林昭庚 Jaung-Geng Lin

Chair Professor at the China Medical University, Taiwan;

Academician, Academia Sinica

Education and Professional Experience

2022-present: The academician, Academia Sinica

2014-present: Chair Professor, School of Post-Baccalaureate Chinese Medicine, Tzu Chi University

2013-present: Chair Professor, Department of Healthcare Administration, Asia University

2004-present: Visiting Professor, Vasile Goldiș Western University of Arad, Romania; Visiting Professor, University of Oradea, Romania

1988-1991: Doctor degree: Institute of Chinese Medical Science, China Medical College

1978-1982: Master degree: Institute of Chinese Medical Science, China Medical College

1966-1973: Bachelor degree: School of Chinese Medicine, China Medical College

Research

My basic research interest is to understand the molecular mechanism and genetic control of pain sensation and neurosensory mechanotransduction. I have accomplished works relating to functional characterization of sensory neuron-specific ion channels, including ATP-gated ion channels (P2X3), acid-sensing ion channels (ASICs), and stretch-activated ion channels, as well as substance P-mediated antinociceptive pathways.

Publications:

1. Chien LH, Deng JS, Jiang WP, Chen CC, Chou YN, Lin JG, Huang GJ* (2022) Study on the potential of Sanghuangporus sanghuang and its components as COVID-19 spike protein receptor binding domain inhibitors. Biomed Pharmacother, 153:113434.
2. Lee YC, Tu CH, Chung HY, Luo ST, Chu YT, MacDonald IJ, Kotha P, Huang CC, Lane HY, Lin JG*, Chen YH* (2022) Antihistamine promotes electroacupuncture analgesia in healthy human subjects: A pilot study. J Tradit Complement Med, 12:511-517.
3. Lin JG*, Kotha P, and Chen YH* (2022) Understandings of acupuncture application and mechanisms. Am J Transl Res, 14(3):1469-1481.
4. Yang HH, Chung YC, Szeto PP, Yeh ML, Lin JG* (2022). Laser acupuncture combined with auricular acupressure improves low-back pain and quality of life in nurses: A randomized controlled trial. J Integr Med, S2095-4964(22)00112-1.
5. Wu LK, Hung CS, Kung YL, Chen ZK, Lin SZ, Lin JG*, Ho TJ (2022). Efficacy of Acupuncture Treatment for Incidence of Poststroke Comorbidities: A Systematic Review and Meta-Analysis of Nationalized Cohort Studies. Evid Based Complement Alternat Med, 2022:3919866.

Clinical practice and research of acupuncture analgesia

Abstract

Acupuncture, a mainstay in Chinese traditional medical practice for many millennia, has achieved significant acceptance worldwide. Its use spans a variety of health conditions, but its globally recognized role pertains predominantly to pain management. Over the past few decades, the primary focal point of academic discourse and research in this field has gravitated towards elucidating the mechanics of analgesia induced by acupuncture. Current research findings, inclusive of our own, suggest that electroacupuncture triggers the secretion of specific neuropeptides such as enkephalin and β-endorphin, in conjunction with monoamines including serotonin and norepinephrine, culminating in anti-nociceptive effects. Our research indicates that the use of an alternating mode in electroacupuncture yields superior results in the management of chronic pain compared to the simultaneous mode, likely by delaying the emergence of EA tolerance. As a result, we advocate for the implementation of alternating mode in therapeutic settings.

Beyond the fundamental research studies on acupuncture, there is a growing interest among the academic community in conducting clinical trials. The recent advances in research methodologies have elevated the robustness and reliability of these trials. Findings from our research imply the efficacy of acupuncture and electroacupuncture in not only mitigating pain but also in reducing the adverse effects subsequent to morphine administration in post-operative scenarios. Moreover, these therapeutic modalities have demonstrated effectiveness in ameliorating pain stemming from a wide range of conditions, including frozen shoulder, knee joint issues, lower back pain, post-cesarean section pain, and discomfort associated with extracorporeal shock wave lithotripsy.

Kathleen A. Sluka

Professor of Physical Therapy and Rehab Science

Co-Director Pain Research Program

The University of Iowa in Iowa City, IA, USA.

Education and Professional Experience

2020-Present Co-Director Pain Research Program, The University of Iowa, Iowa City, IA

2020-Present Secondary Appointment, Department of Pharmacology and Neuroscience, The University of Iowa, IA

2005-Present Secondary Appointment, College of Nursing, The University of Iowa, Iowa City, Iowa

2005-Present Professor, Department of Physical Therapy and Rehabilitation Science, The University of Iowa Carver College of Medicine, Iowa City, Iowa

1993 PhD (Anatomy) University of Texas Medical Branch, Galveston, Texas

1985 BS (Physical Therapy) Georgia State University, Atlanta, Georgia

Research

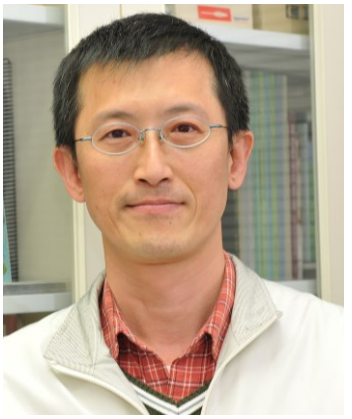
My research focuses on the neurobiology of musculoskeletal pain as well as the mechanisms and effectiveness of non-pharmacological pain treatments commonly used by physical therapists. These studies involve the use of animal models of muscle pain developed and characterized in Dr. Sluka's laboratory, as well as projects in human subjects. We use a variety of techniques to address these questions including cell culture, molecular biology, genetic manipulations, behavioral pharmacology, and standard clinical trial methodology. Our overall goals are to improve the management of pain for people with a variety of musculoskeletal pain conditions by discovering the underlying mechanisms that lead to the development of chronic pain, discovering new therapies for pain management, and improving the use of currently available treatment for pain.

