

Amandine Chaix, Ph.D.

Assistant Professor

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CURRENT POSITION, FUNDING & RESEARCH INTERESTS

2021 **Assistant Professor**
Department of Nutrition & Integrative Physiology, Salt Lake City, UT.

The overarching goal of my research is to investigate the dynamic relationship between metabolism, nutrition and the circadian clock in health and disease. Through this pursuit, I intend to develop new circadian-based therapies to extend healthy life. Currently, I investigate (i) the benefits and mechanisms of TRF as an intervention against atherosclerosis and cardiovascular disease (funded by an AHA Career development award) and (ii) the mechanisms by which TRF delays the onset of age-related declines in health, cognition, and circadian rhythms (funded by an NIA R01). Apart from academic research, I am an active member of my scientific community, I contribute to public outreach and I train and inspire the next generation of scientists.

EDUCATION & TRAINING

2017-2020 **Staff Scientist in Metabolism & Circadian Clock**
2011-2017 **Postdoctoral fellow**
Panda lab, The Salk Institute for Biological Studies, La Jolla, CA, USA.

- Circadian rhythms, dietary interventions and metabolic fitness: Genetic and behavioral perturbations of the circadian clock are associated with metabolic diseases. Interestingly, mice fed a high fat diet have a disrupted daily eating pattern, raising the possibility that the timing of food consumption could contribute to the development of diet-induced obesity and associated metabolic diseases. My work has shown that restricting eating to a regular daily schedule (time restricted feeding, TRF) can prevent and reverse diet-induced obesity and associated metabolic diseases in mice on various energy dense diets without changes in activity or food intake (ref #12). Furthermore, imposed feeding/fasting rhythms can override otherwise compromised rhythms in clock deficient mice by restoring metabolic oscillations and inducing a rhythmic coherent activation of nutrient-sensing pathways and physiological cellular stress responses to maintain cellular homeostasis (ref #4). These comprehensive studies on TRF in preclinical mouse models have laid the ground to investigate the benefits of TRF in humans.
- Circadian rhythms, microbiome and metabolic homeostasis: The gut microbiome plays an essential role in energy balance and metabolic homeostasis. My work investigated the influence of the daily dynamic of the gut microbiome on metabolic homeostasis. I showed that the gut microbiome undergoes daily oscillations that are affected by diet and feeding pattern (ref #13). I also showed that antibiotic-induced microbiome deletion (AIMD) dramatically alters whole-body glucose homeostasis by altering gut luminal secondary metabolites and signaling (ref #5).

2006-2010 **PhD in Cell Signaling and Immunology**
Dubreuil lab, Aix-Marseille II University and Marseille Cancer Institute, France.

- Normal and oncogenic signaling of the receptor tyrosine kinase c-Kit in mast cells: Oncogenic activation of the receptor tyrosine kinase c-Kit is found in various tumors and leukemia. As described for other oncogenes, the wild type (WT) and constitutively active (ca) forms of the receptor can trigger distinct signal transduction cascades. During my Ph.D., I investigated the molecular mechanisms of the differential signaling between WT and oncogenic caKIT. I showed that STAT5 pathway was selectively activated in mastocytoma cell lines and required for their proliferation (ref #18). I also showed that constitutive KIT could recruit a new set of interacting partners that modulate its oncogenic properties (ref #14). My work has identified pathways that are selectively activated in tumor cells representing attractive new therapeutic targets.

- 2006-2009** **Lecturer/Teaching assistant (“Moniteur”)**
Aix-Marseille II University, France.
96 hours of teaching a year in Biochemistry, Cellular Biology and Physiology (see details below)
- 2006** **MS in Eukaryotic Cell Biology**
Ecole Normale Supérieure de Cachan (“Grande Ecole”), Paris, and University of Sciences of Luminy, Marseille, France.
- 2004** **Professorship (“Agregation”) in Biochemistry and Bioengineering**
Ecole Normale Supérieure de Cachan and French Ministry of Research and Education.
- 2003** **BS in Cell Biology and Physiology**
Ecole Normale Supérieure de Cachan and Paris XI University, Paris, France.

