SPEED SCIENCE 2025

Session One

Speed Science Introduction – 9/3
Suckwon Lee

Origin:

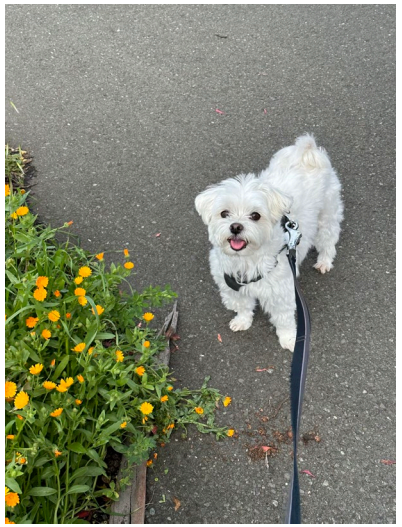
- Born and raised in Seoul, South Korea

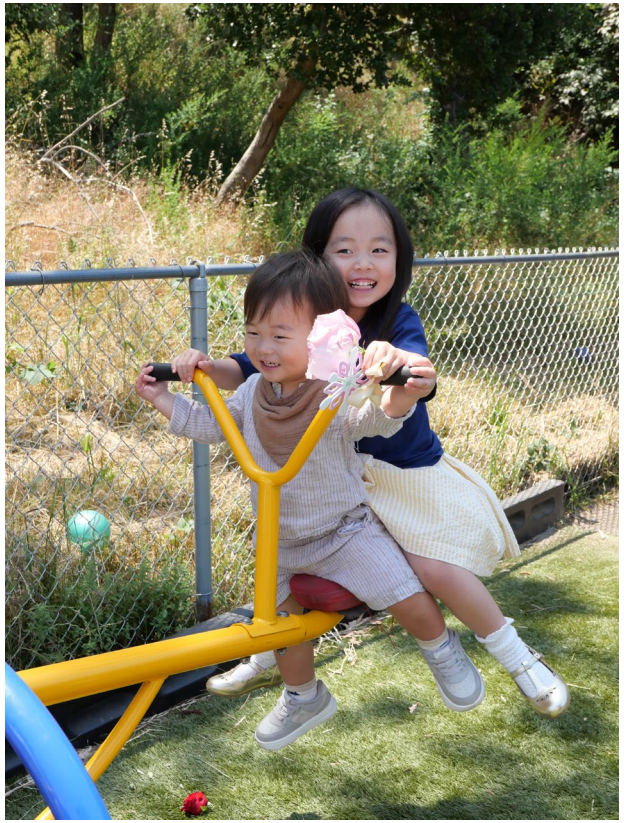
Education:

- B.S. in Biochemistry & Molecular Biology – UC Davis
- M.S. in Chemistry & Chemical Biology – Cornell University

Professional Experience:

- Research Associate at the Buck Institute for Research on Aging





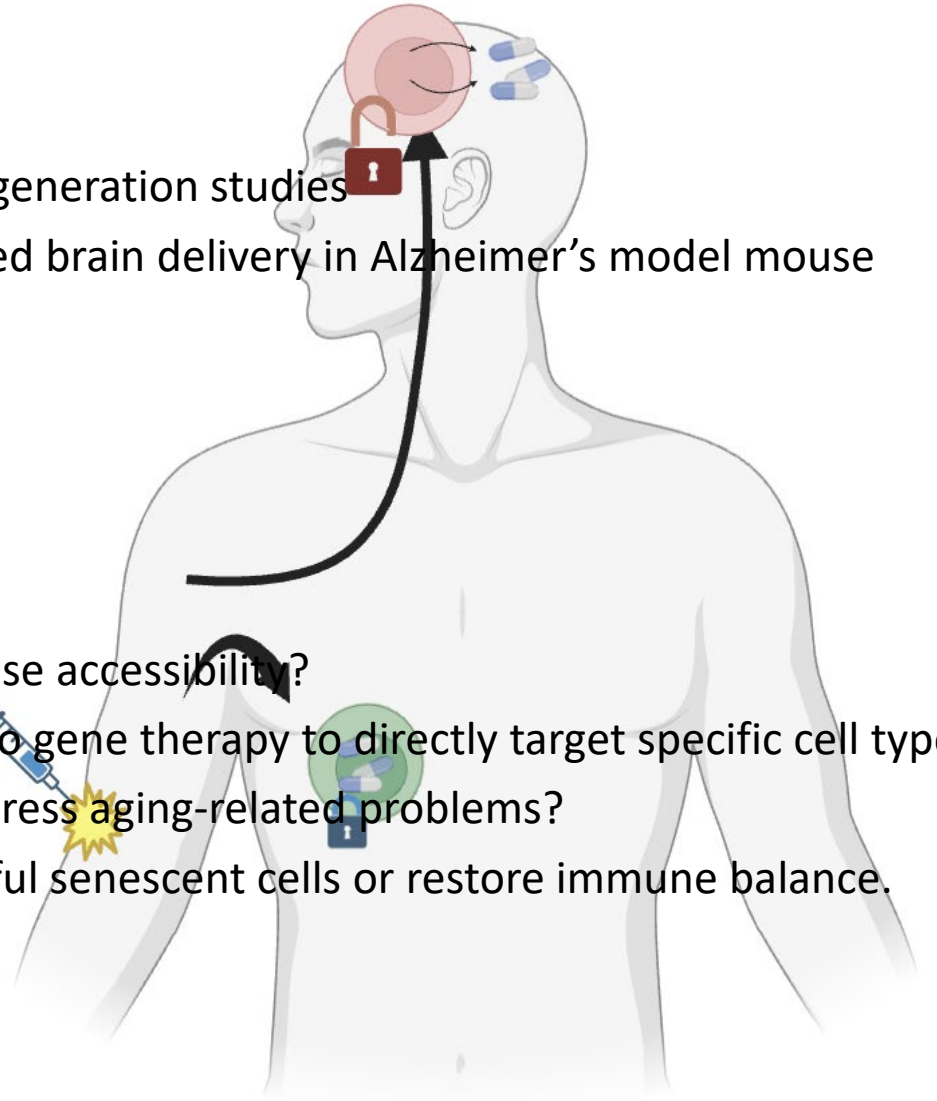
Past Research:

- Developed human primary fetal neuron cultures for neurodegeneration studies
- Engineered Chimeric Antigen Receptor (CAR) Tregs for targeted brain delivery in Alzheimer's model mouse

Current Interests:

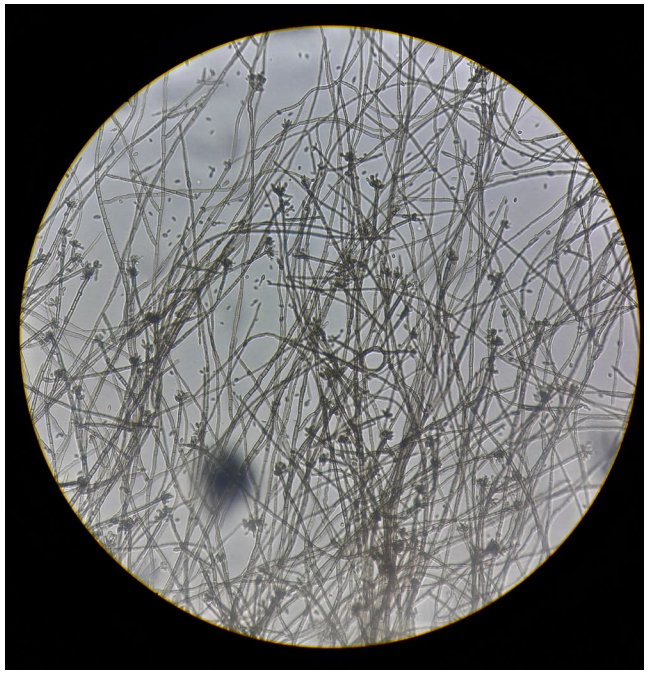
Generally: Relationship Between Aging and Immunology

- How can we scale up CAR T therapy to reduce cost and increase accessibility?
  - By developing universal donor T cells or leveraging in vivo gene therapy to directly target specific cell types.
- How can we harness and enhance the immune system to address aging-related problems?
  - For example, by designing CAR T cells to eliminate harmful senescent cells or restore immune balance.