Publications:

1. Vance CGT, Dailey DL, Chimenti RL, Van Gorp BJ, Crofford LJ, Sluka KA. Using TENS for Pain Control: Update on the State of the Evidence. Medicina (Kaunas). 2022 Sep22;58(10):1332. doi: 10.3390/medicina58101332.
2. Lesnak JB, Nakhla DS, Plumb AN, McMillan A, Saha S, Gupta N, Xu Y, Phruttiwanichakun P, Rasmussen L, Meyerholz DK, Salem AK, Sluka KA. Selective Androgen Receptor Modulator Microparticle Formulation Reverses Muscle Hyperalgesia in Mouse Model of Widespread Muscle Pain. Pain. 2022 Dec 9. 10.1097/j.pain.0000000000002841. Online ahead of print.
3. Lesnak JB, Hayashi K, Plumb AN, Janowski AJ, Chimenti MS, Sluka KA. 2022. The impact of sex and physical activity on the local immune response to muscle pain. bioRxiv doi: 10.1101/2022.12.07.519473 Page 33
4. Hayashi K, Janowski A, Lesnak JB, Sluka KA. Preoperative Exercise Has a Modest Effect on Postoperative Pain, Function, Quality of Life, and Complications: A Systematic Review and Meta-Analysis. Phys Ther. 12/27/22. doi: 10.1093/ptj/pzac169.
5. Post AA, Rio EK, Sluka KA, Moseley GL, Bayman EO, Hall MM, de Cesar Netto C, Wilken JM, Danielson J, Chimenti RL. Efficacy of Telehealth for Movement-Evoked Pain in People with Chronic Achilles Tendinopathy: A Noninferiority Analysis. Phys Ther. 2023;pzac171. doi: 10.1093/ptj/pzac171

Acid-induced muscle pain: ASICS, P2XRs and cytokines

陳志成 Chih-Cheng Chen



Distinguished Research fellow & Deputy Director,
Institute of Biomedical Sciences, Academia Sinica

Education and Professional Experience

2023-present: Distinguished research fellow, IBMS, Academia Sinica, Taipei, Taiwan

2016-2023: Research fellow, IBMS, Academia Sinica, Taipei, Taiwan

2011-2016: Associate research fellow, IBMS, Academia Sinica, Taipei, Taiwan

2003-2011: Assistant research fellow, IBMS, Academia Sinica, Taipei, Taiwan

1998-2003: Postdoctoral fellow, NIMH, NIH, USA

1994-1997: Ph.D. Department of Anatomy, University College London, UK

1988-1990: M.Sc. Zoology, National Taiwan University, Taipei, Taiwan

1984-1988: B.Sc. Zoology, National Taiwan University, Taipei, Taiwan

Research

My basic research interest is to understand the molecular mechanism and genetic control of pain sensation and neurosensory mechanotransduction. I have accomplished works relating to functional characterization of sensory neuron-specific ion channels, including ATP-gated ion channels (P2X3), acid-sensing ion channels (ASICs), and stretch-activated ion channels, as well as substance P-mediated antinociceptive pathways.

Publications:

1. Hung CH, Tsai MH, Wang PS, Liang FW, Hsu CY, Lee KW, Fong YO, Han DS, Lee CH, Lai CL, Chen CC* (2023) Oxidative stress involves phenotype modulation of morbid soreness symptoms in fibromyalgia. **RMD Open** 2023 Mar;9(1):e002741.
2. Han DS, Lee CH, Shieh YD, Chang CT, Li MH, Chu YC, Wang JL, Chang KV, Lin SH, Chen CC* (2022) A role for substance P and acid-sensing ion channel 1a in prolotherapy with dextrose-mediated analgesia in a mouse model of chronic muscle pain. **Pain** 163.
3. Lim J, Tai HH, Liao WH, Chu YC, Hao CM, Lee CH, Lin SS, Hsu S, Chien YC, Lai DM, Chen WS, Chen CC*, Wang JL* (2021) ASIC1a is required for neuronal activation via low-intensity ultrasound stimulation in mouse brain. **Elife** 10: e61660.
4. Hung CH, Lee CH, Tsai MH, Chen CH, Lin HF, Hsu CY, Lai CL, Chen CC* (2020) Activation of acid-sensing ion channel 3 by lysophosphatidylcholine 16:0 mediates psychological stress-induced fibromyalgia-like pain. **Annals of the Rheumatic Diseases** 79(12):1644-1656
5. Lin JH, Hung CH, Han DS, Chen ST, Lee CH, Sun WZ, Chen CC* (2018) Sensing acidosis: nociception or sngception? **J Biomed Sci** 25:85

