Stanford

Katrin Chua

Professor of Medicine (Endocrinology, Gerontology and Metabolism)

Medicine - Endocrinology, Gerontology, & Metabolism

Bio

ACADEMIC APPOINTMENTS

- Professor, Medicine - Endocrinology, Gerontology, & Metabolism
- Member, Bio-X
- Member, Stanford Cancer Institute

ADMINISTRATIVE APPOINTMENTS

- Director, MSTP MD-PhD program, (2018- present)
- Director of Admissions, MSTP MD-PhD program, (2016-2017)
- Associate Director, MSTP MD-PhD program, (2014-2018)
- Member, Stanford Diabetes Research Center, (2023- present)

HONORS AND AWARDS

- Sackler Scholar in Psychobiology, Harvard University (1995-1996)
- Fellow of the Jane Coffin Childs Memorial Fund For Medical Research, Jane Coffin Childs Memorial Fund For Medical Research (2001-2002)
- Pfizer Postdoctoral Fellow in Rheumatology/Immunology, Pfizer (2002-2005)
- Paul Beeson Scholar in Aging Research, National Institute on Aging/American Federation for Aging Research (2006-)
- Ellison Medical Foundation New Scholar in Aging, Ellison Medical Foundation/AFAR (2008-2012)

PROFESSIONAL EDUCATION

- Ph.D., Harvard Medical School , Neuroscience/Cell Biology (2001)
- M.D., Harvard Medical School , Medicine (2001)
- B.A., Harvard University , Biochemistry/Molecular Biology (1991)

LINKS

- Chua Lab Website: https://web.stanford.edu/group/katrinchualab/

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Our lab is interested in understanding molecular processes that underlie aging and age-associated pathologies in mammals. We focus on a family of genes, the SIRTs, which regulate stress resistance and lifespan in lower organisms such as yeast, worms, and flies. In mammals, we recently uncovered a number of ways in which SIRT factors may contribute to cellular and organismal aging by regulating resistance to various forms of stress. We have now begun to characterize the molecular

mechanisms by which these SIRT factors function. In particular, we are interested in how SIRT factors regulate chromatin, the molecular structure in which the DNA of mammalian genomes is packaged, and how such functions may link genome maintenance to stress resistance and aging.

Teaching

COURSES

2023-24

- Physician Scientist Hour: INDE 217 (Aut, Win, Spr)

2022-23

- MSTP Journal club: INDE 231 (Aut)
- Physician Scientist Hour: INDE 217 (Aut, Win, Spr)

2021-22

- Physician Scientist Hour: INDE 217 (Aut, Win, Spr)

2020-21

- Physician Scientist Hour: INDE 217 (Aut, Win, Spr)

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Lu Wang

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Cancer Biology (Phd Program)

Publications

PUBLICATIONS

- **Elevated NSD3 histone methylation activity drives squamous cell lung cancer.** *Nature*
  Yuan, G. n., Flores, N. M., Hausmann, S. n., Lofgren, S. M., Kharchenko, V. n., Angulo-Ibanez, M. n., Sengupta, D. n., Lu, X. n., Czaban, I. n., Azhibek, D. n., Vicent, S. n., Fischle, W. n., Jaremko, et al
  2021

- **The epigenetic regulator SIRT7 guards against mammalian cellular senescence induced by ribosomal DNA instability.** *The Journal of biological chemistry*
  Paredes, S., Angulo-Ibanez, M., Tasselli, L., Carlson, S. M., Zheng, W., Li, T., Chua, K. F.
  2018

- **SIRT6 deacetylates H3K18ac at pericentric chromatin to prevent mitotic errors and cellular senescence** *NATURE STRUCTURAL & MOLECULAR BIOLOGY*
  Tasselli, L., Xi, Y., Zheng, W., Tennen, R. I., Odrowaz, Z., Simeoni, F., Li, W., Chua, K. F.
  2016; 23 (5): 434-440

- **CANCER Metabolism in the driver's seat** *NATURE*
  Tasselli, L., Chua, K. F.
  2012; 492 (7429): 362-363

- **SIRT7 links H3K18 deacetylation to maintenance of oncogenic transformation** *NATURE*
  Barber, M. F., Michishita-Kioi, E., Xi, Y., Tasselli, L., Kioi, M., Moqtaderi, Z., Tennen, R. I., Paredes, S., Young, N. L., Chen, K., Struhl, K., Garcia, B. A., Gozani, et al
  2012; 487 (7405): 114-?