Luiz Henrique Lola Pereira

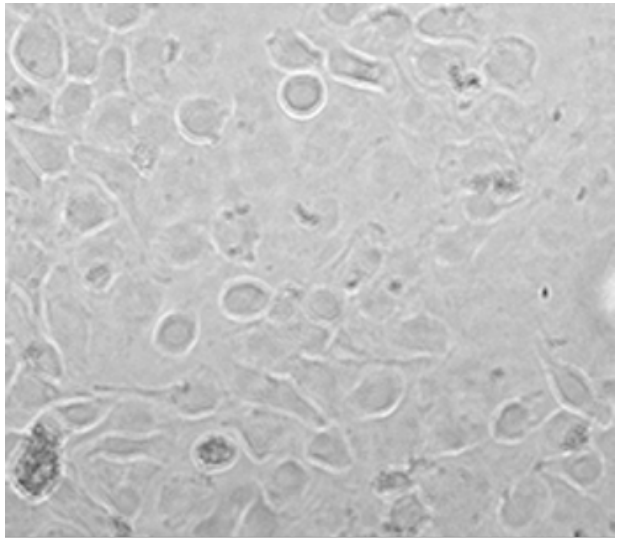
- B.S. in Biomedical Sciences – Universidade Federal do Delta do Parnaíba, Brazil (2023)
- Undergraduate research : Clinical and Environmental Mycology



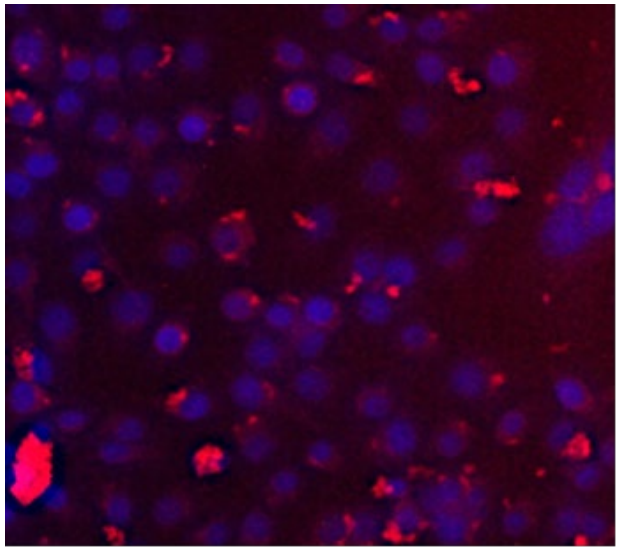
Postgraduate Research at Yale

- Investigated the impact of bacterial infections in antitumor immunity (pancreatic cancer)
- Explored immunotherapy development approaches using pHLIPs and RNA.

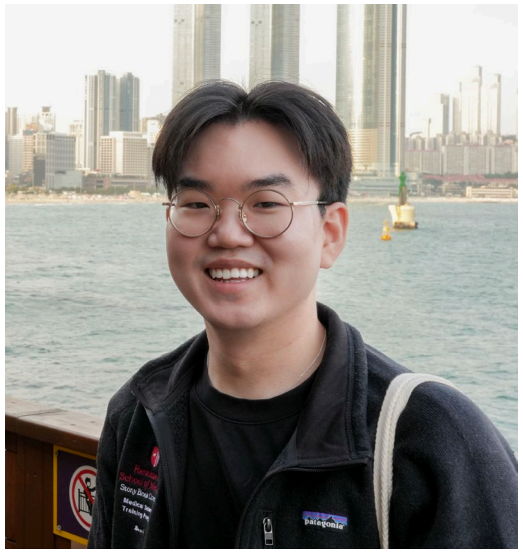
L3.6 Cancer cells



pHLIP + DAPI



Brian Oh

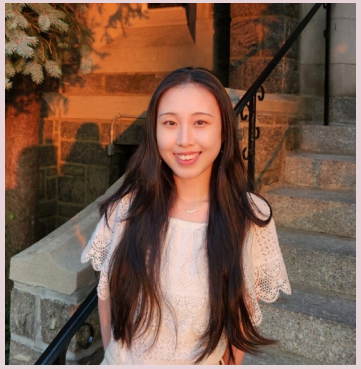


Research interests:
immunology-adjacent fields such as senescence, cancer immunology, rheumatology

- Born and raised on Long Island (from Nassau County)
- Graduated from Columbia University with a BA in Biochemistry in 2020
- Spent 3 years at the Hospital for Special Surgery & Weill Cornell Medicine studying inflammatory bone destruction
- Entered the MSTP at Stony Brook in 2023
- Joined the lab of Corina Amor at CSHL studying the interplay of senescence & the immune system

Hello Everyone!

My name is Wen Yi!

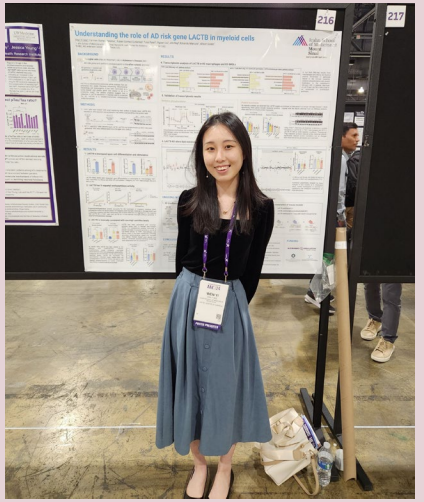


A little about myself…

- I am from/grew up in Malaysia/Japan/Singapore (it’s confusing…)
- I moved to New York in 2016 with my family and have been here ever since!
- I did my undergraduate studies here at Stony Brook and earned my Bachelor’s in Biology in 2021.
- I then worked as a technician at Dr. Alison Goate’s lab at the Icahn School of Medicine at Mount Sinai for 3 years before applying for graduate school.
- And now I’m here

My research background...

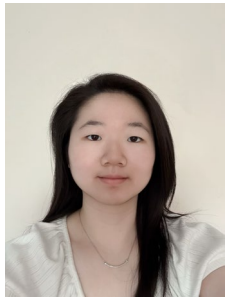
- Alison's lab focuses on understanding how genetic modifiers in Alzheimer's Disease modulate microglial function.
- We work with both in-vitro (immortalized cell lines, iPSC-derived microglia, tricultures, organoids...) and in-vivo (AD mouse models).
- I worked closely with a postdoc, Carmen, on her project investigating the role of AD risk genes *LACTB* and *LACTB2* in myeloid cells.
- I was drawn to the immunological, disease-oriented, and translational aspect of this work, which I hope to continue building on.
- Although my experience has primarily centered around neurodegeneration, I'm eager to explore other disease contexts such as neurodevelopmental, cancer, and cardiovascular models.
- I'm currently doing my first rotation with Dr. Corina Amor at CSHL.



Thank you!

And I look forward to getting to know everyone! 

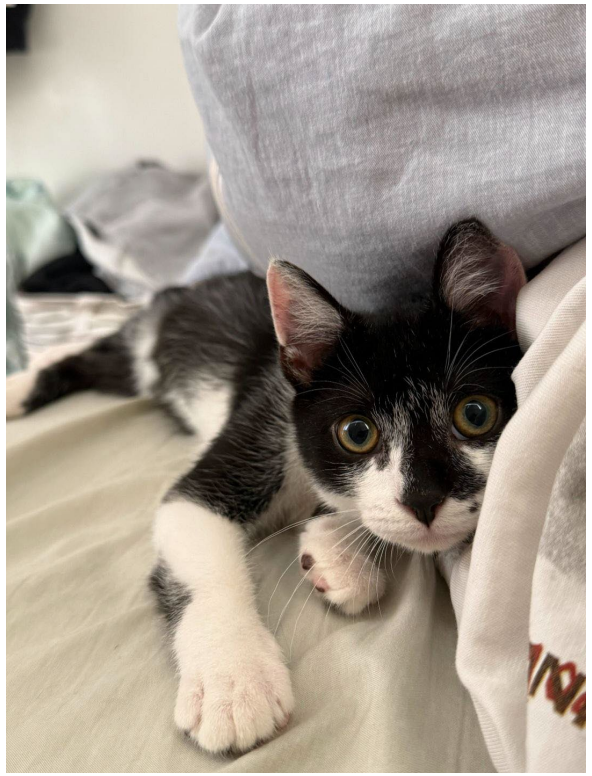
Hi everyone, I'm Wendy!



