

Junchao Shi – Curriculum Vitae

Contact Information

E-MAIL: shijc@big.ac.cn; shijc.lab@gmail.com

Employment

- **Principal Investigator** **Incoming**
Beijing Institute of Genomics Chinese Academy of Sciences
(China National Center for Bioinformatics)
- **Postdoctoral Scholar in Bioinformatics and RNA Biology** **06/2021–present**
University of California, Riverside, CA, USA

Education

- **Ph.D. in Genetics, Genomics and Bioinformatics** **01/2019-06/2021**
University of California, Riverside, CA, USA
- **Ph.D. candidacy in Cell and Molecular Biology** **08/2016-01/2019**
University of Nevada, Reno, NV, USA
- **M.S. in Developmental Biology** **2013/09-07/2016**
University of Chinese academy of Sciences, Beijing, China
- **B.S. in biotechnology (animal)** **09/2008-06/2012**
Jilin University, Changchun, China

Research Experience

Mammalian non-canonical small RNAs

- Small RNA sequencing data annotation software design
- Improvement of small RNA library construction
- Non-canonical small RNAs mediate epigenetic information inheritance
- Identification and prediction of small RNA modifications

Mammalian early embryo development

- Single-cell RNA-seq analysis in mammalian embryo development
- Mathematical modeling of symmetry breaking in pre-implantation mammalian embryo
- Transcriptome clearance during mammalian early embryogenesis

Honors and Awards

- Dean's Distinguished Fellowship Award at University of California, Riverside 2019
- Raymond H. Berner Outstanding Graduate Student Researcher in Molecular Biosciences 2018
Scholarship at University of Nevada, Reno
- National Scholarship of China 2009, 2015

Service

Editorial activity:

- 2022-present Associate Editor - *Frontiers in Molecular Biosciences*
2022-present Guest Associate Editor - *Frontiers in Bioengineering and Biotechnology*
2021-2022 Guest Associate Editor - *Frontiers in Molecular Biosciences*

Refereeing activity:

Genomics Proteomics and Bioinformatics, BMC Medical Genomics, BMC Neuroscience, Frontiers in Genetics, Frontiers in Cardiovascular Medicine, Genomics, Epigenetics, Neural Regeneration Research, Science of the Total Environment, etc.

Invited Talks

1. The 5th Annual IIGB Symposium at University of California, Riverside, United States. May 13, 2022
2. The GECKO Conference: Epigenetic Inheritance across species, Virtual Meeting, May 25-28, 2021
3. Keystone Symposia: Non-Coding RNAs: Biology and Applications, Virtual Meeting, May 11-14, 2021 ("Noncoding RNAs: biology and applications - a Keystone Symposia report", ***Annals of the New York Academy of Sciences***. 1506 (1), 118-141.)
4. The 4th China-US International Symposium of HSCT and Cancer Immunology, Chongqing, China, May 31-Jun 2, 2019
5. *Bioinformatics Mixer at University of Nevada, Reno, United States*. Feb 9, 2018
6. *Bierkamper Symposium at University of Nevada, Reno, Reno, NV, USA*. Aug 25, 2017
7. *Joint Academic Annual Conference of China zoological society and Chinese association for physiological sciences*, Xi'an, China, Oct 14-17, 2015
8. *The young scholars' frontier symposium on quantitative biology development*, Beijing, China, May 8-10, 2015
9. *The 9th Beijing Life Sciences Graduate Forum*, Beijing, China, May 17, 2014

Conference Presentation

1. Poster at *the 10th biennial meeting of Chinese RNA Society*, Ningbo, China. Jun 15-17, 2018. (**Best Poster Award**)
2. Poster at Keystone Symposia: Mobile Genetic Elements and Genome Plasticity, Santa Fe, NM, USA. Feb 11-15, 2018.
3. Poster at 2nd GSA Fall Poster Symposium in UNR, Reno, NV, USA. Nov 1, 2017.
4. Poster at 1st GSA Fall Poster Symposium in UNR, Reno, NV, USA. Nov 14, 2016.
5. Poster at *the 3rd SKLRB Symposium on Reproductive Biology*, Beijing, China, Oct 26-31, 2014.
6. Poster at *the 8th biennial meeting of Chinese RNA Society*, Anhui, China, April 12-13, 2014. (**Best Poster Award**)
7. Poster at *the 8th Beijing Life Sciences Graduate Forum*, Beijing, China, May 11, 2013.

