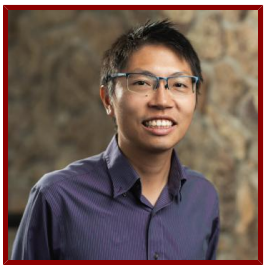
Stanford



Kyle Loh

Associate Professor of Developmental Biology (Stem Cell)

Curriculum Vitae available Online

CONTACT INFORMATION

- **Coordinator**

  Valerie Park - Laboratory Coordinator

  Email valpark@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 marvel and mystery. We have mapped how human embryonic stem cells develop into over twenty different types of cells. This roadmap allowed us to generate enriched populations of human brain, blood, blood vessel, bone, and other cells in a Petri dish from embryonic stem cells, with implications for developmental biology, stem cell biology, and regenerative medicine. Additionally, we have an emerging interest in exploring deadly biosafety level 4 viruses together with our collaborators.

Kyle attended the County College of Morris and Rutgers, and received his Ph.D. from Stanford (working with Irving Weissman), with fellowships from the Hertz Foundation, National Science Foundation and Davidson Institute for Talent Development. He then continued as a Siebel Investigator, and later, as an faculty member at Stanford. Kyle is a Packard Fellow, Pew Scholar, Human Frontier Science Program Young Investigator and Baxter Foundation Faculty Scholar. His research has been recognized by the NIH Director's Early Independence Award, ISSCR Early Career Impact Award, Forbes 30 Under 30, Harold Weintraub Graduate Award, Hertz Foundation Thesis Prize and A*STAR Investigatorship.

ACADEMIC APPOINTMENTS

- Associate 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

- ISSCR Early Career Impact Award, International Society for Stem Cell Research (2026)
- Tucker Collins Lecture, Children's Hospital Boston and Harvard Medical School (2025)
- 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

2025-26

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

2024-25

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

2023-24

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

2022-23

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

STANFORD ADVISEES

Med Scholar Project Advisor

Rayyan Jokhai

Doctoral Dissertation Reader (AC)

Austin Huang, Lauren Koepke, Yujin Moon, Jeffrey Naftaly, Angela Pogson, Suyash Raj, Arjun Rajan, Wendy Trieu, Sicong Wang

Postdoctoral Faculty Sponsor

Matthias Blanc, Amir Dailamy, Qingqing Yin

Doctoral Dissertation Advisor (AC)

Rayyan Jokhai, Hunter King, Anastasiia Masaltseva

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
- **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