- **Undergrad**: BIO BS (SBU 2025)
- **Research Experience**: Protein Purification in Chromatin Biology & Transcription (Luk Lab)
- **Interests**: Cancer Epigenetics · Vaccine Development · Host-Pathogen Interactions
- **Current Projects**: Mao Lab
  - UVE1 endonuclease cloning, expression, & purification
  - Genome-wide CRISPR screen for TMZ resistance

- **Hobbies**: reading, baking
- **Favorite Drink**: boba tea
- **Favorite Dessert**: bingfan (or *"Ice Rice"*)

Some PSA For Animal Lovers!



Name: Domino (male)
Age: ~ 3 months old

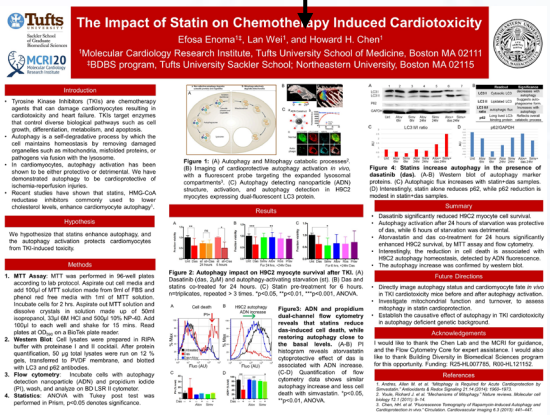
@SBUCATNETWORK

Name: Sunny (female)
Age: ~ 2 months old

Contact SBU Cat Network @ 347-968-0480!

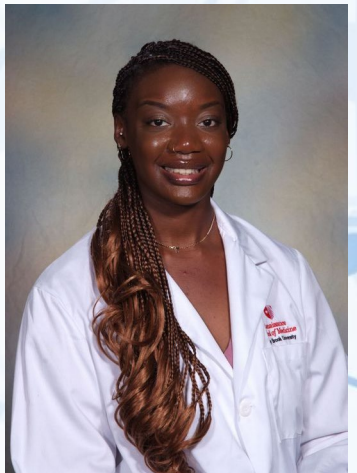
About Efosa

9/3/2024



Hot Girl Walk

WNBA



Alex Cicala, Westcott Lab

Concerning Colorectal Cancer (CRC) Trends:

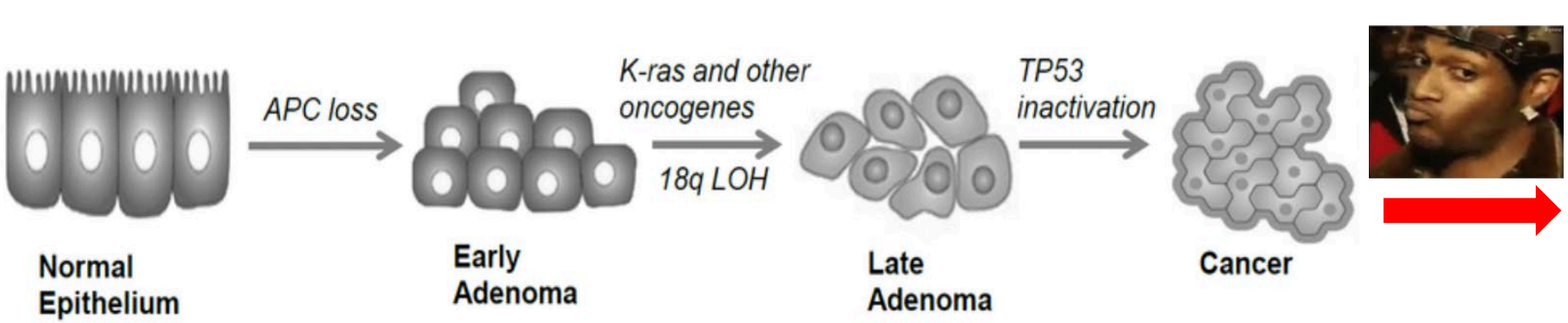
- CRC is the **3rd** most diagnosed and **2nd** deadliest cancer worldwide

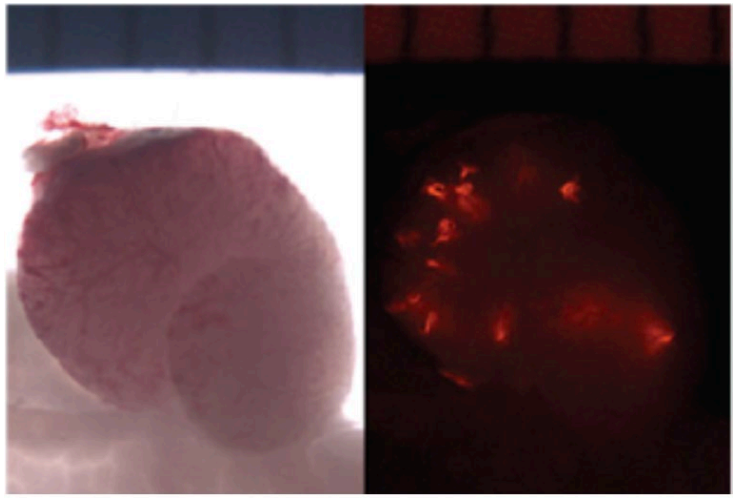
- CRC is the **leading** cause in U.S. men and **2nd leading** cause in U.S. women of <50 cancer deaths

- Early-onset diagnosis and mortality rates have been increasing since the 80's (these young people from the 80's were born in the 1950s)

43

Convoluted Mouse Models of CRC!





Mundade et al. Oncoscience. 2014

- The Westcott Lab has developed mouse models to isolate and dig into these “steps” of CRC development

Secret Sauce of CRC Carcinogenesis

- If oncogenes are necessary but not sufficient for benign to malignant transition, what are the other ingredients (tentatively)?
  - Altered stem cell phenotypes
  - Adaptive immune system
  - Dysbiosis of the gut microbiome

- Can microplastics contribute to this?

- Understanding this deeper can:
  - Identify novel biomarkers & produce better diagnostics
  - Help develop therapeutics
  - Guide public policy & medical recommendations

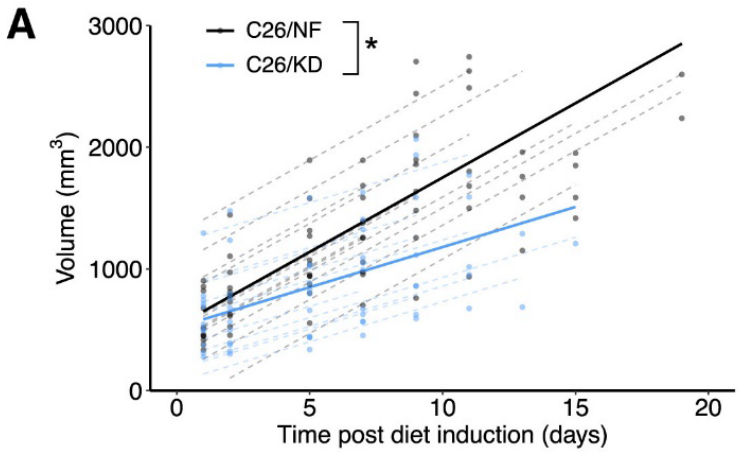
Uncoupling Tumor Ferroptosis from Host Health

