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Memorial Sloan Kettering
Cancer Center

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DEVELOPMENTAL BIOLOGY PROGRAM

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[Developmental Biology Program](#)

Research



Anna-Katerina Hadjantonakis, PhD
Chair, Developmental Biology Program, SKI; Alfred P. Sloan Chair

Cancer is a condition arising when cells undergo an identity crisis. Understanding of how cells control their identity, and how they assemble into tissues with normal organization and function during embryonic development provides the essential blueprint for gaining insights into the fundamental biological processes that become deregulated in disease states such as cancer.

Our research focus and goals - how cells form tissues . We are interested in how cells become specialized, and how they collaborate at the population level to collectively build organs. Our focus is on the endoderm, the progenitor tissue that gives rise to respiratory and digestive tracts, and associated organs such as the lung, liver and pancreas. Our overarching goal is to understand how endodermal organs form - in time and space - from populations of uncommitted progenitor cells in the embryo.

Repair, replace, and regenerate. An aspiration is to develop knowledge that will facilitate future efforts to repair, replace or regenerate diseased or damaged tissues. Our research seeks to gain fundamental insights into the processes by which tissues and organs arise in their native context - the embryo - and consequently, how these mechanisms can be contextually recapitulated or adapted. Furthermore, understanding the processes taking place during normal development paves the way for understanding the mechanisms of cancers in children and young adults (Developmental Oncology).

A multi-disciplinary approach bridging scales. We use mammalian embryo, embryo-derived stem cell, and organoid models, as experimentally tractable platforms for our studies. We have a history of applying cutting-edge high-resolution quantitative methods – from light microscopic imaging to single-cell genomics approaches - to investigate mechanisms driving: (1) the acquisition of cell states and fates leading to the emergence of an endoderm identity, (2) the plasticity and differentiation of endoderm cells and their neighbors, and, (3) the organization and growth of tissue as organs start to take shape from communities of cells.



Three-dimensional visualization of nerves (green) and blood vessels (magenta) in a mouse embryo.

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VIDEO | 02:18

Go inside the lab of Anna-Katerina Hadjantonakis from SKI's Developmental Biology Program.

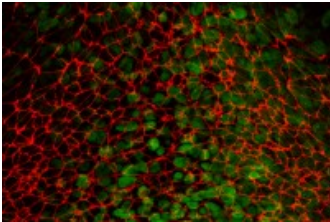
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Featured News



[At Work: Developmental Biologist Anna-Katerina Hadjantonakis](#)

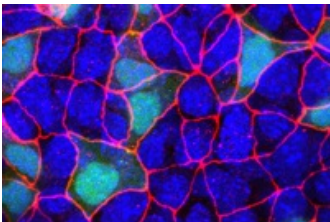
Developmental biologist Kat Hadjantonakis works to gain insights into the critical events that direct the formation and shape of mammalian embryos.



[The Right Moves: How Studying Cell Movement During Embryonic Development May Offer New Insights Into Cancer Metastasis](#)

New insights into the way cells break away from a tissue during embryonic development may also shed new light on the same process in the context of cancer metastasis.

IN THE LAB



[Scientists Rewrite the Textbook of Organ Development, One Cell at a Time](#)

A large study that analyzed nearly 120,000 cells in a developing mouse embryo is full of surprises.

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Publications Highlights

Abuhashem A, Lee AS, Joyner AL, Hadjantonakis AK. [Rapid and efficient degradation of endogenous proteins in vivo](#)

[identifies stage-specific roles of RNA Pol II pausing in mammalian development.](#) Dev Cell. 2022 Apr 25;57(8):1068-1080.e6. doi: 10.1016/j.devcel.2022.03.013. Epub 2022 Apr 13. PMID: 35421370; PMCID: PMC9047393.

