

Abstracts of papers presented  
at the 2024 Cold Spring Harbor Asia Conference

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# GENOME EDITING: ALL THINGS CONSIDERED

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November 18–November 22, 2024

Arranged by

Jens Boch, *Leibniz University Hannover*

Dana Carroll, *University of Utah*

Jin-Soo Kim, *National University of Singapore*

Haoyi Wang, *Institute of Zoology, CAS*

Wensheng Wei, *Peking University*



Cold Spring Harbor Conferences Asia  
Cold Spring Harbor Laboratory



**GENOME EDITING: ALL THINGS CONSIDERED**  
Monday, November 18– Friday, November 22, 2024

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Monday	7:00 pm	<b>1</b> Mechanistic Studies Related to Genome Editing
Tuesday	9:00 am	<b>2</b> New Developments in Genome Editing: Methods and Tools
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> High-throughput Screening and Target Discovery
Wednesday	9:00 am	<b>4</b> Repurposing of Genome Editing
Wednesday	1:30 pm	<i>Visit to Old Suzhou*</i>
Wednesday	7:00 pm	<b>5</b> Genome Editing in Animals and Plants
Thursday	9:00 am	<b>6</b> Therapeutic Application
Thursday	2:00 pm	<b>7</b> Genome Writing and Synthetic Biology
Thursday	5:00 pm	<i>Cocktails and Banquet</i>
Friday	9:00 am	<b>8</b> All Things Considered

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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, November 18—7:00 PM

### **SESSION 1**      MECHANISTIC STUDIES RELATED TO GENOME EDITING

**Chairperson:**      **Wensheng Wei**, Peking University, Beijing, China

#### **Mechanistic studies and structure-based engineering of CRISPR-Cas genome editor nucleases and transposons**

Martin Jinek [25'+5']

Presenter affiliation: University of Zurich, Zurich, Switzerland. 1

#### **RNA-guided nucleases**

Jun-Jie Gogo Liu [25'+5']

Presenter affiliation: Tsinghua University, Beijing, China. 2

#### **Genome editing in plant mitochondria and chloroplasts—Current approaches and applications**

Shin-ichi Arimura, Issei Nakazato [25'+5']

Presenter affiliation: University of Tokyo, Tokyo, Japan. 3

TUESDAY, November 19—9:00 AM

### **SESSION 2**      NEW DEVELOPMENTS IN GENOME EDITING: METHODS AND TOOLS

**Chairperson:**      **Jin-Soo Kim**, National University of Singapore

#### **De novo gene synthesis by an antiviral reverse transcriptase**

Samuel H. Sternberg [25'+5']

Presenter affiliation: Columbia University, New York, New York. 4

**Sequence modeling and design from molecular to genome scale with Evo**

Eric Nguyen, Michael Poli, Matthew G. Durrant, Brian Kang, Dhruva Katrekar, David B. Li, Liam J. Bartie, Armin W. Thomas, Samuel H. King, Garyk Brixi, Jeremy Sullivan, Madelena Y. Ng, Ashley Lewis, Aaron Lou, Stefano Ermon, Stephen A. Baccus, Tina Hernandez-Boussard, Christopher Ré, Patrick D. Hsu, Brian L. Hie [25'+5']

Presenter affiliation: Arc Institute, Palo Alto, California; University of California, Berkeley, California.

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**Break**

**A new RNA base editor repairs nonsense mutations**

Chengqi Yi [25'+5']

Presenter affiliation: Peking University, Beijing, China.

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**Amplification editing enables efficient and precise duplication of DNA to chromosomal scale**

Hao Yin [25'+5']

Presenter affiliation: Wuhan University, Wuhan, China.

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TUESDAY, November 19—2:00 PM

**POSTER SESSION**

**An engineered mitoCBE facilitates mitochondrial DNA editing compatibility and edited mitochondrial transfer**

Jie Liu, Jun Chen, Yunbo Qiao

Presenter affiliation: Qilu Hospital, Shandong University, Jinan, China.

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**All-RNA-mediated targeted gene integration in mammalian cells with rationally engineered R2 retrotransposons**

Yangcan Chen, Shengqiu Luo, Yanping Hu, Bangwei Mao, Xinge Wang, Zongbao Lu, Qi Zhou, Wei Li

Presenter affiliation: Key Laboratory of Organ Regeneration and Reconstruction, State Key Laboratory of Stem Cell and Reproductive Biology, Beijing, China.