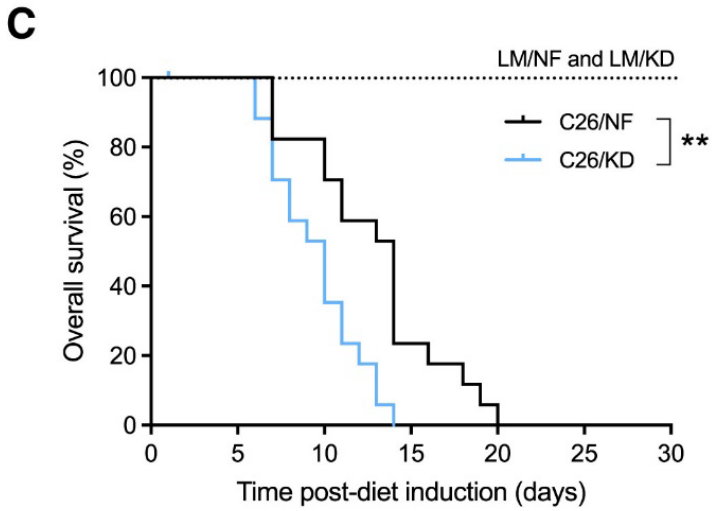
Rohini Guin

Fall 2025

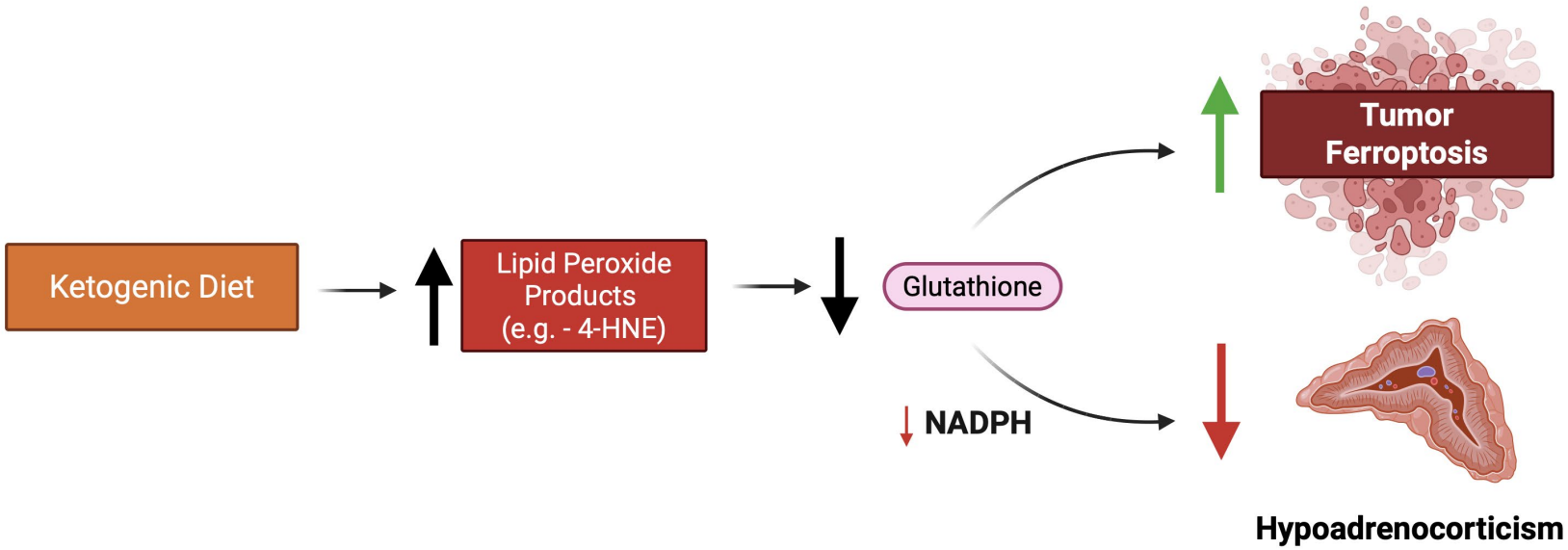
Janowitz Lab

Background, Mechanism, & Goal



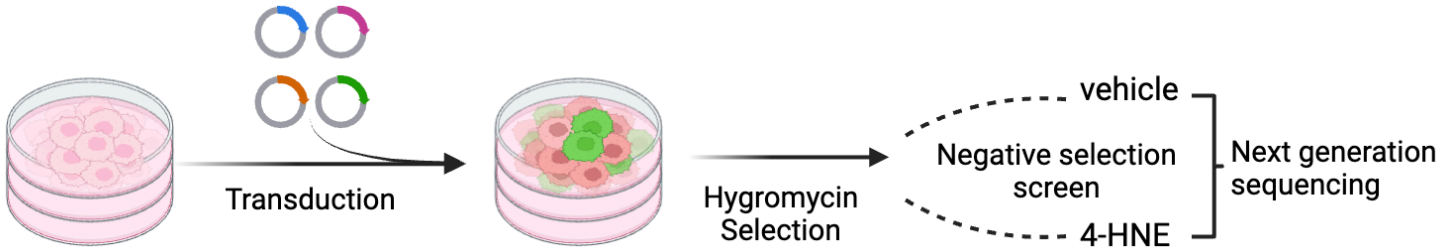


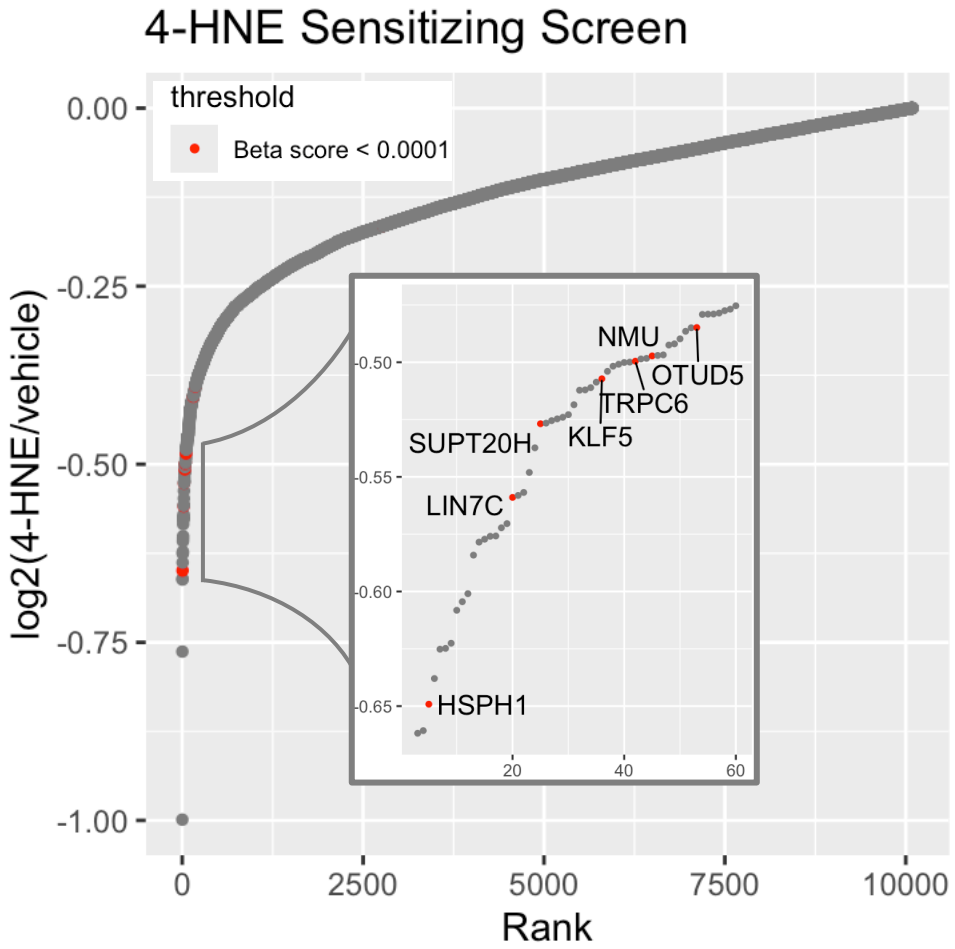
Ketogenic diet can **delay tumor growth,** but its use comes at a **survival cost**



What therapeutic targets can be further exploited to **increase tumor ferroptosis** while **preserving host function?**

