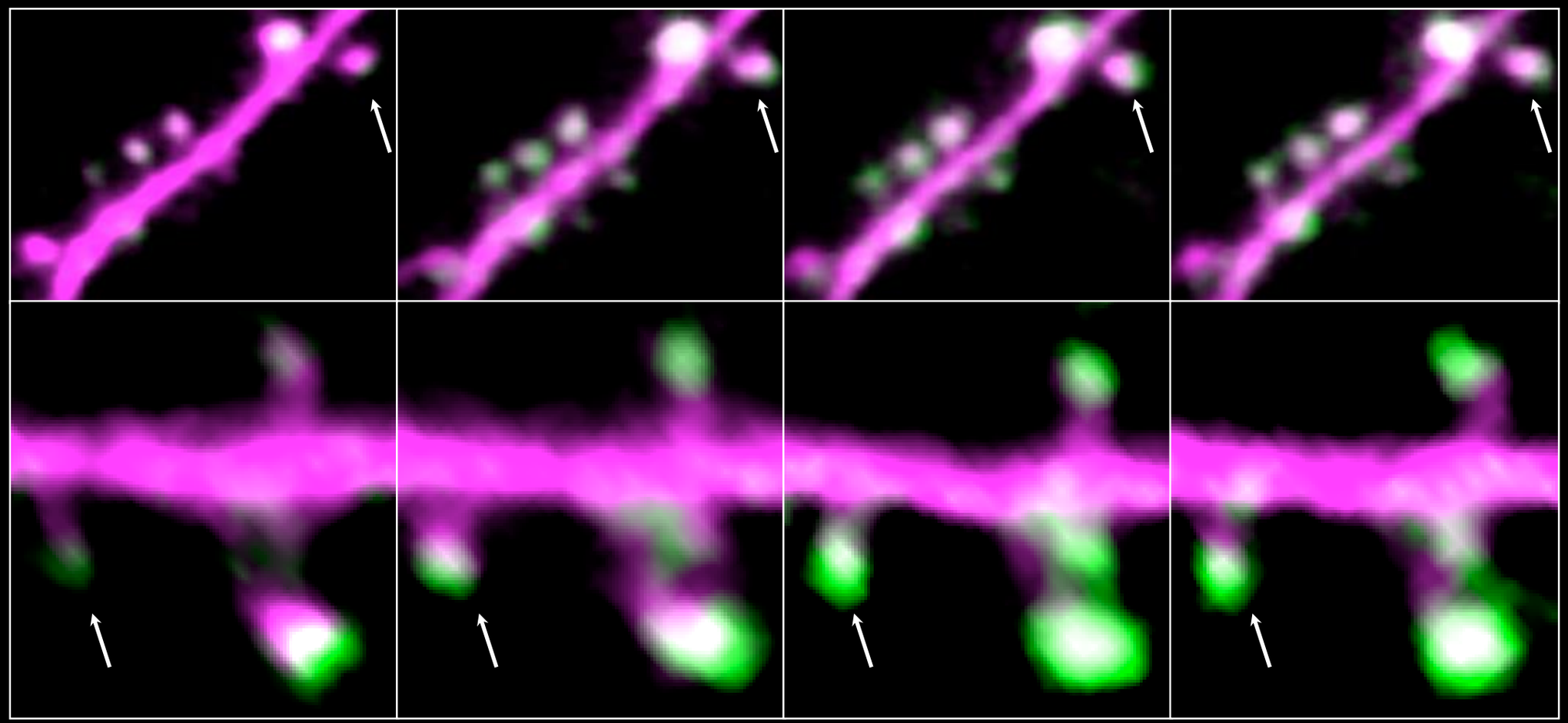


Visualizing Long Term Potentiation in a Live Mouse

Control

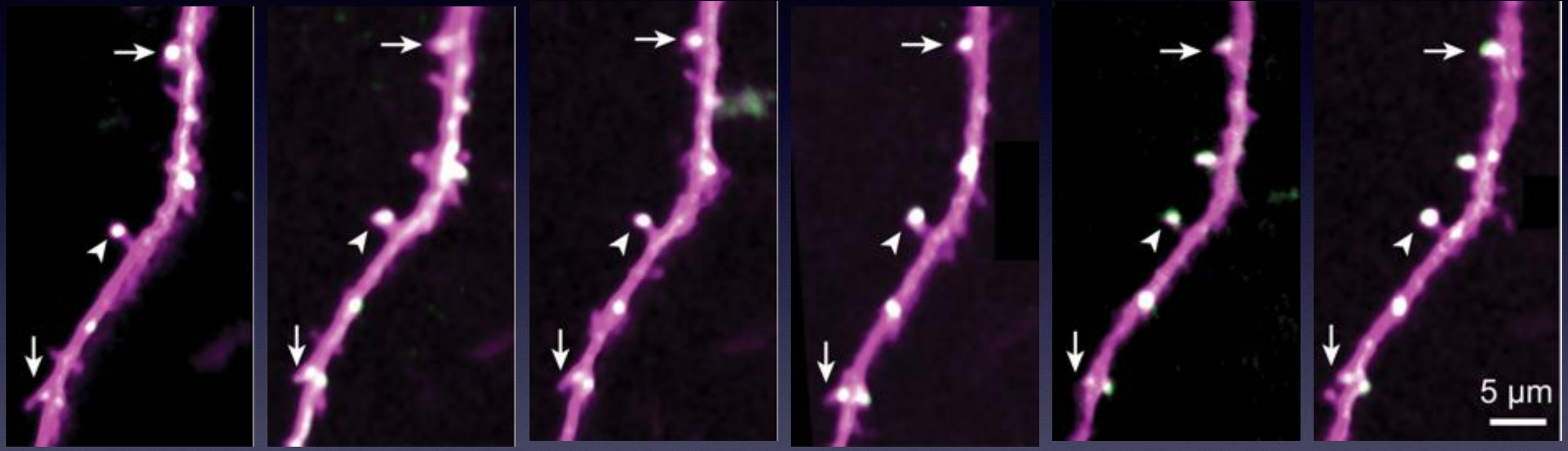


Learning



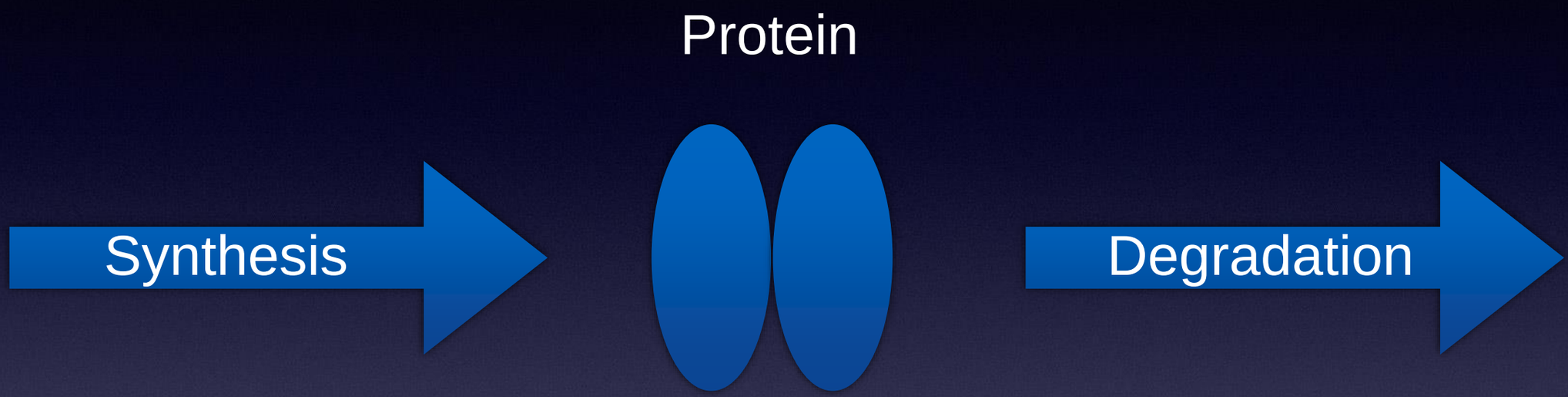
