

Abstracts of papers presented  
at the 2025 Cold Spring Harbor Asia Conference

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# MEMBRANE PROTEINS: FROM PHYSIOLOGY TO PHARMACOLOGY

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April 14–April 18, 2025

Arranged by

Karin Lindkvist, *Lund University*  
Crina Nimigean, *Weill Cornell Medical College*  
Nieng Yan, *Tsinghua University, SMART*



Cold Spring Harbor Conferences Asia  
Cold Spring Harbor Laboratory



# MEMBRANE PROTEINS: FROM PHYSIOLOGY TO PHARMACOLOGY

Monday, April 14 – Friday, April 18, 2025

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Monday	7:00 pm	<b>Opening Remarks</b>
Monday	7:15 pm	<b>1</b> Keynote Session
Tuesday	9:00 am	<b>2</b> Membrane Proteins in Physiology
Tuesday	2:00 pm	<b>Poster Session</b>
Tuesday	3:00 pm	<i>Chinese Tea and Beer Tasting</i>
Tuesday	7:00 pm	<b>3</b> Membrane Proteins and Disease
Wednesday	9:00 am	<b>4</b> Signal Transduction
Wednesday	2:00 pm	<i>Visit to Old Suzhou*</i>
Thursday	9:00 am	<b>5</b> Membrane-Protein Interactions
Thursday	2:00 pm	<b>6</b> Drug Discovery
Thursday	5:00 pm	<i>Cocktails and Banquet</i>
Friday	9:00 am	<b>7</b> Emerging Topics
Friday	12:00 pm	<b>Closing Remarks</b>

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Oral presentation sessions are located in the CSHA Auditorium

Poster session and Chinese Tea & Beer Tasting are in the Lake Front Hall.

Cocktail social hour is held outside in the Suz Garden.

Old Suzhou visits depart from the CSHA lobby

*\*optional tour requires additional fee.*

Meal locations and times are as follows:

Lunch: Main Cafeteria 12:00pm - 1:30pm

Dinner: Main Cafeteria 6:00pm - 7:30pm

Banquet: Suz Garden 6:00pm

More information will be available at CSHA office.

*(Map at the end of this abstract book)*

PROGRAM

MONDAY, April 14—7:00 PM

**Opening Remarks**

**Crina Nimigean**  
Weill Cornell Medical College

**SESSION 1** KEYNOTE SESSION

**Chairperson:** **Karin Lindkvist**, Lund University, Lund, Sweden

**Decoding the neural mechanisms of depression—Insights through ketamine’s pharmacological lens**

Hailan Hu [35'+10']

Presenter affiliation: Zhejiang University, Hangzhou, China.

1

**Prestin conformational dynamics and the molecular basis of the auditory amplification**

Eduardo Perozo [35'+10']

Presenter affiliation: University of Chicago, Chicago, Illinois.

2

TUESDAY, April 15—9:00 AM

**SESSION 2** MEMBRANE PROTEINS IN PHYSIOLOGY

**Chairperson:** **Jing Xue**, Shanghai Jiao Tong University School of Medicine, Shanghai, China

**Ion channels in reproduction—Structural and physiological mechanisms of Kir7.1 and CatSper regulation**

Polina V. Lishko, Dilip K. Swain, Qingwei Niu, Simon Vu, Citlalli Vergara, Julia A. Castro, Monika Haoui, Mingxing Qian, Yuanjiang Xu, Douglas Covey, Ziao Fu, Rui Zhang [20'+10']

Presenter affiliation: Washington University in St. Louis, School of Medicine, St. Louis, Missouri.

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**PIEZO and transcription factor auxiliary proteins (PTAPs) regulate PIEZO channels in sensory and non-sensory cell types**

Charles D. Cox [20'+10']

Presenter affiliation: Victor Chang Cardiac Research Institute, Sydney, Australia; UNSW Sydney, Kensington, Australia.

