

Xue-Mei Song Ph.D.

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Education/Career

- **Associate Professor Visual Neuroscience (Sep. 2015 - now)**

Member of the research group of Prof. Anna Wang Roat ZIINT

- **Associate Investigator Visual Neuroscience (Dec.2010–Aug. 2015)**

Member of the research group of Prof. Chao-Yi Li at the Shanghai Institutes of Biological Sciences

- **Research Assistant Visual Neuroscience (June2007 – Dec.2010)**

Member of the research group of Prof. Chao-Yi Li at the Shanghai Institutes of Biological Sciences

- **Ph.D. Neurobiology (Sept. 2000 - June 2007)**

Shanghai Institutes of Biological Sciences, Chinese Academy of Sciences, Shanghai, China

Area of Research: Visual Neuroscience

Title of Ph.D. dissertation: Contrast-dependent and contrast-independent spatial summation of primary visual cortical neurons of the cat

Supervisor: Chao-Yi Li, Senior Investigator

● **Teacher Physiology and Anatomy (Sept.1993 - June 2000)**

Zibo Health School, Zibo, China

● **B.Sc. Biology Education (Sept.1989 – June1993)**

Qufu Normal University, Qufu, China

Experience

● **Research Experience**

1. Using the methods of single-unit recordings and juxta-cellularly labeling, I recorded 48 V1 neurons and successfully labeled 21 cells. I found that all labeled contrast-dependent (CD) cells were pyramidal cells, whereas all labeled contrast-independent (CID) cells were non-pyramidal cells. An account of the work with the title “Contrast-dependent and contrast-independent spatial summation of primary visual cortical neurons of the cat” was published in *Cerebral Cortex* (Song and Li, 2008).
2. Using an in vivo whole-cell recording technique (Zhu et al., *Cerebral Cortex*, 2002), we published a paper (with myself as co-first-author) describing the morphological bases of suppressive and facilitative spatial summation of striate cortical neurons (Song et al., *PLOS ONE*, 2010). We found that, although both the suppressive and facilitative neurons are mostly pyramidal cells, the two types of cells, do, however, clearly differ in terms of size of soma, in complexity of dendrite branching, spine size and density, and in the range of innervations of the axon collaterals.
3. Using in vivo intracellular recording and an injection technique, combined with the technique of immunocytochemistry, we studied the

immunocytochemical features of the facilitatory extra-receptive field (F-ERF) and inhibitory extra-receptive field(I-ERF) neurons in cat primary visual cortex. Significant differences were found in neurotransmitter receptors between the two types of neurons. F-ERF neurons have more Glu2/3 receptors and less GABA_A receptors on the surface of proximal dendrites and cell body, and the reverse was true for I-ERF neurons. Parts of the results were published as an abstract for a conference (the 7th Asia-pacific Conference on Vision, 15-18 July 2011, Hong Kong).

4. I assisted Prof. Li in supervising a postgraduate student completing a study and became the co-corresponding author for the publication (Xu et al., *PLOS ONE*, 2013).
5. I was also a major contributor to two further recent publications (Chen, Song and Li, *Cerebral Cortex*, 2013; Chen et al., *Vision Research*, 2014).
6. Using single-unit recording combined with local field potential analysis and intrinsic optical imaging technique, we found a spatial summation substructure which is embedded within the traditional pinwheel-like-orientation columns of the primary visual cortex. The work will be submitted for publication soon.
7. Although my work has primarily been carried out on anesthetized cats, I have also taken part in studies using awake and anesthetized monkeys.

- **Teaching Experience**

I have 7 years' experience of teaching. I taught physiology and anatomy at Zibo Health School during the period from 1993 to 2000.

- **Administrative Experience**

I also served as Prof. Li's academic secretary whilst working at SIBS.

Research papers

1. **Song XM, Li CY* (2008)** Contrast-dependent and contrast-independent spatial summation of primary visual cortical neurons of the cat. *Cereb Cortex* 18: 331-336.
2. **Song XM, Wang Y, Zhu Z, Li CY*(2010)** Morphological bases of suppressive and facilitative spatial summation in the striate cortex of the cat. *PLOS ONE* 5, e15025.
3. Yin Yu, **Song XM*(2011)** Optical imaging signal processing with adaptive median filtering. *ACTA BIOPHYSICA SINICA* 27:635-642.
4. Chen Ke, **Song XM*(2012)** The contrast response function of the inhibitory extra-receptive field cells. *ACTA BIOPHYSICA SINICA* 28:146-156.
5. Ke Chen, **Xue-Mei Song**, Chao-Yi Li*(2013) Contrast-dependent variations in the excitatory classical receptive field and suppressive non-classical receptive field of cat primary visual cortex. *Cereb Cortex* 23: 283-292.
6. Tao Xu, Ling Wang, **Xue-Mei Song ***, Chao-Yi Li * (2013) The detection of orientation continuity and discontinuity by cat V1 neurons. *PLOS ONE* 8, e79723.
7. Ke Chen*, **Xue-Mei Song** , Zheng-Qiang Dai , Jiao-Jiao Yin , Xing-Zhen Xu , Chao-Yi Li.(2014) The spatial summation characteristics of three categories of V1 neurons differing in non-classical receptive field modulation properties. *Vision Research* 96:87-95.
8. CHEN Ke*, YIN Jiao-Jiao, **SONG Xue-Mei.(2015)** Receptive field properties of different spatial integrated cells in cat V1. *Progress in Biochemistry and Biophysics* 42: 182-188.

9. Tao Xu, Hong-Mei Yan, **Xue-Mei Song***, Ming Li. (2015) Orientation selectivity in cat primary visual cortex: local and global measurement. *Neuroscience Bulletin* 31(5): 561-571. (cover paper)
10. Tao Xu, Hong-Mei Yan, **Xue-Mei Song***, Ming Li, Yong-Jie Li. (2015) Silent suppressive surrounds and optimal spatial frequencies of single neurons in cat V1. *Neuroscience Letters* 597: 104-110.