

**CURRICULUM VITAE**

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NAME		POSITION TITLE	
Lien, Cheng-Chang		Distinguished Professor of Neuroscience	
EDUCATION/TRAINING			
INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
China Medical University, Taiwan	M.D.	1990-1997	Medicine
University of Freiburg, Germany	Ph.D.	1998-2003	Physiology/Neuroscience (Mentor: Peter Jonas)
University of Freiburg, Germany	Postdoc	2003-2004	Physiology/Neuroscience (Supervisor: Peter Jonas)
University of California, Berkeley, USA	Postdoc	2004-2006	Neurobiology (Supervisor: Mu-Ming Poo)
Heidelberg University, Germany	Visiting scientist	2012 (July-Sep.)	Institute for physiology and pathophysiology (Prof. Andreas Draguhn)
Charité – Universitätsmedizin Berlin, Germany	Research fellow	2016-2018	Alexander von Humboldt Foundation Fellowship

**A. Personal statement (Research narrative)**

A finely calibrated balance between excitation and inhibition of neural networks is essential for normal brain function. GABA ( $\gamma$ -aminobutyric acid)-ergic neurons release GABA, a key neurotransmitter for inhibition. Dysfunction of GABAergic system is associated with a host of brain disorders, including epilepsy, autism, schizophrenia, and mood disorders. Therefore, understanding the molecular and cellular events underpinning inhibitory control of neuronal function is central to understanding information processing in the healthy and pathological brain. Over the past 10 years, my laboratory has established a multidisciplinary approach (including *in vivo* and *in vitro* electrophysiology, pharmacology, molecular biology, optogenetics, chemogenetics, modelling, structural and functional imaging, mouse genetics and behavioral assays) and has extensively applied them in uncovering several GABAergic neuron subtype-specific properties in the hippocampus-amygdala complex, key loci for learning and emotion in health and disease. My current research is focused on circuit neuroscience with three major goals: (1) to understand the hierarchical order and diversity of GABA neurons; (2) to understand the cell type-specific molecular/genetic profiling in the brain and their physiological meanings; (3) to understand how neurotransmission at central synapses is regulated and integrated in normal and diseased brain. My long-term objective is to correlate information processing in the brain circuits in health and disease with behavior.

**Positions and Honors.**

## **Positions and Employment**

Since 2017.08: Distinguished Professor, National Yang-Ming University

Since 2017.01: Director of the Institute of Neuroscience, National Yang-Ming University, Taiwan

Since 2015.08: Professor of the Institute of Neuroscience, National Yang-Ming University, Taiwan

2011.02 – 2015.07: Associate Professor of the Institute of Neuroscience, National Yang-Ming University, Taiwan

2006.07 – 2011.02: Assistant Professor of the Institute of Neuroscience, National Yang-Ming University, Taiwan

1997– 1998: Medical Residency, Neurology, National Taiwan University Hospital, Taiwan

## **Other Experience and Professional Memberships**

2018 – Present: Study Section, Ministry of Science & Technology Grant Review Panel

2016 – Present: Permanent Member, The Chinese Physiological Society, Taiwan

2008 – Present: Regular Member, Society for Neuroscience (SfN), USA

2008 – Present: Regular Member, Neuroscience Society of Taiwan

## **Other Academic Activities and Services**

1. Member of Scientific Committee for EMBO Workshop on Neural Development (2-6, March, 2018), Taipei, Taiwan

2. Council Member of Neuroscience Society of Taiwan (2016 – 2018 year)

## **Ad hoc Peer Review for Scientific Journals**

PNAS, eLife, Journal of Neuroscience, Journal of Neurophysiology, Journal of Physiology (London), Biochimica et Biophysica Acta (BBA – General Subjects), Chinese Journal of Physiology, Developmental Neurobiology, PLoS ONE, Neurotoxicity Research; Current Topics in Medicinal Chemistry, Neuropharmacology, Journal of Neuroscience Research, Scientific Reports, Frontiers in Cellular Neuroscience, Cerebral Cortex, Physiology & Behavior, Journal of Visualized Experiments, EJN, Oncotarget; Science signalling; European Neuropsychopharmacology, J Biomedical Science, Journal of the Chinese Medical Association (JCMA)

## **Review Editorial Board**

**2015** Frontiers in Cellular Neuroscience

**2016** Scientific Reports; Frontiers in Cellular Neuroscience; Neural Plasticity (Guest Editor); French National Research Agency (ANR; External Reviewer); Frontiers in Aging Neuroscience (Review Editor); Matters

