Sahar Tavakoli, Ph.D.

Associate Teaching Professor and Director of Cell and Gene Therapy Program
at Northeastern University
205B Mugar Life Sciences Building, 330 Huntington Ave, Boston, MA 02115
Office # :+16173738602; sa.tavakoli@northeastern.edu

PROFESSIONAL EXPERIENCE

2023- Associate Teaching Professor, Northeastern University

2023- Director of Cell and Gene Therapy Programs, Northeastern University
Mugar Life Sciences Building, 330 Huntington Ave, Boston, MA 02115

RESEARCH EXPERIENCE

2015 -23 Joint Postdoctoral Research Fellow in Stem Cell and Regenerative Biology,
Harvard's Department of Stem Cell and Regenerative Biology (HSCRB), Cambridge, MA, and Boston Children's Hospital, Boston, MA.
Supervisors: Dr. Amy Wagers and Dr. Leonard Zon
Project: Integrative therapeutics: a novel approach to discover new treatments for muscle disease

2014-15 Postdoctoral Research Fellow in Stem Cell and Developmental Biology,
Centre for BioImaging Sciences (CBIS) and Department of Biological Sciences (DBS), National University of Singapore (NUS), Singapore
Supervisor: Dr. Paul Matsudaira
Project: Zebrafish intestinal myofibroblast characterization.

EDUCATION

2014 **Ph. D. in Stem Cell and Developmental Biology**, Department of Biological Science, National University of Singapore (NUS).
Advisor: Dr. Paul Matsudaira
Thesis: The spatiotemporal study of zebrafish intestinal epithelium renewal

2008 **M.S. in Genetics and Animal Breeding**, Department of Agricultural Engineering, Isfahan University of Technology (IUT).

2005 **B.S. in Animal Science**, Department of Agricultural Engineering, Isfahan University of Technology (IUT).

Patent

Tavakoli, Sahar, Amy Wagers and Leonard Zon, Small molecules that enhance the muscle stem cell engraftment. U.S. Serial No.: 62/618,055; PCT/US19/13879.

PUBLICATIONS

Published Research Paper

1. **Tavakoli, Sahar,** Vivian Garcia, Eric Gähwiler, Isaac Adatto, Apoorva Rangan, Kathleen A Messemer, Sara Ashrafi Kakhki, Song Yang, Victoria S Chan, Margot E Manning, Haleh Fotowat, Yi Zhou**,** Leonard I Zon and Amy J Wagers. Zebrafish biomolecular screen uncovers inducers of skeletal muscle engraftment across species. Cell Rep. 2023 Apr 4;42(4):112365.
2. **Tavakoli, S.**, Zhu, S., and Matsudaira, P. (2022). Cell clusters containing intestinal stem cells, line the zebrafish intestine intervillus pocket. Iscience 25, 104280.
3. Tabebordbar, M., Lagerborg, K.A., Stanton, A., King, E.M., Ye, S., Tellez, L., Krunnfusz, A., **Tavakoli, S**., Widrick, J.J., and Messemer, K.A. (2021). Directed evolution of a family of AAV capsid variants enabling potent muscle-directed gene delivery across species. Cell 184, 4919-4938. e4922.
4. Bhattacharya, D., Zhong, J., **Tavakoli, S.**, Kabla, A., and Matsudaira, P. (2021). Strain maps characterize the symmetry of convergence and extension patterns during zebrafish gastrulation. Scientific reports 11, 1-12.
5. Weeks, O., Bossé, G.D., Oderberg, I.M., Akle, S., Houvras, Y., Wrighton, P.J., LaBella, K., Iversen, I., **Tavakoli, S.**, and Adatto, I. (2020). Fetal alcohol spectrum disorder predisposes to metabolic abnormalities in adulthood. The Journal of clinical investigation 130, 2252-2269.

Book Chapter

Tavakoli, S., Rothschild, H., and Zon, L.I. (2017). Zebrafish as a Model for Human Diseases. eLS, 1-8.https://doi.org/10.1002/9780470015902.a0005580.pub2

Media Press

"How Zebrafish Illuminate Human Health". (**2017**). **Sahar Tavakoli** and Isaac Adatto. January 12, 2017. Live Video Shooting by Harvard University Media. Sherman Fairchild Building, Harvard, Cambridge, MA.
https://www.facebook.com/Harvard/videos/vb.105930651606/10154012184766607/?type=2&theater

PRESENTATIONS

Invited Lectures

2023 "Detailing a Small Molecule Screen to Regulate Cell Therapies". (5th Annual Gene Therapy Analytical Development Summit. (November 27-30, 2023, Boston, MA).

