Panpan Hou, Ph.D.

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Dr Neher's Biophysics Laboratory for Innovative Drug Discovery,
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Education, Training, and Position:

2005-2009 B.S. (Biomedical Engineering),
Huazhong University of Science and Technology, Wuhan, China.

2009-2014 PhD. (Biophysics),
Huazhong University of Science and Technology, Wuhan, China.

2014-2020 Postdoc (Biomedical Engineering),
Washington University in St. Louis, US

2021-2025 Assistant Professor,
Macau University of Science and Technology, Macao, China

2026-present Associate Professor,
Macau University of Science and Technology, Macao, China

Academic Contributions:

Ion channel proteins are widely expressed in every cell of the human body and play a critical role in maintaining numerous physiological processes. Abnormal gating of ion channels can lead to severe diseases, such as cardiovascular diseases, stroke, and cancer. Consequently, they represent important therapeutic targets for novel drug development and disease treatment. Since 2009, I have been dedicated to investigating the gating mechanisms, pathological roles, and new therapeutic drugs/strategies for key ion channels in the cardiovascular and cerebrovascular systems. My work has resolved several fundamental questions in the field and has gained wide recognition. These findings have been published as first or corresponding author in high-impact journals, including *Cell Research* (×2), *Circulation Research*, *PNAS*, *Nature Communications* (×2), *eLife* (×2), *Pharmacological Research*, etc.

Selected Publications (# first/co-first, * corresponding/co-corresponding):

1. Xinyu Cheng, Shuangyan Wan, Dexiang Jiang, Hangyu Zhang, Bin Hu, Tong Che, Yuanpeng Chen, Weiwei Nan, Zhuo Zhou, Chenxin Xiao, Ling Zhong, Yuting Zhang, Bing Xiong, **Panpan Hou***, Jin Zhang*. Structural basis of the neuronal M-current generated by an asymmetric KCNQ2/3 assembly. ***Cell Research.*** 2026 May 25.
2. Ling Zhong, Xiaoqing Lin, Xinyu Cheng, Shuangyan Wan, Yaoguang Hua, Weiwei Nan, Bin Hu, Zhenzhen Yan, Dexiang Jiang, Hangyu Zhang, Fengjiao Liu, Chenxin Xiao, Zhuo Zhou, Haijie Yu, Lijuan Ma, Chen Huang, Vincent Kam Wai Wong, Sookja Kim Chung, Bing Shen, Zhi-Hong Jiang, Erwin Neher, Wandi Zhu, Jin Zhang*, **Panpan Hou***. Secondary structure transitions and dual PIP2 binding define cardiac KCNQ1-KCNE1 channel gating. ***Cell Research.*** 2025. 18(6).
3. Ling Zhong#, Zhenzhen Yan#, Dexiang Jiang, Kuo-Chan Weng, Yue Ouyang, Hangyu Zhang, Xiaoqing Lin, Chenxin Xiao, Huaiyu Yang, Jing Yao, Xinjiang Kang, Changhe Wang, Chen Huang, Bing Shen, Sookja Kim Chung, Zhi-Hong Jiang, Wandi Zhu, Erwin

Neher, Jonathan R Silva*, **Panpan Hou*.** Targeting the IKs Channel PKA Phosphorylation Axis to Restore Its Function in High-Risk LQT1 Variants. ***Circulation Research.*** 2024 Sep 13;135(7):722-738.

