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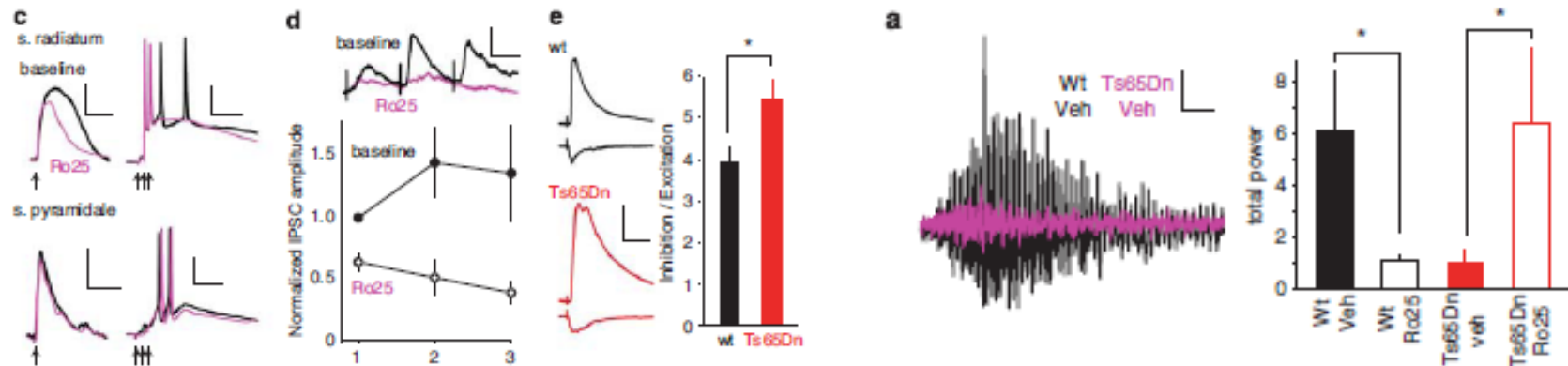
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Research interests of Qiang Zhou

- Biological basis of neurodegenerative diseases and psychiatric disorders and their therapy
- Contribution of inhibition to nervous system function and diseases
- Synaptic transmission, plasticity and their contribution to neurological disorders
- Organization of neural circuitry and its contribution to neurodegenerative diseases and psychiatric disorders
- Epigenetic regulation of neuronal functions and diseases
- Use of combined electrophysiological recording and fluorescence imaging in studying neuronal functions