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**Structural basis of oxalate:formate exchange by a transporter in an oxalate-degrading bacterium in the gut microbiota**

Atsuko Yamashita [20'+10']

Presenter affiliation: Osaka University, Suita, Japan.

5

**Break**

**Astrocyte-modulated phosphate homeostasis and antisense oligonucleotide therapy for primary familial brain calcification**

Xuewen Cheng [10'+5']

Presenter affiliation: Lin Gang Laboratory, Shanghai, China.

6

**Highly conserved residues modulate allosteric nexus mechanics in TRPV1 channels**

Deny Cabezas-Bratesco, Sebastian E. Brauchi [20'+10']

Presenter affiliation: Universidad Austral de Chile, Valdivia, Chile.

7

**The mechanism of retraction fiber and migrasome formation**

Li Yu [20'+10']

Presenter affiliation: Tsinghua University, Beijing, China.

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TUESDAY, April 15—2:00 PM

**POSTER SESSION**

**Phosphorylation of Piezo1 at a single residue, serine 1612, regulates its mechanosensitivity and in vivo mechanotransduction function**

Tingxin Zhang, Cheng Bi, Yiran Li, Lingyun Zhao, Yaxiong Cui, Kunfu Ouyang, Bailong Xiao

Presenter affiliation: Tsinghua University, Beijing, China.

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**Endoplasmic reticulum—Nanodomain organization, dynamics, and membrane contacts with mitochondria**

Guang Gao, Ben Cardoen, Kurt R. Vandevoorde, Milene Ortiz-Silva, Chengjia Zhu, Emma Liu, Parsa Alan, William Liu, Ellie Tiliakou, A Wayne Vogl, Ghassan Hamarneh, Ivan R. Nabi

Presenter affiliation: University of British Columbia, Vancouver, Canada.

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<b>Exploring structural dynamics of urocanate reductase</b> <u>Nitisha Gurav</u> , Raminta Venskutonyte, Dean Lang, Monika Bjelcic, Thomas Ursby, Karin Lindkvist-Petersson Presenter affiliation: Lund University, Lund, Sweden.	11
<b>Identification of a novel regulator in touch sensation</b> <u>Yan Jiang</u> , Wanru Huang, Yan Chen, Hailong Yao Presenter affiliation: Tsinghua University, Beijing, China.	12
<b>Structural basis for high-voltage activation and subtype-specific inhibition of human Nav1.8</b> <u>Xueqin Jin</u> , Xiaoshuang Huang, Gaoxingyu Huang, Xiaojing Pan, Nieng Yan Presenter affiliation: Tsinghua University, Beijing, China.	13
<b>Structure and mechanism of the plastid/parasite ATP/ADP translocator</b> Huajian Lin, Jian Huang, <u>Tianming Li</u> , Wenjuan Li, Yutong Wu, Tianjiao Yang, Yuwei Nian, Xiang Lin, Jiangqin Wang, Ruiying Wang, Xiaohui Zhao, Nannan Su, Jinru Zhang, Xudong Wu, Minrui Fan Presenter affiliation: Chinese Academy of Sciences, Shanghai, China.	14
<b>Closed and open structures of the eukaryotic magnesium channel Mrs2 reveal the auto-ligand-gating regulation mechanism</b> <u>Ping Li</u> , Shiyan Liu, Johan Wallerstein, Rhiza Lyne E Villones, Peng Huang, Karin Lindkvist-Petersson, Gabriele Meloni, Kefeng Lu, Kristine Steen Jensen, Sara I Liin, Pontus Gourdon Presenter affiliation: Lund University, Lund, Sweden.	15
<b>Structural insights into the inhibition mechanism of fungal GWT1 by manogepix</b> Xinli Dai, Xuanzhong Liu, <u>Jialu Li</u> , Hui Chen, Chuangye Yan, Yaozong Li, Hanmin Liu, Dong Deng, Xiang Wang Presenter affiliation: Sichuan University, Chengdu, China.	16
<b>Insights into the structure and modulation of human TWIK-2</b> <u>Qiangqian Ma</u> , Ciria Hernandez, Vikas Navratna, Arvind Kumar, Abraham Lee, Shyamal Mosalaganti Presenter affiliation: University of Michigan, Ann Arbor, Michigan.	17