**2018** External Reviewer of Danish Research in relation to NIH Brain Initiative; French National Research Agency (ANR; External Reviewer)

**2019** National Science Centre in Poland (Grant Reviewer)

## **Honors**

2017-2019: NYMU Academic Excellence Award (the same award received in 2015-2016; 2013-2014; 2011-2012)

2017-2019: Distinguished Professor, National Yang-Ming University

2017: MOST Outstanding Research Award

2016: TienTe Lee Young Scientist Research Award

2016 – 2018: Research Fellow of Alexander von Humboldt Foundation, Germany

2015 – 2016: NeuroCure Fellowship, Berlin, Germany

2012: Award of German Academic Exchange Service (DAAD) Scholarship for the research visit at the Institute for Physiology and Pathophysiology, Ruprecht-Karls-Universität Heidelberg, Germany

2007 – 2012: Teaching award for outstanding teachers in the School of Medicine, National Yang-Ming University.

2010: The Best Poster Award of 2010 TPEVGH-UST Research Grant.

2006: Award of stipend from Cold Spring Harbour for the imaging course: Imaging Structure & Function in the Nervous Systems.

2003: Doctoral thesis with the grade “**summa cum laude**” and research doctorate (research supervisor: Peter Jonas) from Albert-Ludwigs-Universität Freiburg, Germany.

2002: Award of stipend from Marine Biological Laboratory (Woods Hole, USA) for the “Method in Computational Neuroscience” summer course.

1998 – 2003: Award of German Academic Exchange Service (DAAD) Scholarship for the international PhD program in the Institute of Physiology, Albert-Ludwigs-Universität Freiburg, Germany.

#### **Invited Speeches/Chairs in International Conferences**

1. 2018/09/17 Circuit specificity in the inhibitory architecture of the dentate gyrus: DANDRITE lecture: invited by DANDRITE, Dept. Biomedicine, Aarhus University, Denmark.
2. 2018/09/10 Connectivity and function of a longitudinal hippocampal circuitry: The 29th Ion Channel Meeting: invited by CIRB, CNRS UMR, Collège de France.
3. 2018/03/05 Session chair (co-chair with Cyril Herry) for “Circuit formation and function”, EMBO Workshop on Neural Development, Taipei, Taiwan
4. 2017/12/21 Deconstructing Psychophysiology of Chronic Pain: Innsbruck Neuroscience Research Network: Invited by University of Innsbruck, Austria
5. 2015/08/16 - 2015/08/21 Pathway-Specific Recruitment of Dentate Gyrus Interneurons: Invited Talk, Gordon Research Conference, USA.
6. 2016/04/19 Dentate Gyrus GABAergic Circuits: IN-N-OUT Synapses: Invited by Université de Liège, Belgium.
7. 2015/12/07 Inhibitory control of memory circuits: Invited by EMBO/Neural Development Conference, Taipei, Taiwan.
8. 2015/12/02 Dentate Gyrus GABAergic Circuits: IN-N-OUT Synapses: Invited by NeuroCure, Charite, Germany.
9. 2015/11/19 Pathway-specific recruitment of dentate gyrus interneurons: Invited by 10th Conference of the Czech Neuroscience Society with International Participation and the Taiwan-Czech Neuroscience Symposium.
10. 2015/11/17 Pathway-specific recruitment of dentate gyrus interneurons: Invited by Institute of Experimental Medicine, Hungarian Academy of Science, Hungary.
11. 2014/11/20 Dynamic Inhibitory Control of the Gateway of the Hippocampus: Invited by National Institute of Aging/seminar.
12. 2014/06/12 - 2014/06/14 Shunting Inhibition Controls the Gateway of the Hippocampus: Invited by The University of Hong Kong/Physiology Symposium 2014.
13. 2013/07/11 Shunting Inhibition Controls the Gateway of the Hippocampus: Invited by Department of Pharmacology, UC Davis, USA.
14. 2012/10/25 Distinct dynamic switch of GABA release in fast-spiking and non-fast-spiking GABAergic interneurons in the hippocampus: Invited by KOJACH Symposium 2012 in Pusan/Korean Physiological Society.
15. 2012/09/12 Role of acid-sensing ion channel in synaptic function, learning and memory: Invited by Institute of science and technology, Austria.
16. 2012/07/27 - 2013/09/27 Acid-Sensing Ion Channels in The Hippocampus: Invited by Department of Physiology and Pathophysiology, Heidelberg University, Germany.

