



## Kyle Loh

Assistant Professor of Developmental Biology (Stem Cell)

 Curriculum Vitae available Online

### CONTACT INFORMATION

- **Coordinator**

Liyang Ou - Laboratory Coordinator

**Email** lou15@stanford.edu

**Tel** 650-736-8530

### Bio

---

#### BIO

How the richly varied cell-types in the human body arise from one embryonic cell is a biological marvel and mystery. We have mapped how human embryonic stem cells develop into over twenty different human cell-types. This roadmap allowed us to generate enriched populations of human liver, bone, heart and blood vessel precursors in a Petri dish from embryonic stem cells. Each of these tissue precursors could regenerate their cognate tissue upon injection into respective mouse models, with relevance to regenerative medicine. In addition to our interests in developmental and stem cell biology, we also interested in discovering the entry receptors and target cells of deadly biosafety level 4 viruses, together with our collaborators.

Kyle attended the County College of Morris and Rutgers University, and received his Ph.D. from Stanford University (working with Irving Weissman), with fellowships from the Hertz Foundation, National Science Foundation and Davidson Institute of Talent Development. He then continued as a Siebel Investigator, and later, as an Assistant Professor and The Anthony DiGenova Endowed Faculty Scholar at Stanford, where he is jointly appointed in the Department of Developmental Biology and Institute for Stem Cell Biology & Regenerative Medicine. Kyle is a Packard Fellow, Pew Scholar, Human Frontier Science Program Young Investigator and Baxter Foundation Faculty Scholar, and his research has been recognized by the NIH Director's Early Independence Award, Forbes 30 Under 30, Harold Weintraub Graduate Award, Hertz Foundation Thesis Prize and A\*STAR Investigatorship.

#### ACADEMIC APPOINTMENTS

- Assistant Professor, Developmental Biology
- Member, Bio-X
- Member, Cardiovascular Institute
- Member, Institute for Stem Cell Biology and Regenerative Medicine
- Member, Maternal & Child Health Research Institute (MCHRI)
- Faculty Fellow, Sarafan ChEM-H
- Member, Stanford Cancer Institute
- Member, Wu Tsai Neurosciences Institute

## ADMINISTRATIVE APPOINTMENTS

- Catalyst Advisory Board, Additional Ventures Foundation, (2022- present)
- Abstract Review Committee, International Society for Stem Cell Research, (2020- present)
- Scientific Advisory Board, Californians for Cures Foundation, (2020- present)
- Co-Leader, Immunology, Transplantation and Stem Cells Affinity Group, Stanford Diabetes Research Center, (2020- present)
- Member, Stanford Diabetes Research Center, (2018- present)
- Admissions Committee, Stanford Developmental Biology Ph.D. Program, (2018- present)
- Admissions Committee, Stanford Stem Cell Biology & Regenerative Medicine Ph.D. Program, (2017- present)
- Siebel Investigator, Stanford Institute for Stem Cell Biology & Regenerative Medicine, (2016-2018)
- Scientific Advisory Board, Americans for Cures Foundation, (2015-2018)

## HONORS AND AWARDS

- Best Short Presentation, Gordon Research Conference on Vascular Cell Biology (2023)
- Packard Fellowship for Science and Engineering, David and Lucile Packard Foundation (2019)
- Pew Scholar, The Pew Charitable Trusts (2019)
- Human Frontier Science Program Young Investigator, International Human Frontier Science Program (2019)
- Forbes 30 Under 30, Forbes Magazine (2018)
- The Anthony DiGenova Endowed Faculty Scholar, Stanford University (2018)
- Donald and Delia Baxter Foundation Faculty Scholar, Baxter Foundation (2018)
- NIH Director's Early Independence Award DP5, U.S. National Institutes of Health (2017-2022)
- Siebel Investigatorship, Stanford School of Medicine (2016)
- A\*STAR Investigatorship, Singapore Agency for Science, Technology & Research (A\*STAR) (2016)
- Harold Weintraub Graduate Student Award, Fred Hutchinson Cancer Research Center (2015)
- Hertz Foundation Graduate Fellowship Award, The Fannie and John Hertz Foundation (2011)
- NSF Graduate Research Fellowship, U.S. National Science Foundation (2011)
- Davidson Laureate Fellowship, Davidson Institute for Talent Development (2010)
- Harvard Stem Cell Institute Internship Program, Harvard Stem Cell Institute (2008)
- Rutgers University School of Arts & Sciences Excellence Award, Rutgers University (2007-2010)
- Research & Development Council of New Jersey Scholarship, New Jersey Research & Development Council (2007)