0 hour | 1 hour | 2 hour | 3 hour

Visualizing Stable Strong Synapses in a Live Mouse



Day 1 Day 4 Day 7 Day 14 Day 14 Day 28

Protein Stability is Determined by Degradation Rate

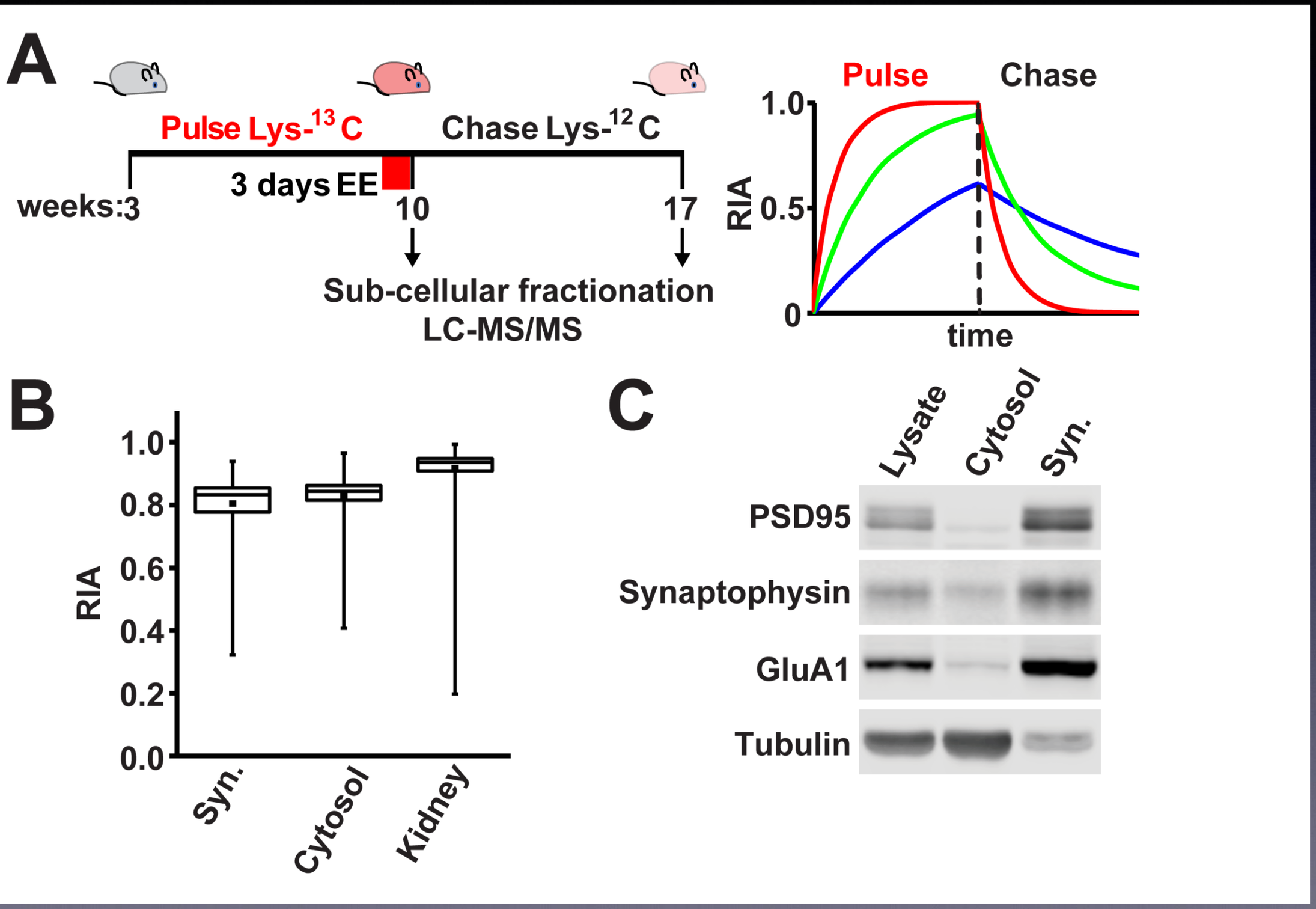