Publications (Total citation number > 2600 from [Google Scholar](#))

First/Co-first/corresponding authorship: (* indicates equal contributions, # indicates corresponding author)

1. Junchao Shi, Tong Zhou[#], Qi Chen[#], "Exploring the expanding universe of small RNAs", *Nature Cell Biology* 2022 Apr;24(4):415-423. doi: 10.1038/s41556-022-00880-5. ([Cover Story](#))
2. Junchao Shi*, Yunfang Zhang*, Dongmei Tan*, Xudong Zhang*, Menghong Yan*, Ying Zhang*, Reuben Franklin*, Marta Shahbazi, Kirsty Mackinlay, Shichao Liu, Bernhard Kuhle, Emma R James, Liwen Zhang, Yongcun Qu, Qiwei Zhai, Wenxin Zhao, Linlin Zhao, Changcheng Zhou, Weifeng Gu, Jernej Murn, Jingtao Guo, Douglas T Carrell, Yinsheng Wang, Xuemei Chen, Bradley R Cairns, Xiang-lei Yang, Paul Schimmel, Magdalena Zernicka-Goetz, Sihem Cheloufi[#], Ying Zhang[#], Tong Zhou[#], Qi Chen[#], "PANDORA-seq expands the repertoire of regulatory small RNAs by overcoming RNA modifications", *Nature Cell Biology*. 2021 Apr;23(4):424-436. doi: 10.1038/s41556-021-00652-7.
3. Wanjun Gu*, Junchao Shi*, Hui Liu*, Xudong Zhang*, Jin J Zhou, Musheng Li, Dandan Zhou, Rui Li, Jingzhu Lv, Guoxia Wen, Shanshan Zhu, Ting Qi, Wei Li, Xiaojing Wang, Zhaohua Wang, Hua Zhu, Changcheng Zhou, Kenneth S Knox, Ting Wang, Qi Chen[#], Zhongqing Qian[#], Tong Zhou[#], "Peripheral blood non-canonical small non-coding RNAs as novel biomarkers in lung cancer", *Molecular Cancer*. 2020 Nov 12;19(1):159. doi: 10.1186/s12943-020-01280-9.
4. Yunfang Zhang*, Junchao Shi*, Minoo Rassoulzadegan, Francesca Tuorto, Qi Chen[#], "Sperm RNA code programmes the metabolic health of offspring", *Nature Reviews Endocrinology*. 2019 Aug;15(8):489-498. doi: 10.1038/s41574-019-0226-2.
5. Junchao Shi*, Yunfang Zhang*, Tong Zhou[#], Qi Chen[#], "tsRNAs: the Swiss army knife for translational regulation", *Trends in Biochemical Sciences*. 2019 Mar;44(3):185-189. doi: 10.1016/j.tibs.2018.09.007
6. Junchao Shi[#], Eun-A Ko, Kenton M. Sanders, Qi Chen[#], Tong Zhou[#], "SPORTS1.0: a tool for annotating and profiling non-coding RNAs optimized for rRNA- and tRNA- derived small RNAs", *Genomics Proteomics & Bioinformatics*. 2018 Apr;16(2):144-151.
7. Qi Chen*, Junchao Shi*, Yi Tao, Magdalena Zernicka-Goetz[#], "Tracing the origin of heterogeneity and symmetry breaking in the early mammalian embryo", *Nature Communications*. 2018 May 8;9(1):1819.
8. Yunfang Zhang*, Xudong Zhang*, Junchao Shi*, Francesca Tuorto*, Xin Li*, Yusheng Liu, Reinhard Liebers, Liwen Zhang, Yongcun Qu, Jingjing Qian, Maya Pahima, Ying Liu, Menghong Yan, Zhonghong Cao, Xiaohua Lei, Yujing Cao, Hongying Peng, Shichao Liu, Yue Wang, Huili Zheng, Rebekah Woolsey, David Quilici, Qiwei Zhai, Lei Li, Tong Zhou, Wei Yan, Frank Lyko, Ying Zhang[#], Qi Zhou[#], Enkui Duan[#], Qi Chen[#], Dnmt2-dependent intergenerational transmission of paternally acquired metabolic disorders via sperm RNAs. *Nature Cell Biology*. 2018 May;20(5):535-540. ([Highlighted in Nat Rev Endocrinol. 2018 14, 446-447](#))
9. Junchao Shi, Xudong Zhang, Ying Liu, Qi Chen[#], "Epigenetic information in gametes: Gaming from before fertilization", *Physics of Life Review*. 2017 Mar;20:146-149.
10. Junchao Shi, Qi Chen, Enkui Duan[#], "Mammalian transgenerational inheritance of acquired traits via germline transmission", *Chinese Bulletin of Life Sciences*. 2017 29(1).
11. Junchao Shi*, Yunfang Zhang*, Qi Chen[#], "Molecular carriers of acquired inheritance: absence of evidence is not evidence of absence", *Environmental Epigenetics*. 2016 Aug 3;2(2):dvw014.
12. Qi Chen[#], Menghong Yan*, Zhonghong Cao*, Xin Li*, Yunfang Zhang*, Junchao Shi*, Gui-hai Feng, Hongying Peng, Xudong Zhang, Ying Zhang, Jingjing Qian, Enkui Duan[#], Qiwei Zhai[#], Qi Zhou[#], "Sperm tsRNAs contribute to intergenerational inheritance of an acquired metabolic disorder", *Science*. 2016 Jan 22;351(6271):397-400. ([Highlighted in Science. 2016 351:13; Highlighted in Nature Reviews Genetics. 2016 doi:10.1038/nrg.2016.1](#))