CRISPR Screen Strategy

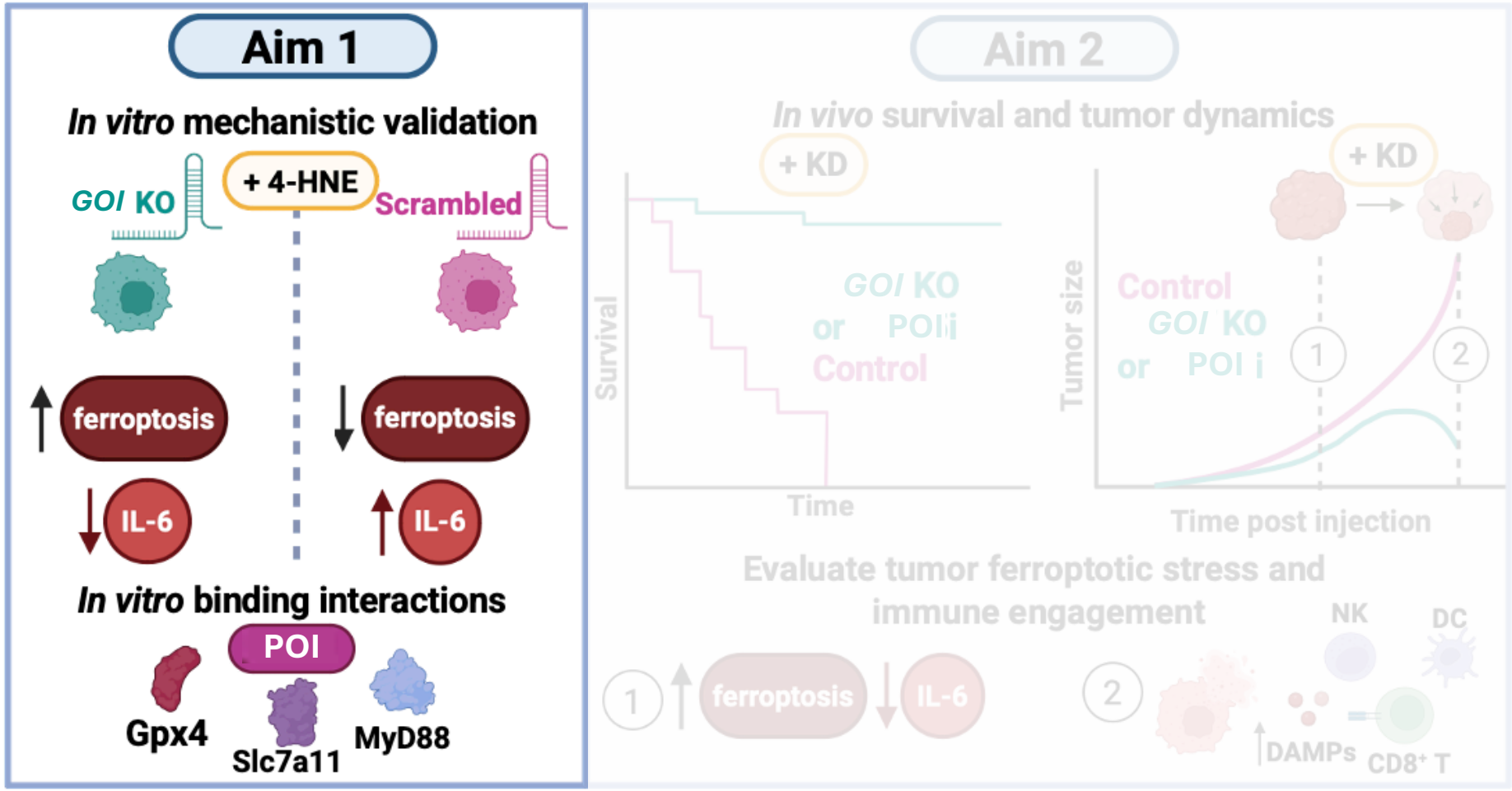




Screen targets followed plus a literature hand search to confirm **pharmacologic tractability** yielded a list of 8 genes/proteins of interest.

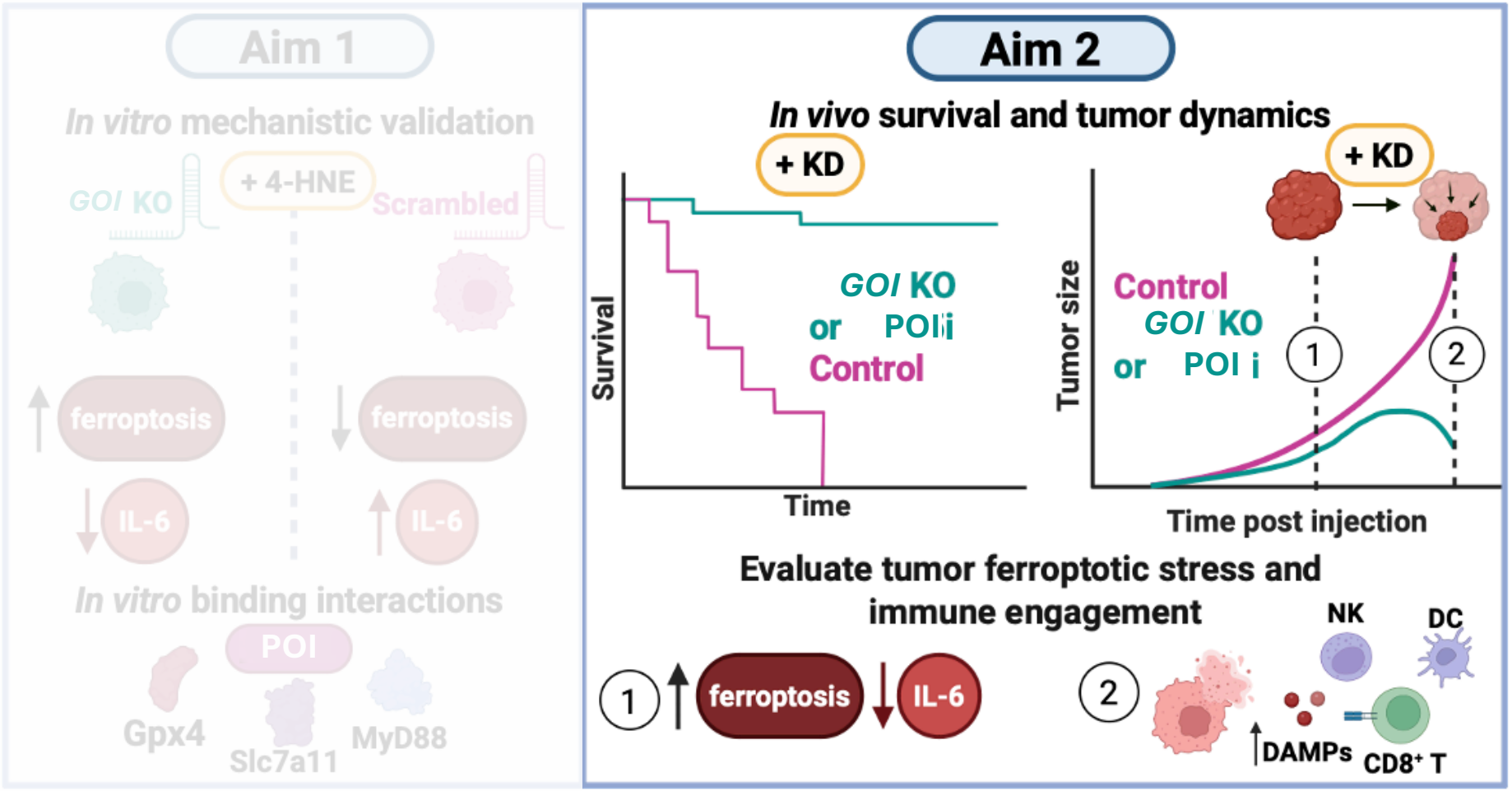
POIs feature **ferroptosis defenders** or **stabilizers**

Project Plan & Central Hypothesis



Hypothesis: *Loss of function of GOIs will potentiate ketogenic diet–induced tumor ferroptosis and attenuate systemic effects of cancer, thereby improving overall host survival.*