#### **B. Peer-reviewed publications (in reverse chronological order).**

1. Hsu YT, Chang YG, Liu YC, Wang KY, Chen HM, Lee DJ, Yang SS, Tsai CH, **Lien CC\***, Chern YJ\*. (2019). Enhanced  $\text{Na}^+\text{-K}^+\text{-2Cl}^-$  cotransporter 1 underlies motor dysfunction in Huntington's disease. **Movement Disorders** [Epub ahead of print] (\*corresponding)

2. Martina M, Lien CC (2018). Book Chapter: Physiological properties of hippocampal neurons. **Hippocampal Microcircuits**: 91-126.
3. Chen CY, Di Lucente J, Lin YC, Lien CC, Rogawski MA, Maezawa I, Jin LW (2018). Defective GABAergic neurotransmission in the nucleus tractus solitarius in Mecp2-null mice, a model of Rett syndrome. **Neurobiol Dis** 109(Pt A):25-32.
4. Kuo YL, Cheng JK, Hou WS, Chang YC, Du PH, Jian JJ, Rau RH, Yang JH, Lien CC, Tsaur ML (2017). K<sup>+</sup> channel modulatory subunits KChIP and DPP participate in Kv4-mediated mechanical pain control. **Journal of Neuroscience** 37(16):4391-4404.
5. Huang CY, Lien CC, Cheng CF, Yen TY, Chen CJ, Tsaur ML (2017). K<sup>+</sup> channel Kv3.4 is essential for axon growth by limiting the influx of Ca<sup>2+</sup> into growth cones. **Journal of Neuroscience** 37(17): 4433-4449.
6. Lee CT, Kao MH, Hou WH, Wei YT, Chen CL, Lien CC (2016). Causal evidence for the role of specific GABAergic interneuron types in entorhinal recruitment of dentate granule cells. **Scientific Reports** 6: 36885.
7. Hou WH, Kuo N, Fang GW, Huang HS, Wu KP, Zimmer A, Cheng JK, Lien CC (2016). Wiring specificity and synaptic diversity in the mouse lateral central amygdala. **Journal of Neuroscience** 36(16): 4549-4563.
8. Hsu TT, Lee CT, Tai MH, Lien CC (2016). Differential recruitment of dentate gyrus interneuron types by commissural versus perforant pathways. **Cerebral Cortex** 26(6): 2715-27.
9. Wu CC, Lien CC, Hou WH, Chiang PM, Tsai KJ (2016). Gain of BDNF function in engrafted neural stem cells promotes the therapeutic potential for Alzheimer's disease. **Scientific Reports** 6:27358.
10. Chang CP, Lee CT, Hou WS, Lin MS, Lai HL, Chien CL, Chang C, Cheng PL, Lien CC\*, Chern Y\* (2016). Type VI adenylyl cyclase negatively regulates GluN2B-mediated LTD and spatial reversal learning. **Scientific Reports** 6(22529): 1-16. (\*corresponding)
11. Chiang PH, Chien TC, Chen CC, Yanagawa Y, Lien CC (2015). ASIC-dependent LTP at multiple glutamatergic synapses in amygdala network is required for fear memory. **Scientific Reports** 5:10143.
12. Lin SH, Chien YC, Chiang WW, Liu YZ, Lien CC, Chen CC (2015). Genetic mapping of ASIC4 and contrasting phenotype to ASIC1a in modulating innate fear and anxiety. **European Journal of Neuroscience** 41(12): 1553-1568.
13. Liu YC, Cheng JK, Lien CC (2014). Rapid dynamic changes of dendritic inhibition in the dentate gyrus by presynaptic activity. **Journal of Neuroscience** 34(4): 1344-1357.
14. Chen WT, Hsieh YF, Huang YJ, Lin CC, Lin YT, Liu YC, Lien CC, Cheng IH (2014). G206D mutation of presenilin-1 reduces Pen2 interaction, increases A $\beta$ 42/A $\beta$ 40 ratio and elevates ER Ca<sup>2+</sup> accumulation. **Molecular Neurobiology**. 52(3): 1835-1849.
15. Cheng CF, Cheng JK, Chen CY, Lien CC, Chu D, Wang SY, Tsaur ML (2014). Mirror-image pain is mediated by NGF produced from TNF $\alpha$ -activated satellite glia after peripheral nerve injury. **Pain** (2014) 155(5):906-920.
16. Chan CF, Kuo TW, Weng JY, Lin YC, Chen TY, Cheng JK, Cheng-Chang Lien CC (2013). Ba<sup>2+</sup>- and bupivacaine-sensitive background K<sup>+</sup> conductances mediate rapid EPSP attenuation in oligodendrocyte precursor cells. **Journal of Physiology (London)**, 591: 4843-4858. (an editor's choice and the highlight by the Perspectives in the same issue)
17. Wu PY, Huang YY, Chen CC, Hsu TT, Lin TC, Weng JY, Chien TC, Cheng H, Lien CC (2013). Acid-sensing ion channel-1a is not required for normal hippocampal LTP and spatial memory. **Journal of Neuroscience** 33(5):1828-1832.
18. Sun YY, Lin SH, Lin HC, Hung CC, Wang CY, Lin YC, Hung KS, Cheng-Chang Lien CC, Kuan CY, Lee YH (2013). Cell type-specific dependency on the PI3K/Akt signaling pathway for the

