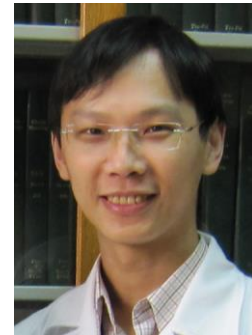


Ming-Kai Pan (潘明楷), M.D., Ph.D.

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Current position

- 2019~present **Assistant Professor**, Institute of Pharmacology, College of Medicine, National Taiwan University, Taipei, Taiwan (台大醫學院藥理所助理教授)
- 2019~present **Attending Physician**, Department of Neurology, National Taiwan University Hospital, Yun-Lin branch, Yun-Lin, Taiwan (台大醫院雲林分院神經部兼任主治醫師)
- 2018~present **Committee Member**, Neurology/neuroscience Committee, Ministry of Science and Technology, Taiwan
- 2018~present **Committee Member**, Tremor Study Group, International Parkinson and Movement Disorder Society (世界動作障礙學會 TSG committee 委員)
<https://www.movementdisorders.org/MDS/About/Study-Groups/MDS-Task-Forces/Task-Force-on-Tremor.htm>
- 2017~present **Translational Research Director**, Molecular Imaging Center, National Taiwan University, Taipei, Taiwan (臺灣大學分子生醫影像中心)
- 2017~present **Member**, Neurobiology and Cognitive Science Center, National Taiwan University, Taipei, Taiwan (臺灣大學神經生物及認知科學中心)
- 2015~present **Committee Member**, Research Ethics Committee, National Taiwan University Hospital, Taipei, Taiwan (台大醫院研究倫理委員會委員)

Research Focus

We focused on the cognitive and motor control mechanism of basal ganglia and cerebellum, as well as the pathophysiology of related movement disorders, such as Parkinson's disease and essential tremor.

Editorial Board

2020~ Experimental Neurology (IF: 4.691)

International Meeting Organizer

2019 Biomedical Molecular Imaging 2019, *Taipei, Taiwan*

<http://www.mic.ntu.edu.tw/tw/academic-events/mic-symposium/event/116/2019-biomedical-molecular-imaging-amp-9th-molecular-imaging-center-symposium.html>

- 2018 1st International Tremor Congress, *New York, NY, USA*
(Organized by Sheng-Han Kuo, *Columbia University*; Elan Louis, *Yale University*; Ming-Kai Pan, *National Taiwan University*)
<https://www.tremorcongress.org>
- 2018 Biomedical Molecular Imaging 2018, *Taipei, Taiwan*
<https://ntumic.wixsite.com/bmi2018/committee>

Online database author

- 2016~present **BMJ best Practice**, Essential tremor
<http://bestpractice.bmj.com/topics/en-gb/1089>

Education

- 2009-2014 **Ph.D.** Institute of Physiology, National Taiwan University College of Medicine, Taipei, Taiwan
Advisor: Chung-Chin Kuo
- 1997-2004 **M.D.** National Taiwan University College of Medicine, Taipei, Taiwan

Professional Experiences

- 2015~2019 **Assistant Professor**, Department of Neurology, College of Medicine, National Taiwan University, Taipei, Taiwan (台大醫院神經科兼任助理教授)
- 2011~2019 **Attending Physician**, National Taiwan University Hospital, Taipei, Taiwan (台大醫院主治醫師)
Department of Neurology 神經部: 2011~2015
Department of Medical Research 醫學研究部: 2015~2019
- 2013~2015 **Department Chief**, Department of Neurology, National Taiwan University Hospital Yin-Lin Branch
- 2012~2014 **Invited Lecturer**, Graduate Institute of Brain and Mind Sciences, National Taiwan University College of Medicine.
- 2009-2010 **Special volunteer (extramural)**, Human motor control section, NINDS, NIH. Advisor: Mark Hallett M.D.
- 2008 **Electrophysiology fellowship**, Human motor control section, NINDS, NIH. Advisor: Mark Hallett M.D.
- 2008 **Mini-fellowship of TMS**, Beth Israel Deaconess Medical Center, Berenson-Allen Center for Non-invasive Brain Stimulation.
Advisor: Alvaro Pascual-Leone