A role for proprioceptors in sngception

Abstract

Proprioceptors are the primary mechanosensory neurons ending on muscle spindles or golgi tendon organs to monitor the status of muscle contraction and/or body position. Although proprioceptors are known as non-nociceptive, low-threshold mechanoreceptors, they also express the pro-nociceptive acid-sensing ion channel 3 (ASIC3). Here we report a new role for proprioceptors in sensing acidosis, which we have named sngception, and that they are responsible for acid-induced pain chronicity. In mouse models, conditional knockout of ASIC3 in proprioceptors but not nociceptors abolished acid-induced chronic hyperalgesia. In contrast, selectively activating proprioceptors via chemo-optogenetic stimuli resulted in hyperalgesic priming that favored chronic pain induced by acidosis. In healthy human volunteers, intramuscular acidification induced acid-perception (sng) but not pain. Conversely, in a spine-injured patient who lost pain sensation in the right leg, proprioception as well as sngception were remaining somatosensory functions, associated with the spinal dorsal column. Together, evidence from both mouse models and human studies suggests a role for proprioceptors in acidosis sensing (or sngception).

蘇以文 Lily I-wen Su

Distinguished Professor

Education and Professional Experience

2016-present: Research fellow, IBMS, Academia Sinica, Taipei, Taiwan

2011-2016: Associate research fellow, IBMS, Academia Sinica, Taipei, Taiwan

2003-2011: Assistant research fellow, IBMS, Academia Sinica, Taipei, Taiwan

1998-2003: Postdoctoral fellow, NIMH, NIH, USA

1994-1997: Ph.D. Department of Anatomy, University College London, UK

1988-1990: M.Sc. Zoology, National Taiwan University, Taipei, Taiwan

1984-1988: B.Sc. Zoology, National Taiwan University, Taipei, Taiwan

Research

The main focus of Professor Su's research lies in cognitive linguistics, with a particular emphasis on the interplay between discourse grammar and pragmatics, as well as an exploration of semantics. In recent years, from a cognitive perspective, Professor Su has been investigating metaphor, studying the extension of word meanings and the conceptual structure within language. Additionally, the research delves into language phenomena arising from pragmatics and metaphorical expressions. It's worth noting that Professor Su's research extends beyond Chinese to include Taiwan indigenous languages and English. Furthermore, the research also touches upon the relationship between language, culture, and cognition.

Publications:

1. Su, IW & Cheung. A. (to appear). Understanding Positive Irony. In Festschrift in Honor of Jane Tsai's 70th Birthday.
2. Chiu, HY, Su, IW, Yu, YW, Chen, YC, Chen CC, Lin, JH. (2023). Soreness or Sng: A Common Symptom with Differential Clinical Impact from Pain in Degenerative Lumbar Spine Diseases. BMJ Open Quality 2023; 12: e001982. doi:10.1136/bmjoq-2022-001982
3. Lai, CH, Hsieh, SK, Lee, CL, Su, IW Liu, TH, Lu, CR, Tsai, IN, Chou, TL. 2021. Neuro-cognitive Differences in Semantic Processing Between Native Speakers and Proficient Learners of Mandarin Chinese. Frontiers in Psychology, section Language Sciences, vol.12: 781304. doi.org/10.3389/fpsyg.2021.781304.
4. Su, IW. 2021. Our Metaphorical Minds: Language as Cultural Manifestations. Cognitive Linguistics Studies. 8(1):85-108.
5. Su, IW, Wu, FW, Liang, KC, Cheng, KY, Hsieh, ST, Sun, WZ, Chou, TL. 2016. Pain Perception Can Be Modulated by Mindfulness Training: A Resting-State fMRI Study. Frontiers in Human Neuroscience, 10:570, DOI: 10.3389/fnhum.2016.00570.

Why Do We Need the Concept SNG: A Linguistic Point of View

Abstract

Cohen et al (2018) proposed a revision of the IASP 1979 definition of pain, which Treede (2018) considered useful in the assessment of pain, though not as a redefinition of pain. Such idea implies the limitations of language as a means of communication, which calls for a new look at the expression of pain. Language as a communication tool often leads to the realization that translation between two languages is likely to succeed only if we recognize and accept the idea of "near equivalents" (Grace 1983). Rita Charon in her keynote lecture in the 2017 conference of Encountering Pain pointed out that "Unremitting pain, is … our contemporary central dilemma." The common clinical practice of using numerical scales to indicate the degree of pain one suffers reveals the difficulty to fully communicate the level of pain, let alone to express the manner of pain by verbal expressions. This is especially true when it comes to the sensation of muscle soreness, which is not foreign to speakers around the world, but many languages fall short on descriptors for such sensation (Su et al, submitted). Based on data collected from 10 languages of different language families of the world, it was found that not all languages feature a proper lexical descriptor for sng. Since the limit of our language is the limit of our world (Wittgenstein 1963), it is time for us to go beyond pain scales to describe the qualitative dimension of painful experience, and consider, perhaps, abandoning the English language as the gold standard to express pain.