RESEARCH SUPPORT

Ongoing Research Support

18CDA34110292, AHA

Chaix, Amandine (PI)

07/01/18-06/30/21

Benefits and mechanisms of time-restricted feeding as an intervention against atherosclerosis and cardiovascular disease.

R01AG065993-01

Chaix, Amandine (PI)

09/15/2019-05/31/2024

Mechanisms by which time-restricted feeding (TRF) delays the onset of age-related declines in health, cognition, and circadian rhythms.

Completed Research Support

Oklahoma Nathan Shock Center pilot award

Chaix, Amandine (PI)

07/20/2019-07/19/2010

Cardiac benefits of time-restricted feeding in middle-aged mice.

7-12-MN-64, Mentor-Based Postdoctoral Fellowship, ADA

Panda, Satchidananda (PI) & Chaix, Amandine (Mentee)

07/01/2012-06/30/2016

Metabolic Rhythms and Diabetes Prevention.

French Society of Haematology, PhD-to-postdoc Transition Fellowship.

09/01/2010- 08/31/2011

French Association for Cancer Research (ARC) Predoctoral Fellowship.

09/01/2009- 08/31/2010

French Ministry of Education and Research Dual Research & Teaching Predoctoral Fellowship.

09/01/2006- 08/31/2009

SPECIALIZED PROFESSIONAL TRAINING

- 2016** Certificate for Introduction to Statistics with R, SBP Medical Discovery Institute, La Jolla, CA.
- 2015** Metabolomics and XCMS short course, The Scripps Research Institute, La Jolla, CA.
- 2014** NIH/MMPC Course: 7th Annual Course on Isotope Tracers in Metabolic Research: Principles and Practice of Kinetic Analysis, Cleveland, OH.
- 2012** MMPC Course: Glucose Clamping the Conscious Mouse, Vanderbilt University, Nashville, TN.

AWARDS & HONORS

- 2017 Poster Award, Metabolism in action meeting, Copenhagen, Denmark.
- 2017 Travel Award to Metabolism in action meeting in Copenhagen, Salk Society of Research Fellows.
- 2016 Salk Women & Science Research Award, Salk Institute.
- 2016 Travel Award to Keystone Symposium, Society of Research Fellows, Salk Institute.
- 2014 People's Choice Award, Salk Institute Science Retreat.
- 2014 Society for Research on Biological Rhythms (SRBR) Research Merit Award.
- 2013 Philippe Foundation Inc. Award for Promise in Research.
- 2010 Aix-Marseille University Best PhD Thesis Prize 2010.

PRESENTATIONS

- 2021 Invited Seminar, Michigan State University, MI.
- 2021 Invited Speaker, 2nd International Conference on Precision Nutrition and Metabolism in Public Health and Medicine, Greece.
- 2021 Invited Seminar, University of Kentucky, Lexington, KY.
- 2021 Invited Speaker, Center for Circadian Biology Symposium, San Diego, CA.
- 2020 Invited Speaker, Diabetes and Metabolism Virtual Research Recharge, Salt Lake City, UT.
- 2020 Invited Speaker, 4th Annual La Jolla Aging Meeting, La Jolla, CA.
- 2020 Invited Seminar, University of Kentucky, Lexington, KY.
- 2020 Invited Seminar, University of California Davis, Davis, CA.
- 2019 Invited Seminar, University of Colorado, Anschutz Medical Campus, Denver, CO.
- 2019 Selected Short Talk, Meeting of the European Biological Rhythm Society, Lyon, France.
- 2019 Invited Speaker, Nutrition meeting, Baltimore, MD.
- 2019 Invited Speaker, Annual meeting of the Society for the Study of Ingestive Behavior, Utrecht, Netherlands.
- 2019 Invited Seminar, Colorado State University, Fort Collins, CO.
- 2019 Poster Presentation, Keystone symposium Obesity and Adipose Tissue Biology, Banff, Canada.
- 2018 Poster Presentation, Cell symposium Metabolites as signaling molecules, Seattle, WA.
- 2017 Selected Short Talk, Salk Science at the seaside, Salk Institute Science Retreat, La Jolla, CA.
- 2017 Invited Chair, Cell symposium on Metabolic disease therapies, San Diego, CA.
- 2017 Selected Short Talk, Cell symposium on Metabolic disease therapies, San Diego, CA.
- 2017 Poster Presentation, Metabolism in action, Copenhagen, Denmark.
- 2017 Poster Presentation, Keystone symposium Diabetes, Keystone, CO.
- 2017 Invited Speaker, SLEEP meeting, Boston, MA.
- 2016 Selected Short Talk, Keystone symposium Metabolism, Transcription and Disease, Snowbird, UT.
- 2015 Poster Presentation, Center for Circadian Biology Symposium, La Jolla, CA.
- 2014 Selected Short Talk, Meeting of the Society for Research on Biological Rhythms, Big Sky, MO.
- 2014 Invited short talk, 7th Annual Salk/Fondation Ipsen/Nature Symposium on Biological Complexity, La Jolla, CA.
- 2013 Guided Audio Poster Presentation, 73rd Annual American Diabetes Association Scientific Sessions, Chicago, IL.
- 2009 Selected Short Talk, Annual Congress of the Hematopoiesis and Oncogenesis Club, Giens, France.
- 2009 Poster Presentation, EMBO Workshop – Visualizing Immune System Complexity, Marseille, France.
- 2008 Selected Short Talk, Annual Congress of the Hematopoiesis and Oncogenesis Club, Giens, France.
- 2008 Poster Presentation, 20th Congress of the European Association for Cancer Research, Lyon, France.
- 2007 Poster Presentation, FEBS-EMBO Advanced Lecture Course – Molecular Mechanisms in Signal Transduction and Cancer, Spetses, Greece.