Contribution of inhibition and neural circuitry to neural functions and diseases



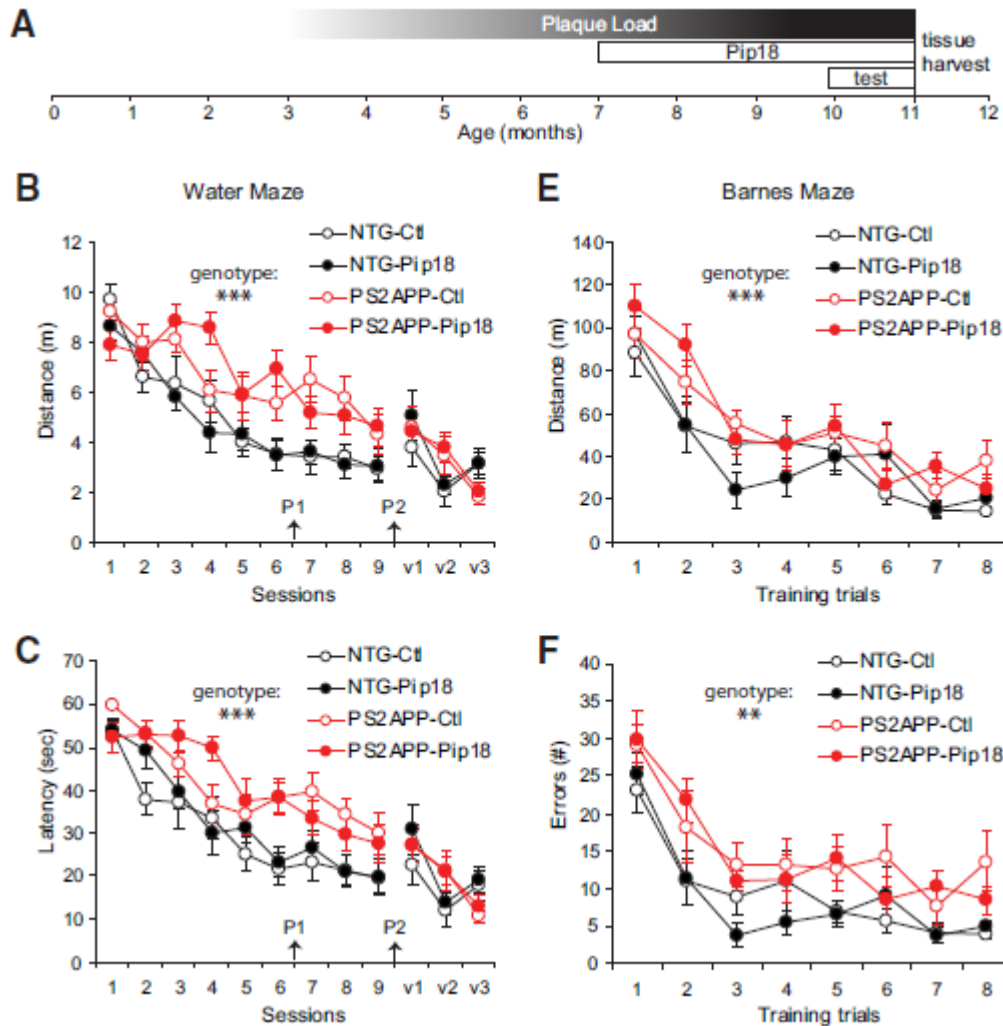
Hanson J et al., *Neuropsychopharmacology*. 38(7):1221-33, 2013.

- ✓ *Electrophysiological recordings (brain slices, in vivo)*
- ✓ *Disease models (neurodegenerative and psychiatric)*
- ✓ *In vitro readout of circuitry functions (e.g., oscillations)*
- ✓ *Effects of potential drugs (acute and chronic)*

See also - Hanson J, Deng L, et al., *J. Neurosci.* 33:5924-9, 2013

Cox CL et al., *Nature* 394: 478-482, 1998.

Testing chronic effects of drugs in disease models

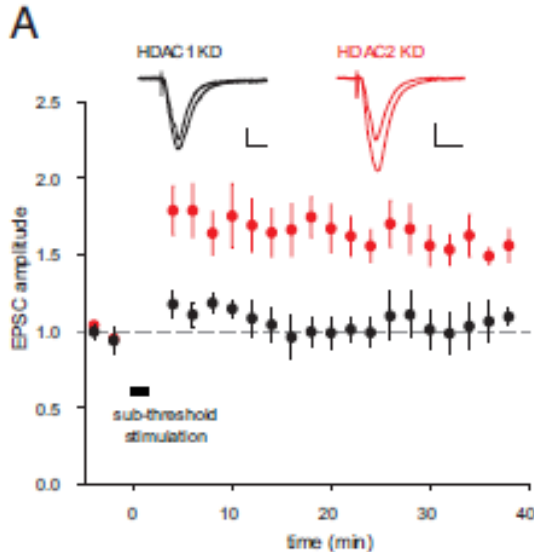


- ✓ Chronic testing drug effects in disease models
- ✓ Relevant animal functions (e.g., memory)
- ✓ Long-pursued and novel drug targets

Hanson J et al., *J. Neurosci.* 34: 8277 – 8288, 2014.

See also - Hanson J et al., *Neuropsychopharmacology.* 38(7):1221-33, 2013.

