

Chu Chen, PhD

Associate Professor of Otorhinolaryngology and Neuroscience

Education

1994-1996 Postdoctoral fellow, LSU Health Sciences Center, New Orleans
1989-1993 PhD, Tulane University, New Orleans
1983-1986 MS, Zhejiang Medical University, Hangzhou, China
1979-1983 BS, Nanjing University, Nanjing, China



Academic positions

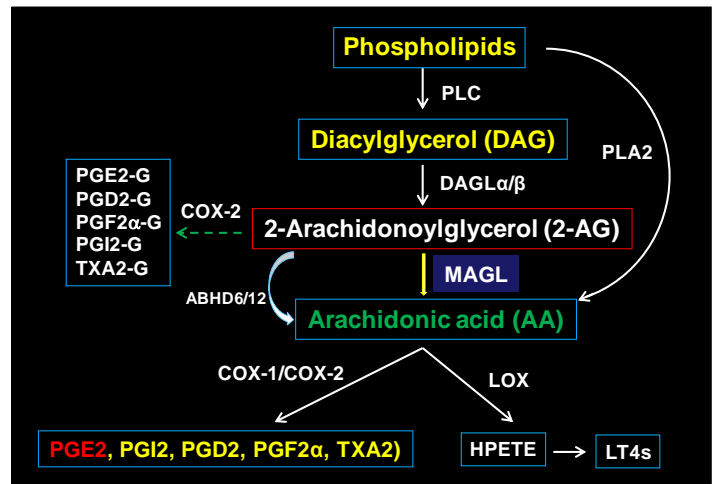
2008-present Associate Professor with tenure, Department of Otorhinolaryngology and Neuroscience Center, LSUHSC
2002-2008 Tenure track Assistant Professor, Department of Otorhinolaryngology and Neuroscience Center, LSUHSC
1998-2002 Research Assistant Professor, Department of Otorhinolaryngology and Neuroscience Center, LSUHSC
1996-1998 Research Assistant Professor, Department of Otorhinolaryngology, LSUHSC
1988-1989 Lecturer, Department of Physiology, Zhejiang Medical University, Hangzhou, China
1986-1988 Instructor, Department of Physiology, Zhejiang Medical University, Hangzhou, China

Study sections

Alzheimer's Association grants (2004-2012)
National Science Foundation Grants
Irish Health Research Board grants, Ireland (2005-2006)
Indiana University Alzheimer's Disease Research Grants (2008-2009)
Wellcome Trust Research grants, UK (2010)
NIH NIDA Special Emphasis Panel ZDA1 - JXR - D (06) (2011)
Medical Research Council (MRC), UK (2012)

Research Interests

Inflammation is now believed to be a common mechanism of disease. Neuroinflammation, the inflammatory response that occurs in the nervous system, has been implicated in many brain disorders such as epilepsy, traumatic brain injury and stroke, and in neurodegenerative diseases such as multiple sclerosis, Parkinson's and Alzheimer's diseases. However, our understanding of the molecular mechanisms underlying neuroinflammation in the pathogenesis of neurodegenerative diseases is still elusive. My research programs focus on neuroinflammation in synaptic plasticity and neurodegenerative diseases. Specifically, I am interested in endocannabinoid and prostaglandin signaling in hippocampal synaptic plasticity and pathogenesis of Alzheimer's disease. Recent evidence shows that a large proportion of prostaglandins derives from hydrolysis of the endogenous cannabinoid 2-arachidonoylglycerol (2-AG) by the enzyme monoacylglycerol lipase (MAGL), that primarily metabolizes 2-AG in the brain. While 2-AG exhibits anti-inflammatory and neuroprotective properties, prostaglandins (e.g., PGE₂) are proinflammatory and neurotoxic. Therefore, MAGL plays an important role in regulation of endocannabinoid 2-AG and prostaglandin signaling (See inset). Thus, inhibition of MAGL will result in strengthening anti-inflammatory and neuroprotective 2-AG signaling, while reducing proinflammatory arachidonic acid and eicosanoid levels. We are currently addressing this important issue as to whether inactivation of MAGL is able to alter hippocampal synaptic signaling and reduce neuropathology of Alzheimer's disease and whether epigenetic mechanisms such as noncoding microRNAs are involved in regulation of synaptic plasticity and neuropathology by endocannabinoid and prostaglandin signaling.