Morgani SM, Su J, Nichols J, Massagué J, Hadjantonakis AK [The transcription factor Rreb1 regulates epithelial architecture, invasiveness and vasculogenesis in early mouse embryos](#) Elife. 2021 Apr 30;10:e64811. doi: 10.7554/eLife.64811. Epub ahead of print. PMID: 33929320

Simon CS, Rahman S, Raina D, Schröter C, Hadjantonakis AK. [Live Visualization of ERK Activity in the Mouse Blastocyst Reveals Lineage-Specific Signaling Dynamics.](#) Dev Cell. 2020 Oct 16; S1534-5807(20)30762-0. doi: 10.1016/j.devcel.2020.09.030

Saiz N, Mora-Bitria L, Rahman S, George H, Herder J, Garcia-Ojalvo J, Hadjantonakis AK. [Growth factor-mediated coupling between lineage size and cell fate choice underlies robustness of mammalian development.](#) Elife. 2020 Jul 28;9:e56079. doi: 10.7554/eLife.56079.

Nowotschin S, Setty M, Kuo YY, Liu V, Garg V, Sharma R, Simon CS, Saiz N, Gardner R, Boutet SC, Church DM, Hoodless PA, Hadjantonakis AK, Pe'er D. [The emergent landscape of the mouse gut endoderm at single-cell resolution.](#) Nature. 2019 May;569(7756):361-367. doi: 10.1038/s41586-019-1127-1.

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People

Anna-Katerina Hadjantonakis, PhD

Chair, Developmental Biology Program, SKI: Alfred P. Sloan Chair

The Hadjantonakis laboratory studies pluripotency and cell fate specification, tissue patterning and morphogenesis, in mammalian embryos and stem cell-derived embryo models.

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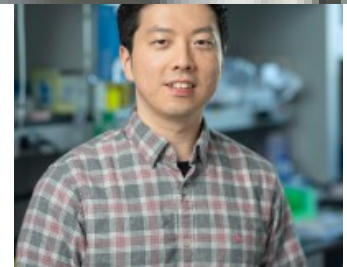
Members



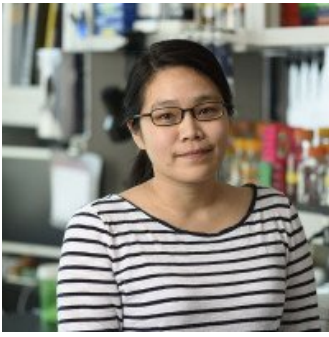
Mohamed Gatie
Postdoctoral Research
Fellow



David Godovich
Research Technician



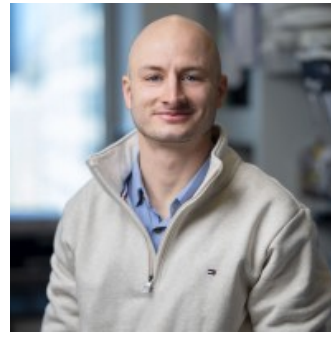
Woonyung Hur
Postdoctoral Research
Fellow - joint with Dr. Eric
Siggia at Rockefeller



Ying-Yi Kuo
Research Assistant



Sonja Nowotschin
Senior Research Scientist



Lucas Schroefl
Research Assistant

Lab Alumni
+

Lab Affiliations
+

Lab News & Events

UPCOMING EVENT

[**FGF Signaling, Hif1a and Hypoxia During Vertebrate Axis Extension: Independent Contributors or Collaborators?**](#)

Thursday, November 7, 2024 - 2:00 PM to 3:00 PM

Memorial Sloan Kettering Cancer Center
Rockefeller Research Laboratories
430 East 67th Street
Room RRL-116
New York, NY 10065

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MSK requires doctors and faculty members to report (“disclose”) the relationships and financial interests they have with external entities. As a commitment to transparency with our community, we make that information available to the public.

Anna-Katerina Hadjantonakis discloses the following relationships and financial interests:

No disclosures meeting criteria for time period

The information published here is a complement to other publicly reported data and is for a specific annual disclosure period. There may be differences between information on this and other public sites as a result of different reporting periods and/or the various ways relationships and financial interests are categorized by organizations that publish such data.

This page and data include information for a specific MSK annual disclosure period (January 1, 2023 through disclosure submission in spring 2024). This data reflects interests that may or may not still exist. This data is updated annually.

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