Epigenetic regulation of neural circuitry and neurological diseases



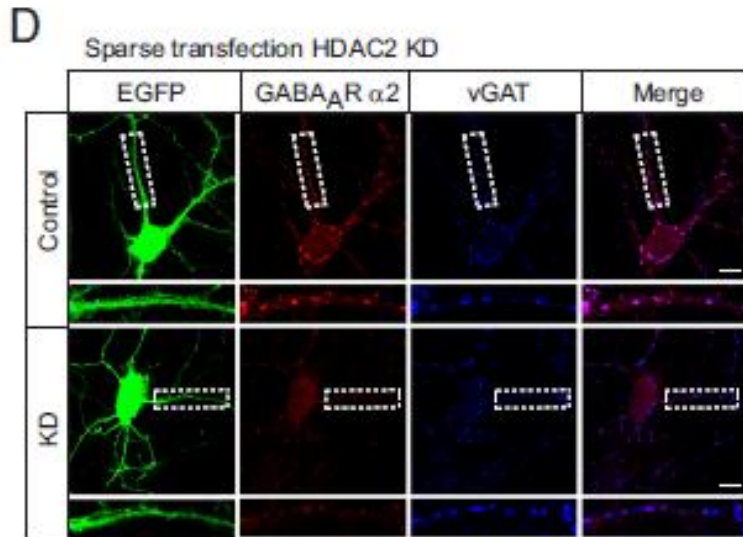
✓ Effects on synaptic transmission and plasticity

✓ Effects on inhibition and neural network balance

✓ Effects on animal behavior and functions

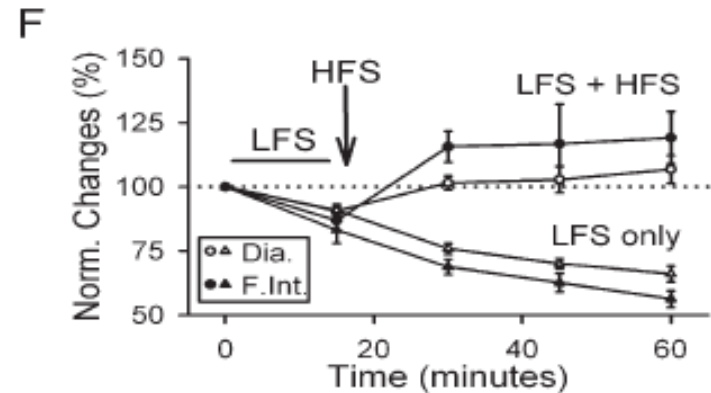
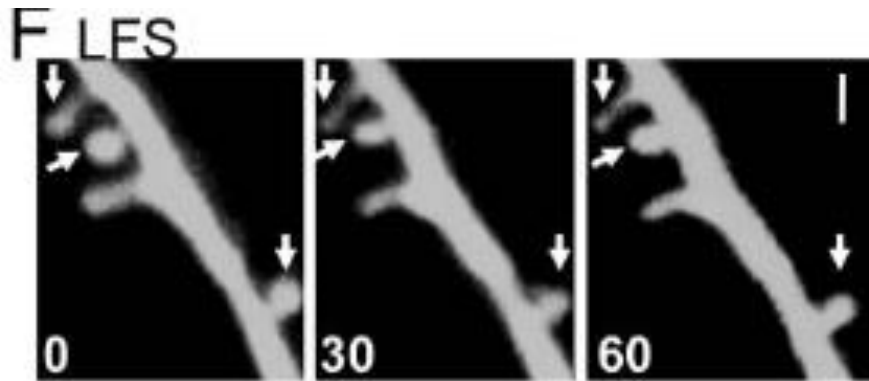
✓ New and novel agents for regulating epigenetic functions

See also - Hanson J et al., *Plos One*. 8: e69964, 2013.

