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Zheng Ruan, Ph. D.

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Education and Training

- **Van Andel Research Institute**, Grand Rapids, Michigan, USA (Aug 2018 – Now)
  Postdoctoral Research Fellow, Structural Biology
  Advisor: Dr. Juan Du and Dr. Wei Lü
- **University of Georgia (UGA)**, Athens, Georgia, USA (Aug 2012 -- Jul 2018)
  Doctor of Philosophy, Bioinformatics
  Dissertation: Functional annotation of oncogenic mutations of epidermal growth factor receptor kinase (EGFR)
  Advisor: Dr. Natarajan Kannan
- **Huazhong Agricultural University (HZAU)**, Wuhan, Hubei, China (Sep 2008 – Jun 2012)
  Bachelor of Science, Biotechnology
  Thesis: Prediction and analysis of pentatricopeptide repeat (PPR) protein family in maize

Selected Award and Honors

- **Graduate Student Excellence in Research Award 2019**, University of Georgia, 2019
- **Innovative and Interdisciplinary Research Grants for Doctoral Students (IIRG)**, University of Georgia Graduate School, 2017
- **Grimes Family Distinguished Graduate Fellowship in Natural Sciences**, Franklin College Grimes Award Committee, University of Georgia, 2015
- **Monsanto Scholarship**, Monsanto Company and Huazhong Agricultural University, 1st prize for 2010 & 2011
- **National Scholarship,** Ministry of Education of P.R. China, 2009

Current Extramural Research Funding

- **Postdoctoral Fellowship (American Heart Association 20POST35120556)** 01/01/2020 –12/31/2021
  Role: Principle Investigator
  Structural and functional investigation of the pannexin 1 (PANX1) ATP release channel

Pending Extramural Research Funding

- **NIH Pathway to Independence Awards (K99/R00)** 07/01/2022 –06/30/2027
  Role: Principle Investigator
  Structural and Functional Studies on Proton-activated Chloride (PAC) Channel

Publications

Journal publications (Total citations: 458 and h-index: 11)

1. **Zheng Ruan***, Emery Haley*, Ian Orozco*, Rebecca Roth, Mark Sabat, Richard Myers, Wei Lu#, Juan Du#. Structures of TRPM5 channel elucidate mechanisms of activation and inhibition. ***Nat Struct Mol Biol.*** (2021) Doi: doi.org/10.1038/s41594-021-00607-4. (* Equal contribution)
2. James Osei-Owusu, Junhua Yang, Ka Ho Leung, **Zheng Ruan**, Wei Lü, Yamuna Krishnan, Zhaozhu Qiu. Proton-activated chloride channel PAC regulates endosomal acidification and transferrin receptor-mediated endocytosis. ***Cell Reports.*** (2021) Jan 26: 34(4). Doi: 10.1016/j.celrep.2020.108683.
3. **Zheng Ruan***, James Osei-Owusu*, Juan Du, Zhaozhu Qiu#, Wei Lü#. Structures and pH sensing mechanism of proton-activated chloride channel. ***Nature.*** (2020) Nov 04: 588(7837): 350-354. Doi: 10.1038/s41586-020-2875-7. (* Equal contribution)
4. **Zheng Ruan**, Ian Orozco, Juan Du#, Wei Lü#. Structures of human Pannexin 1 reveal ion pathways and mechanism of gating. ***Nature.*** (2020) Jun 03: 584(7822):646-651. Doi: 10.1038/s41586-020-2357-y.
5. Wayland Yeung*, **Zheng Ruan***, Natarajan Kannan. Emerging roles of the αC-β4 loop in protein kinase structure, function, evolution, and disease. ***IUBMB Life.*** (2020) Feb 26: 1-14. Doi: 10.1002/iub.2253. (* Equal contribution)
6. Yu-Yang Jiang, Wolfgang Maier, Ralf Baumeister, Gregory Minevich, Ewa Joachimiak, Dorota Wloga, **Zheng Ruan**, Natarajan Kannan, Stephen Bocarro, Anoosh Bahraini, Krishna Kumar Vasudevan, Karl Lechtreck,

Eduardo Orias, Jacek Gaertig. LF4/MOK and a CDK-related kinase regulate the number and length of cilia in Tetrahymena. ***PLoS Genet.*** (2019) Jul 24: 15(7). Doi: 10.1371/journal.pgen.1008099.