2019 "Zebrafish chemical compound screen uncovers inducers of skeletal muscle engraftment across species". (June 25, 2019, Harvard Medical School, Boston, MA).

2018 "A cross-species chemical compound screen uncovers chemical inducers of skeletal muscle engraftment". (December 18, 2018, Department of Biology, Isfahan University, Isfahan, Iran).

2017 "Integrative therapeutics: a novel approach to discover new treatments for muscle disease". Harvard Department of Stem Cell and Regenerative Biology Intradepartmental Seminar Series (November 03, 2017, Harvard University, Cambridge, MA).

2017 "Integrative therapeutics: a novel approach to discover new treatments for muscle disease". Joslin Inaugural Islet and Regenerative Biology (December 14, 2017, Joslin Diabetes Center, Boston, MA).

Conference Talks

2020 "Zebrafish chemical compound screen uncovers inducers of skeletal muscle engraftment across species". International Society for Stem Cell Research (ISSCR). (June 24-27, 2020, Boston, MA).

2019 "Zebrafish chemical compound screen uncovers inducers of skeletal muscle engraftment across species". Stem Cell Biology (September 17-21, 2019, Cold Spring Harbor Laboratory (CSHL), NY).

2019 "A cross-species chemical compound screen uncovers chemical inducers of skeletal muscle engraftment". Zebrafish disease model 12 (ZDM12). (July 15-18, 2019, Harvard Medical Center, Boston, MA).

2017 "Muscle cell transplantation to treat muscular genetic disorders". July 21, 2017, Harvard University, Cambridge, MA.

2017 "Genetic disorders". Science Festival (April 19, 2017, Harvard University, Cambridge, MA).

2014 "Intestinal Stem Cells Repopulate the Zebrafish Intestinal Epithelium Every 2 Days". 15th ANZ Zebrafish Meeting (February 1-4, 2014, Coogee Beach, Sydney, Australia).

2014 "The zebrafish intestinal stem cells regenerate the epithelial layer along a base-to-tip axis". 7th Asia-Pacific Organization for Cell Biology (APOCB) Congress (February 24-27, 2014, Biopolis, Singapore).

2013 "Climbing the Intestinal Ridge". Department of Biological Sciences (DBS) Research Lab Talks (November 21, 2013, University Town, National University of Singapore (NUS), Singapore).

Selected Posters and Abstracts*

2023 **Sahar Tavakoli**, Sara Ashrafi, Victoria Chan, Eric Gahwiler, Margot Manning, Kathleen Messemer, Apoorva Rangan, Amy Wagers, and Leonard Zon. Zebrafish chemical compound screen uncovers inducers of skeletal muscle engraftment across species (March 18, 2023, BAZaR (Boston Area Zebrafish Researchers Meeting), Boston College, Boston, MA).

2020 **Sahar Tavakoli**, Sara Ashrafi, Victoria Chan, Eric Gahwiler, Margot Manning, Kathleen Messemer, Apoorva Rangan, Amy Wagers, and Leonard Zon. Zebrafish chemical compound screen uncovers inducers of skeletal muscle engraftment across species (May 20, 2020, 15th Annual HSCI Retreat, Translating Science to the Clinic, Harvard Medical School, Boston, MA).

2018 **Sahar Tavakoli**, Sara Ashrafi, Victoria Chan, Eric Gahwiler, Margot Manning, Kathleen Messemer, Apoorva Rangan, Amy Wagers, and Leonard Zon. Niflumic acid and Lysophosphatidic acid increase the engraftment of transplanted muscle progenitor cells into the vertebrate animal models. FASEB Skeletal Muscle Satellite Cells and Regeneration (July 8-13, 2018, Steamboat Springs, CO).

2016 **Sahar Tavakoli**, Leonard Zon and Amy Wagers. Integrative therapeutics: a novel approach to discover new treatments for muscle disease. Skeletal Muscle Development and Homeostasis in Health and Disease. (June 6-11, 2016 Asilomar Conference Grounds, Pacific Grove, CA).

2015 **Sahar Tavakoli** and Paul Matsudaira. prmt1 cells echo the intestinal stem cells' characteristics in zebrafish. GRC Stem Cells & Cancer. (February 14-20, 2015 Ventura Beach Marriott, CA).

2014 **Sahar Tavakoli** and Paul Matsudaira. Zebrafish intestinal stem cells are located at the base of the inter-villus pocket between villi ridges and populate both sides of the flanking ridges. The 2014 ascb/ifcb meeting (December 6-10, 2014, Philadelphia, PA).