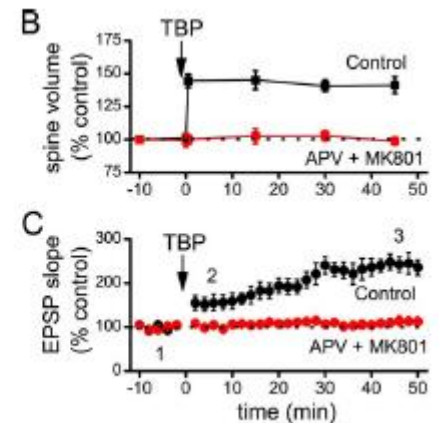
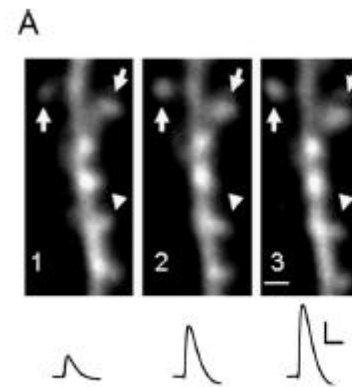
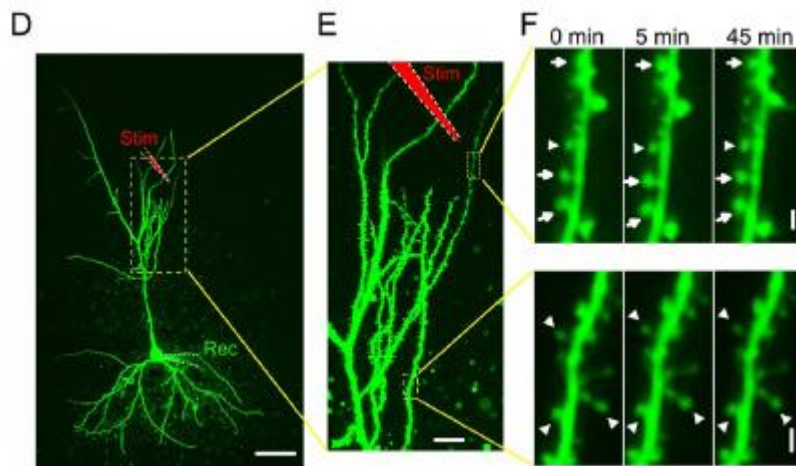


Synaptic and spine modifications

- in neural development, function and diseases



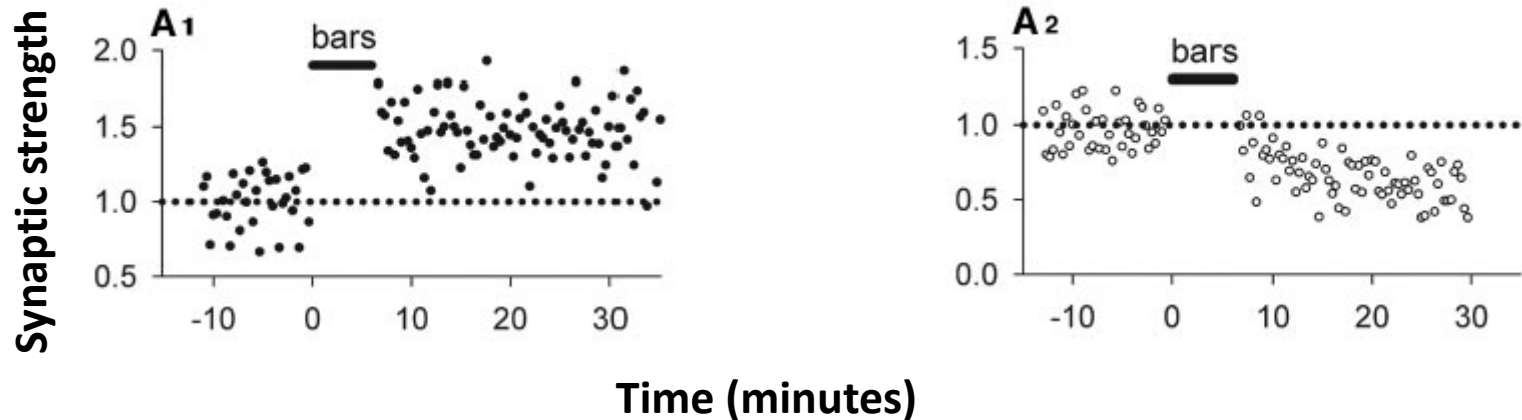
Zhou Q et al., *Neuron* 44:749-757, 2004.