13. Junchao Shi*, Qi Chen^{*,#}, Xin Li^{*}, Xiudeng Zheng^{*}, Ying Zhang, Jie Qiao, Fuchou Tang, Yi Tao[#], Qi Zhou[#], Enkui Duan[#], "Dynamic transcriptional symmetry-breaking in pre-implantation mammalian embryo development revealed by single-cell RNA-seq", *Development*. 2015 Oct 15;142(20):3468-77. ([Highlighted in Development 142: e2002](#))
14. Yunfang Zhang^{*}, Ying Zhang^{*}, Junchao Shi*, He Zhang, Zhonghong Cao, Xuan Gao, Wanhua Ren, Yunna Ning, Lina Ning, Yujing Cao, Yongchang Chen, Weizhi Ji, Zi-jiang Chen[#], Qi Chen[#], Enkui Duan[#], "Identification and characterization of an ancient class of small RNAs enriched in serum associating with active infection", *Journal of Molecular Cell Biology*. 2014 Apr;6(2):172-4. ([Editor's Recommendation & Cover Story](#))
15. Hongying Peng^{*}, Junchao Shi*, Ying Zhang, He Zhang, Shangying Liao, Wei Li, Li Lei, Chunsheng Han, Lina Ning, Yujing Cao, Qi Zhou, Qi Chen[#], Enkui Duan[#], "A novel class of tRNA-derived small RNAs extremely enriched in mature mouse sperm", *Cell Research*. 2012 Nov;22(11):1609-12. ([Highlighted in Cell Research. 2013 23:18-19](#))

Other authorship:

1. Jingwei Liu, Junchao Shi, Rebecca Hernandez, Xiuchun Li, Pranav Konchadi, Yuma Miyake, Qi Chen, Tong Zhou, Changcheng Zhou, "Paternal phthalate exposure-elicited offspring metabolic disorders are associated with altered sperm small RNAs in mice", *Environment International*. 2023 Jan 23, (173)107769.
2. Qi Chen, Xudong Zhang, Junchao Shi, Menghong Yan, Tong Zhou, "Origins and evolving functionalities of tRNA-derived small RNAs", *Trends in Biochemical Sciences*. 2021 May 27;S0968-0004(21)00103-1.
3. Jun Wang, Xueying Xie, Junchao Shi, Wenjun He, Qi Chen, Liang Chen, Wanjuan Gu, Tong Zhou, "Denoising Autoencoder, a Deep Learning Algorithm, Aids the Identification of a Novel Molecular Signature of Lung Adenocarcinoma", *Genomics, Proteomics & Bioinformatics*. 2020 Dec 18;S1672-0229(20)30137-6.
4. Yongcun Qu, Qi Chen, Shanshan Guo, Chiyuan Ma, Yonggang Lu, Junchao Shi, Shichao Liu, Tong Zhou, Taichi Noda, Jingjing Qian, Liwen Zhang, Xili Zhu, Xiaohua Lei, Yujing Cao, Wei Li, Nicolas Plachta, Martin M Matzuk, Masahito Ikawa, Enkui Duan, Ying Zhang, Hongmei Wang, "Cooperation-based sperm clusters mediate sperm oviduct entry and fertilization", *Protein & Cell*. 2021 Mar 1. doi: 10.1007/s13238-021-00825-y.
5. Xudong Zhang, Fatima Trebak, Lucas A C Souza, Junchao Shi, Tong Zhou, Patrick G Kehoe, Qi Chen, Yumei Feng Earley. "Small RNA modifications in Alzheimer's disease", *Neurobiology of Disease*. 2020 Nov;145:105058. doi: 10.1016/j.nbd.2020.105058.
6. Xiaohua Lei, Yujing Cao, Baohua Ma, Yunfang Zhang, Lina Ning, Jingjing Qian, Liwen Zhang, Yongcun Qu, Tao Zhang, Dehong Li, Qi Chen, Junchao Shi, Xudong Zhang, Chiyuan Ma, Ying Zhang, Enkui Duan. "Development of mouse preimplantation embryos in space", *National Science Review*. 2020 7 (9), 1437-1446. doi: 10.1093/nsr/nwaa062.
7. Jiaqiang Wang, Leyun Wang, Guihai Feng, Yukai Wang, Yufei Li, Xin Li, Chao Liu, Guanyi Jiao, Cheng Huang, Junchao Shi, Tong Zhou, Qi Chen, Zhonghua Liu, Wei Li, Qi Zhou, "Asymmetric Expression of LincGET Biases Cell Fate in Two-Cell Mouse Embryos", *Cell*. 2018 Dec 13;175(7):1887-1901.e18. doi: 10.1016/j.cell.2018.11.039.
8. Tong Zhou, Xueying Xie, Musheng Li, Junchao Shi, Jin Zhou, Kenneth Knox, Ting Wang, Qi Chen, Wanjuan Gu, "Rat BodyMap transcriptomes reveal unique circular RNA features across tissue types and developmental stages", *RNA*. 2018 Aug 9. pii: rna.067132.118.
9. Jingjing Qian, Yunfang Zhang, Yongcun Qu, Liwen Zhang, Junchao Shi, Xudong Zhang, Shichao Liu, Bo Hyun Kim, Sung Jin Hwang, Tong Zhou, Qi Chen, Sean M Ward, Enkui Duan, Ying Zhang, "Caffeine consumption during early pregnancy impairs oviductal embryo transport, embryonic development and uterine

