BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.

NAME: CHEN, KE

eRA COMMONS USER NAME (credential, e.g., agency login): CHENKE0703

POSITION TITLE: Assistant Scientific Investigator

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Huazhong University of Science and Technology, Wuhan, Hubei	B. Eng	09/2003	Biomedical Engineering
University of Electronic Science and Technology of China, Chengdu, Sichuan	M. Eng	03/2006	Biomedical Engineering
University of Electronic Science and Technology of China, Chengdu, Sichuan	D. Eng	06/2012	Biomedical Engineering
City University of Hongkong, HongKong	Postdoctoral Fellow	12/2014	Visual Electrophysiology
City University of Hongkong, Hongkong	Senior Research fellow	07/2016	Visual Electrophysiology
The University of Arizona, COM-PHX	Assistant Scientific Investigator		Synaptic physiology, plasticity

A. Personal Statement

My current research interest is related to neural encoding, and dynamic integration properties of receptive field of the visual system. Previously, I worked on deciphering the classical and non-classical receptive fields in the cat visual cortex. Recently, my work focused on the reorganization pattern of the primary visual cortex in rodent models of retinal degeneration, investigation on the role of distinct risk genes on the emerging visual cortex circuit function, and utilizing the visual cortex to study the conserved circuit mechanisms that operate in the developing neocortex. I am experienced at applying single/multi- unit recording and intrinsic optical imaging combined with visual stimulus in dissecting cell type-specific functions in the cat or mouse primary visual cortex. In the past, my work has been supported by research grants from China Postdoctoral Science Foundation and from the Natural Science Foundation of China. Currently, I am working in Dr. Shenfeng Qiu's lab at the University of Arizona College of Medicine - Phoenix. We are using the mouse visual system as a gateway to understanding how cortical circuits are built by intrinsic developmental programs, shaped by experience, and disrupted by genes relevant to neurodevelopmental disorders.

1. **Chen K**, Wang Y, Liang X, Zhang Y, Ng TK, Chan LL. Electrophysiology Alterations in Primary Visual Cortex Neurons of Retinal Degeneration (S334ter-line-3) Rats. ***Sci Rep.*** 2016 May 26;6:26793. PubMed PMID: 27225415; PubMed Central PMCID: PMC4880896.
2. **Chen K**, Ding AM, Liang XH, Zhang LP, Wang L, Song XM. Effect of Contrast on Visual Spatial Summation in Different Cell Categories in Cat Primary Visual Cortex. ***PLoS One.*** 2015 Dec 4;10(12):e0144403. PubMed PMID: 26636580; PubMed Central PMCID: PMC4670232.
3. **Chen K**, Song XM, Dai ZQ, Yin JJ, Xu XZ, Li CY. The spatial summation characteristics of three categories of V1 neurons differing in non-classical receptive field modulation properties. ***Vision Res.*** 2014 Mar;96:87-95. PubMed PMID: 24508921.
4. **Chen K**, Song XM, Li CY. Contrast-dependent variations in the excitatory classical receptive field and suppressive nonclassical receptive field of cat primary visual cortex. ***Cereb Cortex.*** 2013 Feb;23(2):283-92. PubMed PMID: 22302117.

B. Positions and Honors

Positions and Employment

2009 - 2012	Graduate student researcher, University of Electronic Science and Technology of China, Chengdu
2012 - 2016	Lecturer, University of Electronic Science and Technology of China, Chengdu
2016 -	Assistant Scientific Investigator, The University of Arizona College of Medicine-Phoenix, Phoenix, AZ

Other Experience and Professional Memberships

2013 -	Member, The Chinese Neuroscience Society

Honors

2001 - 2002	Outstanding student scholarship, Huazhong University of Science and Technology
2004 - 2005	Student scholarship for achieving excellency, University of Electronic Science and Technology of China