- **SIRT6 is required for maintenance of telomere position effect in human cells** *NATURE COMMUNICATIONS*
  Tennen, R. I., Bua, D. J., Wright, W. E., Chua, K. F.

2011; 2

- **SIRT6 Links Histone H3 Lysine 9 Deacetylation to NF-kappa B-Dependent Gene Expression and Organismal Life Span** *CELL*
  Kawahara, T. L., Michishita, E., Adler, A. S., Damian, M., Berber, E., Lin, M., McCord, R. A., Ongaigui, K. C., Boxer, L. D., Chang, H. Y., Chua, K. F.
  2009; 136 (1): 62-74

- **SIRT6 is a histone H3 lysine 9 deacetylase that modulates telomeric chromatin** *NATURE*
  Michishita, E., McCord, R. A., Berber, E., Kioi, M., Padilla-Nash, H., Damian, M., Cheung, P., Kusumoto, R., Kawahara, T. L., Barrett, J. C., Chang, H. Y., Bohr, V. A., Ried, et al
  2008; 452 (7186): 492-U16

- **Antibody toolkit to investigate eEF1A methylation dynamics in mRNA translation elongation.** *The Journal of biological chemistry*
  Mealey-Farr, R., Jeong, J., Park, J., Liu, S., Hausmann, S., Francis, J. W., Angulo Ibanez, M., Cho, J., Chua, K., Mazur, P. K., Gozani, O.
  2023: 104747

- **HDAC inhibition results in widespread alteration of the histone acetylation landscape and BRD4 targeting to gene bodies.** *Cell reports*
  Slaughter, M. J., Shanle, E. K., Khan, A. n., Chua, K. F., Hong, T. n., Boxer, L. D., Allis, C. D., Josefowicz, S. Z., Garcia, B. A., Rothbart, S. B., Strahl, B. D., Davis, I. J.
  2021; 34 (3): 108638

- **Mammalian SIRT6 Represses Invasive Cancer Cell Phenotypes through ATP Citrate Lyase (ACLY)-Dependent Histone Acetylation.** *Genes*
  Zheng, W., Tasselli, L., Li, T. M., Chua, K. F.
  2021; 12 (9)

- **Multivalent tumor suppressor adenomatous polyposis coli promotes Axin biomolecular condensate formation and efficient beta-catenin degradation.** *Scientific reports*
  Li, T., Ren, J., Husmann, D., Coan, J. P., Gozani, O., Chua, K. F.
  2020; 10 (1): 17425

- **Chromatin Regulation and Genome Maintenance by Mammalian SIRT6 and SIRT7**
  Chua, K.
  WILEY.2020

- **Structural basis for the activation and inhibition of Sirtuin 6 by quercetin and its derivatives.** *Scientific reports*
  You, W., Zheng, W., Weiss, S., Chua, K. F., Steegborn, C.
  2019; 9 (1): 19176

- **Binding to medium and long chain fatty acyls is a common property of HEAT and ARM repeat modules.** *Scientific reports*
  Li, T., Coan, J. P., Krajewski, K., Zhang, L., Elias, J. E., Strahl, B. D., Gozani, O., Chua, K. F.
  2019; 9 (1): 14226

- **A Click Chemistry Approach Reveals the Chromatin-Dependent Histone H3K36 Deacylase Nature of SIRT7.** *Journal of the American Chemical Society*
  Wang, W. W., Angulo-Ibanez, M., Lyu, J., Kurra, Y., Tong, Z., Wu, B., Zhang, L., Sharma, V., Zhou, J., Lin, H., Gao, Y. Q., Li, W., Chua, et al
  2019

- **CHROMATIN AND NUCLEAR SIGNALING: SIRT7 FUNCTION IN THE NUCLEOLUS AND BEYOND** *INTRODUCTORY REVIEW ON SIRTUINS IN BIOLOGY, AGING, AND DISEASE*
  Angulo-Ibanez, M., Chua, K. F., Guarente, L., Mostoslavsky, R., Kazantsev, A.
  2018: 131–40