MANUSCRIPT PEER REVIEW

Cell Metabolism, Nature Metabolism, Molecular Metabolism, NPG Aging and Mechanisms of Disease, Journal of Biological Rhythms.

TEACHING EXPERIENCE

- 2006 - 2009 Lecturer/Teaching assistant** (“Moniteur”), B.Sc. in Biological Sciences, University of Sciences of Luminy, Marseille, France.
96 hours of teaching a year
- Biochemistry, Cellular Biology, Metabolism and Bioenergetics; lectures, lab classes, discussion.
 - Test preparatory classes affiliated with the university (Vet school, Med school, Agriculture school); lectures, oral and written examinations.
- 2006 - 2009 Professor agrégé, educational project**, « TousChercheurs » (we are all scientists) association, Marseille, France.
80h /year.
- Conceptualization, design and execution of a 3 days inquiry-based learning and hands-on workshop on glycemia and diabetes for high school students.
 - Publication of the protocol of the workshop as well as the evaluation of the teaching approach in Advances in Physiological Education.

MENTORING & OUTREACH

- 2011 - 2012** Ishika Arora, UCSD undergraduate, Senior Honors Thesis supervisor, Best Poster Award at UCSD Undergrads Research Showcase.
- 2012 - 2014** Phuong Miu, BS Laboratory Assistant I supervisor. Now Staff Research Associate at UCSD.
- 2012 - 2013** Angela Yao, UCSD undergraduate, Senior Honors Thesis supervisor, Best Poster Award at UCSD Undergrads Research Showcase.
- 2012 - 2013** Lucy Oh, High School Student, Salk Scholars Program. Now at John Hopkins Medical School.
- 2013 - 2014** Sally Huang, UCSD undergraduate, recipient of the Ledell Family Endowed Undergraduate Research Scholarship. Now at UC Davis Veterinary School.
- 2014 - 2015** Jeanine Mejares, UCSD undergraduate, recipient of the Ledell Family Endowed Undergraduate Research Scholarship.
- 2015** Clarisse A Marotz, UCSD biomedical sciences graduate program, rotation supervisor.
- 2016** Jiayi Dong, UCSD biomedical sciences graduate program, rotation supervisor.
- 2016 - 2019** Terry Lin, Research Assistant I supervisor. Now PhD Student in Panda Lab.
- 2017 - 2020** Tiffani Le, UCSD undergraduate, recipient of Julia Brown Research Scholarship for Medical Research. Medical School Fall 2021.
- 2017 - 2020** Raghav Bhardwaj, UCSD master student. Now Senior Research Associate at Avidity Biosciences.
- 2021** Farahnaz Akrami, NUIP PhD program, PhD advisor.
- 2021** Paul Bourrant, NUIP MS program, MS advisor.
- 2016** Design, organization and running of a booth, “Heath and lifestyle: working around the clock” booth, Explore Salk, Salk Institute, La Jolla, CA.
- 2016** Invited speaker, “Nutritional Genomics: Health and Well-being” seminar, Salk Women & Science seminar series, Salk Institute, La Jolla, CA.
- 2015/16/17** Design, organization and running of a 30 min hands on workshop in the lab to discover the circadian clock, Salk high school science day, Salk Institute, La Jolla, CA.