- 2008-2010 **Clinical electrophysiology fellowship**, Department of Neurology, National Taiwan University Hospital, Taipei, Taiwan.
- 2004-2008 **Residency**, Department of Neurology, National Taiwan University Hospital, Taipei, Taiwan

Honors and Rewards

- 2020 **National Innovation Award** (國家新創獎)
- 2020 **Young Scholar Innovation Award**, Foundation of the Advancement of Outstanding Scholarship (傑出人才發展基金會：年輕學者創新獎)
- 2020 **Young Scholar Innovation Award**, Tien Te Lee Biomedical Foundation (永信李天德醫藥基金會：青年醫藥科技獎)
- 2019 **Taiwan Brain Technology Project**: Chief PI. Ministry of Science and Technology, Taiwan (台灣腦科技發展及國際躍升計畫)
- 2018 **Junior Faculty Award**, MDS-AOS SYNERGIES 2018 (亞太動作障礙學會 SYNERGIES 獎)
<https://www.movementdisorders.org/MDS/Education/Past-Courses/SYNERGIES-Seoul-Korea2018.htm>
- 2018 **Awardee, 13 Health Tech Innovators Changing the World**, APEC ASPIRE. (亞大經濟合作會議 ASPIRE 獎：科技部暨中華台北代表，Health Tech Innovators 得獎人)
https://www.apec.org/Press/News-Releases/2018/0705_aspire (APEC website);
<https://hub.wiley.com/community/exchanges/discover/blog/2017/06/26/apec-prize-nominees-discuss-the-importance-of-global-research-collaboration> (Wiley Network)
- 2018 **Awardee, LEAP program**, International Parkinson and Movement Disorder Society (世界動作障礙學會 LEAP program 得主)
<https://www.movementdisorders.org/MDS/Education/Courses/MDS-LEAP-Program.htm>
- 2018 **Brain Science Project**: Chief PI and one of the four subproject PIs. Ministry of Science and Technology, Taiwan (科技部以疾病為導向之腦與心智科學專案研究計畫)
- 2018 **Excellent Young Researcher Project**: Ministry of Science and Technology, Taiwan (科技部年輕優秀學者研究計畫)
- 2018 **Future Tech Breakthrough Award**, Future Tech 2018 (未來科技展 2018：未來科技突破獎) <http://www.futuretech.org.tw/>
- 2018 **Best Media Notification Award**, Future Tech 2018 (未來科技展 2018：最佳媒體關注獎) <http://www.futuretech.org.tw/>
- 2018 **Ta-You Wu Memorial Award**, Ministry of Science and Technology, Taiwan (吳大猷先生紀念獎)

- 2015 **Young Star Developmental Tract Award**, Taiwan Bio-Development Foundation (台灣生技醫藥發展基金會人材培育獎助)
- 2014 **Excellent Research Award**, National Taiwan University Hospital (台大醫院傑出研究獎)
- 2014 **Outstanding Publication Award**, National Taiwan University College of Medicine (台大醫學院傑出論文獎)
- 2014 Best presentation, MDS-AOS Basic Scientist Summer School
- 2011-2014 Member of the Phi Tau Phi Scholastic Honor Society
- 2011 Travel Grant, AOPMC (Asia and Oceanian Parkinson's Disease and Movement Disorders Congress)

Grant Support

Ongoing Support:

1. **Ministry of Science and Technology, Taiwan** (to M-K Pan) 2020-2024
Ta-You Wu Memorial Award Project (吳大猷紀念獎計畫)
Grant ID: MOST 109-2326-B-002-013-MY4 (**Rank 1st, 16 million**)
Multi-dimensional approaches of cerebellar mechanism in tremor generation, motor rhythm control and motor coordination.
2. **National Institute of Health, USA** (to S-H Kuo, subaward to M-K Pan) 2020-2025
Grant ID: R01NS118179 (Rank 2nd percentile)
Targeting cerebellar excitatory synapses for tremor progression.
3. **National Institute of Health, USA** (to S-H Kuo, subaward to M-K Pan) 2018-2023
Grant ID: R01NS104423
Cerebellar Circuitry in Pathophysiology of Tremor.
4. **Ministry of Science and Technology, Taiwan** (to M-K Pan) 2019-2020
Taiwan Brain Technology Project (臺灣腦科技及國際躍升計畫)
Grant ID: 108-2321-B-002 -059 -MY2 (**Rank 1st, 20.5 million**)
Explore reward-based decision making and motor coordination by cerebellar EEG technology.