7. Yu-Yang Jiang*, Wolfgang Maier*, Ralf Baumeister, Ewa Joachimiak, **Zheng Ruan**, Natarajan Kannan, Diamond Clark, Panagiota Louka, Mayukh Guha, Joseph Frankel, Jacek Gaertig. Two antagonistic Hippo signaling circuits set the division plane at the medial position in the ciliate Tetrahymena. ***Genetics.*** (2019) Feb 1; 211(2) 651-663. doi: 10.1534/genetics.118.301889. (* Equal contribution)
8. Sam A. Jamieson*, **Zheng Ruan***, Abigail E. Burgess, Jack R. Curry, Hamish D. McMillan, Jodi Brewster, Anita K. Dunbier, Natarajan Kannan, Peter D. Mace. Substrate binding allosterically relieves autoinhibition of the pseudokinase TRIB1. ***Sci Signal.*** 2018 Sep 25; 11(549) doi: 10.1126/scisignal.aau0597. (* Equal contribution) Cover story of the issue
9. **Zheng Ruan**, Natarajan Kannan. Altered conformational landscape and dimerization dependence underpins the activation of EGFR by αC-β4 loop insertion mutations. ***PNAS.*** 2018 Aug 13; 115 (35) E8162-E8171 doi: doi.org/10.1073/pnas.1803152115.
10. Liang-Chin Huang, Karen E. Ross, Harold Drabkin, Krzysztof J. Kochut, **Zheng Ruan**, Peter D'Eustachio, Daniel McSkimming, Cecilia Arighi, Chuming Chen, Darren Natale, Cynthia Smith, Pascale Gaudet, Cathy Wu, and Natarajan Kannan. High resolution annotation of protein kinase post-translational modifications and cancer-associated mutations through integration of domain-specific ontologies and protein resources. ***Sci Rep.*** 2018 Apr 25; 8:6518 doi: 10.1038/s41598-018-24457-1.
11. Annie Kwon, Mihir John, **Zheng Ruan**, Natarajan Kannan. Coupled regulation by the juxtamembrane and sterile α motif (SAM) linker is a hallmark of Ephrin tyrosine kinase evolution. ***J Biol Chem.*** 2018 Apr 6; 293(14): 5102-5116 doi:10.1074/jbc.RA117.001296.
12. Melody Fulton, Laura Hanold, **Zheng Ruan**, Sneha Patel, Aaron Beedle, Natarajan Kannan, Eileen J. Kennedy. Conformationally constrained peptides target the allosteric kinase dimer interface and inhibit EGFR activation. ***Bioorg Med Chem.*** 2018 Mar 15; 26(6): 1167-1173. doi: 10.1016/j.bmc.2017.08.051.
13. Yu-Yang Jiang, Wolfgang Maier, Ralf Baumeister, Gregory Minevich, Ewa Joachimiak, **Zheng Ruan**, Natarajan Kannan, Diamond Clarke, Joseph Frankel and Jacek Gaertig. The Hippo Pathway Maintains the Equatorial Division Plane in the Ciliate Tetrahymena. ***Genetics.*** 2017 Jun 1; 206(2):873-888. doi: 10.1534/genetics.
14. **Zheng Ruan**, Samiksha Katiyar, Natarajan Kannan. Computational and experimental characterization of patient derived mutations reveal an unusual mode of regulatory spine assembly and drug sensitivity in EGFR kinase. ***Biochemistry.*** 2017 Jan 10; 56(1): 22-32. doi: 10.1021/acs.biochem.6b00572.
15. Jonathan A Stefely, Floriana Licitra, Leila Laredj, Andrew G Reidenbach, Zachary A Kemmerer, Anais Grangeray, Tiphaine Jaeg-Ehret, Catherine E Minogue, Arne Ulbrich, Paul D Hutchins, Emily M Wilkerson, **Zheng Ruan**, Deniz Aydin, Alexander S Hebert, Xiao Guo, Elyse C Freiberger, Laurence Reutenauer, Adam Jochem, Maya Chergova, Isabel E Johnson, Danielle C Lohman, Matthew JP Rush, Nicholas W Kwiecien, Pankaj K Singh, Anna I Schlagowski, Brendan J Floyd, Ulrika Forsman, Pavel J Sindelar, Michael S Westphall, Fabien Pierrel, Joffrey Zoll, Matteo Dal Peraro, Natarajan Kannan, Craig A Bingman, Joshua J Coon, Philippe Isope, Hélène Puccio, David J Pagliarini. Cerebellar ataxia and coenzyme Q deficiency through loss of unorthodox kinase activity. ***Mol Cell.*** 2016 Aug 18; 63(4): 608-20. doi: 10.1016/j.molcel.2016.06.030.
16. Smita Mohanty, Krishnadev Oruganty, Annie Kwon, Dominic P Byrne, Samantha Ferries, **Zheng Ruan**, Laura E Hanold, Samiksha Katiyar, Eileen J Kennedy, Patrick A Eyers, Natarajan Kannan. Hydrophobic core variations provide a structural framework for tyrosine kinase evolution and functional specialization. ***PLoS Genet.*** 2016 Feb 29; 12(2): e1005885. doi: 10.1371/journal.pgen.1005885.
17. **Zheng Ruan**, Natarajan Kannan. Mechanistic insights into R776H mediated activation of epidermal growth factor receptor kinase. ***Biochemistry.*** 2015 Jul 14; 54(27): 4216-25. doi: 10.1021/acs.biochem.5b00444.
18. Tuan Nguyen, **Zheng Ruan**, Krishnadev Oruganty, Natarajan Kannan. Co-Conserved MAPK features couple D-domain docking groove to distal allosteric sites via the C-terminal flanking tail. ***PLoS One.*** 2015; 10(3): e0119636. doi: 10.1371/journal.pone.0119636.
19. Timothy I Shaw, **Zheng Ruan**, Travis C Glenn, Liang Liu. STRAW: Species TRee Analysis Web server. ***Nucleic Acids Res.*** 2013 Jul; 41(Web Server issue): W238-W241. doi: 10.1093/nar/gkt377.

