

Postdoctoral Positions: RNA interactions and modification mechanisms in human diseases

Two NIH-funded postdoctoral positions are immediately available in Dr. Zhipeng Lu lab at USC Department of Pharmacology and Pharmaceutical Sciences, in Los Angeles, California. Our research is focused on in vivo RNA structures, interactions, and modification mechanisms. We develop and apply novel chemical and computational technologies to understand the structures and functions of RNA in basic cellular processes, with the ultimate goal of treating human diseases, including genetic disorders, cancers and viral infections. Recent studies include the development of several methods that enabled de novo discovery and modeling of RNA 2D/3D structures and interactions on a transcriptome wide scale in vivo, such as PARIS, SHARC, and CRSSANT, revealing new mechanisms in neurological disorders and infectious diseases.

The projects

We are recruiting postdoctoral fellows to work on the three major directions listed below. We also welcome and support novel and unconventional ideas that are broadly related to the current work in the lab.

1. Newly discovered RNA modification mechanisms and their roles in physiological and pathological contexts, including stem cell, development, cancer, and neurological disorders. We are interested in both mechanistic studies in cell/animal models and pre-clinical therapeutic development.
2. Discovery and functional analysis of cellular ncRNA interaction networks, using our recently developed chemical and computational tools, PARIS, SHARC and CRSSANT (refs below). Current focus is on snoRNAs, tRNA fragments, and rRNA fragments.
3. Discovery and functional analysis of RNA-mediated host-virus interactions, and their roles in innate immunity, using our recently developed chemical and computational tools. We have discovered a number of new RNA interaction mechanisms in several RNA viruses.

The lab

Research in the Lu lab is highly interdisciplinary and collaborative. In addition to our state-of-the-art methods and core computational and chemical expertise for in vivo RNA 2D/3D analysis, we also have animal models, iPS/organoid models, and human patient samples for a variety of RNA-related diseases. Postdocs are exposed to research questions and techniques in the forefront of various fields centered on RNA. This training environment is exceptionally valuable for individuals who are interested in pursuing careers in academia or scientific leadership positions in the pharmaceutical industry. The first postdoc from our group has started his own lab in 2023 at Tianjin Medical University.

The candidate

Candidates should have or expect a Ph.D. and/or an M.D. and less than three years of postdoctoral experience. Candidates should also have significant experimental training in molecular biology, genetics, biochemistry, or chemical biology, as evidenced by publications. Experience in various sequencing methods and computational biology is highly valued. The position is funded for at least four years, contingent on performance. To apply, please send a cover letter discussing your interests in the position, your CV, and contact information for three references to zhipengl@usc.edu. You can find additional information at www.zhipenglulab.org.

Selected recent publications:

1. Velema* and **Lu*** 2023. *JACS Au*. Chemical RNA Cross-Linking: Mechanisms, Computational Analysis, and Biological Applications.
2. Zhang ... **Lu*** 2022 *Genome Research*. Classification and clustering of RNA crosslink-ligation data reveal complex structures and homodimers.
3. **Van Damme**, ..., **Lu*** and Velema*. 2022 *Nature Comm*. Chemical Reversible Crosslinking Enables Measurement of RNA 3D Distances and Alternative Conformations in Cells. Recommended by Faculty Opinions (<https://facultyopinions.com/article/741670636>).
4. Zhang ... **Lu***. 2021 *Nature Comm*. Optimized photochemistry enables analysis of dynamic RNA structures and interactomes in genetic and infectious diseases.
5. **Lu*** et al. 2020 *Nature Comm*. Structural modularity of the XIST ribonucleoprotein complex.
6. **Lu** et al. 2016 *Cell*. RNA duplex map in living cells reveals higher order transcriptome structure. Featured on the cover and in a paperclip of *Cell*, Youtube: **Get an Eye-full** (Eiffel), <https://www.youtube.com/watch?v=1GXibPeUUGQ>, on the cover of "**Best of Cell 2016**". Highlighted in *Nature Methods*, *Nature Chemical Biology*, *Molecular Cell*, *Trends in Biochemical Sciences*, *Faculty Opinions* and *F1000Prime*.