洪志憲 Chih-Hsien Hung

Assistant Professor, Department of Neurology,
Kaohsiung Medical University Hospital

Education and Professional Experience

Dr. Chih-Hsien Hung obtained his M.D. degree from China Medical University (Taichung, Taiwan) in 2007, and received specialty training in Department of Neurology at Chang-Gang Memorial Hospital, Linkou branch, between 2008~2012. Then he finished graduate studies in Ph.D. program in Translational Medicine, Kaohsiung Medical University and Academia Sinica (Taiwan), since 2015. The research theme during his PhD period was the translational research of fibromyalgia and its potential molecular mechanism. He is also involved in the research related to sleep disorders, mainly focus on restless leg syndrome. He is now an attending physician in the Department of Neurology, Kaohsiung Medical University Hospital.

Research

Fibromyalgia, translational research, neuropsychiatry, animal models, metabolomics, molecular biology

Publications:

1. **CH Hung**, MH Tsai, PS Wang, FW Liang, CY Hsu, KW Lee, YO Fong, DS Han, CH Lee, CL Lai, CC Cheng. Oxidative stress involves phenotype modulation of morbid soreness symptoms in fibromyalgia. **RMD Open** 2023 Mar;9(1):e002741
2. **CH Hung**, CH Lee, MH Tsai, CH Chen, HF Lin, CY Hsu, CL Lai, CH Chen. Activation of acid-sensing ion channel 3 by lysophosphatidylcholine 16:0 mediates psychological stress-induced fibromyalgia-like pain. **Annals of the Rheumatic Diseases**. 2020 Dec;79(12):1644-1656.
3. KV Chang*, **CH Hung***, WZ Sun, WT Wu, CL Lai, DS Han, CC Chen. Evaluating soreness symptoms of fibromyalgia: Establishment and validation of the Revised Fibromyalgia Impact Questionnaire with Integration of Soreness Assessment. **Journal of the Formosan Medical Association**, 2020 Jul;119(7):1211-1218
4. JH Lin*, **CH Hung***, DS Han*, ST Chen, CH Lee, WZ Sun and CC Chen. Sensing acidosis: nociception or sngception? **Journal of Biomedical Science**, 2018, 25,85-92.
5. **CH Hung**, KH Chang, YL Chen, YM Wu, CL Lai, HS Chang, RK Lyu, YR Wu, CM Chen, CC Huang, CC Chu, CH Chen, LS Ro. Clinical and radiological findings suggesting disorders other than Tolosa-Hunt syndrome among ophthalmoplegic patients: a retrospective analysis. **Headache**, Feb;55(2):252-64.
6. **CH Hung**, KH Chang, YM Wu, YL Chen, RK Lyu, HS Chang, YR Wu, CM Chen, CC Huang, CC Chu et al: A comparison of benign and inflammatory manifestations of Tolosa-Hunt syndrome. **Cephalalgia** 2013, 33(10):842-852.

Morbid soreness in fibromyalgia

Abstract

Musculoskeletal soreness occurs after exercise and also under morbid conditions, such as fibromyalgia (FM). However, the nosography and pathoetiology of morbid soreness symptoms in FM remain unknown. This study aimed to investigate the soreness manifestations in FM and probe its pathophysiology with metabolomics profiling. Fifty-one newly diagnosed FM patients from 166 consecutive cases of chronic musculoskeletal pain and 41 healthy controls were prospectively recruited. Musculoskeletal symptoms, therapeutic responses and metabolomics data were recorded and analyzed. Similar to pain complaints, soreness symptoms were highly prevalent in FM individuals (92.2%). In terms of manifestations and metabolomic features, phenotypes diverged between cases with prominent soreness (FM-PS) and those without symptoms (FM-P). Conventional treatment did not ameliorate soreness severity despite its efficacy on pain symptoms. Moreover, despite the salient therapeutic efficacy on pain relief, conventional treatment did not improve the general disease severity in patients with prominent soreness manifestations (FM-PS). Metabolomics analyses suggested oxidative metabolism dysregulation in FM, and high malondialdehyde level indicated excessive oxidative stress in FM individuals ($p=0.008$). Contrary to exercise-induced soreness, lactate levels were significantly lower in FM individuals than controls, especially in FM-PS. Moreover, FM-PS cases exclusively featured increased malondialdehyde level ($p=0.008$) and its correlation with soreness intensity ($r=0.337$, $p=0.086$). These findings suggest that morbid soreness symptoms were common in FM, with the therapeutic responses different from pain conditions. Oxidative stress rather than lactate accumulation involved phenotype modulation of the morbid soreness in FM. From this perspective, antioxidants could be potential therapeutic approaches for relieving soreness symptoms in the disorder.

陳貞吟 Jen-Yin Chen

Professor and Chair

Department of Anesthesiology, Chi Mei Medical Center, Tainan, Taiwan

Education and Professional Experience

2014-present: Chair of the Anesthesiology Department and Subdivision Pain Management in Chi Mei Medical Center, Taiwan

2020: Professor, Taiwan

2015-2020: Associated professor, Taiwan

2011-2015: Assistant professor, Taiwan

2007-2013: Ph.D. Food Science and Biotechnology, National Chung Hsing University, Taiwan

1979-1986: M.D. School of Medicine, China Medical University, Taiwan

Research

I am a board certificated anesthesiologist and pain physician. I completed a PhD in Food Science and Biotechnology. My research interest is to understand the correlation between nutrition and the clinical symptoms and signs of chronic pain such as postherpetic neuralgia and chronic muscular pain. In addition, I am interested in the treatment of chronic pain with nutrition intervention.