Yang Y et al., *J. Neurosci.* 28:5740-51, 2008.

Synaptic and spine modifications

- in neural development, function and diseases



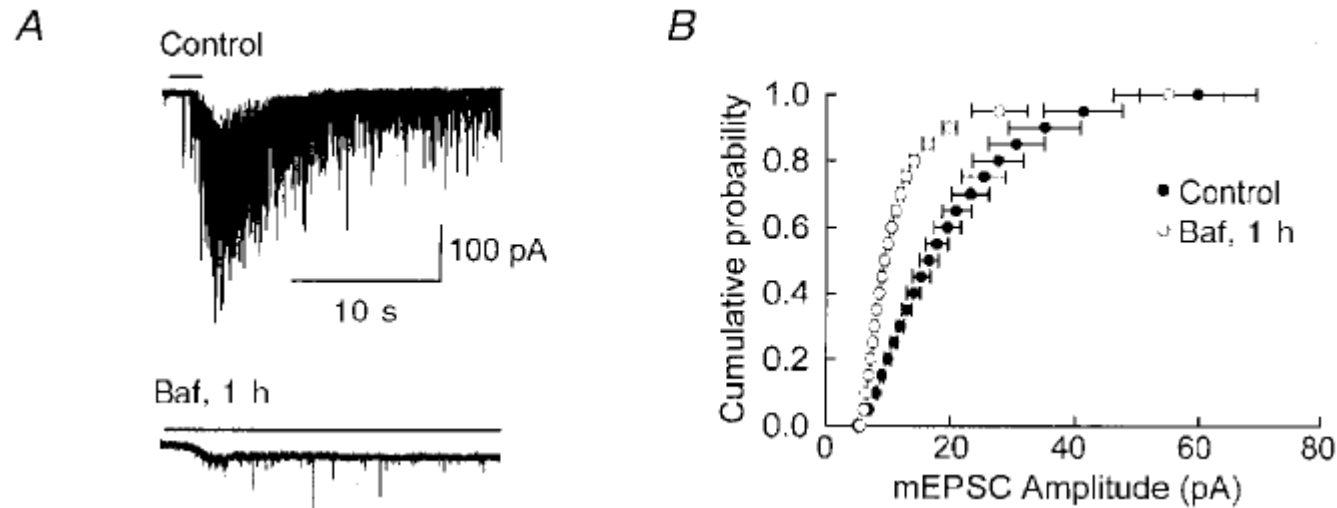
Zhou Q et al., *Science* 300, 1953-1957, 2003.

- ✓ *In vitro* and *in vivo*
- ✓ *Functional significance*
- ✓ *Disease relevance*
- ✓ *Biological mechanisms*

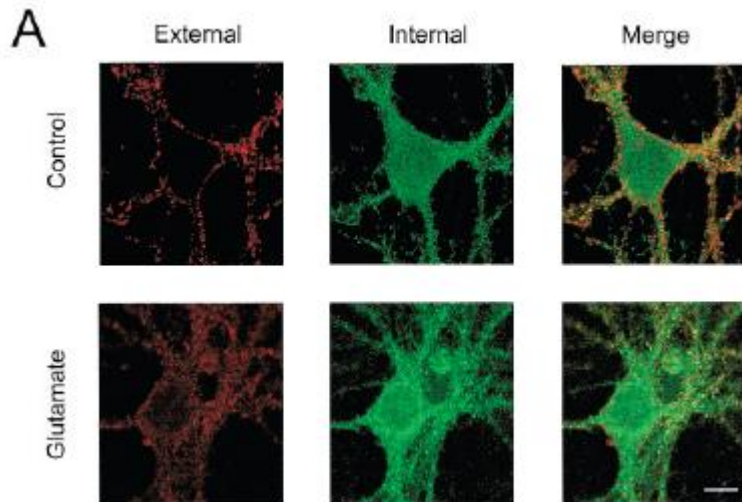
See also

- Wang X et al., *J. Neurosci.* 27:12419-29, 2007.
- Yang Y et al., *PNAS.* 105: 11388-11393, 2008.
- Wang X et al., *PNAS* 105:19520-19525, 2008.
- Yang y et al., *PNAS* 107: 11999-2004, 2010.
- Bozdagi O et al. *J Neurosci.* 30: 9984-9, 2010.
- Bozdagi O et al., *Mol Autism.* 1(1):15, 2010.