Project Plan & Central Hypothesis



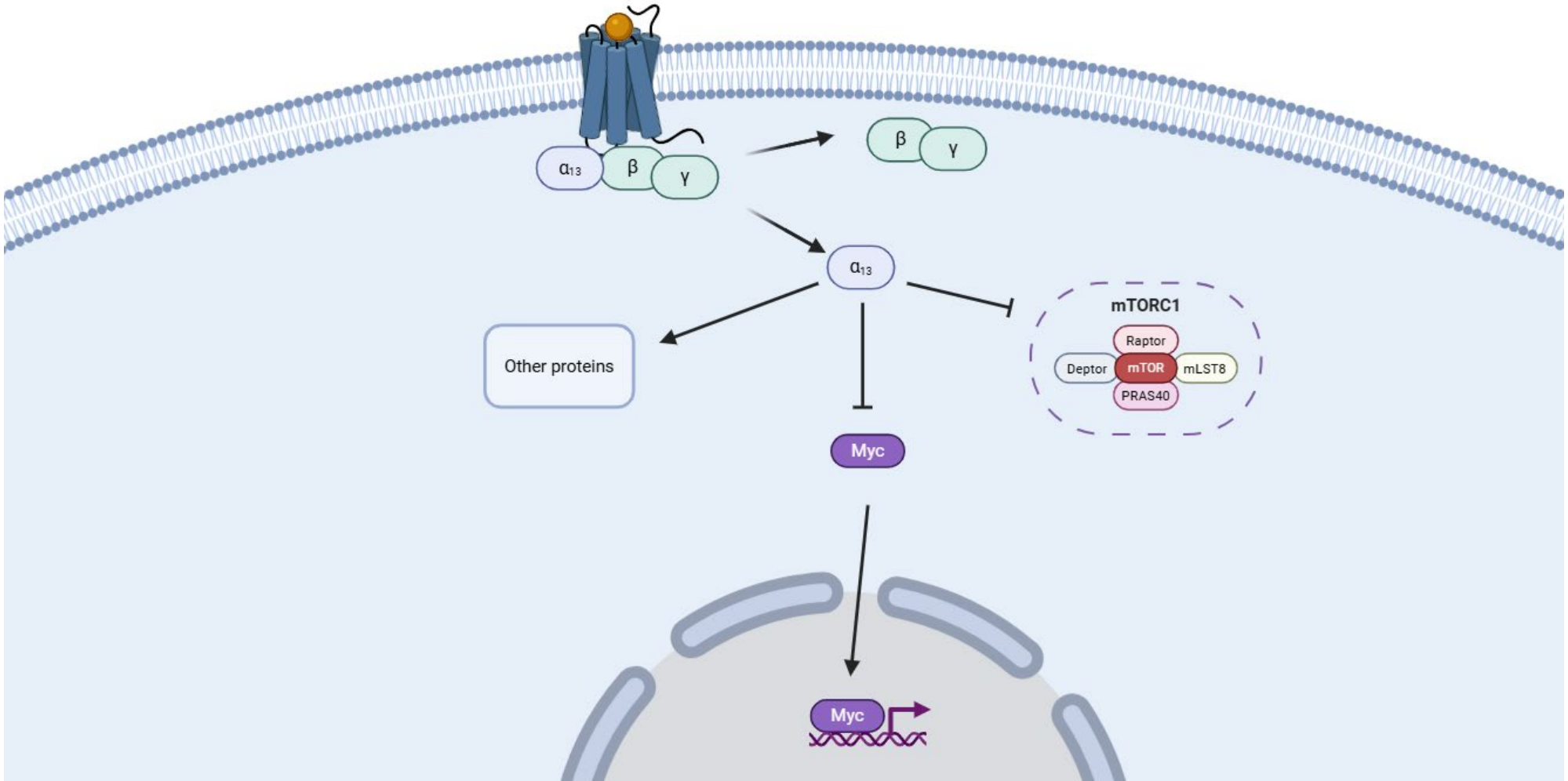
Hypothesis: *Loss of function of GOIs will potentiate ketogenic diet–induced tumor ferroptosis and attenuate systemic effects of cancer, thereby improving overall host survival.*

Jason Harper

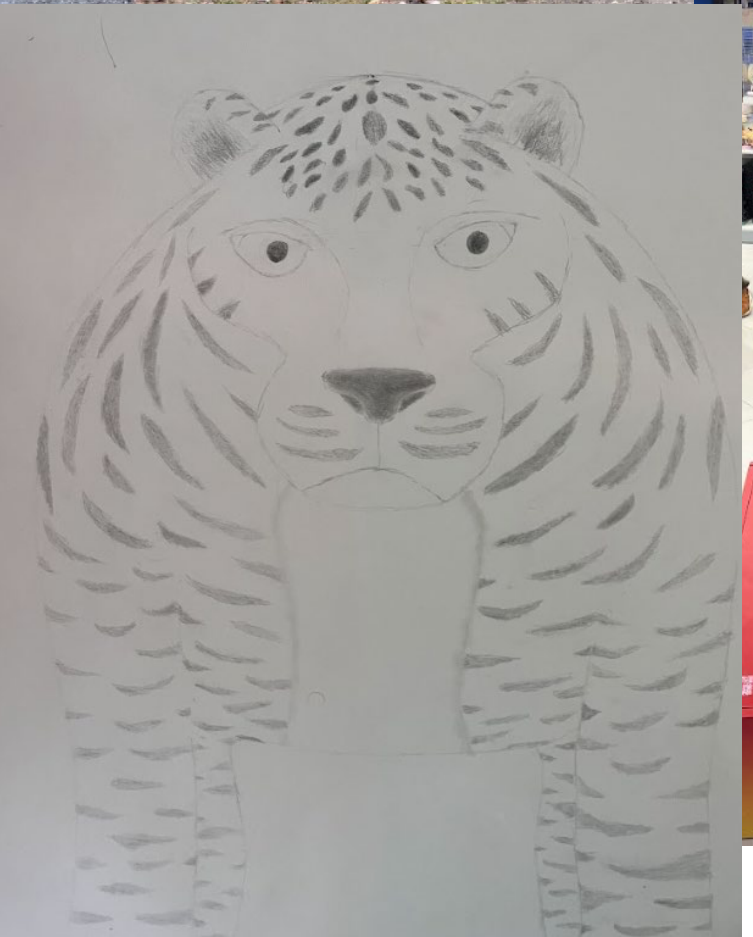
B.S. – Stony Brook University, Class of ‘24

Advisor – Dr. Mario Shields

Research Topic: Gα13 and cancer




NIKE

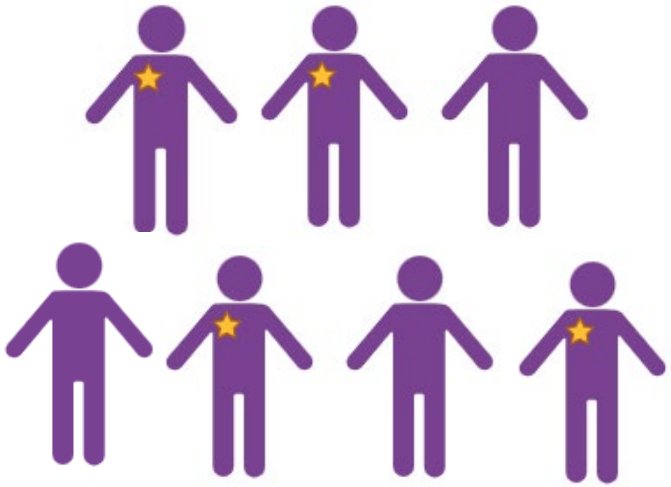


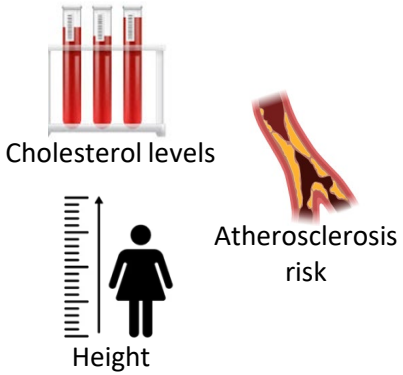
Applying Genealogy-aware methods in Quantitative Genetics