Publications:

1. Kuo-Chuan Hung, Sheng-Hsiang Yang, Chia-Yu Chang, Li-Kai Wang, Yao-Tsung Lin, Chia-Hung Yu, Min-Hsiang Chuang, Jen-Yin Chen*. (2023) Is Circulating Vitamin D Status Associated with the Risk of Venous Thromboembolism? A Meta-Analysis of Observational Studies. Nutrients, Feb. 2023.
2. Kuo-Mao Lan, Li-Kai Wang, Yao-Tsung Lin, Kuo-Chuan Hung, Li-Ching Wu, Chung-Han Ho, Chia-Yu Chang, Jen-Yin Chen*. Suboptimal Plasma Vitamin C Is Associated with Lower Bone Mineral Density in Young and Early Middle-Aged Men: A Retrospective Cross-Sectional Study. (2022) Nutrients, Aug.
3. Kuo-Chuan Hung, Li-Kai Wang, Jen-Yin Chen. Association of preoperative vitamin D deficiency with the risk of postoperative delirium and cognitive dysfunction: A meta-analysis. (2022) J Clin Anesth. (Impact Factor: 9.45)
4. Yao-Tsung Lin, Li-KaiWang, Kuo-Chuan Hung, Chia-Yu Chang, Li-Ching Wu, Chung-Han Ho, Jen-Yin Chen*. Prevalence and Predictors of Insufficient Plasma Vitamin C in a Subtropical Region and Its Associations with Risk Factors of Cardiovascular Diseases: A Retrospective Cross-Sectional Study. (2022) Nutrients, March.
5. Jen-Yin Chen, Bor-Shing Lin, Yi-Wei Luo, Cheng-Yuan Lin, Bor-Shyh Lin. Recovery Evaluation System of Bowel Functions Following Orthopedic Surgery and Gastrointestinal Endoscopy. (2021) IEEE, May. (Impact Factor: 4.5)

Low levels of vitamin B2 or B6 were associated with sngception in patients with muscle pain and degenerative lumbar spine diseases

Abstract

Soreness or sng is a common symptom with differential clinical impact from pain in patients with muscle pain and degenerative lumbar spine diseases. Sngception represents a specific somatosensory function that senses tissue acidosis and transmits the acid sensation from the peripheral to the central nervous system. In clinical practice, soreness sensation might be related to acid sensation. Sngception is different from nociception although overlap does exist.

Deficiency of aconitase and succinate dehydrogenase has been shown to cause acidosis in muscles. Iron–sulfur clusters (ISCs) are integral parts of aconitase and succinate dehydrogenase. The active form of vitamin B6 (pyridoxal phosphate) is involved in ISCs biosynthesis. Succinate dehydrogenase (SDH or Complex II) is a heterotetrameric protein complex containing four subunits, a flavoprotein (SDH1), an iron–sulfur protein (SDH2), and two small integral membrane proteins (SDH3 and SDH4). SDH1 contains a bound flavin adenine dinucleotide (FAD) cofactor. Therefore, we proposed that deficiency of either vitamin B6 or B2 may cause tissue acidosis leading to sngception in patients with muscle pain and degenerative lumbar spine diseases.

Our retrospective cross-sectional study revealed that patients with muscle pain had a high prevalence of low levels of certain plasma vitamin B's (B1, 2, 5, 6, 9, 12). The concentrations of plasma vitamin B2 or B6 in patients with muscle pain were negatively correlated with sngception by the questionnaires. Vitamin B2 or B6 supplements reduced sngception (soreness sensation) effectively in patients suffering from muscle pain with low vitamin B2 or B6, respectively.

陳建璋 Chien-Chang Chen

Director, Department of Academic Affairs and Instrument Services

Professor/Research Fellow, Institute of Biomedical Sciences, Academia Sinica

Education and Professional Experience

2020-present Director, Department of Academic Affairs and Instrument Service, Academia Sinica

2019-2020 Director, Department of International Affairs, Academia Sinica

2018-present Research fellow, IBMS, Academia Sinica, Taipei, Taiwan

2011-2018: Associate research fellow, IBMS, Academia Sinica, Taipei, Taiwan

2005-2011: Assistant research fellow, IBMS, Academia Sinica, Taipei, Taiwan

1999-2005: Postdoctoral fellow, HHMI, University of Iowa, USA

1991-1998: M.Sc. and PhD Department of Molecular and Integrative Physiology, University of Illinois at Urbana/Champaign, USA

Research

Our laboratory focuses on the mechanisms underlying the development of persistent chronic pain using optogenetics, chemogenetics, in vivo imaging, gene targeting, electrophysiological, pharmacological and behavioral approaches in wild type and genetically modified mice. We are investigating the circuits through which PVA involves in chronic pain. We are also studying the role of neurons and non-neuronal cells in hyperalgesia priming using acid-induced muscle pain (AIMP) model.