## LINKS

- Lab Website: <https://loh.stanford.edu/>

## Teaching

---

### COURSES

#### 2022-23

- Stem Cell Biology & Regenerative Medicine: STEMREM 201A (Aut)

#### 2021-22

- Stem Cell Intensive: STEMREM 200 (Aut)
- Stem Cells and Human Development: From Embryo to Cell Lineage Determination: STEMREM 201A (Aut)

#### 2020-21

- Stem Cell Intensive: STEMREM 200 (Aut)
- Stem Cells and Human Development: From Embryo to Cell Lineage Determination: STEMREM 201A (Aut)

#### 2019-20

- Stem Cell Intensive: STEMREM 200 (Aut)
- Stem Cells and Human Development: From Embryo to Cell Lineage Determination: STEMREM 201A (Aut)

### STANFORD ADVISEES

#### Med Scholar Project Advisor

Rayyan Jokhai

#### Doctoral Dissertation Reader (AC)

Grace Jean, Jeffrey Naftaly

#### Postdoctoral Faculty Sponsor

Yimiao Qu, Qingqing Yin

#### Doctoral Dissertation Advisor (AC)

Carolyn Dundes, Jonas Fowler, Rayyan Jokhai, Sherry Zheng

#### Postdoctoral Research Mentor

Yimiao Qu

## Publications

---

### PUBLICATIONS

- **Generating human artery and vein cells from pluripotent stem cells highlights the arterial tropism of Nipah and Hendra viruses.** *Cell*  
Ang, L. T., Nguyen, A. T., Liu, K. J., Chen, A., Xiong, X., Curtis, M., Martin, R. M., Raftry, B. C., Ng, C. Y., Vogel, U., Lander, A., Lesch, B. J., Fowler, et al  
2022
- **Improving the safety of human pluripotent stem cell therapies using genome-edited orthogonal safeguards.** *Nature communications*  
Martin, R. M., Fowler, J. L., Cromer, M. K., Lesch, B. J., Ponce, E., Uchida, N., Nishimura, T., Porteus, M. H., Loh, K. M.  
2020; 11 (1): 2713
- **Mapping the Pairwise Choices Leading from Pluripotency to Human Bone, Heart, and Other Mesoderm Cell Types** *CELL*  
Loh, K. M., Chen, A., Koh, P. W., Deng, T. Z., Sinha, R., Tsai, J. M., Barkal, A. A., Shen, K. Y., Jain, R., Morganti, R. M., Shyh-Chang, N., Fernhoff, N. B., George, et al  
2016; 166 (2): 451-467
- **Efficient endoderm induction from human pluripotent stem cells by logically directing signals controlling lineage bifurcations.** *Cell stem cell*  
Loh, K. M., Ang, L. T., Zhang, J., Kumar, V., Ang, J., Auyeong, J. Q., Lee, K. L., Choo, S. H., Lim, C. Y., Nichane, M., Tan, J., Noghabi, M. S., Azzola, et al  
2014; 14 (2): 237-252
- **A Precarious Balance: Pluripotency Factors as Lineage Specifiers** *CELL STEM CELL*  
Loh, K. M., Lim, B.  
2011; 8 (4): 363-369
- **An atlas of lamina-associated chromatin across twelve human cell types reveals an intermediate chromatin subtype.** *Genome biology*  
Shah, P. P., Keough, K. C., Gjoni, K., Santini, G. T., Abdill, R. J., Wickramasinghe, N. M., Dundes, C. E., Karnay, A., Chen, A., Salomon, R. E., Walsh, P. J., Nguyen, S. C., Whalen, et al  
2023; 24 (1): 16
- **Creating artificial signaling gradients to spatially pattern engineered tissues.** *Current opinion in biotechnology*