Completed Grant

1. **Ministry of Science and Technology, Taiwan** (to M-K Pan) 2018-2020
Excellent Young Investigator Project (年輕優秀學者研究計畫)
Grant ID: MOST 107-2628-B-002-002
Rhythm control in the primary motor cortex: A mouse-to-human electrophysiological study from Parkinson's disease to essential tremor
2. **Ministry of Science and Technology, Taiwan** (to M-K Pan) 2018-2020
Brain Science Project (科技部以疾病為導向之腦與心智科學專案研究計畫)
Grant ID: 107-2321-B-002-020 (**Rank 1st, 14.5 million**)
From essential tremor to cerebellar rhythm generation: an integrative study from mouse model to human electrophysiology

3. **Ministry of Science and Technology, Taiwan** (to M-K Pan) 2015-2018
Grant ID: 104-2314-B-002-076-MY3
Title: The neuronal coding, circuitry mechanism and plasticity evolution of essential tremors: the translational research between rodent models to human brain pathology
4. **National Taiwan University Hospital, Taiwan** (to M-K Pan) 2015
Grant ID: NTUH.104-N2870
Title: Optogenetic interrogation of the electrophysiological basis in hypokinetic movements
5. **National Taiwan University Hospital, Yun-Lin Branch, Taiwan** (to M-K Pan) 2014
Grant ID: NTUHYL104.N007
Title: The oscillatory mechanism of basal ganglia circuitry in parkinsonian motor deficits
6. **National Taiwan University Hospital, Taiwan** (to M-K Pan) 2015-2018
Grant ID: NTUH.104-P10
Title: Electrophysiological Basis of Basal Ganglion in Hyperkinetic Movement Disorders
7. **National Taiwan University Hospital, Taiwan** (to M-K Pan) 2017-2018
Excellent research award (I.F. > 12)
Title: Electrophysiological and optogenetic approaches of motor preparation and related deficits in Parkinson's disease- an animal to human study.
8. **National Taiwan University Hospital, Taiwan** (to M-K Pan) 2017-2018
Grant ID: NTUH.105-N3227
Title: The mechanism of essential tremor: from microstructural abnormality to neuronal coding changes in cerebellar Purkinje cell

International Invited Speeches (selected)

- | | |
|------|---|
| 2020 | Cerebellar roles in tremor pathophysiology: from human inspiration to technical innovation
<i>The 43rd Annual Meeting of the Japan Neuroscience Society, Osaka, Japan</i> |
| 2019 | Exploring the pathophysiology of Tremor
<i>60th annual meeting of Japanese Society of Neurology, Osaka, Japan</i> |
| 2019 | Electrophysiological biomarkers in Parkinson's disease
<i>3rd ITCN, Taipei, Taiwan</i> |
| 2019 | The roles of NMDA receptors in regulating real-time motor control and parkinsonian motor behaviors
<i>The 9th Federation of the Asian and Oceanian Physiological Societies Congress (FAOPS), Kobe, Japan</i> |
| 2018 | Explore the Pathophysiology of Essential Tremor
<i>MDS SYNERGES, Seoul, Korea</i> |
| 2018 | Physiological alterations in Tremor from abnormal synaptic organization
<i>1st International Tremor Congress, New York, NY, USA</i> |

- 2017 Synaptic pruning, Cerebellar Oscillations and Essential Tremor.
National Institute of Health, Washington DC, USA
- 2014 Cortico-subthalamic Transmission is the Causative Mechanism of
Parkinsonian Hypokinetic Movements.
Society for Neuroscience, Nanosymposium, Washington DC, USA
- 2014 The Role of Cortico-subthalamic Transmission in Parkinsonian Motor
Deficits.
Columbia University, New York, USA