**Pancreatic islet rhythmicity arising from  $\delta$  and  $\alpha$  cell interactions maintains glucose homeostasis**

Huixia Ren, Yanjun Li, Beichen Xie, Zhenchao Fu, Xiaohong Peng, Weiran Qian, Yi Yu, Tianyi Chang, Xiaojing Yang, Kim Sneppen, Liangyi Chen, Chao Tang  
Presenter affiliation: Chinese Institutes for Medical Research, Beijing, China.

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**Mitochondrial transporters regulate metabolite signaling and mitochondrial central dogma**

Yiping Wang  
Presenter affiliation: Shanghai Jiao Tong University School of Medicine, Shanghai, China.

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**Mitochondrial 16S rRNA processing maintained by WBSCR16 regulates energy expenditure**

Shengjie Zhang, Zi Dong  
Presenter affiliation: Shanghai General Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, China.

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**AtKC1 inhibits AKT1 activation via its amino-terminal inhibitory domain**

Zijie Zheng, Yannan Qu, Jiexin Chen, Yuyue Tang, Dongliang Liu, Zhuo Huang, Huaizong Shen  
Presenter affiliation: Westlake University, Hangzhou, China; Fudan University, Shanghai, China.

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**PIEZO1 mediates mechanotransduction in choroid plexus epithelial cells and regulates cilia formation and cerebrospinal fluid homeostasis**

Xiao Zhu, Jiajie Zhu, WenHao Liu, Yaxiong Cui, Bailong Xiao  
Presenter affiliation: Tsinghua University, Beijing, China.

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TUESDAY, April 15—3:00 PM

**Chinese Tea and Beer Tasting**

TUESDAY, April 15—7:00 PM

**SESSION 3**      MEMBRANE PROTEINS AND DISEASE

**Chairperson:**    **Chao Wang**, Shenzhen Bay Laboratory, Shenzhen, China

**The twisted link between a dual function glutamate transporter and episodic ataxia**

Renaë M. Ryan [20'+10']

Presenter affiliation: University of Sydney, Sydney, Australia.

23

**New insights into the regulation of the CNS water channel aquaporin-4—From cell biology to clinical trials**

Roslyn M. Bill [20'+10']

Presenter affiliation: Aston Institute for Membrane Excellence, Birmingham, United Kingdom.

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**Aquaporins in health and disease**

Karin Lindkvist-Petersson [20'+10']

Presenter affiliation: Lund University, Lund, Sweden.

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**Spring-like mechanics enables stochastic single-channel gating of the mechanically activated PIEZO channel**

Wenhao Liu, Qijing He, Yang Meng, Bailong Xiao [20'+10']

Presenter affiliation: Tsinghua University, Beijing, China.

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WEDNESDAY, April 16—9:00 AM

**SESSION 4**      SIGNAL TRANSDUCTION

**Chairperson:**    **Zhangqiang Li**, Tsinghua University, Beijing, China

**Structural basis for the specific interactions between neuropeptide ligands and their G protein-coupled receptors**

Chaehee Park, Hyunook Kang, Jeessoo Kim, Hee-Jung Choi [20'+10']

Presenter affiliation: Seoul National University, Seoul, South Korea.

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**Structural pharmacology studies of human bitter taste receptors**

Weixiu Xu, Xiaolong Hu, Weizhen Ao, Lijie Wu, Zhi-Jie Liu, Tian Hua

[20'+10']

Presenter affiliation: iHuman Institute, Shanghai, China.