Conference Abstracts

1. **Zheng Ruan**, Orozco J Ian, Juan Du, Wei Lu. Structural and Functional Investigation on Human Pannexin 1 (PANX1) Reveals Novel Insight Into Channel Gating, Ion Permeation and Drug Inhibition. ***Biophys. J.*** 2021; 120(3):112a

2. James Osei-Owusu, **Zheng Ruan**, Juan Du, Wei Lu, Zhaozhu Qiu. Structures of Human Proton-Activated Chloride Channel (PAC) Reveal Mechanism of pH Sensing and Gating. ***Biophys. J.*** 2021; 120(3):192a
3. **Zheng Ruan**, Samiksha Katiyar, Natarajan Kannan. Characterization of rare oncogenic mutations in the kinase domain of Epidermal Growth Factor Receptor (EGFR). ***FASEB J.*** 2016 Apr 1; 30 (1 Supplement), 665.4-665.4, doi: 10.1096/fj.1530-6860.
4. **Zheng Ruan**, Natarajan Kannan. 57 Activation mechanism of R776H mutation in Epidermal Growth Factor Receptor (EGFR). ***J Biomol Struct Dyn.*** 2015; 33 Suppl 1:38-9. doi: 10.1080/07391102.2015.1032673.

Scientific Presentations

1. CryoEM Current Practices Webinar. Lessons learned from Sample Preparation and Structural Analysis of Three Membrane Channels. Aug 26, 2021.
2. Biophysical Society Annual Meeting 2021: Biophysical Structural and Functional Investigation on Human Pannexin 1 (PANX1) Reveals Novel Insight Into Channel Gating, Ion Permeation and Drug Inhibition. Feb 24, 2021. Platform: Other Channels and Regulatory Mechanisms.
3. Gordon Research Conference Proteins: Exploring the Role of Proteins as Cellular Organizers by Combining Experiment and Theory. June 18-23, 2017. Holderness, NH. Poster presentation and lightning talk: Experimental and Computational Analysis on Oncogenic Mutations in Epidermal Growth Factor Receptor (EGFR)
4. Invited talks: Mechanistic Insight into Oncogenic Mutations Using Molecular Dynamics Simulations. UGA Center for Simulational Physics. March 21, 2017. Athens, GA
5. EB 2016 (ASBMB annual meeting). April 2-6, 2016. San Diego, CA. Poster presentation: Characterization of rare oncogenic mutations in the kinase domain of Epidermal Growth Factor Receptor (EGFR)
6. Albany 2015: The 19th Conversation. June 9-13, 2015. Albany, NY. Poster Presentation: Activation mechanism of R776H mutation in Epidermal Growth Factor Receptor
7. State-of-the-Art Next Generation Sequence Symposium. April 8-9, 2013. Athens, GA. Poster Presentation: ErbB signaling network modeling

Paper Review Experiences

Ad hoc reviewer for *Journal of Chemical Information and Modeling*, *Journal of Biological Chemistry*, and *Communications Biology*.