Peer-reviewed Publications

First or Corresponding author: (indicate corresponding author)*

1. **Pan M-K***, Li Y-S, Wang S-B, Ni C-L, Wang Y-M, Liu W-C, Lu L-Y, Lee J-C, Cortes EP, Vonsattel J-P, Sun Q, Louis E, Faust P, Kuo S-H*. Cerebellar oscillations driven by synaptic pruning deficits of cerebellar climbing fibers contribute to tremor pathophysiology. *Science Translational Medicine*. 2020 Jan 15;12(526):eeey1769 (IF: 17.161)
2. **Pan M-K**, Ni C-L, Wu Y-C, Li Y-S, Kuo S-H*. Animal Models of Tremor: Relevance to Human Tremor Disorders. *Tremor Other Hyperkinetic Movements (N Y)*. 2018 Oct 9;8:587
3. **Pan M-K***, Kuo S-H*. Tracking the central and peripheral origin of tremor. *Clinical Neurophysiology*. 2018 Jul;129(7):1451-1452. (IF: 3.866)
4. **Pan M-K**, Kuo S-H, Tai C-H, Liou J-Y, Pei J-C, Chang C-Y, Wang Y-M, Lui W-C, Wang T-R, Lai W-C, Kuo C-C*. Neuronal firing patterns outweigh circuitry oscillations in parkinsonian motor control. *Journal of Clinical Investigation*. 2016 Dec 1;126(12):4516-4526 (IF:13.251)
5. **Pan M-K**, Tai C-H, Liu W-C, Pei J-C, Lai W-C, Kuo C-C*. Deranged NMDAergic cortico-subthalamic transmission underlies parkinsonian motor deficits. *Journal of Clinical Investigation*. 2014;124(10):4629-4641 (IF: 13.765)
6. **Pan M-K**, Huang S-C, Lo Y-C, Yang C-C, Cheng T-W, Yang C-C, Hua M-S, Lee M-J*, and Tseng W-YI*. Microstructural integrity of cerebral fiber tracts in hereditary spastic paraparesis with SPG11 mutation. *American Journal of Neuroradiology (AJNR)*. 2013;34(5):990-996, S991. (IF: 3.675)
7. **Pan M-K**, Tai C-H, and Kuo C-C*. [Parkinson's disease and cortico-Basal Ganglia circuits]. *Acta Neurol Taiwan*. 2010;19(3):213-222.

Co-author:

8. Yueh-Chi Wu, Elan D Louis, John Gionco, **Ming-Kai Pan**, Phyllis L Faust, Sheng-Han Kuo. Increased Climbing Fiber Lateral Crossings on Purkinje Cell Dendrites in the Cerebellar Hemisphere in Essential Tremor. *Movement Disorders* 2021. *In press* (IF: 8.324)
9. Nadia Amokrane, Anisha Viswanathan, Samantha Freedman, Chen-Ya Yang, Natasha A. Desai, **Ming-Kai Pan**, Sheng-Han Kuo, MD, Chi-Ying Lin. Impulsivity in Cerebellar Ataxias: Testing the Cerebellar Q2 Reward Hypothesis