Select Publications

1. He H, Mahnke A, Doyle S, Fan N, Wang C, Hall B, Tang YP, Inglis F, **Chen C** & Erickson JD (2012) A neurodevelopmental role for VGLUT2 in pyramidal neuron maturation and spatial learning. *Journal of Neuroscience* (In press)
2. Xu J, Zhang J & **Chen C**, (2012) Long-lasting potentiation of hippocampal synaptic transmission by direct cortical input is mediated via endocannabinoids. *Journal of Physiology* (Lond) 590:2305-2315.
3. Du H, Chen X, Zhang J & **Chen C**. (2011) Inhibition of COX-2 expression by endocannabinoid 2-arachidonoylglycerol is mediated by PPAR- γ . *British Journal of Pharmacology* (2011) 163:1533-1549.
4. Chen X, Zhang J & **Chen C**. Endocannabinoid 2-arachidonoylglycerol protects neurons against β -amyloid insults. *Neuroscience* (2011) 178:159-168.
5. Yu T, Li Z, Jia Z, Clapcote SJ, Liu C, Li S, Asrar S, Pao A, Chen R, Fan N, Carattini-Rivera S, Bechard AR, Spring S, Henkelman RM, Stoica G, Matsui S-I, Nowak NJ, Roder JC, **Chen C**, Bradley A & Yu YE. A mouse model of Down Syndrome trisomic for all human chromosome 21 syntenic regions. *Human Molecular Genetics* (2010) 19:2780–2791.
6. **Chen C**. COX-2's new role in inflammation. *Nature Chemical Biology* (2010) 6: 401-402.
7. Xu J, Zhang J & **Chen C**. Endocannabinoids differentially modulate long-term depression in rat hippocampal CA1 pyramidal neurons. *PLoS ONE* (2010) 5:e10306.
8. Sang N, Zhang J & **Chen C**. Anandamide potentiation of miniature spontaneous excitatory synaptic transmission is mediated via IP3 pathway. *Neurochemistry International* (2010) 56:590-596.
9. Fan N, Yang H, Zhang J & **Chen C**. Reduced expression of glutamate receptors and phosphorylation of CREB are responsible for Δ 9-THC-impaired hippocampal synaptic plasticity. *Journal of Neurochemistry* (2010) 112:691-702.
10. Grewal S, Defamie N, Zhang X, Gois SD, Shawki A, Mackenzie B, **Chen C**, Varoqui H & Erickson JD. SNAT2 amino-acid transporter is regulated by osmolytes of the SLC6 GABA transporter subfamily and may play no role in delivering glutamine for spontaneous glutamatergic transmission. *Journal of Biological Chemistry* (2009) 284:11224-11236.
11. Yang H, Zhang J, Breyer RM & **Chen C**. Altered hippocampal long-term synaptic plasticity in mice deficient in the PGE2 EP2 receptor. *Journal of Neurochemistry* (2009) 108: 295-304.
12. Zhang X, Zhang J & **Chen C**. Long-term potentiation at hippocampal perforant path-dentate astrocyte synapses. *Biochemical and Biophysical Research Communication* (2009) 383:326-330.
13. Zhang J & **Chen C**. Endocannabinoid 2-arachidonoylglycerol protects neurons by limiting COX-2 elevation. *Journal of Biological Chemistry* (2008) 283: 22601–22611.
14. Yang H & **Chen C**. COX-2 in synaptic signaling. *Current Pharmaceutical Design* (2008) 14: 1443-1451.
15. Yang H, Zhang J, Andreasson K & **Chen C**. COX-2 Oxidative metabolism of endocannabinoids augments hippocampal synaptic plasticity. *Molecular and Cellular Neuroscience* (2008) 37: 682-695.

