Stanford

Lay Teng Ang

Instructor, Institute for Stem Cell Biology and Regenerative Medicine

CONTACT INFORMATION

- **Administrative Contact**

  Liying Ou - Administrative Associate

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Bio

BIO

As a stem cell biologist, I aim to understand the mechanisms through which stem cells differentiate into progressively specialized cell types and to harness this knowledge to artificially generate pure populations of desired cell types from stem cells. My work over the past ten years has centered on pluripotent stem cells (PSCs, which include embryonic and pluripotent stem cells), which can generate any of the hundreds of diverse cell types in the body. However, it has been notoriously challenging to guide PSCs to differentiate into a pure population of a given cell type. Current differentiation strategies typically generate heterogeneous cell populations unsuitable for basic research or clinical applications. To address this challenge, I mapped the cascade of branching lineage choices through which PSCs differentiate into various endodermal and mesodermal cell types. I then developed effective methods to differentiate PSCs into specific lineages by providing the extracellular signal(s) that specify a given lineage while inhibiting the signals that induce the alternate fate(s), enabling the generation of highly-pure human heart and bone (Loh & Chen et al., 2016; Cell) and liver (Loh & Ang et al., 2014; Cell Stem Cell) from PSCs. My laboratory currently focuses on differentiating human PSCs into liver progenitors (Ang et al., 2018; Cell Reports) and blood vessel cells (Ang et al., 2022; Cell).

I earned my Ph.D. jointly from the University of Cambridge and A*STAR and was subsequently appointed as a Research Fellow and, later, a Senior Research Fellow at the Genome Institute of Singapore. I then moved my laboratory to Stanford University as a Siebel Investigator and Instructor at the Stanford Institute for Stem Cell Biology & Regenerative Medicine. My laboratory has been supported by the Siebel Investigatorship, California Institute for Regenerative Medicine, and other sources.

ACADEMIC APPOINTMENTS

- Instructor, Institute for Stem Cell Biology and Regenerative Medicine
- Member, Cardiovascular Institute

HONORS AND AWARDS

- Catalyst to Independence Award, Additional Ventures (2022-Current)
- Siebel Investigatorship, Stanford Institute for Stem Cell Biology & Regenerative Medicine (2018-Current)
- Outstanding Partnership Award, Genome Institute of Singapore (2015)
- A*STAR-Cambridge Scholarship and Fellowship, Agency for Science, Technology, and Research (2008-2015)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Professional member, American Heart Association (2022 - present)
- Member, Stanford Maternal & Child Health Research Institute (2018 - present)
- Member, Stanford Cardiovascular Institute (2018 - present)

PROFESSIONAL EDUCATION

- B.A., National University of Singapore , Bioengineering (2007)
- Ph.D., University of Cambridge , Stem Cell Biology (2013)

Publications

PUBLICATIONS

- **Lineage-tracing hematopoietic stem cell origins in vivo to efficiently make human HLF+ HOXA+ hematopoietic progenitors from pluripotent stem cells.** *Developmental cell*
  Fowler, J. L., Zheng, S. L., Nguyen, A., Chen, A., Xiong, X., Chai, T., Chen, J. Y., Karigane, D., Banuelos, A. M., Niizuma, K., Kayamori, K., Nishimura, T., Cromer, et al
  2024
- **Monolayer platform to generate and purify primordial germ-like cells in vitro provides insights into human germline specification.** *Nature communications*
  Vijayakumar, S., Sala, R., Kang, G., Chen, A., Pablo, M. A., Adebayo, A. I., Cipriano, A., Fowler, J. L., Gomes, D. L., Ang, L. T., Loh, K. M., Sebastiano, V.
  2023; 14 (1): 5690
- **Building human artery and vein endothelial cells from pluripotent stem cells, and enduring mysteries surrounding arteriovenous development.** *Seminars in cell & developmental biology*
  Loh, K. M., Ang, L. T.
  2023
- **Variation in CFHR3 determines susceptibility to meningococcal disease by controlling factor H concentrations** *AMERICAN JOURNAL OF HUMAN GENETICS*
  Kumar, V., Pouw, R. B., Autio, M., Sagmeister, M. G., Phua, Z., Borghini, L., Wright, V. J., Hoggart, C., Pan, B., Tan, A., Binder, A., Brouwer, M. C., Pinnock, et al
  2022; 109 (9): 1680-1691
- **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
- **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
- **Controversies surrounding the origin of hepatocytes in adult livers and the in vitro generation or propagation of hepatocytes.** *Cellular and molecular gastroenterology and hepatology*
  Qian Pek, N. M., Liu, K. J., Nichane, M. n., Ang, L. T.
  2020
- **Efficient Differentiation of Human Pluripotent Stem Cells into Liver Cells.** *Journal of visualized experiments : JoVE*
  Loh, K. M., Palaria, A., Ang, L. T.
  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

- **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

- **Evaluating the regenerative potential and functionality of human liver cells in mice** *DIFFERENTIATION*
  Tan, A., Loh, K. M., Ang, L.
  2017; 98: 25–34

- **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

- **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

- **Ex uno plures: molecular designs for embryonic pluripotency.** *Physiological reviews*
  Loh, K. M., Lim, B., Ang, L. T.
  2015; 95 (1): 245-295

- **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

- **Pluripotency factors regulate definitive endoderm specification through eomesodermin** *GENES & DEVELOPMENT*
  Teo, A., Arnold, S. J., Trotter, M. B., Brown, S., Ang, L., Chng, Z., Robertson, E. J., Dunn, N., Vallier, L.
  2011; 25 (3): 238-250