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**Flexible TAM requirement of TnpB enables efficient single-nucleotide editing with expanded targeting scope**

Xu Feng, Ruyi Xu, Jianglan Liao, Xiaoxue Wang, Wenyuan Han, Qunxin She

Presenter affiliation: Shandong University, Qingdao, China.

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- Protein language models-assisted optimization of a uracil-N-glycosylase variant enables programmable T-to-G and T-to-C base editing**  
Yan He, Xibin Zhou, Fajie Yuan, Xing Chang  
 Presenter affiliation: Westlake University, Hangzhou, China. 11
- CDK11 is a novel therapeutic target in hepatocellular carcinoma**  
Zhijian Kuang, Jack Wong  
 Presenter affiliation: The University of Hong Kong, Hong Kong, China. 12
- A highly efficient direct gene transformation system unlocks genome editing opportunities in oil palm**  
Fong Chin Lee, Norkhairunnisa Che Mohd Khan, Maimon Abdullah, Muhammad Rashdan Muad, Wan Chin Yeap  
 Presenter affiliation: SD Guthrie Technology Centre, Serdang, Malaysia. 13
- Functional profiling of serine, threonine and tyrosine sites**  
Yizhou Li, Tao Xu, Huazheng Ma, Di Yue, Qiezhong Lamao, Ying Liu, Zhuo Zhou, Wensheng Wei  
 Presenter affiliation: Peking University, Beijing, China; Changping Laboratory, Beijing, China. 14
- Enhanced eMAGE applied to identify genetic factors of nuclear hormone receptor dysfunction via combinatorial gene editing**  
Zhuobin Liang, Peter N. Ciaccia, Anabel Y. Schweitzer, Eli Metzner, Farren J. Isaacs  
 Presenter affiliation: Yale University, New Haven, Connecticut; Shenzhen Bay Laboratory, Shenzhen, China. 15
- A nucleic acid detection platform based on DNA sulfur modification**  
 Hang Gao, Yuting Shuai, Dini Ma, Anan Xu, Xinyi He, Zixin Deng, Guang Liu  
 Presenter affiliation: Shanghai Jiao Tong University, Shanghai, China. 16
- High fidelity PAMless base editing of hematopoietic stem cells to treat chronic granulomatous disease**  
Linyuan Ma, Vera Bzhilyanskaya, Siyuan Liu, Lauren R. Fox, Madelynn N. Whittaker, Ronald J. Meis, Michelle Ma, Cicera R. Lazzarotto, Shengdar Q. Tsai, Justin Lack, Xiaolin Wu, Gary Dahl, Harry L. Malech, Suk See De Ravin, Benjamin P. Kleinstiver  
 Presenter affiliation: Massachusetts General Hospital, Boston, Massachusetts; Harvard Medical School, Boston, Massachusetts. 17

- Improved strategies for precise gene knock-in with large genomic fragment removal using CRISPR-Cas3**  
Daiki Nagatomo, Kazuto Yoshimi, Tomoji Mashimo, Tetsushi Sakuma  
 Presenter affiliation: Kyoto University, Kyoto, Japan. 18
- Massively parallel interrogation of human functional variants modulating cancer immunosurveillance**  
 Ying Liu, Yongshuo Liu, Xuran Niu, Ang Chen, Yizhou Li, Ying Yu, Zhiheng Liu, Tao Xu, Jie Cheng, Zeguangu Wu, Wensheng Wei  
 Presenter affiliation: Peking University, Beijing, China. 19
- Evaluation of *in vivo* genome editing efficiency using a reporter mouse model**  
Masato Ohtsuka, Jurai Imafuku, Aki Kurosaki, Kenya Kamimura, Yumu Yaku, Keiko Yokoyama, Akihide Kamiya, Haruno Onuma, Yusuke Sato, Channabasavaiah B. Gurumurthy, Hiromi Miura  
 Presenter affiliation: Tokai University, Isehara, Japan. 20
- Circular ADAR-recruiting RNA alleviates long-term disease phenotype in Duchenne muscular dystrophy by RNA editing**  
Huixian Tang, Zongyi Yi, Wenting Guo, Raoxian Bai, Shuaiwei Ren, Xiwen Chang, Jiwu Ren, Wei Tang, Ying Yu, Pengfei Yuan, Weizhi Ji, Yongchang Chen, Wensheng Wei  
 Presenter affiliation: Peking University, Beijing, China. 21
- Prime editor-based high-throughput screening reveals functional synonymous mutations in the human genome**  
 Xuran Niu, Wei Tang, Yongshuo Liu, Ying Liu, Binrui Mo, Ying Yu, Wensheng Wei  
 Presenter affiliation: Peking University, Beijing, China. 22
- Identification and validation of DNA barrier elements using a novel high-throughput multicolor assay**  
Aqeel F. Taqi, Illeana Guerrini, Rio Hermantara, Valentine Jeantet, Lura Richmond, Sabari Chilaka, Katherine West, Adam West  
 Presenter affiliation: University of Glasgow, School of Cancer Sciences, Glasgow, United Kingdom; Dasman Diabetes Institute, Kuwait City, Kuwait. 23
- Mining and implementation of CRISPR-associated transposases for multiplexed genome editing**  
Siqi Yang, Xiaojie Zhou, Shijie Cai  
 Presenter affiliation: Chinese Academy of Sciences, Shanghai, China. 24