4. **Panpan Hou***, Lu Zhao, Ling Zhong, Jingyi Shi, Hong Zhan Wang, Junyuan Gao, Huilin Liu, Joan Zuckerman, Ira S Cohen, Jianmin Cui*. The fully activated open state of KCNQ1 controls the cardiac "fight-or-flight" response. ***PNAS Nexus***. 2024 Oct 9;3(10).
5. Zhenzhen Yan#, Ling Zhong#, Wandi Zhu, Sookja Kim Chung, **Panpan Hou***. Chinese herbal medicine for the treatment of cardiovascular diseases ─ targeting cardiac ion channels. ***Pharmacological Research***. 2023. 106765.
6. Demin Ma#, Ling Zhong#, Zhenzhen Yan, Jing Yao, Yan Zhang, Fan Ye, Yuan Huang, Dongwu Lai, Wei Yang*, **Panpan Hou***, Jiangtao Guo*. Structural mechanisms for the activation of human cardiac KCNQ1 channel by electro-mechanical coupling enhancers. ***PNAS.*** 2022. 119(45).
7. **Panpan Hou,** Po Wei Kang, Audrey Deyawe Kongmeneck, Nien-Du Yang, Yongfeng Liu, Jingyi Shi, Xianjin Xu, Kelli McFarland White, Mark A. Zaydman, Marina A. Kasimova, Guiscard Seebohm, Ling Zhong, Xiaoqin Zou, Mounir Tarek*, and Jianmin Cui*. Two-stage electro-mechanical coupling of a K_V channel in voltage-dependent activation. ***Nature Communications*.** 2020; 11: 676.
8. **Panpan Hou,** Jodene Eldstrom, Jingyi Shi, Ling Zhong, Kelli McFarland, Yuan Gao, David Fedida, Jianmin Cui*. Inactivation of KCNQ1 potassium channels reveals dynamic coupling between voltage sensing and pore opening. ***Nature Communications.*** 2017. 8(1):1730.
9. **Panpan Hou,** Jingyi Shi, Kelli McFarland White, Yuan Gao, Jianmin Cui*. ML277 specifically enhances the fully activated open state of KCNQ1 by modulating VSD-pore coupling. ***eLife.*** 2019. Jul 22;8.
10. Keenan C. Taylor#, Po Wei Kang#, **Panpan Hou#**, Nien-Du Yang, Georg Kuenze, Jarrod A. Smith, Jingyi Shi, Hui Huang, Kelli McFarland White, Dungeng Peng, Alfred L. George Jr., Jens Meiler, Robert L. McFeeters, Jianmin Cui*, and Charles R. Sanders*. Structure and Physiological Function of the KCNQ1 Channel Voltage Sensor Intermediate State. ***eLife*.** 2020. Feb 24;2.
11. Haowen Liu#, **Panpan Hou#**, Xiying Guo#, Zhiwen Zhao, Bin Hu, Xia Li, Lu-Yang Wang, Jiuping Ding*, Sheng Wang*. Structural Basis for Calcium and Magnesium Regulation of a Large Conductance Calcium-Activated Potassium Channel with β1 Subunits. ***J. Biol. Chem.*** 2014. 289:16914-16923.
12. Junnan Li, Zhenni Yang, Shaoying Zhang, Yangliang Ye, Jiangnan He, Yan Zhang, Huayun Han, Wan Kong, Jiangru Liu, Yu Min, Juwen Shen, Lianghe Mei, Zongsheng Chen, Panpan Hou, Jiangtao Guo, Qiansen Zhang & Huaiyu Yang*. Small molecule inhibits KCNQ channels with a non-blocking mechanism. ***Nature Chemical Biology***. 2025.(5)3874.
13. Shaoying Zhang, Demin Ma, Kun Wang, Ya Li, Zhenni Yang, Xiaoxiao Li, Junnan Li, Jiangnan He, Lianghe Mei, Yangliang Ye, Zongsheng Chen, Juwen Shen, **Panpan Hou**, Jiangtao Guo, Qiansen Zhang, Huaiyu Yang*. A small-molecule activation mechanism that directly opens the KCNQ2 channel. ***Nature Chemical Biology***. 2024.(3)7265.
14. Demin Ma, Yueming Zheng, Xiaoxiao Li, Xiaoyu Zhou, Zhenni Yang, Yan Zhang, Long Wang, Wenbo Zhang, Jiajia Fang, Guohua Zhao, **Panpan Hou**, Fajun Nan, Wei Yang, Nannan Su, Zhaobing Gao, Jiangtao Guo. Ligand activation mechanisms of human KCNQ2 channel. ***Nature Communications***. 2023 14:6632
15. Julian A. Schreiber, Melina Möller, Mark Zaydman, Lu Zhao, Zachary Beller, Sebastian Becker, Nadine Ritter, **Panpan Hou,** Jingyi Shi, Jon Silva, Eva Wrobel, Nathalie Strutz-Seebohm, Niels Decher, Nicole Schmitt, Sven G. Meuth, Martina Düfer, Bernhard Wünsch, Jianmin Cui, and Guiscard Seebohm. A benzodiazepine activator locks Kv7.1 channels open by electro-mechanical uncoupling. ***Communications Biology***. 2022. 5:3

16. Yangyang Lin#, Sam Z. Grinter#, Zhongju Lu#, Xianjin Xu#, Hong Zhan Wang, Hongwu Liang, **Panpan Hou,** Junyuan Gao, Chris Clausen, Jingyi Shi, Wenshan Zhao, Zhiwei Ma, Yongfeng Liu, Kelli McFarland White, Lu Zhao, Po Wei Kang, Guohui Zhang, Ira S. Cohen*, Xiaoqin Zou* & Jianmin Cui*. Modulating the voltage sensor of a cardiac potassium channel shows antiarrhythmic effects. ***PNAS.*** 2021 May 18;118(20).
17. Wandi Zhu, Andrea Mazzanti, Taylor L. Vwoelker, **Panpan Hou**, Jonathan D. Moreno, Paweorn Angsutararux, Kristen M. Naegle, Silvia G. Priori, Jonathan R. Silva*. Predicting Patient Response to the Antiarrhythmic Mexiletine Based on Genetic Variation: Personalized Medicine for Long QT Syndrome. ***Circulation Research.*** 2018. 124(4):539-552.

Academic Appointments:

Committee Member of the Ion Channel and Receptor Branch, Chinese Neuroscience Society;
Committee Member of the Neurobiophysics Branch, Chinese Biophysical Society;
Review Editor of Pharmacological Research;
Review Editor of The Innovation;

Research Funding Support:

1) 2018-2020
   AHA postdoctoral fellowship
   Funding #: 18POST34030203
   Role: Principal Investigator

2) 2022-2025
   NSFC (General Program)
   Funding #: 32171221
   Role: Principal Investigator

3) 2023-2025
   FDCT-MOST joint project
   Funding #: 0006/2021/AMJ
   Role: Principal Investigator

4) 2023-2026
   FDCT project (General Program)
   Funding #: 0074/2022/A2
   Role: Principal Investigator

5) 2023-2024
   MUST FRG project
   Funding #: FRG-23-030-SKL
   Role: Principal Investigator

6) 2024-2027
   FDCT project (General Program)
   Funding #: 0098/2023/RIA2
   Role: Principal Investigator