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<b>Voltage sensor conformations induced by LQTS-associated mutations in hERG potassium channels</b> <u>Guacan Dai</u> , Aaron Chan, Lucas Handlin, Emad Tajkhorshid [10'+5'] Presenter affiliation: Saint Louis University, Saint Louis, Missouri.	29
<b>AtKC1 inhibits AKT1 activation via its amino-terminal inhibitory domain</b> Zijie Zheng, Yannan Qu, Jiexin Chen, Yuyue Tang, Dongliang Liu, Zhuo Huang, <u>Huaizong Shen</u> [10'+5'] Presenter affiliation: Westlake University, Hangzhou, China.	30
<b>Break</b>	
<b>A GPCR-G protein-β-arrestin megacomplex induced by an allosteric modulator</b> Guodong He, Qinxin Sun, Xinyu Xu, Fang Kong, Shuhao Zhang, Kexin Ye, Xiaou Sun, Xin Chen, Chuangye Yan, <u>Xiangyu Liu</u> [20'+10'] Presenter affiliation: Tsinghua University, Beijing, China.	31
<b>Non-equilibrium structural pharmacology of the mu-opioid receptor</b> Michael Robertson, <u>Georgios Skiniotis</u> [20'+10'] Presenter affiliation: St Jude Children's Research Hospital, Memphis, Tennessee.	32
<b>From precision to expansion—Unveiling GPCR signaling modulation for therapeutic innovation</b> <u>Guodong He</u> , Qinxin Sun, Xinyu Xu, Xiangyu Liu [10'+5'] Presenter affiliation: Tsinghua University, Beijing, China.	33

WEDNESDAY, April 16—2:00 PM

**Visit to Old Suzhou**



**SESSION 5**      **MEMBRANE-PROTEIN INTERACTIONS**

**Chairperson:**      **Wei Lu**, Northwestern University, Evanston, Illinois, USA

**Ca<sup>2+</sup>-dependent gating and lipid scrambling by TMEM16 proteins in liposomes**

Zhang Feng, Omar E. Alvarenga, Eleonora Di Zanni, Sangyun Lee, George Khelashvili, Alessio Accardi [20'+10']

Presenter affiliation: Weill Cornell Medical School, New York, New York.

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**TMEM63 proteins are mechanically activated lipid scramblases**

Zijing Zhou, Yiechang Lin, Yaoyao Han, Ruitao Jin, Delfine Cheng, Yixiao Zhang, Ben Corry, Charles Cox [10'+5']

Presenter affiliation: Victor Chang Cardiac Research Institute, Sydney, Australia; University of New South Wales, Sydney, Australia.

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**Structural Insights into human Kir7.1 regulation by bioactive lipids**

Qingwei Niu, Simon Vu, Douglas Covey, Ziao Fu, Rui Zhang, Polina Lishko [10'+5']

Presenter affiliation: Washington University in St. Louis, St Louis, Missouri.

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**ABC transporters under the influence of substrates, lipids and ligands**

Arne Moeller [20'+10']

Presenter affiliation: Osnabrueck University, Osnabrück, Germany.

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**Break**

**Revealing the hydrophobic interactions between lipid bilayers and transmembrane peptides/proteins via photo-tagging and mass spectrometry**

Yu Xia [20'+10']

Presenter affiliation: Tsinghua University, Beijing, China.

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**MT1-MMP—New therapeutic target of metabolic disorder**

Hoi Leong Xavier Wong [10'+5']

Presenter affiliation: Hong Kong Baptist University, Hong Kong, China.

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**Native NMDA receptors in the brain—From atomic structure to synaptic physiology**

Shujia Zhu [20'+10']

Presenter affiliation: Institute of Neuroscience, Chinese Academy of Sciences, Shanghai, China.

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THURSDAY, April 17—2:00 PM

**SESSION 6** DRUG DISCOVERY

**Chairperson:** **Frank Yan**, 3E Bioventures/K2 Medicines, Shanghai, China

**Regulation of GABA<sub>A</sub> receptors by transmembrane auxiliary subunits**

Wei Lu [20'+10']

Presenter affiliation: NINDS, Bethesda, Maryland.