Publications:

1. Chen, W.H., Lien, C.C. & Chen, C.C.* (2022) Neuronal basis for pain- and anxiety-like behaviors in CeA. Pain 163 (3), e463-e475.
2. Tamang, H.K., Yang, R.B., Song, Z.H., Hsu, S.C., Peng, C.C, Tung, Y.C, Tzeng, B.H.*, and Chen, C.C* (2022) Cav3.2 T-type calcium channel regulates mouse platelet activation and arterial thrombosis. J Thromb Haemost 20 (8), 1887-1899.
3. Chang, Y.T., Chen, W.H., Shih, H.C., Shyu, B.C., Min, M.Y. & Chen, C.C.* (2019) Anterior nucleus of paraventricular thalamus mediates chronic mechanical hyperalgesia. Pain 160(5) 1208-1223.
4. Chen, W.H., Chang, Y.T., Cheng, S.J. & Chen, C.C. (2018) Spinal PKC/ERK signal pathway mediates hyperalgesia priming. Pain 159 (5), 907-918.
5. Cheng, Y.F., Chang, Y.T., Chen, W.H., Shih, H.C., Chen, Y.H., Shyu, B.C. & Chen, C.C. (2017) Cardioprotection induced in mouse model of neuropathic pain via anterior nucleus of paraventricular thalamus. Nat Commun 8, 826,

The role of spinal astrocytes in acid-induced hyperalgesic priming

Abstract

Chronic pain affects a significant portion of the population, and understanding the transition from acute to chronic states is crucial for effective management. Hyperalgesic priming, a state of heightened sensitivity to pain, serves as a model to study this transition. Astrocytes, dynamic glial cells in the central nervous system, play a vital role in regulating brain and spinal cord functioning and are implicated in pain modulation. However, their specific involvement in hyperalgesia priming has remained uncertain. To investigate the role of spinal astrocytes in hyperalgesia priming, we employed an acid-induced chronic muscle pain model. Following acid injection, we observed activation of spinal astrocytes. Notably, inhibition of astrocyte activation using LAA, an astrotoxin, after the first acid injection prevented hyperalgesia priming, as evidenced by the transient hyperalgesia induced by the second acid injection. These findings indicate the involvement of astrocytes in hyperalgesia priming. Additionally, we demonstrated the significance of astrocytic glutamate transporters GLT-1 and GLAST in this process. The release of D-Serine, a gliotransmitter, by astrocytes was identified as a mediator for the development of hyperalgesia. Overall, our study suggests that the excitatory inputs from nociceptors, stimulated by acid injection, activate pERK in Vglut2+ neurons, leading to glutamate release and increased excitability in the spinal cord. Astrocytes respond to these signals via glutamate transporters and release D-Serine, thus contributing to the development of hyperalgesic priming.

孫維欣 Wei-Hsin Sun

Professor

Department of Life Sciences & Institute of Genome Sciences, National Yang Ming Chiao Tung University

Education and Professional Experience

2019-present: Professor, Dept. of Life Sciences & Inst. of Genome Sciences, National Yang Ming Chiao Tung University, Taipei, Taiwan

2020-2021: Associate Dean, Office of International Affairs, National Yang Ming Chiao Tung University, Taipei, Taiwan

2016-2019: Professor, Dept. of Life Sciences, National Central University, Taoyuan, Taiwan

2011-2016: Associate professor, Dept. of Life Sciences, National Central University, Taoyuan, Taiwan

2003-2011: Assistant professor, Dept. of Life Sciences, National Central University, Taoyuan, Taiwan

1999-2003: Postdoctoral fellow, NICHD & NIMH, NIH, USA

1995-1999: Ph.D. Division of Anatomy, Cell & Human Biology, King's College London, U.K.

1988-1992: B.Sc. Dept. of Agricultural Chemistry, National Taiwan University, Taipei, Taiwan

Research

My research interest is to understand the molecular mechanisms of chronic pain using two major pain models, rheumatoid arthritis (Inflammatory/Nociplastic pain) and peripheral neuropathy (neuropathic pain). Current Research are focused on several areas: (1) The transition from the acute to chronic pain – modulation of proton-sensing GPCRs on distinct nociceptors; (2) Gut Microbe to Brain signaling and pain – neuroimmune modulation; (3) Peripheral nerve degeneration and pain – interaction between neurons and glial cells; (4) Sexual diamorphism in functional pain syndromes – neurohormonal modulation; (5) Analgesic drug development.

