

Cell Research



Q K 2 1 2 0 7 8 0

Volume 31 Number 6 June 2021

www.nature.com/cr
www.cell-research.com

L1 and B1/Alu repeats compartmentalize the 3D genome

A novel strategy for in vivo RNAi therapy

A spatial navigation system outside the hippocampal formation

A primate-specific lncRNA controls nucleolar structure & function

ISSN 1001-0602



9 771001 060218

Center for Excellence in Molecular Cell Science
Chinese Academy of Sciences

SPRINGER NATURE

(Founded in 1990)

Online submission via:

<http://www.nature.com/cr>

<http://www.cell-research.com>

Cell Research is published monthly by Nature Publishing Group (NPG) in partnership with Center for Excellence in Molecular Cell Science (CEMCS), Chinese Academy of Sciences (CAS) since 2006.

Sponsored by:

Center for Excellence in Molecular Cell Science (CEMCS), CAS

© 2021 CEMCS, CAS



Affiliated with:

The Chinese Society for Cell Biology since August 2007



Granted by:

Publishing Foundation of Chinese Academy of Sciences, National Natural Science Foundation of China, and China Association for Science and Technology



Supported by SPFCAS

This journal is a member of, and subscribes to the principles of, the Committee on Publication Ethics (COPE) www.publicationethics.org



SPRINGER NATURE

Coordinating Editor for this issue
Shushu Jiang

RESEARCH HIGHLIGHTS

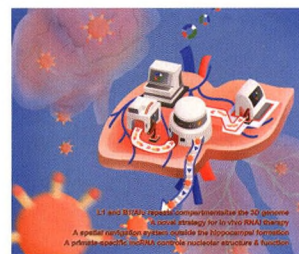
- 603 3D genome encoded by LINE and SINE repeats**
Zhengyu Liang, Xiang-Dong Fu
- 605 A spatial map out of place**
Adrien Peyrache, Adrian J. Duszakiewicz
- 607 Panning for brain antigens in dural sinuses**
Ania Bogoslawski, Paul Kubes
- 609 LETN and NPM1 tango in human nucleoli**
Guang Xu, Man Wu, Ling-Ling Chen
- 611 To learn something new, do something new**
Adam M. P. Miller, Paul W. Frankland

ARTICLES

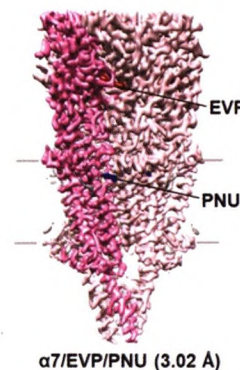
- 613 Homotypic clustering of L1 and B1/Alu repeats compartmentalizes the 3D genome**
Open
J. Yuyang Lu, Lei Chang, Tong Li, Ting Wang, Yafei Yin, Ge Zhan, Xue Han, Ke Zhang, Yibing Tao, Michelle Percharde, Liang Wang, Qi Peng, Pixi Yan, Hui Zhang, Xianju Bi, Wen Shao, Yantao Hong, Zhongyang Wu, Runze Ma, Peizhe Wang, Wenzhi Li, Jing Zhang, Zai Chang, Yingping Hou, Bing Zhu, Miguel Ramalho-Santos, Pulong Li, Wei Xie, Jie Na, Yujie Sun, Xiaohua Shen
- 631 In vivo self-assembled small RNAs as a new generation of RNAi therapeutics**
Open
Zheng Fu, Xiang Zhang, Xinyan Zhou, Uzair Ur-Rehman, Mengchao Yu, Hongwei Liang, Hongyuan Guo, Xu Guo, Yan Kong, Yuanyuan Su, Yangyang Ye, Xiuting Hu, Wei Cheng, Jinrong Wu, Yanbo Wang, Yayun Gu, Sheng-feng Lu, Dianqing Wu, Ke Zen, Jing Li, Chao Yan, Chen-Yu Zhang, Xi Chen

- 649 A novel somatosensory spatial navigation system outside the hippocampal formation**
Open
Xiaoyang Long, Sheng-Jia Zhang

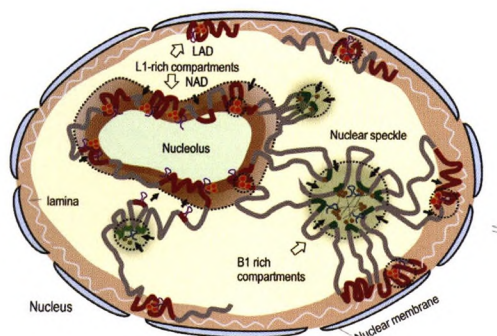
- 664 Mutual dependency between lncRNA LETN and protein NPM1 in controlling the nucleolar structure and functions sustaining cell proliferation**
Open
Xianteng Wang, Xiaolin Hu, Wanlu Song, Hui Xu, Zhengtao Xiao, Rongyao Huang, Qingran Bai, Fan Zhang, Yongzhen Chen, Yu Liu, Jianhuo Fang, Xin Li, Qin Shen, Haitao Zhao, Xuerui Yang



Cover: When synthetic biology meets RNAi therapy. Programmable genetic circuits (multicolor circles) utilize the liver as tissue chassis and a bio-generator, which can continuously produce and assemble exosome-encapsulated siRNAs (orange balls with spikes) for targeted delivery to multiple organs. See page 631–648 by Zheng Fu et al. for details. This cover is designed by Tianxiang Lan.



Cryo-EM map of human $\alpha 7$ nicotinic acetylcholine receptor in EVP/PNU-bound state. See page 713–716 by Yue Zhao et al. for details.



A hypothetical model showing repetitive elements organizing the macroscopic structure of the genome at three hierarchical levels. See page 613–630 by J. Yuyang Lu et al. for details.