C. Contribution to Science

1. **Findings in the cat primary visual cortex advanced the knowledge on classical receptive field.** We found the contrast-dependent non-classical receptive field (nCRF) characteristic in cat primary visual cortex (V1). We estimated quantitatively the effect of contrast on the spatial extent of the CRF and nCRF as well as the strength of surround suppression. Our results showed that both the CRF and nCRF expanded at low contrast, but the expansion is more marked for the CRF than for the nCRF. Moreover, we found three categories of V1 neurons differing in non-classical receptive field modulation properties.

    a. **Chen K,** Song XM, Dai ZQ, Yin JJ, Xu XZ, Li CY. The spatial summation characteristics of three categories of V1 neurons differing in non-classical receptive field modulation properties. ***Vision Res.*** 2014 Mar;96:87-95. PubMed PMID: 24508921.

    b. **Chen K,** Song XM, Li CY. Contrast-dependent variations in the excitatory classical receptive field and suppressive nonclassical receptive field of cat primary visual cortex. ***Cereb Cortex.*** 2013 Feb;23(2):283-92. PubMed PMID: 22302117.

2. **Revealed modulation of spatial summation across populations of neurons**. Multiple cell classes have been found in the primary visual cortex, but the relationship between cell types and spatial summation has seldom been studied. Our results revealed that the excitatory classical receptive field and the suppressive non-classical receptive field expanded at low contrast for both FSUs (fast-spiking cells) and RSUs (regular-spiking cells), but the expansion was more marked for the RSUs than for the FSUs. Our results suggest that the modulation of spatial summation by stimulus contrast differs across populations of neurons in the cat primary visual cortex.

   a. **Chen K,** Ding AM, Liang XH, Zhang LP, Wang L, Song XM. Effect of Contrast on Visual Spatial Summation in Different Cell Categories in Cat Primary Visual Cortex. ***PLoS One.*** 2015 Dec 4;10(12):e0144403. PubMed PMID: 26636580; PubMed Central PMCID: PMC4670232.

   b. **Chen K,** Song XM, Dai ZQ, Yin JJ, Xu XZ, Li CY. The spatial summation characteristics of three categories of V1 neurons differing in non-classical receptive field modulation properties. ***Vision Res.*** 2014 Mar;96:87-95. PubMed PMID: 24508921.

3. **Examined visual cognitive ability changes during retinal degeneration.** Electrophysiological properties at the retina level have been investigated during the progression of retinal degeneration; however, little is known about the changes in electrophysiological properties that occur in the primary visual cortex (V1) during the course of retinal degeneration. By conducting extracellular recording, we examined the electrophysiological properties of V1 in S334ter-line-3 rats (a transgenic model of retinal degeneration developed to express a rhodopsin mutation similar to that found in human retinitis pigmentosa patients). We discovered V1 neurons in the S334ter-3 rats showed weaker orientation selectivity, lower optimal spatial and temporal frequency values and a smaller receptive field size compared to the Long-Evans rats. These results suggest that the visual cognitive ability significantly changes during retinal degeneration.

   a. Wang Y, **Chen K,** Xu P, Ng TK, Chan LL. Spontaneous neural activity in the primary visual cortex of retinal degenerated rats. ***Neurosci Lett.*** 2016 Jun 3;623:42-6. PubMed PMID: 27132087.

   b. **Chen K,** Wang Y, Liang X, Zhang Y, Ng TK, Chan LL. Electrophysiology Alterations in Primary Visual Cortex Neurons of Retinal Degeneration (S334ter-line-3) Rats. ***Sci Rep.*** 2016 May 26;6:26793. PubMed PMID: 27225415; PubMed Central PMCID: PMC4880896.

D. Additional Information: Research Support and/or Scholastic Performance

Current Research Support

University of Arizona, startup fund, UAHS bridge fund

Qiu (PI)

Completed Research Support

Postdoctoral Fellowship

China Postdoctoral Science Foundation
07/01/2012-12/31/2015.
Role: Postdoctoral Fellow

NFSC Research Project:

Natural Science Foundation of China (NFSC)
01/01/2014-12/31/2016.
Image Information Integration Across Cell Classes in Cat Visual Area V1 and V2
Role: PI