**Cell-free long single-stranded DNA payloads with multiple modifications for gene and cell therapy studies**

Lumeng Ye, Haiye Sun, Qian Gao, Hong Li

Presenter affiliation: GenScript Biotech, Nanjing, China.

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**Precision optimization of mitoBEs empowers the establishment of mitochondrial disease models**

Xiaoxue Zhang, Xue Zhang, Jiwu Ren, Jiayi Li, Xiaoxu Wei, Ying Yu, Zongyi Yi, Wensheng Wei

Presenter affiliation: Changping Laboratory, Beijing, China.

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TUESDAY, November 19—3:00 PM

**Chinese Tea and Beer Tasting**

TUESDAY, November 19—7:00 PM

**SESSION 3 HIGH-THROUGHPUT SCREENING AND TARGET DISCOVERY**

**Chairperson:** **Caixia Gao**, Institute of Genetics and Developmental Biology, Chinese Academy of Sciences, Beijing, China

**Screening the different dimensions of immunological genome**

Sidi Chen [25'+5']

Presenter affiliation: Yale University, West Haven, Connecticut.

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**Advancing cell and gene therapies through high-throughput functional genomics**

Wensheng Wei [25'+5']

Presenter affiliation: Peking University, Beijing, China.

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**Genome-wide Cas9-mediated screening of essential non-coding regulatory elements via libraries of paired single-guide RNAs**

Yufeng Li, Minkang Tan, Almira Akkari-Henic, Limin Zhang, Maarten Kip, Shengnan Sun, Jorian J. Sepers, Ningning Xu, Yavuz Ariyurek, Susan L. Kloet, Richard P. Davis, Harald Mikkers, Joshua J. Gruber, Michael P. Snyder, Xiao Li, Baoxu Pang [25'+5']

Presenter affiliation: Leiden University Medical Center, Leiden, the Netherlands.

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**Massively parallel interrogation of human functional variants modulating cancer immunosurveillance**

Ying Liu, Yongshuo Liu, Xuran Niu, Ang Chen, Yizhou Li, Ying Yu, Zhiheng Liu, Tao Xu, Jie Cheng, Zeguang Wu, Wensheng Wei [15'+5']

Presenter affiliation: Peking University, Beijing, China.

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**Prime editor-based high-throughput screening reveals functional synonymous mutations in the human genome**

Xuran Niu, Wei Tang, Yongshuo Liu, Ying Liu, Binrui Mo, Ying Yu, Wensheng Wei [15'+5']

Presenter affiliation: Peking University, Beijing, China.

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WEDNESDAY, November 20—9:00 AM

**SESSION 4** REPURPOSING OF GENOME EDITING

**Chairperson:** **Haoyi Wang**, Institute of Zoology, Chinese Academy of Sciences, Beijing, China

**Programmable technologies for genome and transcriptome editing**

Omar O. Abudayyeh, Jonathan S. Gootenberg [25'+5']

Presenter affiliation: Harvard University, Cambridge, Massachusetts; Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts; Beth Israel Deaconess Medical Center, Boston, Massachusetts.

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**Epigenetic editing cancer therapy**

Albert W. Cheng [25'+5']

Presenter affiliation: Institute of Zoology, Chinese Academy of Sciences, Beijing, China; Beijing Institute for Stem Cell and Regenerative Medicine, Beijing, China; University of Chinese Academy of Sciences, Beijing, China.