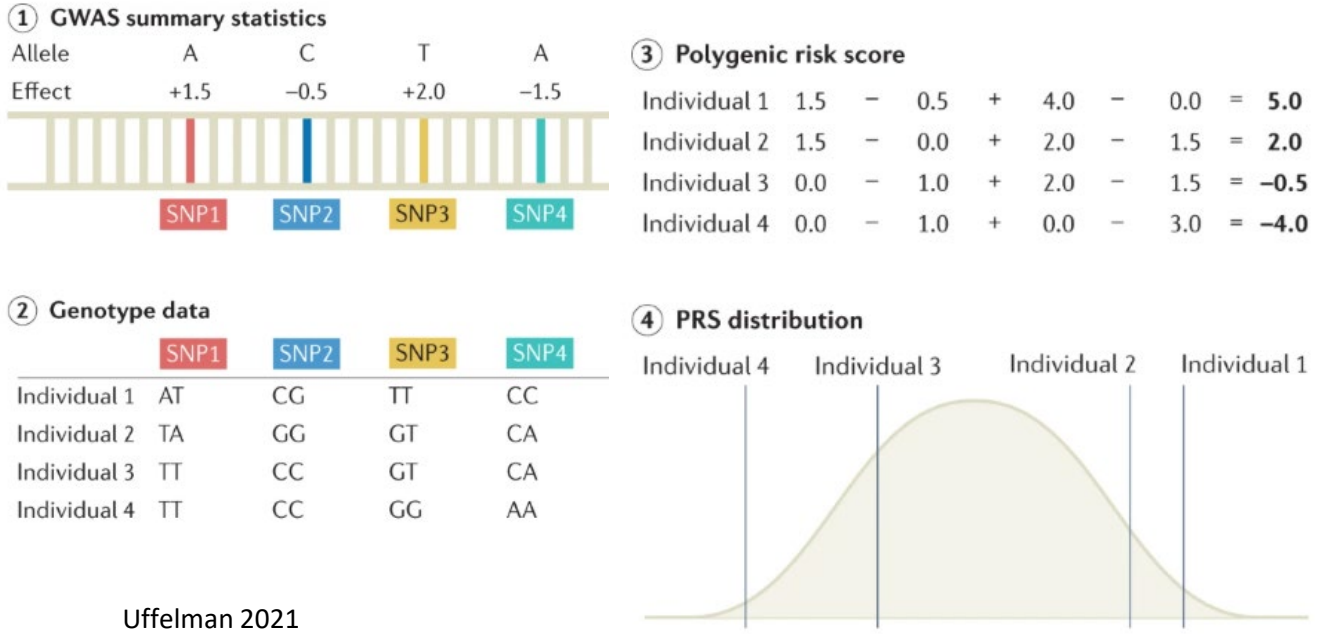
Shareef Khalid

Siepel Lab (CSHL)

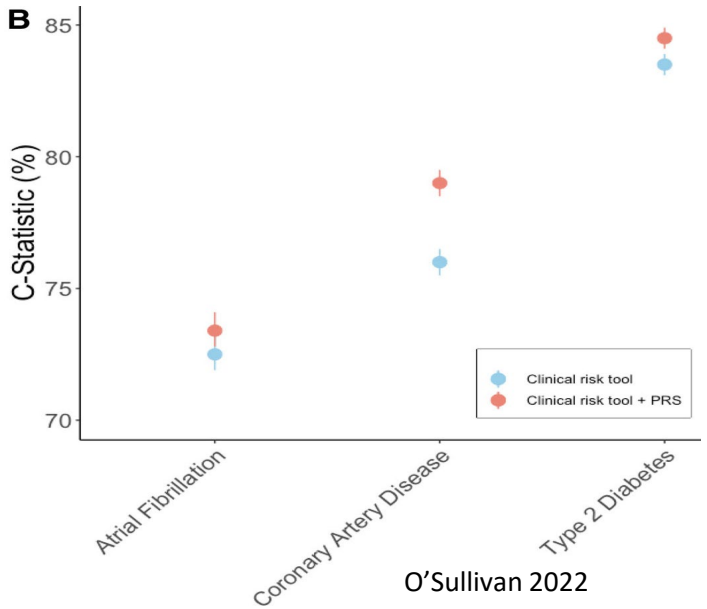
Genetic Variant ~ Phenotype





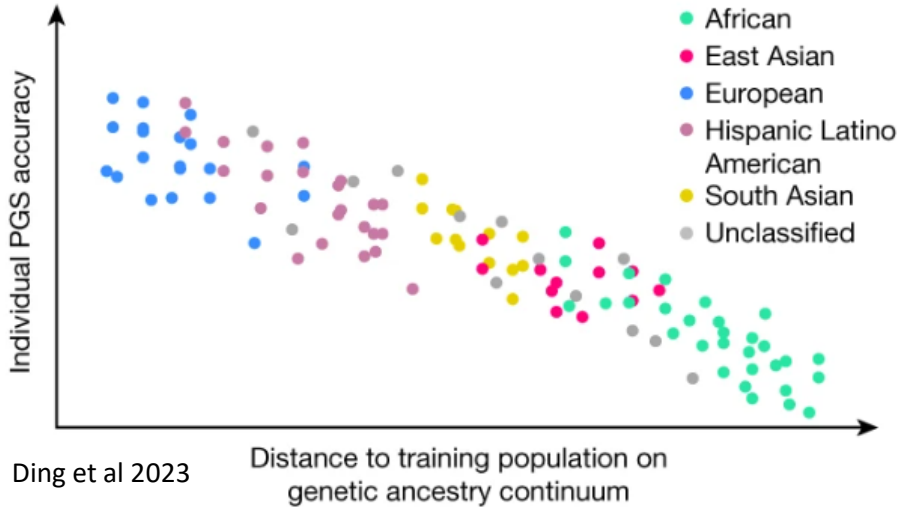


Uffelman 2021

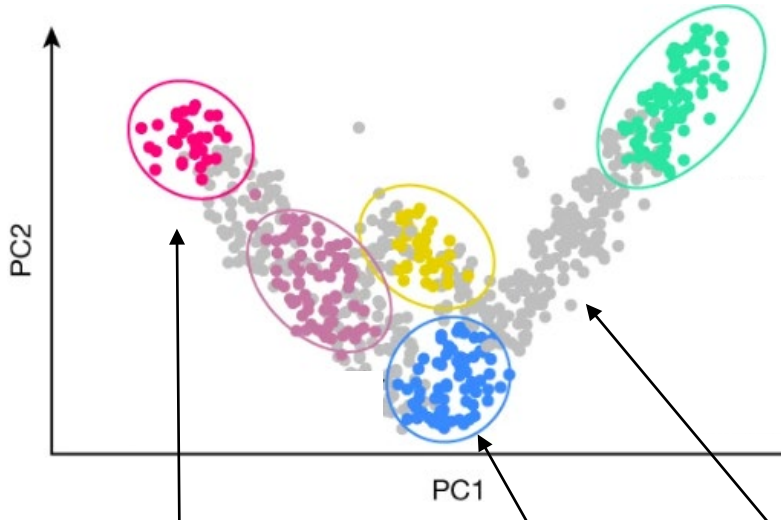


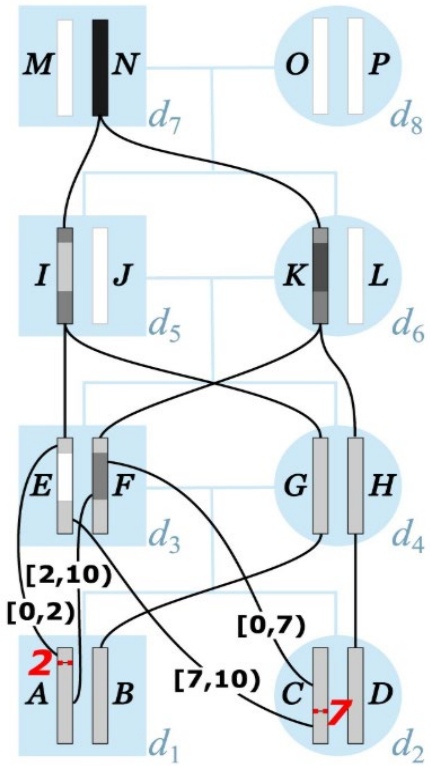
O'Sullivan 2022

<u>Polygenic Risk Scores</u> are currently being used in clinical trials to identify patients with high risk of disease before symptoms show up