LIST OF PUBLICATIONS

Full list of publications

<https://www.ncbi.nlm.nih.gov/myncbi/amandine.chaix.1/bibliography/public/>

1. **Chaix A**, Rynders CA. Time restricted feeding plus exercise: could two be better than one for metabolic health? J Physiol. 2021 Feb 3. PMID: 33533524.
2. Manoogian ENC, **Chaix A**, Panda S. When to Eat: The Importance of Eating Patterns in Health and Disease. J Biol Rhythms. 2019 Dec;34(6):579-581.

3. **Chaix A**, Panda S. Timing tweaks exercise. *Nat Rev Endocrinol*. 2019 Aug;15(8):440-441.
4. **Chaix A**, Manoogian ENC, Melkani GC, Panda S. Time-restricted eating to prevent and manage chronic metabolic diseases. *Annu Rev Nutr*. 2019 Aug 21;39:291-315.
5. Garcia D, Hellberg K, **Chaix A**, Wallace M, Herzig S, Badur MG, Lin T, Shokhirev MN, Pinto AFM, Ross DS, Saghatelian A, Panda S, Dow LE, Metallo CM, Shaw RJ. Genetic Liver-Specific AMPK Activation Protects against Diet-Induced Obesity and NAFLD. *Cell Rep*. 2019 Jan 2;26(1):192-208.
6. **Chaix A**, Lin T, Le HD, Chang MW, Panda S. Time-restricted feeding prevents obesity and metabolic syndrome in mice lacking a circadian clock. *Cell Metab*, 2019 Feb 5;29(2):303-319.
 - Cover Article.
 - Faculty of 1000 prime recommended.
7. Zarrinpar A*, **Chaix A***, Xu ZZ, Chang MW, Marotz CA, Saghatelian A, Knight R, Panda S. * **co-first authors**. Antibiotic induced microbiome depletion alters metabolic homeostasis by affecting gut signaling and colonic metabolism. *Nat Commun*, 2018, 9(1):2872.
8. **Chaix A**, Zarrinpar A, Panda S. The circadian coordination of cell biology. *J Cell Biol*, 2016, 215(1):15-25.
9. **Chaix A**, Panda S. Ketone Bodies Signal Opportunistic Food-Seeking Activity. *Trends Endocrinol Metab*, 2016, 27(6):350-2.
10. Zarrinpar A, **Chaix A**, Panda S. Daily Eating Patterns and Their Impact on Health and Disease. *Trends Endocrinol Metab*, 2016, 27(2):69-83.
11. **Chaix A** and Zarrinpar A. The effects of time-restricted feeding on lipid metabolism and adiposity. *Adipocyte*, 2015, 4(4):319-24.
12. Mingueneau M, **Chaix A**, Scotti N, Chaix J, Reynders A, Hammond C, Thimonier J. A multidisciplinary guided practical on type I diabetes engaging students in inquiry-based learning. *Adv Physiol Educ*, 2015, 39(4):383-91.
13. Mingueneau M, **Chaix A**, Scotti N, Chaix J, Reynders A, Hammond C, Thimonier J. Hands-on experiments on glycemia regulation and type 1 diabetes. *Adv Physiol Educ*, 2015, 39(3):232-9.
14. **Chaix A**, Zarrinpar A, Miu P, Panda S. Time-restricted feeding is a preventative and therapeutic intervention against diverse nutritional challenges. *Cell Metabolism*, 2014, 20(6):991-1005.
 - Cover Article.
 - Featured Article.
 - Press coverage: the New York Times, Wall Street Journal, The Today Show, Public Radio International's Science Friday, BBC News, and CBS News among others.
15. Zarrinpar A, **Chaix A**, Yooseph S, Panda S. Diet and feeding pattern affect the diurnal dynamics of the gut microbiome. *Cell Metabolism*, 2014, 20(6):1006-17.
 - Cover Article.
 - Featured Article.
 - Press coverage: Public Radio International's Science Friday, BBC News, and CBS News among others.
16. **Chaix A**, Arcangelli ML, Lopez S, Voisset E, Yang Y, Vita M, Letard S, Audebert S, Finetti P, Birnbaum D, Bertucci F, Aurrand-Lions M, Dubreuil P, De Sepulveda P. KIT-D816V oncogenic activity is controlled by the juxtamembrane docking site Y568-Y570. *Oncogene*. 2014, 33(7):872-81.
17. Plikus MV, Vollmers C, De la Cruz D, **Chaix A**, Ramos R, Panda S, Chuong CM. Local circadian clock gates cell cycle progression of transient amplifying cells during regenerative hair cycling. *Proc Natl Acad Sci U S A.*, 2013, 110(23):E2106-15.
18. Hatori M, Vollmers C, Zarrinpar A, DiTacchio L, Bushong EA, Gill S, Leblanc M, **Chaix A**, Joens M, Fitzpatrick JA, Ellisman MH, Panda S. Time-restricted feeding without reducing caloric intake prevents metabolic diseases in mice fed a high-fat diet. *Cell Metabolism*, 2012, 15(6):848-60.
 - Cover article.