Most Proteins last 1-7 days

Collagen (cartilage) and Crystallin (eye lens) last decades ~ 100 years

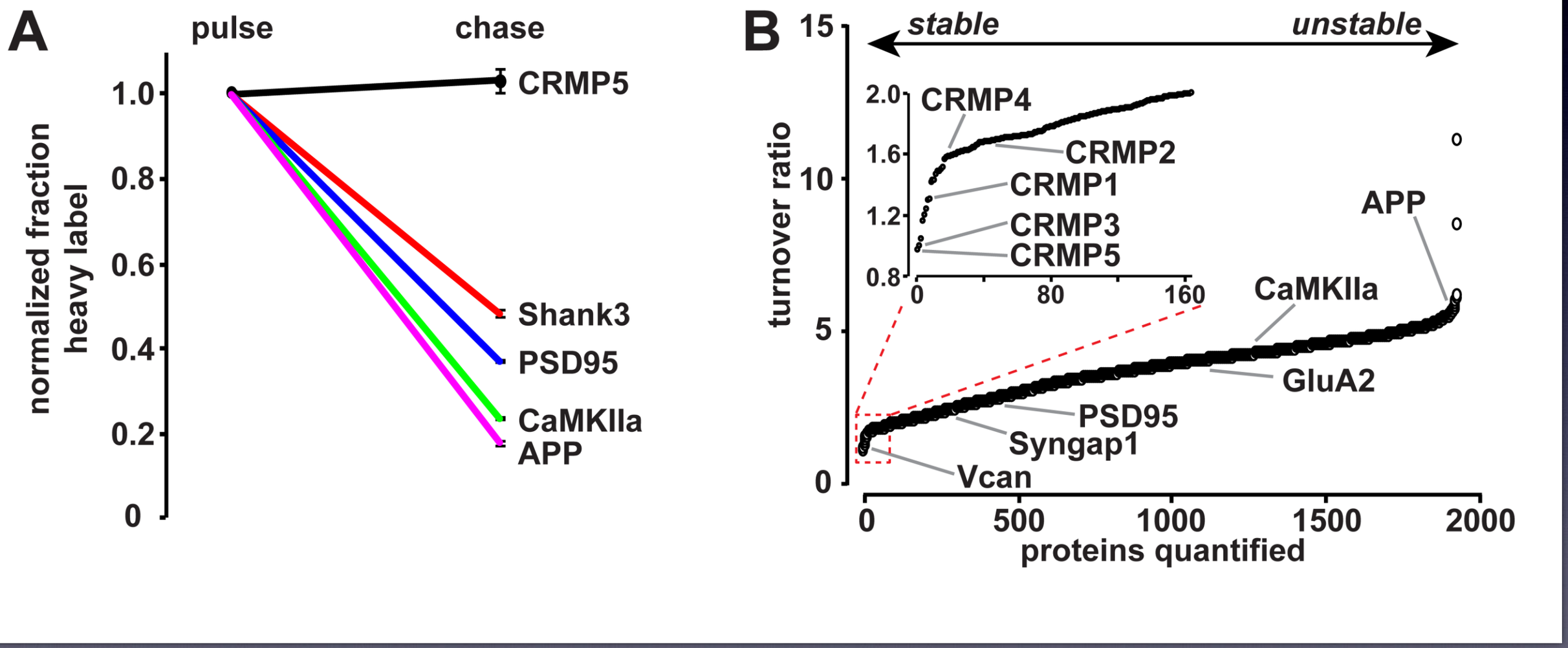
Are there Long Lived Proteins in Synapses?

Stable Isotope Labeling in Mice: SILAM