2014 **Sahar Tavakoli** and Paul Matsudaira. Intestinal Stem Cells Repopulate the Zebrafish Intestinal Epithelium Every 2 Days. 15th ANZ Zebrafish Meeting (February 1-4, 2014, Coogee Beach, Sydney, Australia).

2013 **Sahar Tavakoli**, Zhengyuan Wang, Grace Ng Hwee Boon, Zhiyuan Gong, Paul Matsudaira. Intestine of zebrafish: Architecture, Function, Foundation and Renovation. Singapore-MIT Alliance (SMA) Symposium. (January 14-16, 2013, National University of Singapore (NUS), Singapore).

*A full list of poster presentations is available upon request.

2012 **Sahar Tavakoli** and Paul Matsudaira. The Zebrafish Intestinal Epithelium Is Repopulated along a Base-to-Tip Axis. 10th International Conference on Zebrafish Development and Genetics (June 20–24, 2012, Madison, WI).

TEACHING & ADVISING EXPERIENCE

Course Development:

- Cell and Gene Therapy (4SH)
  This course is designed to familiarize participants with some of the most cutting-edge topics available in molecular biology today: Introduction to cell and gene therapy, in vivo and ex vivo gene therapy (key concepts including CRISPR/Cas9, delivery, and limitations), CAR T-cells, RNA interference (RNAi), and more. This course provides a platform to learn the theory behind these new technologies and their power in previously known incurable diseases treatment.

- Regulatory Landscape of Cell and Gene Therapy (2 SH)
  Introduces the current state of regulatory approvals for cell and gene therapies. Focuses on the scientific and technical considerations for approval for such drugs in the United States, in Europe, and in other key global markets. Explores the scientific challenges in the context of regulatory approval of these products, as well as how the process differs from traditional biotherapeutic product approvals. Examines how these regulatory pathways are evolving with a specific focus on quality, efficacy, and safety throughout the product life cycle (manufacturing through commercialization).

Teaching:

- Cell Therapy (2 SH)
- Cell and Gene Therapy (4 SH)

Mentoring Experience

One Ph.D student, Harvard University (2020-present) , one M.Sc. student, ETH Zurich (2018), and three undergraduate students at Harvard University (2017-19), University of Rochester (2016), and Chulalongkorn University, Thailand (2015).

Teaching Assistant

Responsibilities included leading discussions, supervising labs, grading all assignments, and advising students.

- General Biology, 6 semesters, Department of Biological Sciences (DBS), NUS. ~120 students (2010-14).
- Developmental Biology, 2 semesters, Department of Biological Sciences (DBS). NUS. ~50 students (2012-14)
- Biochemistry, 1 semester, Department of Biological Sciences (DBS), NUS. ~ 360 students (2013).

Instructor and Guest lecturer

Workshop on “Genetics, Genomics and Imaging in Medaka & Zebrafish”, National University of Singapore (NUS), Temasek Life Sciences Laboratory Singapore (TLL) and the National Institute of Basic Biology, Okazaki, Japan (NIBB). (July 22-31, 2012, National University of Singapore (NUS), Singapore).
https://www.nibb.ac.jp/en/interchange/tll/collaboration/2012/07/2nd-joint.html

Pedagogical Training

1. **Lab Dynamics: Difficult conversations and interactions in the academic workplace.** Science Management Associates. January 13-14, 2020, Harvard University, Boston, MA.
2. **Successful Grant Writing Strategies**, The Harvard Catalyst Education Program, May-August 2018, Harvard University, Boston, MA.
3. **Applied Biostatistics**, The Harvard Catalyst Education Program, September 2018-May 2019. Harvard Medical School, Boston, MA.
4. **Undergraduate mentoring**, Harvard University, Faculty of art and sciences, Science education, January- April 2019, Harvard University, Cambridge, MA.
5. **Funding Your Research: NIH,** The Harvard Catalyst Education Program, February 19-April 15, 2020, Harvard University, Boston, MA.

AWARDS

2009-2013	**Full Scholarship**; Singapore International Graduate Award (SINGA).
2012 July	**Travel award;** GEM4 2012: Developmental Biology, MIT, Cambridge, MA.
2011 Nov 14-21	**Travel award;** The 6th NIBB International Practical Course and the 1st NIBB - TLL Joint International Practical Course." Okazaki, Japan. http://www.nibb.ac.jp/course/
2008-2009	**Government Grant**; "Genetic test for the identification of carriers of complex vertebral malformations in cattle" (Isfahan University of Technology).
2005-2006	**Scholarship**; Iranian Gov. Ranked 2nd in a class of 25.