- Faculty of 1000 prime recommended.
- Feature in multiple news outlets including front page of Los Angeles Times, Washington Post, and BBC News among others.

19. Fournier G, Cabaud O, Josselin E, **Chaix A**, Adélaïde J, Isnardon D, Restouin A, Castellano R, Dubreuil P, Chaffanet M, Birnbaum D, Lopez M. Loss of AF6/Afadin, a marker of poor outcome in breast cancer, induces cell migration and tumor growth. *Oncogene*, 2011 Sep 8;30(36):3862-74.
20. **Chaix A**, Lopez S, Voisset E, Gros L, Dubreuil P, De Sepulveda P. Mechanisms of STAT protein activation by oncogenic KIT mutants in neoplastic mast cells. *J Biol Chem*, 2011, 286(8):5956-66.
21. Yang Y, Létard S, Borge L, **Chaix A**, Hanssens K, Lopez S, Vita M, Finetti P, Birnbaum D, Bertucci F, Gomez S, De Sepulveda P and Dubreuil P. Pediatric mastocytosis-associated KIT extracellular domain mutations exhibit different functional and signaling properties compared with KIT-phosphotransferase domain mutations. *Blood*, 2010, 116(7):1114-23.
22. Voisset E, Lopez S, **Chaix A**, Vita M, George C, Dubreuil P, De Sepulveda P. FES kinase participates in KIT-ligand induced chemotaxis. *Biochem and Biophys Res Commun.*, 2010, 393(1):174–8.
23. Voisset E, Lopez S, **Chaix A**, Georges C, Hanssens K, Prébet T, Dubreuil P, De Sepulveda P. FES kinases are required for oncogenic FLT3 signaling. *Leukemia*, 2010, 24(4):721-8.
24. Simon C, Dondi E, **Chaix A**, de Sepulveda P, Kubiseski TJ, Varin-Blank N, Velazquez L. Lnk adaptor protein down-regulates specific Kit-induced signaling pathways in primary mast cells. *Blood*, 2008, 112(10).
25. Gironella M, Seux M, Xie MJ, Cano C, Tomasini R, Gommeaux J, Garcia S, Nowak J, Yeung ML, Jeang KT, **Chaix A**, Fazli L, Motoo Y, Wang Q, Rocchi P, Russo A, Gleave M, Dagorn JC, Iovanna JL, Carrier A, Pébusque MJ, Dusetti NJ. Tumor protein 53-induced nuclear protein 1 expression is repressed by miR-155, and its restoration inhibits pancreatic tumor development. *PNAS*, 2007, 104(41).