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The Christine Mayr Lab

[Education & Training](#)

[Cancer Biology & Genetics Program](#)
[News & Events](#)

Research
[Open Positions](#)



Christine Mayr, MD, PhD

Control of protein activity through RNA-induced protein conformation changes

My laboratory studies mRNA functions that go beyond the transmission of the genetic code. We discovered that 3' untranslated regions regulate protein complex assembly and control protein functions. Mechanistically, we found that 3'UTRs control translation in mRNA-rich, constitutively expressed cytoplasmic condensate networks, including TIS granules and the FXR1 network. These compartments enable widespread binding of mRNAs to transcription factors and enzymes through a new and widespread RNA-binding domain located in their intrinsically disordered regions (IDRs). We found that RNA binding changes the conformational states of the IDRs to control protein complex assembly and protein activity.

Going forward, we will study the molecular mechanism and functional scope of RNA-induced activation of proteins and will develop tools to monitor RNA-induced protein conformation changes and to control protein activity through exogenous RNA. To do so, we take a multidisciplinary approach and use molecular biology and biophysics, biochemistry and chemical biology, high-resolution imaging, and computational methods to study how RNA regulates protein activity. We envision that protein activity regulation through RNA-induced conformational changes is similar in scale and scope to post-translational modifications.

If you are interested in this topic, please [contact me](#) as we have open positions for postdocs and graduate students from diverse backgrounds.

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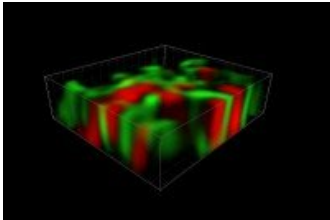
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It's not every day that scientists discover a new part of the cell. Two biologists from the Sloan Kettering Institute just did.

IN THE LAB



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New findings from researchers at the Sloan Kettering Institute suggest that cancer causes may be lurking in the molecule that bridges DNA and protein.



[At Work: Cancer Biologist Christine Mayr](#)

Christine Mayr, who once dreamed of exploring space as an astronaut, today probes new realms in the field of cancer genetics.

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Publications Highlights

[Ma W, Zhen G, Xie W, Mayr C. *In vivo* reconstitution finds multivalent RNA-RNA interactions as drivers of mesh-like condensates. *eLife*, 10:e64252 \(2021\).](#)

[Lee SH, Mayr C. Gain of additional BIRC3 protein functions through 3'UTR-mediated protein complex formation. *Mol Cell* 74, 701-712 \(2019\).](#)

[Ma W, Mayr C. A membraneless organelle associated with the endoplasmic reticulum enables 3'UTR-mediated protein-protein interactions. *Cell* 175, 1492-1506 \(2018\).](#)

[Berkovits BD, Mayr C. Alternative 3'UTRs act as scaffolds to regulate membrane protein localization. *Nature* 522, 363-367 \(2015\). Epub 2015 Apr 20.](#)

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People



Christine Mayr, MD, PhD

Molecular and cell biologist Christine Mayr studies how 3'UTRs regulate protein functions and how mRNAs contribute to cytoplasmic organization.

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PhD, Humboldt University Berlin

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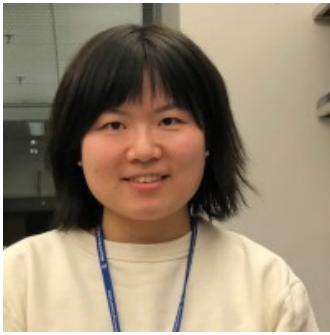
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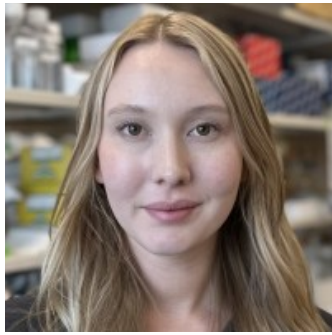
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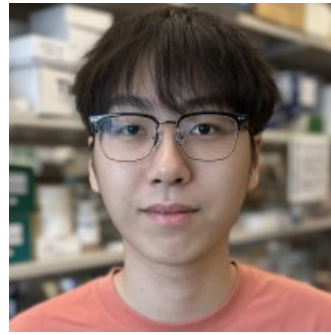
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Hernández
Senior Administrative
Assistant



Yang (Vicky)
Luo
Postdoctoral Fellow



Lila
Peters
Graduate Student



Yaofeng
Zhong
Graduate Student

Lab Alumni
+

Lab Affiliations
+

Achievements

Luise and Allston Boyer Young Investigator Award for Basic Research (2019)
NIH Director's Pioneer Award (2016)
Pershing Square Sohn Prize for Young Investigators in Cancer Research (2015)
Damon Runyon-Rachleff Innovation Award, Damon Runyon Cancer Research Foundation (2012)
Selected as 'Cell Scientist to watch' by Journal of Cell Science (2015)

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Disclosures

Doctors and faculty members often work with pharmaceutical, device, biotechnology, and life sciences companies, and other organizations outside of MSK, to find safe and effective cancer treatments, to improve patient care, and to educate the health care community.

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Christine Mayr discloses the following relationships and financial interests:

No disclosures meeting criteria for time period

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[Programs for college & high school students](#)

▼ News & Events

[Overview](#)

[Seminars & events](#)

▼ Open Positions

[Overview](#)

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