- **SIRT6: Novel Mechanisms and Links to Aging and Disease.** *Trends in endocrinology and metabolism*
  Tasselli, L., Zheng, W., Chua, K. F.
  2017; 28 (3): 168-185

- **Structural Basis of Sirtuin 6 Activation by Synthetic Small Molecules.** *Angewandte Chemie (International ed. in English)*
  You, W., Rotili, D., Li, T., Kambach, C., Meleshin, M., Schutkowski, M., Chua, K. F., Mai, A., Steegborn, C.
  2017; 56 (4): 1007-1011

- **SIRT7 clears the way for DNA repair.** *EMBO journal*
  Paredes, S., Chua, K. F.
  2016; 35 (14): 1483-1485

- **Nuclear DNA damage signalling to mitochondria in ageing** *NATURE REVIEWS MOLECULAR CELL BIOLOGY*
  Fang, E. F., Scheibye-Knudsen, M., Chua, K. F., Mattson, M. P., Croteau, D. L., Bohr, V. A.
  2016; 17 (5): 308-321
- **SIRT7 inactivation reverses metastatic phenotypes in epithelial and mesenchymal tumors** *SCIENTIFIC REPORTS*
  Malik, S., Villanova, L., Tanaka, S., Aonuma, M., Roy, N., Berber, E., Pollack, J. R., Michishita-Kioi, E., Chua, K. F.
  2015; 5
- **Methylation gets into rhythm with NAD(+)-SIRT1.** *Nature structural & molecular biology*
  Tasselli, L., Chua, K. F.
  2015; 22 (4): 275-277
- **Molecular Pathways: Emerging Roles of Mammalian Sirtuin SIRT7 in Cancer.** *Clinical cancer research*
  Paredes, S., Villanova, L., Chua, K. F.
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- **SIRT7 Represses Myc Activity to Suppress ER Stress and Prevent Fatty Liver Disease** *CELL REPORTS*
  Shin, J., He, M., Liu, Y., Paredes, S., Villanova, L., Brown, K., Qiu, X., Nabavi, N., Mohrin, M., Wojnoonski, K., Li, P., Cheng, H., Murphy, et al
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- **The Role of SIRT6 Protein in Aging and Reprogramming of Human Induced Pluripotent Stem Cells.** *journal of biological chemistry*
  Sharma, A., Diecke, S., Zhang, W. Y., Lan, F., He, C., Mordwinkin, N. M., Chua, K. F., Wu, J. C.
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- **A general molecular affinity strategy for global detection and proteomic analysis of lysine methylation.** *Molecular cell*
  Moore, K. E., Carlson, S. M., Camp, N. D., Cheung, P., James, R. G., Chua, K. F., Wolf-Yadlin, A., Gozani, O.
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- **Proteomic analysis of the SIRT6 interactome: novel links to genome maintenance and cellular stress signaling.** *Scientific reports*
  Simeoni, F., Tasselli, L., Tanaka, S., Villanova, L., Hayashi, M., Kubota, K., Isono, F., Garcia, B. A., Michishita-Kioi, E., Chua, K. F.
  2013; 3: 3085-?
- **Finding a Target for Resveratrol** *CELL*
  Tennen, R. I., Michishita-Kioi, E., Chua, K. F.
  2012; 148 (3): 387-389
- **Lysine methylation of the NF-kappa B subunit RelA by SETD6 couples activity of the histone methyltransferase GLP at chromatin to tonic repression of NF-kappa B signaling** *NATURE IMMUNOLOGY*
  Levy, D., Kuo, A. J., Chang, Y., Schaefer, U., Kitson, C., Cheung, P., Espejo, A., Zee, B. M., Liu, C. L., Tangsombatvisit, S., Tennen, R. I., Kuo, A. Y., Tanjing, et al
  2011; 12 (1): 29-U47
- **Chromatin regulation and genome maintenance by mammalian SIRT6** *TRENDS IN BIOCHEMICAL SCIENCES*
  Tennen, R. I., Chua, K. F.
  2011; 36 (1): 39-46
- **Functional dissection of SIRT6: Identification of domains that regulate histone deacetylase activity and chromatin localization** *MECHANISMS OF AGEING AND DEVELOPMENT*
  Tennen, R. I., Berber, E., Chua, K. F.
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- **Cell cycle-dependent deacetylation of telomeric histone H3 lysine K56 by human SIRT6** *CELL CYCLE*
  Michishita, E., McCord, R. A., Boxer, L. D., Barber, M. F., Hong, T., Gozani, O., Chua, K. F.
  2009; 8 (16): 2664-2666
- **SIRT6 stabilizes DNA-dependent Protein Kinase at chromatin for DNA double-strand break repair** *Aging*
  McCord RA, Michishita E, Hong T, Berber E, Boxer LD, Kusumoto R, Guan S, Shi X, , Gozani O, Burlingame AL, Bohr VA, Chua KF
  2009; 1: 109-121
- **Mice lacking histone deacetylase 6 have hyperacetylated tubulin but are viable and develop normally** *MOLECULAR AND CELLULAR BIOLOGY*