- Zheng, S. L., Loh, K. M.  
2022; 78: 102810
- **A stem cell roadmap of ribosome heterogeneity reveals a function for RPL10A in mesoderm production.** *Nature communications*  
Genuth, N. R., Shi, Z., Kunimoto, K., Hung, V., Xu, A. F., Kerr, C. H., Tiu, G. C., Osés-Prieto, J. A., Salomon-Shulman, R. E., Axelrod, J. D., Burlingame, A. L., Loh, K. M., Barna, et al  
2022; 13 (1): 5491
  - **Affinity-matured DLL4 ligands as broad-spectrum modulators of Notch signaling** *NATURE CHEMICAL BIOLOGY*  
Gonzalez-Perez, D., Das, S., Antfolk, D., Ahsan, H. S., Medina, E., Dundes, C. E., Jokhai, R. T., Egan, E. D., Blacklow, S. C., Loh, K. M., Rodriguez, P. C., Luca, V. C.  
2022
  - **Affinity-matured DLL4 ligands as broad-spectrum modulators of Notch signaling.** *Nature chemical biology*  
Gonzalez-Perez, D., Das, S., Antfolk, D., Ahsan, H. S., Medina, E., Dundes, C. E., Jokhai, R. T., Egan, E. D., Blacklow, S. C., Loh, K. M., Rodriguez, P. C., Luca, V. C.  
2022
  - **Chimpanzee and pig-tailed macaque iPSCs: Improved culture and generation of primate cross-species embryos.** *Cell reports*  
Roodgar, M., Suchy, F. P., Nguyen, L. H., Bajpai, V. K., Sinha, R., Vilches-Moure, J. G., Van Bortle, K., Bhadury, J., Metwally, A., Jiang, L., Jian, R., Chiang, R., Oikonomopoulos, et al  
2022; 40 (9): 111264
  - **Increased ACTL6A occupancy within mSWI/SNF chromatin remodelers drives human squamous cell carcinoma.** *Molecular cell*  
Chang, C. Y., Shipony, Z., Lin, S. G., Kuo, A., Xiong, X., Loh, K. M., Greenleaf, W. J., Crabtree, G. R.  
2021
  - **Dach1 Extends Artery Networks and Protects Against Cardiac Injury.** *Circulation research*  
Raftrey, B., Williams, I. M., Rios Coronado, P. E., Fan, X., Chang, A. H., Zhao, M., Roth, R. K., Trimm, E., Racelis, R., D'Amato, G., Phansalkar, R., Nguyen, A., Chai, et al  
2021
  - **16p11.2 microdeletion imparts transcriptional alterations in human iPSC-derived models of early neural development.** *eLife*  
Roth, J. G., Muench, K. L., Asokan, A., Mallett, V. M., Gai, H., Verma, Y., Weber, S., Charlton, C., Fowler, J. L., Loh, K. M., Dolmetsch, R. E., Palmer, T. D.  
2020; 9
  - **Bridging naive and primed pluripotency.** *Nature cell biology*  
Dundes, C. E., Loh, K. M.  
2020
  - **Spatially controlled stem cell differentiation via morphogen gradients: A comparison of static and dynamic microfluidic platforms** *JOURNAL OF VACUUM SCIENCE & TECHNOLOGY A*  
Cui, K. W., Engel, L., Dundes, C. E., Nguyen, T. C., Loh, K. M., Dunn, A. R.  
2020; 38 (3)
  - **Spatially controlled stem cell differentiation via morphogen gradients: A comparison of static and dynamic microfluidic platforms.** *Journal of vacuum science & technology. A, Vacuum, surfaces, and films : an official journal of the American Vacuum Society*  
Cui, K. W., Engel, L., Dundes, C. E., Nguyen, T. C., Loh, K. M., Dunn, A. R.  
2020; 38 (3): 033205
  - **Efficient Differentiation of Human Pluripotent Stem Cells into Liver Cells.** *Journal of visualized experiments : JoVE*  
Loh, K. M., Palaria, A., Ang, L. T.  
2019
  - **Antibody Conditioning Enables MHC-Mismatched Hematopoietic Stem Cell Transplants and Organ Graft Tolerance.** *Cell stem cell*  
George, B. M., Kao, K. S., Kwon, H., Velasco, B. J., Poyser, J., Chen, A., Le, A. C., Chhabra, A., Burnett, C. E., Cajuste, D., Hoover, M., Loh, K. M., Shizuru, et al  
2019
  - **Long-term ex vivo haematopoietic-stem-cell expansion allows nonconditioned transplantation.** *Nature*  
Wilkinson, A. C., Ishida, R., Kikuchi, M., Sudo, K., Morita, M., Crisostomo, R. V., Yamamoto, R., Loh, K. M., Nakamura, Y., Watanabe, M., Nakauchi, H., Yamazaki, S.