16. Sang N, Zhang J & **Chen C**. COX-2 oxidative metabolite of endocannabinoid 2-AG enhances excitatory glutamatergic synaptic transmission and induces neurotoxicity. *Journal of Neurochemistry* (2007) 102: 1966-1977.
17. Sang N & **Chen C**. Lipid signaling and synaptic plasticity. *Neuroscientist* (2006) 12: 425-434.
18. Sang N, Zhang J & **Chen C**. PGE2 glycerol ester, a COX-2 oxidative metabolite of 2-arachidonoyl glycerol, modulates inhibitory synaptic transmission in mouse hippocampal neurons. *Journal of Physiology* (Lond) (2006) 572: 735-745.
19. Sang N, Zhang J, Marcheselli V, Bazan, NG & **Chen C**. Postsynaptically synthesized prostaglandin E2 modulates hippocampal synaptic transmission via a presynaptic PGE2 EP2 receptor. *Journal of Neuroscience* (2005) 25: 9858-9870.
20. **Chen C**. β -Amyloid increases dendritic Ca^{2+} influx by inhibiting the A-type K^{+} current in hippocampal CA1 pyramidal neurons. *Biochemical and Biophysical Research Communication* (2005) 338: 1913-1919.
21. Gois SD, Schafer MK-H, Defamie N, **Chen C**, Ricci A, Weihe E, Varoqui H & Erickson JD. Homeostatic scaling of vesicular glutamate and GABA transporters expression in rat neocortical circuits. *Journal of Neuroscience* (2005) 25:7121-7133.
22. **Chen C** & Bazan NG. Lipid signaling: Sleep, synaptic plasticity, and neuroprotection. *Prost Lipid Mediators* (2005) 77: 65-76.
23. Zhu P, Genc A, Zhang X, Zhang J, Bazan NG & **Chen C**. Heterogeneous expression and regulation of PGE2 receptors in the hippocampus. *Journal of Neuroscience Research* (2005) 81: 817-826.
24. **Chen C** & Bazan NG. Endogenous PGE2 regulates membrane excitability and synaptic transmission in rat hippocampal CA1 pyramidal neurons. *Journal of Neurophysiology* (2005) 93: 929-941.
25. **Chen C**. ZD7288 inhibits postsynaptic glutamate receptor-mediated responses at hippocampal perforant path-granule cells synapses. *European Journal of Neuroscience* (2004) 19: 643-649.
26. McDermott CM, LaHoste GL, **Chen C**, Musto A, Bazan NG & Magee JC. Sleep deprivation causes behavioral, synaptic and membrane excitability alterations in hippocampal neurons. *Journal of Neuroscience* (2003) 23: 9687-9695.
27. **Chen C**, Magee JC & Bazan NG, Cyclooxygenase-2 regulates prostaglandin E2 signaling in hippocampal long-term synaptic plasticity. *Journal of Neurophysiology* (2002) 87:2851-2857.
28. Rodriguez de Turco EBR, Tang W, Topham MK, Sakane F, Marcheselli VL, **Chen C**, Taketomi A, Prescott S & Bazan NG. Diacylglycerol kinase epsilon regulates seizure susceptibility and long-term potentiation through arachidonoyl-inositol lipid signaling. *Proceedings of National Academy of Science USA* (2001) 98: 4740-4745.
29. **Chen C**, Magee JC, Marcheselli V, Hardy M & Bazan NG. Attenuated long-term potentiation in hippocampal dentate gyrus neurons of mice deficient in the PAF receptor. *Journal of Neurophysiology* (2001) 85: 384-390.

Current Funding

Source: NIH-NINDS R01NS076815 6/15/2012-3/31/2017
 Title: Endocannabinoids in neurodegenerative diseases.
 Role on Grant: PI.

Source: NIH-NIA R21AG039669 4/1/2011-3/31/2013
 Title: MAGL inhibition in prevention and treatment of Alzheimer's disease.
 Role on Grant: PI.

Source: NIH-NINDS R01NS054886 6/1/2007-11/30/2012
 Title: Endocannabinoids in COX-2 mediated synaptic modification and neurotoxicity.
 Role on Grant: PI.