Zhang, Y., Kwon, S., Yamaguchi, T., Cubizolles, F., Rousseaux, S., Kneissel, M., Cao, C., Li, N., Cheng, H., Chua, K., Lombard, D., Mizeracki, A., Matthias, et al
2008; 28 (5): 1688-1701

- **ING2 PHD domain links histone H3 lysine 4 methylation to active gene repression** *NATURE*
  Shi, X., Hong, T., Walter, K. L., Ewalt, M., Michishita, E., Hung, T., Carney, D., Pena, P., Lan, F., Kaadige, M. R., Lacoste, N., Cayrou, C., Davrazou, et al
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- **Genomic instability and aging-like phenotype in the absence of mammalian SIRT6** *CELL*
  Mostoslavsky, R., Chua, K. F., Lombard, D. B., Pang, W. W., Fischer, M. R., Gellon, L., Liu, P. F., Mostoslavsky, G., Franco, S., Murphy, M. M., Mills, K. D., Patel, P., Hsu, et al
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- **DNA repair, genome stability, and aging** *CELL*
  Lombard, D. B., Chua, K. F., Mostoslavsky, R., Franco, S., Gostissa, M., Alt, F. W.
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- **Stress-dependent regulation of FOXO transcription factors by the SIRT1 deacetylase** *SCIENCE*
  Brunet, A., Sweeney, L. B., Sturgill, J. F., Chua, K. F., Greer, P. L., Lin, Y. X., Tran, H., Ross, S. E., Mostoslavsky, R., Cohen, H. Y., Hu, L. S., Cheng, H. L., Jedrychowski, et al
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- **Developmental defects and p53 hyperacetylation in Sir2 homolog (SIRT1)-deficient mice** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
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- **The influence of transcriptional orientation on endogenous switch region function** *NATURE IMMUNOLOGY*
  Shinkura, R., Tian, M., Smith, M., Chua, K., Fujiwara, Y., Alt, F. W.
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- **Transcription-targeted DNA deamination by the AID antibody diversification enzyme** *NATURE*
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- **Increased ionizing radiation sensitivity and genomic instability in the absence of histone H2AX** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Bassing, C. H., Chua, K. F., Sekiguchi, J., Suh, H., Whitlow, S. R., Fleming, J. C., Monroe, B. C., Ciccone, D. N., Yan, C., Vlasakova, K., Livingston, D. M., Ferguson, D. O., Scully, et al
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- **The function of AID in somatic mutation and class switch recombination: upstream or downstream of DNA breaks.** *journal of experimental medicine*
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  Chua, K., Reed, R.
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- **Human step II splicing factor hSlu7 functions in restructuring the spliceosome between the catalytic steps of splicing** *GENES & DEVELOPMENT*
  Chua, K., Reed, R.
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- **Cyclin E associates with components of the pre-mRNA splicing machinery in mammalian cells** *MOLECULAR AND CELLULAR BIOLOGY*

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1998; 18 (8): 4526-4536

- **Phosphorylation of spliceosomal protein SAP 155 coupled with splicing catalysis** *GENES & DEVELOPMENT*
  Wang, C. Y., Chua, K., Seghezzi, W., Lees, E., Gozani, O., Reed, R.
  1998; 12 (10): 1409-1414
- **The splicing factor BBP interacts specifically with the pre-mRNA branchpoint sequence UACUAAC** *CELL*
  Berglund, J. A., Chua, K., Abovich, N., Reed, R., Rosbash, M.
  1997; 89 (5): 781-787