2019

- **A critical look: Challenges in differentiating human pluripotent stem cells into desired cell types and organoids.** *Wiley interdisciplinary reviews. Developmental biology*  
Fowler, J. L., Ang, L. T., Loh, K. M.  
2019; e368
- **Obliterating Obstacles to an Odyssey.** *Cell stem cell*  
Nichane, M., Loh, K. M.  
2018; 23 (3): 313–15
- **A Roadmap for Human Liver Differentiation from Pluripotent Stem Cells** *CELL REPORTS*  
Ang, L., Tan, A., Autio, M. I., Goh, S., Choo, S., Lee, K., Tan, J., Pan, B., Lee, J., Lum, J., Lim, C., Yeo, I., Wong, et al  
2018; 22 (8): 2190–2205
- **Isolation and 3D expansion of multipotent Sox9+ mouse lung progenitors.** *Nature methods*  
Nichane, M., Javed, A., Sivakamasundari, V., Ganesan, M., Ang, L. T., Kraus, P., Lufkin, T., Loh, K. M., Lim, B.  
2017; 14 (12): 1205-1212
- **Isolation and 3D expansion of multipotent Sox9(+) mouse lung progenitors** *NATURE METHODS*  
Nichane, M., Javed, A., Sivakamasundari, V., Ganesan, M., Ang, L., Kraus, P., Lufkin, T., Loh, K. M., Lim, B.  
2017; 14 (12): 1205–+
- **Evaluating the regenerative potential and functionality of human liver cells in mice** *DIFFERENTIATION*  
Tan, A., Loh, K. M., Ang, L.  
2017; 98: 25–34
- **Live Imaging Reveals that the First Division of Differentiating Human Embryonic Stem Cells Often Yields Asymmetric Fates.** *Cell reports*  
Brown, K., Loh, K. M., Nusse, R.  
2017; 21 (2): 301-307
- **Thirst-associated preoptic neurons encode an aversive motivational drive.** *Science (New York, N.Y.)*  
Allen, W. E., DeNardo, L. A., Chen, M. Z., Liu, C. D., Loh, K. M., Fenno, L. E., Ramakrishnan, C. n., Deisseroth, K. n., Luo, L. n.  
2017; 357 (6356): 1149–55
- **An atlas of transcriptional, chromatin accessibility, and surface marker changes in human mesoderm development** *SCIENTIFIC DATA*  
Koh, P. W., Sinha, R., Barkal, A. A., Morganti, R. M., Chen, A., Weissman, I. L., Ang, L. T., Kundaje, A., Loh, K. M.  
2016; 3
- **Reprogramming mouse fibroblasts into engraftable myeloerythroid and lymphoid progenitors** *NATURE COMMUNICATIONS*  
Cheng, H., Ang, H. Y., El Farran, C. A., Li, P., Fang, H. T., Liu, T. M., Kong, S. L., Chin, M. L., Ling, W. Y., Lim, E. K., Li, H., Huber, T., Loh, et al  
2016; 7
- **Inhibition of Apoptosis Overcomes Stage-Related Compatibility Barriers to Chimera Formation in Mouse Embryos.** *Cell stem cell*  
Masaki, H., Kato-Itoh, M., Takahashi, Y., Umino, A., Sato, H., Ito, K., Yanagida, A., Nishimura, T., Yamaguchi, T., Hirabayashi, M., Era, T., Loh, K. M., Wu, et al  
2016; 19 (5): 587-592
- **Generating Cellular Diversity and Spatial Form: Wnt Signaling and the Evolution of Multicellular Animals.** *Developmental cell*  
Loh, K. M., van Amerongen, R., Nusse, R.  
2016; 38 (6): 643-655
- **Stem cells: Equilibrium established.** *Nature*  
Loh, K. M., Lim, B.  
2015; 521 (7552): 299-300
- **Ex uno plures: molecular designs for embryonic pluripotency.** *Physiological reviews*  
Loh, K. M., Lim, B., Ang, L. T.  
2015; 95 (1): 245-295
- **Stem cell signaling. An integral program for tissue renewal and regeneration: Wnt signaling and stem cell control.** *Science*  
Clevers, H., Loh, K. M., Nusse, R.