- in Humans. *Movement Disorders* 2020 Aug 35(8): 1491-1493 (IF: 8.324)
10. Chun-Hwei Tai, **Ming-Kai Pan**, Sheng-Hong Tseng, Tien-Rei Wang, Chung-Chin Kuo. Hyperpolarization of the Subthalamic Nucleus Alleviates Hyperkinetic Movement Disorders. *Scientific Reports*. 2020 May 19;10(1):8278 (IF: 4.525).
 11. Yueh-Feng Wu, Rai-Teng Ye, **Ming-Kai Pan**, Sung-Jan Lin, Hsin-Yuan Tan. A Custom Multiphoton Microscopy Platform for Live Imaging of Mouse Cornea and Conjunctiva. *J Vis Exp* 2020 May 17;(159).
 12. Kuo SH, Louis ED, Faust PL, Handforth A, Chang SY, Avlar B, Lang EJ, **Pan MK**, Miterko LN, Brown AM, Sillitoe RV, Anderson CJ, Pulst SM, Gallagher MJ, Lyman KA, Chetkovich DM, Clark LN, Tio M, Tan EK, Elble RJ. Current Opinions and Consensus for Studying Tremor in Animal Models. *Cerebellum*. 2019 Dec;18(6):1036-1063. (IF: 3.280)
 13. Fan SM, Chang YT, Chen CL, Wang WH, **Pan MK**, Chen WP, Huang WY, Xu Z, Huang HE, Chen T, Plikus MV, Chen SK, Lin SJ. External light activates hair follicle stem cells through eyes via an ipRGC-SCN-sympathetic neural pathway. *Proc Natl Acad Sci U S A (PNAS)*. 2018 Jun; 115(29): E6880-E6889. (IF: 9.504)
 14. S-H Kuo, C-Y Lin, Jie Wang, Peter A Sims; **M-K Pan**, J-You Liou, Danielle Lee; William J Tate, Geoffrey C Kelly, Elan D Louis, Phyllis L Faust. Climbing fiber-Purkinje Cell Synaptic Pathology in Tremor and Cerebellar Degenerative Diseases. *Acta Neuropathologica*. 2017 Jan;133(1):121-138 (IF:15.872)
 15. Louis ED, Kuo SH, Wang J, Tate WJ, **Pan MK**, Kelly GC, Gutierrez J, Cortes EP, Vonsattel JG, Faust PL. Cerebellar Pathology in Familial vs. Sporadic Essential Tremor. *Cerebellum* 2017 Aug;16(4):786-791 (IF: 2.429)
 16. Kuo SH, Wang J, Tate WJ, **Pan MK**, Kelly GC, Gutierrez J, Cortes EP, Vonsattel JG, Louis ED, Faust PL. Cerebellar pathology in early and late onset essential tremor. *Cerebellum* 2017 Apr;16(2):473-482 (IF: 2.429)
 17. Kuo S-H, Lin C-Y, Wang J, Liou J-Y, **Pan M-K**, Louis R, Wu W-P, Gutierrez J, Louis E, Faust P. Deep Brain Stimulation and Climbing Fiber Synaptic Pathology in Essential Tremor. *Ann Neurol*. 2016 Sep;80(3):461-5 (IF: 10.244)
 18. Yang Y-C, Tai C-H, **Pan M-K**, and Kuo C-C. The T-type calcium channel as a new therapeutic target for Parkinson's disease. *Pflugers Archiv : European journal of physiology*. 2014;466(4):747-755. (IF: 4.101)
 19. Shen C-P, Liu S-T, Zhou W-Z, Lin F-S, Lam AY-Y, Sung H-Y, Chen W, Lin J-W, Chiu M-J, **Pan M-K**, Kao J-H, Wu J-M, and Lai F. A physiology-based seizure detection system for multichannel EEG. *PLoS ONE*. 2013;8(6):e65862. (IF: 3.534)
 20. Tai C-H, **Pan M-K**, Lin JJ, Huang C-S, Yang Y-C, and Kuo C-C. Subthalamic discharges as a causal determinant of parkinsonian motor deficits. *Ann Neurol*. 2012;72(3):464-476. (IF: 11.193)
 21. Tai C-H, Yang Y-C, **Pan M-K**, Huang C-S, and Kuo C-C. Modulation of subthalamic T-type Ca²⁺ channels remedies locomotor deficits in a rat model of Parkinson disease. *Journal of Clinical Investigation*. 2011;121(8):3289-3305. (IF: 13.069)
 22. Tai C-H, Wu R-M, Lin C-H, **Pan M-K**, Chen Y-F, Liu H-M, Lu H-H, Tsai C-W,

- and Tseng S-H. Deep brain stimulation therapy for Parkinson's disease using frameless stereotaxy: comparison with frame-based surgery. *European Journal of Neurology*. 2010;17(11):1377-1385. (IF: 4.387)
23. Lee M-J, Cheng T-W, Hua M-S, **Pan M-K**, Wang J, Stephenson DA, and Yang C-C. Mutations of the SPG11 gene in patients with autosomal recessive spastic paraparesis and thin corpus callosum. *J Neurol Neurosurg Psychiatr*. 2008;79(5):607-609. (IF: 7.349)
 24. Chao C-C, Yang C-C, Hsiao C-H, **Pan M-K**, Lin C-H, and Hsieh S-T. Nephrogenic systemic fibrosis associated with gadolinium use. *J Formos Med Assoc*. 2008;107(3):270-274.

Referees

1. **Dr. Chung-Chin Kuo** (chungchinkuo@ntu.edu.tw), Department of Physiology, National Taiwan University College of Medicine; Department of Neurology, National Taiwan University Hospital
2. **Dr. Mark Hallett** (hallettm@ninds.nih.gov), human motor control section, NINDS, NIH, MD, USA