- **Human vein-to-artery endothelial cell fate transition is driven by VEGF/ERK activation and PI3K inhibition.** *Development (Cambridge, England)*
  Amir Ugokwe, Z., Pyke, A. L., Trimm, E., Chakraborty, M., Fan, X., Lay Teng, A., Loh, K. M., Red-Horse, K.
  2026
- **Comprehensive Lineage Tracing Maps the Landscape of Cell Fate Decisions in Mouse Embryogenesis.** *bioRxiv : the preprint server for biology*
  Colgan, W. N., Koblan, L. W., Villagrana, J., Jason Hou, T. C., Wang, M., Gowri, G., Chandler, W., Sepúlveda, L. A., Ciftci, D., Smolyar, K., Young, A., Wittler, L., Markoulaki, et al
  2026
- **Regulation of endothelial cell chromatin availability and transcription factor activity during arterial-venous specification.** *Development (Cambridge, England)*
  Chavkin, N. W., Nelson, E. A., Bradecamp, G., Aragon, J., Ang, L. T., Loh, K. M., Hirschi, K. K.
  2026
- **Replacement-Based Ageing Interventions for Systemic Rejuvenation: Shaping Longevity Science and Clinical Directions.** *Aging cell*
  Olaisen, B. F., Gladyshev, V. N., Zhang, B., Atala, A., Loh, K. M., Gorbunova, V., Rando, T. A., Wyss-Coray, T., Verdin, E., Zhavoronkov, A., Scheibye-Knudsen, M., Lore, S., Bakula, et al
  2026; 25 (5): e70516
- **Reprogramming Stars #27: Drawing Inspiration from Reprogramming to Guide Stem Cell Differentiation: An Interview with Dr. Kyle Loh.** *Cellular reprogramming*
  Loh, K. M., Lopes, M., Pereira, C. F.
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- **Elucidating genes sufficient for viral entry into cells through sequential genome-wide CRISPR activation screens.** *bioRxiv : the preprint server for biology*
  Chai, T., Wong, A., Yin, Q., von Creytz, I., Weissman, J. S., Saunders, R. A., Prescott, J. B., Loh, K. M.
  2026
- **DNMT3A R882H Is Not Required for Disease Maintenance in Primary Human AML, but Is Associated With Increased Leukemia Stem Cell Frequency.** *Cancer discovery*
  Köhnke, T., Karigane, D., Hilgart, E., Fan, A. C., Kayamori, K., Miyauchi, M., Collins, C. T., Suchy, F. P., Rangavajhula, A., Feng, Y., Nakauchi, Y., Martinez-Montes, E., Fowler, et al
  2025
- **Vascularization of neonatal liver lobules presages adult liver size.** *Nature communications*
  Azizoglu, D. B., Perez, K., Zheng, S. L., Rahman, S., Rim, E. Y., Anbarchian, T., Fish, M., Loh, K. M., Red-Horse, K., Nusse, R.
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- **Intra-leukemic interferon signaling suppresses expansion and mediates chemoresistance in human AML.** *Blood cancer discovery*
  Karigane, D., Fan, A. C., Nishimura, T., Kayamori, K., Nakauchi, Y., Köhnke, T., Rangavajhula, A., Ediriwickrema, A., Benard, B. A., Thomas, R., Zhao, F., Stafford, M., Suchy, et al
  2025
- **Development of iPSC-derived T cells targeting EGFR neoantigens in non-small cell lung cancer.** *Molecular therapy. Methods & clinical development*
  Niizuma, K., Nishimura, T., Villanueva, J., Amaya, L., Fowler, J. L., Isobe, T., Nakauchi, Y., Saavedra, B., Xu, H., Nakanishi, M., Wilkinson, A. C., Loh, K. M., Shrager, et al
  2025; 33 (3): 101517
- **Chronic cerebral hypoperfusion induces venous dysfunction via EPAS1 regulation in mice.** *Nature communications*
  Wazny, V. K., Mahadevan, A., Nguyen, N., Wee, H., Vipin, A., Lam, T., Tay, K. Y., See, J. X., Sandhu, G., Leow, Y. J., D'Agostino, G., Graf, M., Sivakumar, et al
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- **Two parallel lineage-committed progenitors contribute to the developing brain.** *bioRxiv : the preprint server for biology*
  Dundes, C. E., Jokhai, R. T., Ahsan, H., Kang, R. S., Salomon-Shulman, R. E., Rajan, A., Kim, Y. S., Stanton, L. J., Xu, C., Do, S., McDonald, B. D., López, J. M., Urrutia, et al
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- **Dopaminergic neurons entering the brain under the immunological cover of darkness.** *Cell stem cell*
  Chai, T., Chen, J. Y., Loh, K. M.
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- **A microfluidic platform for anterior-posterior human endoderm patterning via countervailing morphogen gradients in vitro** *ISCIENCE*
  Engel, L., Liu, K. J., Cui, K. W., de la Serna, E. L., Vachharajani, V. T., Dundes, C. E., Zheng, S., Begur, M., Loh, K. M., Ang, L., Dunn, A. R.
  2025; 28 (3)
- **The placenta as a cradle, but not source, of blood?** *PLoS biology*
  Chen, J. Y., Loh, K. M.
  2025; 23 (2): e3003021
- **Protocol for the generation of HLF+ HOXA+ human hematopoietic progenitor cells from pluripotent stem cells.** *STAR protocols*
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- **Protocol for efficient generation of human artery and vein endothelial cells from pluripotent stem cells.** *STAR protocols*
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- **BRAINSTEM NEUROMODULATORY NEURONS PROMOTE GLIOMA GROWTH LOCALLY AND VIA LONG-RANGE PROJECTIONS TO MIDLINE AND CORTICAL STRUCTURES**
  Drexler, R., Drinnenberg, A., Gavish, A., Yalcin, B., Shamardani, K., Rogers, A., Mancusi, R., Taylor, K., Kim, Y., Woo, P., Ravel, A., Tatlock, E., Jokhai, et al
  OXFORD UNIV PRESS INC.2024
- **Can developmental signals shatter or mend our genomes?** *Trends in genetics : TIG*
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  2024
- **DNMT3AR882H Is Not Required for Disease Maintenance in Primary Human AML, but Is Associated With Increased Leukemia Stem Cell Frequency.** *bioRxiv : the preprint server for biology*
  Köhnke, T., Karigane, D., Hilgart, E., Fan, A. C., Kayamori, K., Miyauchi, M., Collins, C. T., Suchy, F. P., Rangavajhula, A., Feng, Y., Nakauchi, Y., Martinez-Montes, E., Fowler, et al
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- **Mesoscale chromatin confinement facilitates target search of pioneer transcription factors in live cells.** *Nature structural & molecular biology*
  Wang, Z., Wang, B., Niu, D., Yin, C., Bi, Y., Cattoglio, C., Loh, K. M., Lavis, L. D., Ge, H., Deng, W.
  2024
- **TMX1, a disulfide oxidoreductase, is necessary for T cell function through regulation of CD3ζ.** *bioRxiv : the preprint server for biology*
  Chai, T., Loh, K. M., Weissman, I. L.
  2024
- **Reshaping Waddington's developmental landscape.** *Nature reviews. Genetics*
  Qu, Y., Loh, K. M.
  2024
- **Inflammatory risk contributes to post-COVID endothelial dysfunction through anti-ACKR1 autoantibody.** *Life science alliance*
  Lee, E., Nguyen, N., Young, B. E., Wee, H., Wazny, V., Lee, K. L., Tay, K. Y., Goh, L. L., Chioh, F. W., Law, M. C., Lee, I. R., Ang, L. T., Loh, et al
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- **Spatially Segregated Macrophage Populations Predict Distinct Outcomes In Colon Cancer.** *Cancer discovery*
  Matusiak, M., Hickey, J. W., van IJzendoorn, D. G., Lu, G., Kidzinski, L., Zhu, S., Colburg, D. R., Luca, B., Phillips, D. J., Brubaker, S. W., Charville, G. W., Shen, J., Loh, et al
  2024
- **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

- **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., Oses-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.
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- **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.
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- **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
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  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.
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- **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.
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- **Evaluating the regenerative potential and functionality of human liver cells in mice** *DIFFERENTIATION*
  Tan, A., Loh, K. M., Ang, L.
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- **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.
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- **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.
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- **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
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- **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
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- **Rejuvenating tithonus.** *EMBO reports*
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