2014; 346 (6205)

- **Differentiation of trophoblast cells from human embryonic stem cells: to be or not to be?** *REPRODUCTION*  
Roberts, R. M., Loh, K. M., Amita, M., Bernardo, A. S., Adachi, K., Alexenko, A. P., Schust, D. J., Schulz, L. C., Telugu, B. P., Ezashi, T., Pedersen, R. A.  
2014; 147 (5): D1-D12
- **Rapid and efficient conversion of integration-free human induced pluripotent stem cells to GMP-grade culture conditions.** *PloS one*  
Durruthy-Durruthy, J., Briggs, S. F., Awe, J., Ramathal, C. Y., Karumbayaram, S., Lee, P. C., Heidmann, J. D., Clark, A., Karakikes, I., Loh, K. M., Wu, J. C., Hoffman, A. R., Byrne, et al  
2014; 9 (4)
- **Rapid and Efficient Conversion of Integration-Free Human Induced Pluripotent Stem Cells to GMP-Grade Culture Conditions.** *PloS one*  
Durruthy-Durruthy, J., Briggs, S. F., Awe, J., Ramathal, C. Y., Karumbayaram, S., Lee, P. C., Heidmann, J. D., Clark, A., Karakikes, I., Loh, K. M., Wu, J. C., Hoffman, A. R., Byrne, et al  
2014; 9 (4)
- **Clonal precursor of bone, cartilage, and hematopoietic niche stromal cells** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Chan, C. K., Lindau, P., Jiang, W., Chen, J. Y., Zhang, L. F., Chen, C., Seita, J., Sahoo, D., Kim, J., Lee, A., Park, S., Nag, D., Gong, et al  
2013; 110 (31): 12643-12648
- **Rejuvenating tithonus.** *EMBO reports*  
Loh, K. M., Lim, B.  
2013; 14 (7): 583-584
- **EPIGENETICS Actors in the cell reprogramming drama** *NATURE*  
Loh, K. M., Lim, B.  
2012; 488 (7413): 599-600
- **Investigating the bona fide differentiation capacity of human pluripotent stem cells** *CELL RESEARCH*  
Heng, J. D., Loh, K. M., Ng, H.  
2012; 22 (1): 6-8
- **Recreating Pluripotency?** *CELL STEM CELL*  
Loh, K. M., Lim, B.  
2010; 7 (2): 137-139
- **A Small-Molecule Inhibitor of Tgf-beta Signaling Replaces Sox2 in Reprogramming by Inducing Nanog** *CELL STEM CELL*  
Ichida, J. K., Blanchard, J., Lam, K., Son, E. Y., Chung, J. E., Egli, D., Loh, K. M., Carter, A. C., Di Giorgio, F. P., Koszka, K., Huangfu, D., Akutsu, H., Liu, et al  
2009; 5 (5): 491-503