Basic mechanisms of synaptic transmission and its role in neuronal diseases



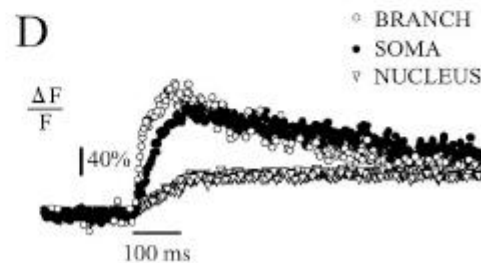
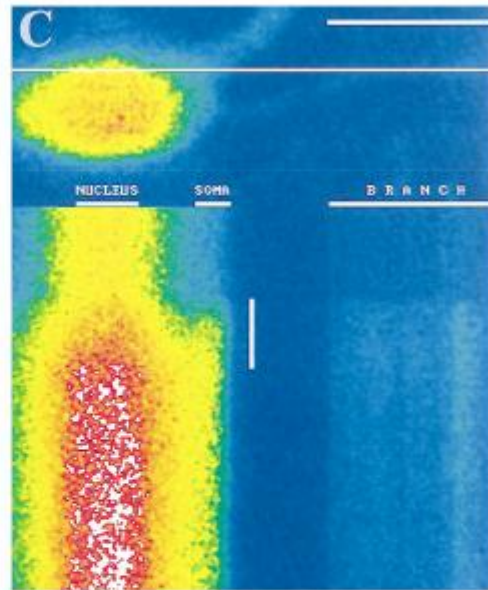
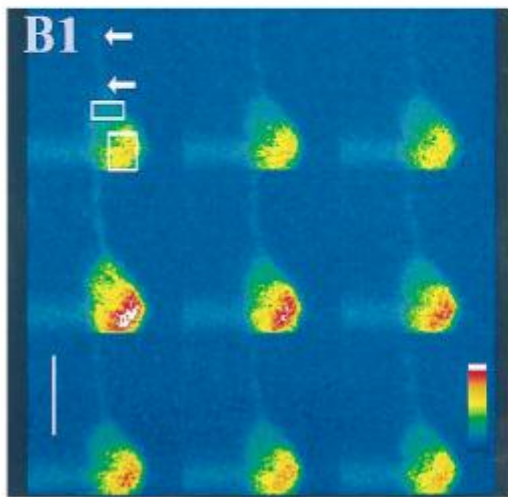
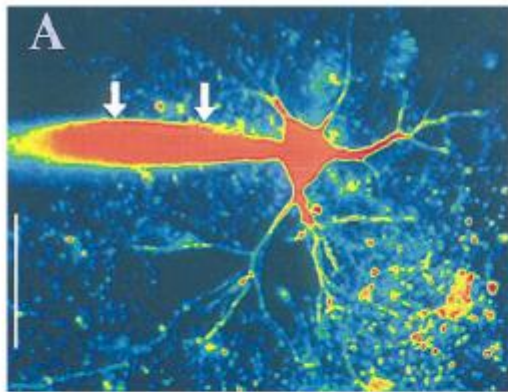
Zhou Q et al., *J. Physiology* 525 (1):195-206, 2000.



- ✓ *In vitro* and *in vivo*
- ✓ Functional significance
- ✓ Disease relevance
- ✓ Biological mechanisms

Zhou Q et al., *Proc. Natl. Acad. USA*. 98: 1261-1266, 2001.

Combining electrophysiological recording with fluorescence imaging



Combined with

- Ca²⁺ imaging
- Voltage-sensing
- Imaging structural changes

In vivo and *in vitro*

to study

- Basic biology
- Disease mechanisms

Zhou Q et al., *J. Neurophysiol.* 77: 2816-2825, 1997.

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