684 Sequential fate-switches in stem-like cells drive the tumorigenic trajectory from human neural stem cells to malignant glioma **Open**

Xiaofei Wang, Ran Zhou, Yanzhen Xiong, Lingling Zhou, Xiang Yan, Manli Wang, Fan Li, Chuanxing Xie, Yiming Zhang, Zongyao Huang, Chaoqiong Ding, Kaidou Shi, Weida Li, Yu Liu, Zhongwei Cao, Zhen-Ning Zhang, Shengtao Zhou, Chong Chen, Yan Zhang, Lu Chen, Yuan Wang

703 BacFlash signals acid-resistance gene expression in bacteria

Di Wu, Wenfeng Qi, Wei Nie, Zhengyuan Lu, Yongxin Ye, Jinghang Li, Tao Sun, Yufei Zhu, Heping Cheng, Xianhua Wang

LETTERS TO THE EDITOR

713 Structural basis of human $\alpha 7$ nicotinic acetylcholine receptor activation **Open**

Yue Zhao, Sanling Liu, Yingxin Zhou, Mengge Zhang, Haopeng Chen, H. Eric Xu, Demeng Sun, Lei Liu, Changlin Tian

717 Structural basis for the different states of the spike protein of SARS-CoV-2 in complex with ACE2 **Open**

Renhong Yan, Yuanyuan Zhang, Yanning Li, Fangfei Ye, Yingying Guo, Lu Xia, Xinyue Zhong, Ximin Chi, Qiang Zhou

720 The basis of a more contagious 501Y.V1 variant of SARS-CoV-2

Haolin Liu, Qianqian Zhang, Pengcheng Wei, Zhongzhou Chen, Katja Aviszus, John Yang, Walter Downing, Chengyu Jiang, Bo Liang, Lyndon Reynoso, Gregory P. Downey, Stephen K. Frankel, John Kappler, Philippa Marrack, Gongyi Zhang

ADVANCE ONLINE PUBLICATION

RNA m⁶A modification orchestrates a LINE-1–host interaction that facilitates retrotransposition and contributes to long gene vulnerability **Open**

Feng Xiong, Ruoyu Wang, Joo-Hyung Lee, Shenglan Li, Shin-Fu Chen, Zian Liao, Lana Al Hasani, Phuoc T. Nguyen, Xiaoyu Zhu, Joanna Krakowiak, Dung-Fang Lee, Leng Han, Kuang-Lei Tsai, Ying Liu and Wenbo Li

Association of assisted reproductive technology, germline de novo mutations and congenital heart defects in a prospective birth cohort study

Cheng Wang, Hong Lv, Xiufeng Ling, Hong Li, Feiyang Diao, Juncheng Dai, Jiangbo Du, Ting Chen, Qi Xi, Yang Zhao, Kun Zhou, Bo Xu, Xiumei Han, Xiaoyu Liu, Meijuan Peng, Congcong Chen, Shiyao Tao, Lei Huang, Cong Liu, Mingyang Wen, Yangqian Jiang, Tao Jiang, Chuncheng Lu, Wei Wu, Di Wu, Minjian Chen, Yuan Lin, Xuejiang Guo, Ran Huo, Jiayin Liu, Hongxia Ma, Guangfu Jin, Yankai Xia, Jiahao Sha, Hongbing Shen and Zhibin Hu

Cell Discovery

Making publication fun for you

Cell Discovery is an open access international journal that publishes results of high significance and broad interest in all areas of molecular and cell biology. The basic bar of acceptance is comparable to prestigious society journals in the respective field of the work. It is established in 2015 as a sister journal of *Cell Research*, a high-profile international journal with a current impact of 20.507. The new impact of *Cell Discovery* is 6.255.

Authors benefit from:

- Open Access Publication – anyone can download and read your paper
- Wide exposure to a large global audience on nature.com
- Internationally renowned editors and editorial board
- Quality peer-review and fast publication
- Indexed in Scopus and PubMed Central (PMC)
Science Citation Index Expanded (SciSearch®),
Journal Citation Reports/Science Edition

Featured articles

Initial whole-genome sequencing and analysis of the host genetic contribution to COVID-19 severity and susceptibility

Cell Discov. 2020 Nov 10;6(1):83. doi: 10.1038/s41421-020-00231-4.

The differential immune responses to COVID-19 in peripheral and lung revealed by single-cell RNA sequencing

Cell Discov. 2020 Oct 20;6:73. doi: 10.1038/s41421-020-00225-2.

Immune cell profiling of COVID-19 patients in the recovery stage by single-cell sequencing

Cell Discov. 2020 May 4;6:31. doi: 10.1038/s41421-020-0168-9.

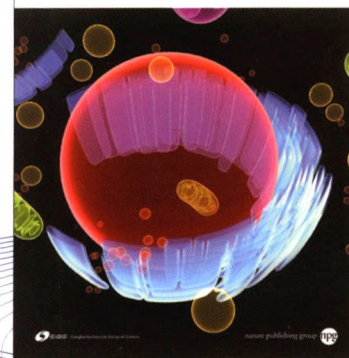
Phosphorylation of cGAS by CDK1 impairs self-DNA sensing in mitosis

Cell Discov. 2020 Apr 28;6:26. doi: 10.1038/s41421-020-0162-2.

Single-cell RNA sequencing reveals the heterogeneity of liver-resident immune cells in human

Cell Discov. 2020 Apr 28;6:22. doi: 10.1038/s41421-020-0157-z.

Cell Discovery



Editor-in-Chief: Dangsheng Li

SUBMIT

Visit www.nature.com/celldisc/
to read the Published Papers and Submit Today!