Seok et al., PNAS, April 2, 2018

Pulse/Chase Heavy and Light IsotopeAbundance is Used to Measure Protein Turnover



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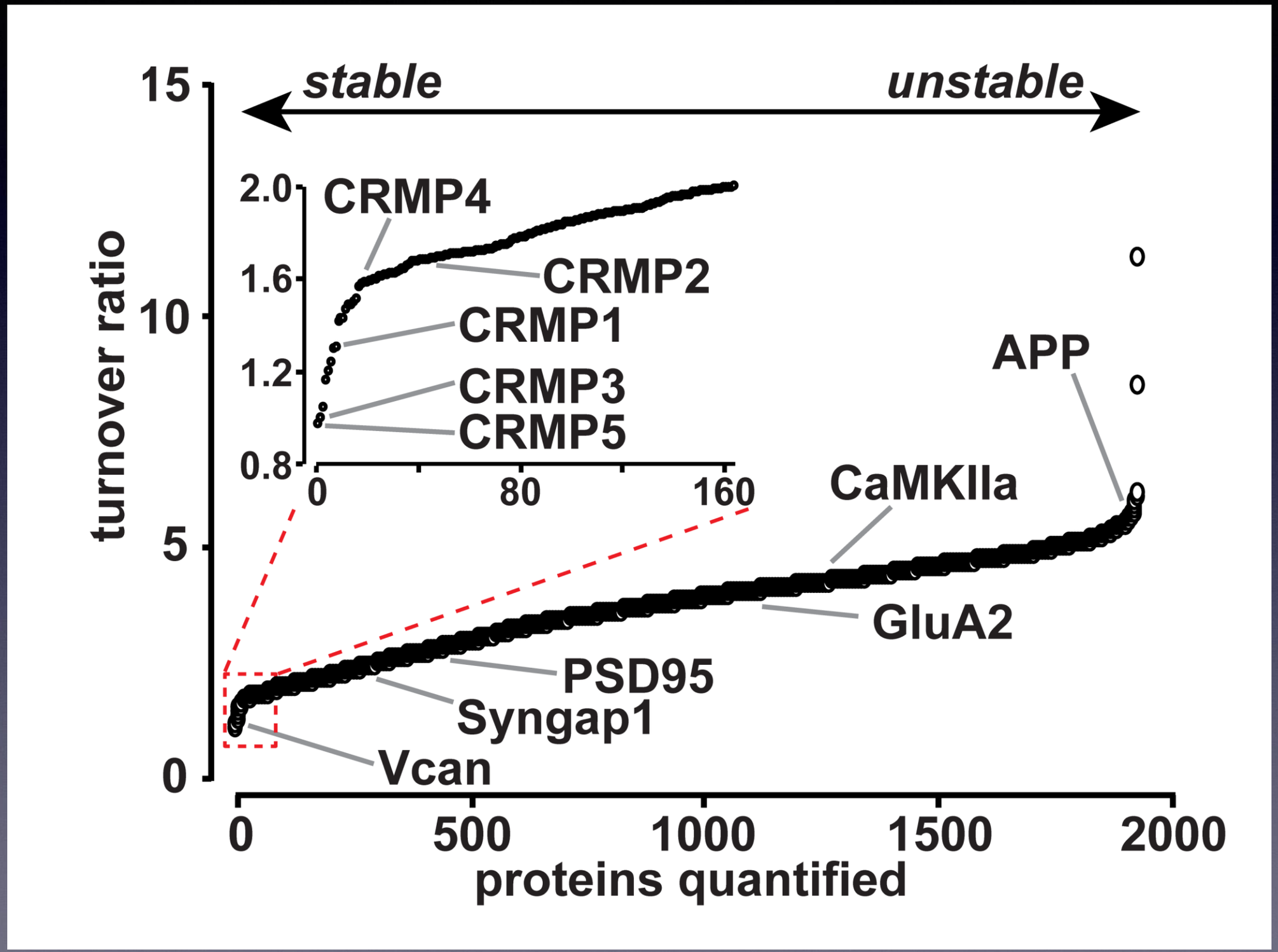