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**Break**

**Programmable technologies for genome and transcriptome editing**

Omar O. Abudayyeh, Jonathan S. Gootenberg [25'+5']

Presenter affiliation: Harvard University, Cambridge, Massachusetts; Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts; Beth Israel Deaconess Medical Center, Boston, Massachusetts.

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### **Base editing to treat $\beta$ -thalassemia**

Yongrong Lai, Rongrong Liu, Lijie Wang, Xu-Kai Ma, Yaliang Li, Gaohui Yang, Lingling Shi, Jia Wei, Zhenbin Wei, Xuemei Zhou, Kewei Lan, Yan Zhang, Xiaodun Mou, Li Yang, Jia Chen [25'+5']  
Presenter affiliation: ShanghaiTech University, Shanghai, China; Shanghai Clinical Research and Trial Center, China.

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### **Identification and validation of DNA barrier elements using a novel high-throughput multifluorescent assay**

Aqeel F. Taqi, Illeana Guerrini, Rio Hermantara, Valentine Jeantet, Lura Richmond, Sabari Chilaka, Katherine West, Adam West [15'+5']  
Presenter affiliation: University of Glasgow, School of Cancer Sciences, Glasgow, United Kingdom; Dasman Diabetes Institute, Kuwait City, Kuwait.

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WEDNESDAY, November 20—1:30 PM

### **Visit to Old Suzhou**

WEDNESDAY, November 20—7:00 PM

## **SESSION 5 GENOME EDITING IN ANIMALS AND PLANTS**

**Chairperson:** **Dali Li**, East China Normal University, Shanghai, China

### **Next-generation precise genome editing technologies and their applications in crop improvement**

Caixia Gao [25'+5']  
Presenter affiliation: Institute of Genetics and Developmental Biology, Chinese Academy of Sciences, Beijing, China.

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### **Organellar DNA editing in vitro and in vivo**

Jin-Soo Kim [25'+5']  
Presenter affiliation: National University of Singapore, Singapore.

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### **Precision optimization of mitoBEs empowers the establishment of mitochondrial disease models**

Xiaoxue Zhang, Xue Zhang, Jiwu Ren, Jiayi Li, Xiaoxu Wei, Ying Yu, Zongyi Yi, Wensheng Wei [15'+5']  
Presenter affiliation: Changping Laboratory, Beijing, China.

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**Peptide-assisted genome editing enables efficient engineering of mouse primary neural precursor cells**

Yangyang Li, Yifan He, Shanshan Xu, Xu Yan, Zhenyan Xu, Zhen Zhang [25'+5']

Presenter affiliation: Hefei Comprehensive National Science Center, Hefei, China.

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THURSDAY, November 21—9:00 AM

**SESSION 6 THERAPEUTIC APPLICATION**

**Chairperson:** **Wei Li**, Institute of Zoology, Chinese Academy of Sciences, Beijing, China

**Expanding the applications of homology directed repair to create innovative cell based medicines**

Matthew H. Porteus [25'+5']

Presenter affiliation: Stanford University, Stanford Medical School, Stanford, California.

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**Genome editing and its clinical applications**

Dali Li [25'+5']

Presenter affiliation: East China Normal University, Shanghai, China.

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**Circular ADAR-recruiting RNA alleviates long-term disease phenotype in Duchenne muscular dystrophy by RNA editing**

Huixian Tang, Zongyi Yi, Wenting Guo, Raoxian Bai, Shuaiwei Ren, Xiwen Chang, Jiwu Ren, Wei Tang, Ying Yu, Pengfei Yuan, Weizhi Ji, Yongchang Chen, Wensheng Wei [15'+5']

Presenter affiliation: Peking University, Beijing, China.

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**Break**

**Directed evolution of adenine base editors and generation humanized mice: tackling ABE applications for human gene therapy**

Feng Gu [25'+5']

Presenter affiliation: Hunan Normal University, Changsha, China.

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**AAV-CRISPR-mediated liver-specific knock-in restored hemostasis in neonatal hemophilia B mice**

Zhenjie Zhang, Xiangjun He, Siqi Zhang, Bo Feng [25'+5']  
Presenter affiliation: The Chinese University of Hong Kong, Hong Kong SAR, China; Hong Kong Institute of Science & Innovation, Chinese Academy of Sciences, Hong Kong SAR, China.