Publications:

1. Hung CC, Chin Y, Fong YO, Lee CH, Han DS, Lin JH, *Sun WH, Chen CC (2023) Acidosis-related pain and its receptors as targets for chronic pain. Pharmacol & Therapeut 247, 108444.
2. Kung CC, Huang YC, Hung TY, Teng CY, Lee TY, *Sun WH. (2020) Deletion of Acid-sensing ion channel 3 relieves the late phase of neuropathic pain by preventing neuron degeneration and promoting neuron repair. Cells 9, 2355
3. Dai SP, Hsieh WS, Chen CH, Lu YH, Huang HS, Chang DM, Huang SL, *Sun WH. (2020) TDAG8 deficiency reduces satellite glial number and pro-inflammatory macrophage number to relieve rheumatoid arthritis disease severity and chronic pain. J Neuroinflammation, 17:170
4. Chung YC, Lee CH, Sun WH, Chen CC. (2018) Involvement of advillin in somatosensory neuron subtypes-specific axon regeneration and neuropathic pain. PNAS 115:E8557-8566.
5. Su YS, Mei HR, Wang CH, *Sun WH. (2018) Peripheral 5-HT3 mediates mirror-image pain by a cross-talk with acid-sensing ion channel 3. Neuropharmacology 130: 92-104

TDAG8-modulated signaling contributes to the early and late phase of neuropathic pain

Abstract

Neuropathic pain caused by a lesion or disease profoundly alters the transduction of nociceptive signaling. The coordination of neurons, glia and immune cells results in persistent pain and inflammation. T-cell death-associated gene 8 (TDAG8), a proton-sensing G protein-coupled receptor, is located at nociceptors and immune cells and involved in inflammatory pain and arthritis-induced pain. However, whether TDAG8 also participates in neuropathic pain and how TDAG8 regulates neuropathic pain is unclear. Here we used chronic constriction injury of the sciatic nerve as the neuropathic pain model to examine TDAG8 roles in chronic pain. We demonstrate that TDAG8 deletion attenuates the early and late phase of mechanical allodynia induced by constriction injury, but thermal hyperalgesia. In the early phase, TDAG8 activation modulated Nav1.8 expression and activity in small IB4(+) neurons to initiate mechanical allodynia; it also modulated substance P release from IB4(-) neurons to induce neurogenic inflammation, facilitating the early mechanical allodynia. In the late phase, TDAG8 activation increased medium to large IB4(-) neuron activity to develop chronic mechanical allodynia; it also modulated substance P release in soma to reduce satellite glial number and down-regulate Nav1.7 expression, attenuating late mechanical allodynia.

Guy Smith Bewick

Senior Lecturer of School of Medical Sciences

University of Aberdeen

Education and Professional Experience

2023-present: Scientific Board member, Tenovus Grampian.
2023 Guest Editor, Experimental Physiology.
2022-present: Translational Neuroscience Section Lead
2017-present: Reviewing Editor, Nature Scientific Reports
2000-present: Senior Lecturer, School of Medical Sciences, Univ of Aberdeen
2001-present: Licensed Teacher of Anatomy
1994-present: PhD & MSc examiner for 20 students.

Research

Understanding how appropriate nerve-muscle signalling is established and maintained, both in motor and sensory systems. One focus is elucidating the role of the intriguing system of synaptic-like vesicles in mechanically sensitive sensory endings, he uncovered in collaboration with Dr Robert Banks of Durham University. This vesicle-based system seems to regulate the excitability of these sensory endings over a wide range, and is even capable of turning off the ending entirely. The other focus is on the neuromuscular junction, where he is over a range of in vivo activity patterns. As well as understanding the basic examining how transmitter release from the motor terminal is maintained neuroscience, he is exploring these control mechanisms as potential targets for strategies to ameliorate weakness in neuromuscular diseases.

Publications:

1. Development of abnormalities at the neuromuscular junction in the SOD1-G93A mouse model of ALS: dysfunction then disruption of postsynaptic structure precede motor symptoms. Mcintosh, J., Mekrouda, I., Dashti, M., Giuraniuc, C., Banks, R., Miles, G. B. & Bewick, G. S., 12 Apr 2023, (Accepted/In press) In: Frontiers in Molecular Neuroscience.
2. Biophysical model of muscle spindle encoding Housley, S. N., Powers, R. K., Nardelli, P. J., Lee, S., Blum, K., Bewick, G. S., Banks, R. W. & Cope, T., 26 Mar 2023, (E-pub ahead of print) In: Experimental Physiology.
3. The Plant Derived 3-3′-Diindolylmethane (DIM) Behaves as CB2 Receptor Agonist in Prostate Cancer Cellular Models Tucci, P., Brown, I., Bewick, G. S., Pertwee, R. G. & Marini, P., 11 Feb 2023, In: International Journal of Molecular Sciences. 24, 4, 14 p., 3620.
4. Molecular characterization of the intact mouse muscle spindle using a multi-omics approach Bornstein, B., Heinemann-Yerushalmi, L., Krief, S., Adler, R., Dassa, B., Leshkowitz, D., Kim, M., Bewick, G.S., Banks, R. W. & Zelzer, E., 6 Feb 2023, In: eLife. 12, 21 p., e81843.
5. Molecular characterization of the intact muscle spindle using a multi-omics approach Bornstein, B., Heinemann-Yerushalmi, L., Krief, S., Dassa, B., Leshkowitz, D., Bewick, G. S., Banks, R. W. & Zelzer, E., 3 Feb 2023, (Accepted/In press) In: eLife.