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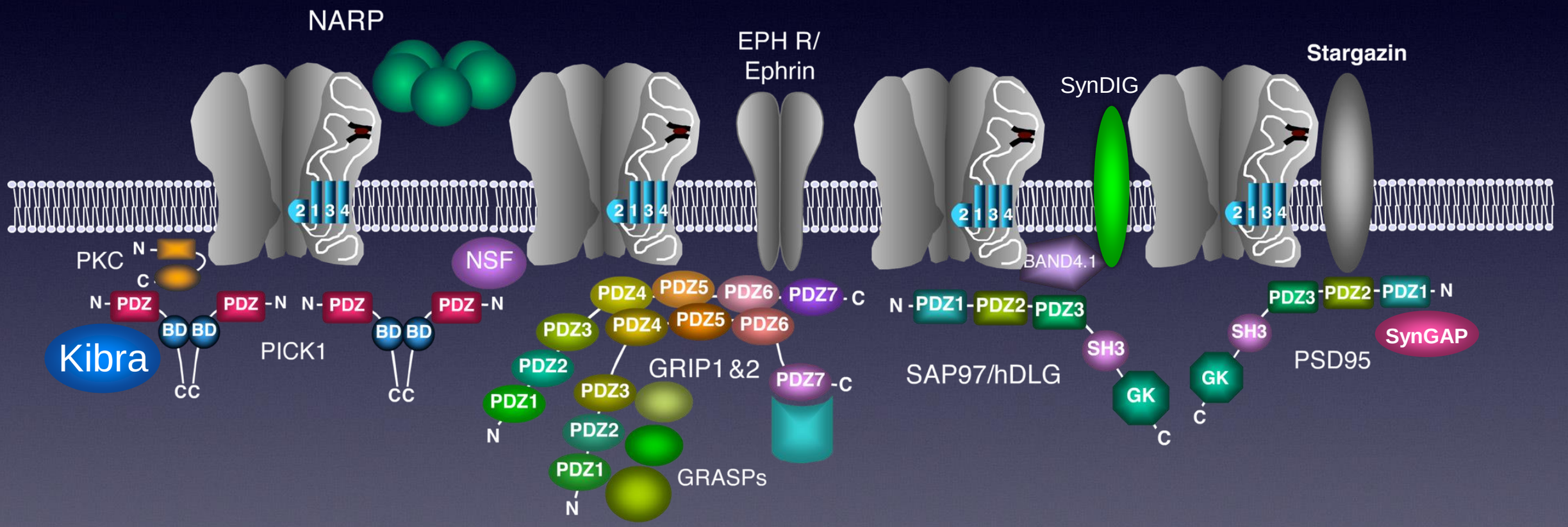
What Happens to Long Lived Proteins Over Time?

Does Damage to Synaptic Long Lived Proteins Contribute to Age Related Memory Disorders?

Regulation of Receptors and Cognitive Function



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