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THURSDAY, November 21—2:00 PM

**SESSION 7 GENOME WRITING AND SYNTHETIC BIOLOGY**

**Chairperson:** **Hao Yin**, Wuhan University, Wuhan, China

**Targeted transgene integration via primed micro-homologues and engineered R2 retrotransposons**

Wei Li [25'+5']

Presenter affiliation: Key Laboratory of Organ Regeneration and Reconstruction, Institute of Zoology, Chinese Academy of Sciences, Beijing, China.

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**Click-to-Install—Programmable genome writing using DNA polymerases and HUH endonucleases**

Joana Ferreira da Silva, Connor J. Tou, David Rufino-Ramos, Christopher R. Cromwell, Madeline Eller, Emily M. King, Linyuan Ma, Benjamin P. Kleinstiver [25'+5']

Presenter affiliation: Massachusetts General Hospital, Boston, Massachusetts; Harvard Medical School, Boston, Massachusetts.

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**All-RNA-mediated targeted gene integration in mammalian cells with rationally engineered R2 retrotransposons**

Yangcan Chen, Shengqiu Luo, Yanping Hu, Bangwei Mao, Xinge Wang, Zongbao Lu, Qi Zhou, Wei Li [15'+5']

Presenter affiliation: Key Laboratory of Organ Regeneration and Reconstruction, State Key Laboratory of Stem Cell and Reproductive Biology, Beijing, China.

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**Break**

**Development of transposon based genome engineering tools**

Haoyi Wang [25'+5']

Presenter affiliation: Chinese Academy of Sciences, Beijing, China.

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**Ultra-efficient multi-locus genome editing via a trackable prime editor toolkit**

Zhichao Qiu, Keke Sun, Qingwei Zeng, Ziwei Luo, Xinran Liu, Yaping Li, Xiang Lei, Ruilin Zhao, Xuan Wang, Joe Z. Zhang, Xiaolong Wang, Alessandra Giorgetti, Zhuobin Liang [25'+5']

Presenter affiliation: Shenzhen Bay Laboratory, Shenzhen, China. 50

**Improved strategies for precise gene knock-in with large genomic fragment removal using CRISPR-Cas3**

Daiki Nagatomo, Kazuto Yoshimi, Tomoji Mashimo, Tetsushi Sakuma [15'+5']

Presenter affiliation: Kyoto University, Kyoto, Japan. 51

THURSDAY, November 21—5:00 PM

**COCKTAILS and BANQUET**

FRIDAY, November 22—9:00 AM

**SESSION 8 ALL THINGS CONSIDERED**

**Chairperson:** **Zhuobin Liang**, Shenzhen Bay Laboratory, Shenzhen, China

**An integrative type I-F cascade-based CRISPRi library screening identifies novel antibiotic resistance determinants in superbugs**

Guangming Zhang, Yingtong Su, Xiaoyang Han, Mengyao Guo, Aixin Yan [25'+5']

Presenter affiliation: The University of Hong Kong, Hong Kong SAR, China. 52

**Advancing bacterial genome editing with non-killing CRISPR-Cas systems**

Peng-Fei Xia, Ying Wei, Pei-Ru Chen [25'+5']

Presenter affiliation: Shandong University, Qingdao, China. 53

**Break**

**Engineered IscB- $\omega$ RNA system with improved base editing efficiency for disease correction via single AAV delivery in mice**

Ruo Chen Guo, Xiaozhi Sun, Feizuo Wang, Dingyi Han, Qiaoxia Yang, Hua Gao, Zhifang Li, Zhuang Shao, Jinqi Shi, Rongrong Yang, Xiaona Huo, Junda Yan, Guoling Li, Qingquan Xiao, Yuanhua Liu, Leyun Wang, Chunyi Hu, Chunlong Xu [25'+5']

Presenter affiliation: Lingang Laboratory, Shanghai, China; ShanghaiTech University, Shanghai, China; Shanghai Center for Brain Science and Brain-Inspired Technology, Shanghai, China.

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**Total solution for efficient cell therapy engineering with non-viral gene knock-in solutions**

Lumeng Ye, Fan Zhou, Fei Huang, Hong Li [15'+5']

Presenter affiliation: GenScript Biotech, Nanjing, China.

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