endogenous Epo and VEGF induction by baicalein in neurons versus astrocytes. **PLoS ONE**, 013 Jul 9; 8(7): e69019.

19. Lee YC, Alexandra D, Majczenko K, Huang YH, Liu YC, Lien CC, Tsai PC, Ichikawa Y, Goto J, Monin ML, Li JZ, Chung MY, Mundwiller E, Shakkottai V, Liu TT, Tesson C, Lu YC, Brice A, Tsuji S, Burmeister M, Stevanin G, Soong BW (2012). Mutations in *KCND3* cause spinocerebellar ataxia type 22. **Annals of Neurology** 72(6): 859-869.
20. Majumder P, Chen YT, Bose JK, Wu CC, Cheng WC, Cheng SJ, Fang YH, Chen YL, Tsai KJ, Lien CC, Shen CK (2012). TDP-43 regulates the mammalian spinogenesis through translational repression of Rac1. **Acta Neuropathologica** 124(2): 231-245.
21. Chiang PH, Wu PY, Kuo TW, Liu YC, Chan CF, Chien TC, Cheng JK, Huang YY, Lien CC (2012). GABA is depolarizing in hippocampal dentate granule cells of the adolescent and adult rats. **Journal of Neuroscience** 32(1): 62-67.
22. Weng JY, Lin YC, Lien CC (2010). Cell type-specific expression of acid-sensing ion channels in hippocampal interneurons. **Journal of Neuroscience** 30(19): 6548-6558.
23. Lin YC, Liu YC, Huang YY, Lien CC (2010). High-density expression of Ca<sup>2+</sup>-permeable ASIC1a channels in NG2 glia of rat hippocampus. **PLoS ONE** 5(9): e12665.
24. Chu KC, Chiu CD, Hsu TT, Hsieh YM, Huang YY, Lien CC (2010). Functional identification of an outwardly rectifying pH- and anesthetic-sensitive leak K<sup>+</sup> conductance in hippocampal astrocytes. **European Journal of Neuroscience** 32(5):725-735.
25. Chiang PH, Yeh WC, Lee CT, Huang YY, Lien CC (2010). M1-like muscarinic acetylcholine receptors regulate fast-spiking interneuron excitability in rat dentate gyrus. **Neuroscience** 169(1): 39-51.
26. Liao CW, Lien CC (2009). Estimating intracellular Ca<sup>2+</sup> concentrations and buffering in a dendritic inhibitory hippocampal interneuron. **Neuroscience** 164(4): 1701-1711.
27. Lien CC, Mu Y, Vargas-Caballero M, Poo MM (2006). Visual stimuli-induced LTD of GABAergic synapses mediated by presynaptic NMDA receptors. **Nature Neuroscience** 9(3): 372-380.
28. Aponte Y, Lien CC, Reisinger E, Jonas P (2006). Hyperpolarization-activated cation channels in fast-spiking interneurons of rat hippocampus. **Journal of Physiology (London)** 574(Pt 1): 229-243.
29. Oliver D#, Lien CC#, Soom M, Baukrowitz T, Jonas P, Fakler B (2004). Functional conversion between A-type and delayed rectifier K<sup>+</sup> channels by membrane lipids. **Science (Research Article)** 304(5668): 265-270. (#: equally contributing).
30. Lien CC, Jonas P (2003). Kv3 potassium conductance is necessary and kinetically optimized for high-frequency action potential generation in hippocampal interneurons. **Journal of Neuroscience** 23(6): 2058-2068
31. Lien CC, Martina M, Schultz J, Ehmke H, Jonas P (2002). Gating, modulation, and subunit composition of voltage-gated K<sup>+</sup> channels in dendritic inhibitory interneurons of rat hippocampus. **Journal of Physiology (London)** 538(Pt 2): 405-419.