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**Structural insights into human peroxisomal ABC transporters ABCD1 and ABCD3—Mechanisms of fatty acid transport and disease pathology**

Wen-Tao Hou [10'+5']

Presenter affiliation: University of Sciences and Technology of China, Hefei, China.

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**Structural basis of substrate transport and inhibition of human mitochondrial pyruvate carrier**

Jiaming Liang, Junhui Shi, Ailong Song, Meihua Lu, Kairan Zhang, Meng Xu, Gaoxingyu Huang, Peilong Lu, Xudong Wu, Dan Ma [10'+5']

Presenter affiliation: Westlake University, Hangzhou, China.

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**Structural basis for urate preference and apigenin inhibition of human GLUT9**

Xiaoqing Pan [20'+10']

Presenter affiliation: Shenzhen Medical Academy of Research and Translation (SMART), Shenzhen, China.

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**Break**

**Propofol rescues voltage-dependent gating of HCN1 channel epilepsy mutants**

Crina Nimigean [20'+10']

Presenter affiliation: Weill Cornell Medical College, New York, New York.

45

**Structural-guided identification of two novel modulators of  $\beta$ -1,3-glucan synthase FKS1**

Jialu Li, Jian Li, Chuangye Yan, Dong Deng, Yunzi Luo, Xiang Wang [10'+5']

Presenter affiliation: Sichuan University, Chengdu, China.

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**Structural insights into heteromeric amino acid transporters (HATs)—Implications for targeted drug design**

Renhong Yan [10'+5']

Presenter affiliation: Southern University of Science and Technology, Shenzhen, China.

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**The function of TMEM16F in health and disease**

Peishang Shi, Ruijia Lai, Kun Cao, Jialin Yin, Mengya Cai, Yang Zhang [10'+5']

Presenter affiliation: Shenzhen Bay Laboratory, Shenzhen, China.

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THURSDAY, April 17—5:00 PM

**COCKTAILS and BANQUET**

FRIDAY, April 18—9:00 AM

**SESSION 7** EMERGING TOPICS

**Chairperson:** **Dong Deng**, Sichuan University, Chengdu, China

**High-speed atomic force microscopy for membrane protein structural biology**

Simon Scheuring [20'+10']

Presenter affiliation: Weill Cornell Medicine, New York, New York.

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**How physiological temperature drives TRPM4 ligand recognition and channel gating**

Jinhong Hu, Juan Du, Wei Lu [20'+10']

Presenter affiliation: Northwestern University, Evanston, Illinois.

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<b>De novo design of functional transmembrane proteins</b> <u>Peilong Lu</u> [10'+5'] Presenter affiliation: Westlake University, Hangzhou, China.	51
<b>Identification of a novel CatSper component by combining cryo-EM and AlphaFold</b> <u>Jianping Wu</u> [10'+5'] Presenter affiliation: Westlake University, Hangzhou, China.	52
<b>Break</b>	
<b>PepDance—Multi-conformation targeted AI peptide drug design</b> Yi Xu, Anji Liu, <u>Yafei Yuan</u> , Chuangye Yan [10'+5'] Presenter affiliation: Tsinghua University, Beijing, China.	53
<b>Journey into the chloroplast</b> <u>Zhen Yan</u> [20'+10'] Presenter affiliation: Westlake University, Hangzhou, China.	54
<b>From sugar transporters to glycoconjugated ion channels</b> <u>Nieng Yan</u> [20'+10'] Presenter affiliation: Shenzhen Medical Academy of Research and Translation (SMART), Shenzhen, China; Tsinghua University, Beijing, China.	55

FRIDAY, April 18—12:00 PM

### **Closing Remarks**

**Nieng Yan**  
Tsinghua University, SMART