Glutamatergic autoregulation of primary mechanosensory terminals

裴育晟 Yu-Cheng Pei

Director, Professor, and Attending Physician at Department of Physical Medicine and Rehabilitation and School of Medicine

Chang Gung Memorial Hospital at Linkou/Chang Gung University

Education and Professional Experience

1999-present Physiatrist in Department of Physical Medicine and Rehabilitation, Chang Gung Memorial Hospital at Linkou, Taoyuan, Taiwan

2005-2009 PhD Program of Neuroscience, School of Medicine, Johns Hopkins University, Baltimore, USA

2018-present Director, Department of Physical Medicine and Rehabilitation, Chang Gung Memorial Hospital at Linkou, Taoyuan, Taiwan

Research

My research focuses on understanding how tactile features, such as tactile orientation or motion, are represented in the primary somatosensory cortex. Using rodent and primate models, our team characterizes the neural codes underlying the non-linear processing of tactile features as the information ascends along the processing hierarchies. This understanding is further applied in the development of rehabilitation robots which have been approved by FDA and applied clinically for patients with neurological disorders.

Publications:

1. Pu SW, et al. Decoupling Finger Joint Motion in an Exoskeletal Hand: A Design for Robot-assisted Rehabilitation. IEEE transactions on industrial electronics. 2020 Jan. 67(1) 686-697.
2. Pei Y, et al. Neural mechanisms of tactile motion integration in primary somatosensory cortex. Neuron. 2011; 69(3):536-547.
3. Pei Y, et al. Shape invariant coding of motion direction in primary somatosensory cortex. PLoS Biology. 2010;8(2):e1000305.
4. Pei Y, et al. The tactile integration of local motion cues is analogous to its visual counterpart. Proc Natl Acad Sci USA. 2008 Jun 10;105(23):8130-5.

Submodality integration for joint position sense

Abstract

In this talk, I will discuss how somatosensory submodality inputs, such as slowly adapting and rapidly adapting afferents, contribute to the percept of joint positions. According to data collected in human psychophysical and animal neurophysiological experiments, it is clear the joint position sense is a result of integration of multiple submodality inputs. Indeed, afferents originating from the joint, muscle, and skin are all very important in the judgement of joint position. The degree to which joint position sense is determined by each of these three inputs depends on a variety of factors, such as body parts and functional needs. Questions remain regarding the computational insight and functional implications in this integration. Furthermore, the clinical importance of this integration will be discussed, an approach that could guide us for the development of novel therapeutic methods and assessment tools in patients with neurological disorders.

Aya Takeoka

Associate professor at KU Leuven, Faculty of Medicine, Neuroscience Department

Principal Investigator at Neuroelectronics Research Flanders (NERF), Flanders Institute for Biotechnology (VIB)

Education and Professional Experience

2023-2025 Associate Editor of Neuroscience Research, an official society journal of the Japanese Society for Neuroscience

2021, 2023 Program steering committee for the Japanese Annual Neuroscience Meeting 2021 and 2023

2016-present: Associate professor at KU Leuven, Faculty of Medicine, Neuroscience Department

2010-2016: Post-doctoral Fellow (Mentor: Silvia Arber), Friedrich Miescher Institute for Biomedical Research, Basel, Switzerland

2004-2010: Ph.D. Molecular, Cellular, and Integrative Physiology Interdepartmental Ph.D. program (Mentors: V. Reggie Edgerton and Patricia Phelps)University of California, Los Angeles, USA

1999-2003: Oberlin College, Oberlin, OH, USA, Bachelor of Arts (Mentor: Dennison Smith)High honors in Neuroscience

Research

My central research aim is to understand how animals learn to generate and control motor behavior in health and disease. In my lab, we study mechanisms of circuit assembly, function and plasticity that lead to motor learning and recovery after neurotrauma.

We use a wide variety of methods, including detailed motor kinematic assessments, mouse genetics, viral tracing and manipulation, electrophysiological and imaging techniques. This approach allows us to manipulate functions of specific neuronal populations, which in turn helps us to understand their role in sensorimotor circuit output and plasticity.

Publications:

1. Rehman R, Miller M, Krishnamurthy S, Kjell J, Elsayed L, Hauck S, Heuvel F, Conquest A, Chandrasekar A, Ludolph A, Boeckers T, Mulaw M, Goetz M, Morganti-Kossmann M, Takeoka A, Roselli F, Met/HGFR triggers detrimental reactive microglia in TBI. Cell Reports 41, 111867. (2022)
2. Lavaud S, Bichara C, D'Andola M, Yeh S, Takeoka A. Electrophysiological signatures reveal spinal cord mechanisms for a lasting sensorimotor adaptation. BioRxiv, doi:10.1101/2022.03.30.486422 (2022)
3. Bertels H, Vicente-Ortiz G, El Kanbi K, Takeoka A. Neurotransmitter phenotype switching by spinal excitatory interneurons regulates locomotor recovery after spinal cord injury. Nature Neuroscience 25 (5) 617–629. (2022)
4. Takeoka A. Proprioception: Bottom-up directive for motor recovery after spinal cord injury. Neurosci Res 154, 1-8. Invited review. (2020)
5. Ceyssens F, Carmona MB, Kil D, Deprez M, Tooten E, Nuttin B, Takeoka A, Balschun D, Kraft M, Puers R. Chronic neural recording with probes of subcellular cross-section using 0.06 mm^2 dissolving microneedles as insertion device. Sensors and Actuators B: Chemical 284: 369-376 (2019)

Proprioception in spinal circuit plasticity