receptivity in mice", *Biology of reproduction*. 2018 Jul 5. doi: 10.1093/biolre/ioy155.

10. Zhongqing Qian, Hui Liu, Musheng Li, Junchao Shi, Na Li, Yao Zhang, Xiaojie Zhang, Jingzhu Lv, Xueying Xie, Yunfei Bai, Qinyu Ge, Eun-A Ko, Haiyang Tang, Ting Wang, Xiaojing Wang, Zhaohua Wang, Tong Zhou, Wanjun Gu, "Potential Diagnostic Power of Blood Circular RNA Expression in Active Pulmonary Tuberculosis", *EbioMedicine*. 2018 Jan;27:18-26.
11. Yunfang Zhang, Junchao Shi, Qi Chen, "tsRNAs: new players in mammalian retrotransposon control", *Cell Research*. 2017 Nov;27(11):1307-1308.
12. Wenbo Liu, Fengchao Wang, Qianhua Xu, Junchao Shi, Xiaoxin Zhang, Xukun Lu, Zhen-Ao Zhao, Zheng Gao, Huaixiao Ma, Enkui Duan, Fei Gao, Shaorong Gao, Zhaohong Yi, Lei Li, "BCAS2 is involved in alternative mRNA splicing in spermatogonia and the transition to meiosis", *Nature Communications*. 2017 Jan 27;8:14182.
13. Yusheng Liu, Xukun Lu, Junchao Shi, Xingjiang Yu, Xiaoxin Zhang, Kai Zhu, Zhaohong Yi, Enkui Duan, Lei Li, "BTG4 is a key regulator for maternal mRNA clearance during mouse early embryogenesis", *Journal of Molecular Cell Biology*. 2016 Aug;8(4):366-8. ([Highlighted in J Mol Cell Biol. 2016 8 \(4\): 369-370](#))
14. Shuang Liu, Xinyue Wang, Qian Zhao, Shu Liu, Huishan Zhang, Junchao Shi, Na Li, Xiaohua Lei, Huashan Zhao, Zhili Deng, Yujing Cao, Lina Ning, Guoliang Xia, Enkui Duan, "Senescence of human skin-derived precursors regulated by Akt-FOXO3-p27(KIP1)/p15(INK4b) signaling", *Cellular and Molecular Life Sciences*. 2015 Aug;72(15):2949-60.
15. Shuang Zhang, Shuangbo Kong, Bingyan Wang, Xiaohong Cheng, Yongjie Chen, Weiwei Wu, Qiang Wang, Junchao Shi, Ying Zhang, Shumin Wang, Jinhua Lu, John P Lydon, Francesco DeMayo, Warren S Pear, Hua Han, Haiyan Lin, Lei Li, Hongmei Wang, Yan-ling Wang, Bing Li, Qi Chen, Enkui Duan, Haibin Wang, "Uterine Rbpj is required for embryonic-uterine orientation and decidual remodeling via Notch pathway-independent and -dependent mechanisms", *Cell Research*. 2014 Aug;24(8):925-42. ([Cover Story & Highlighted in Cell Research. 2014 24:1031-2](#))
16. He Zhang, Ying Zhang, Huashan Zhao, Yunfang Zhang, Qi Chen, Hongying Peng, Li Lei, Jingqiao Qiao, Junchao Shi, Zhonghong Cao, Enkui Duan, Yaping Jin, "Hormonal regulation of ovarian bursa fluid in mice and involvement of aquaporins", *PloS One*. 2013 May 22;8(5):e63823.