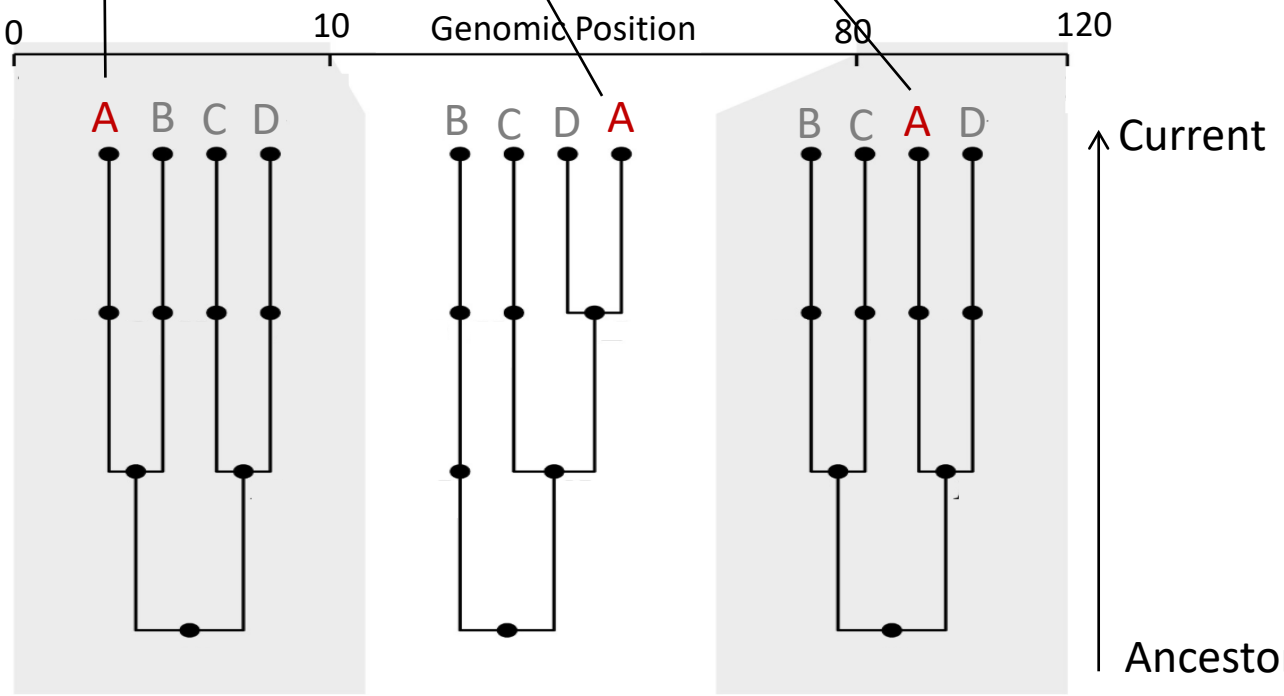
Ding et al 2023

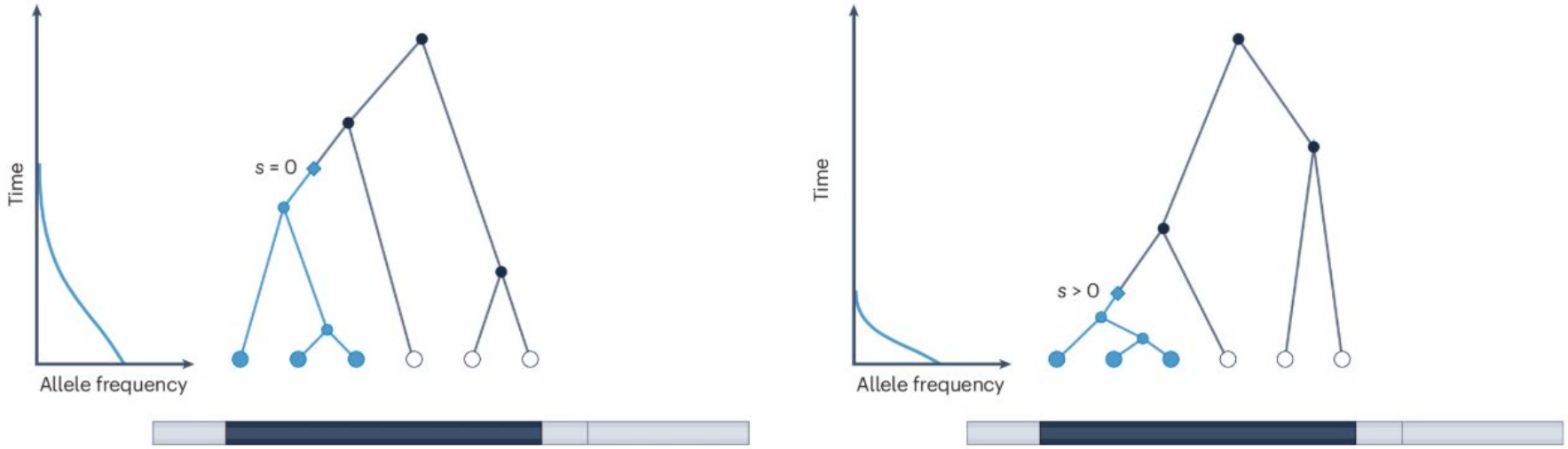




Recombination results in **differing LD patterns** across different populations

Taking into account **locus specific genealogies** can improve transferability of polygenic risk scores





- Inferred genealogies aka **Ancestral Recombination Graphs (ARGs)** encode a lot of population genetic parameters.
- Our lab is utilizing ARGs to improve polygenic risk prediction, detect selection sweeps, introgression, heritability estimates, genetic correlations etc.
- For quantitative genetics the goal is to develop methods which don't require grouping people into arbitrary population labels, which can be harmful.

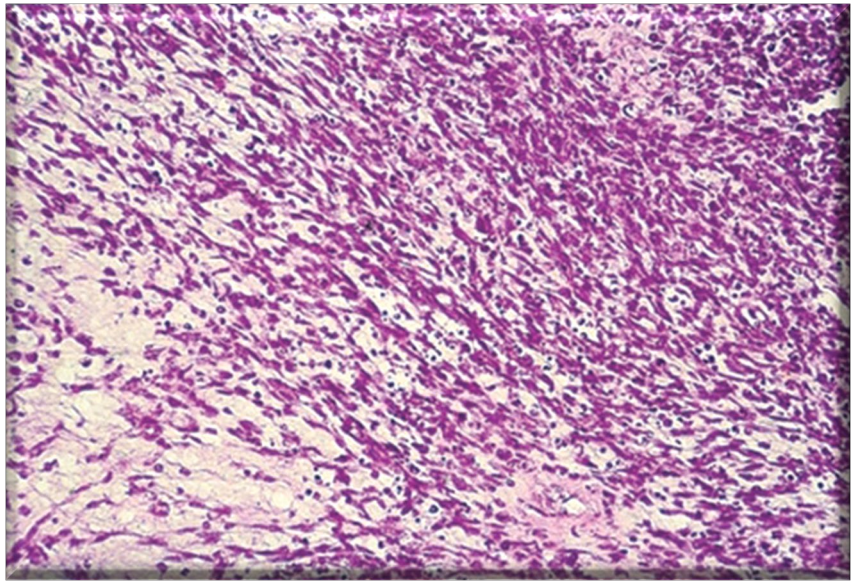
Stony Brook University

Cold Spring Harbor Laboratory

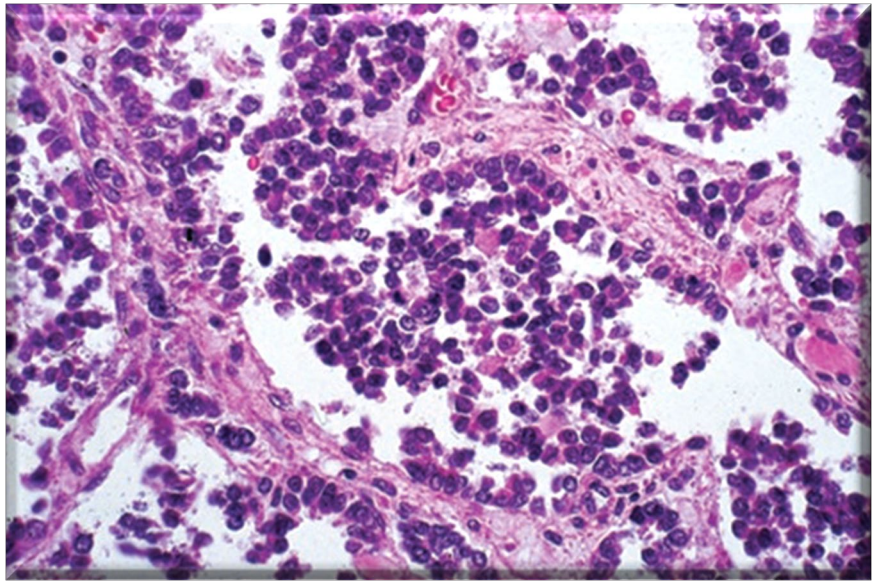
Discover P3F1's cofactors using CRISPR screen

Trace Le
Vakoc Lab

Rhabdomyosarcoma (RMS) is a common soft tissue malignancy in children



Embryonal RMS (ERMS)



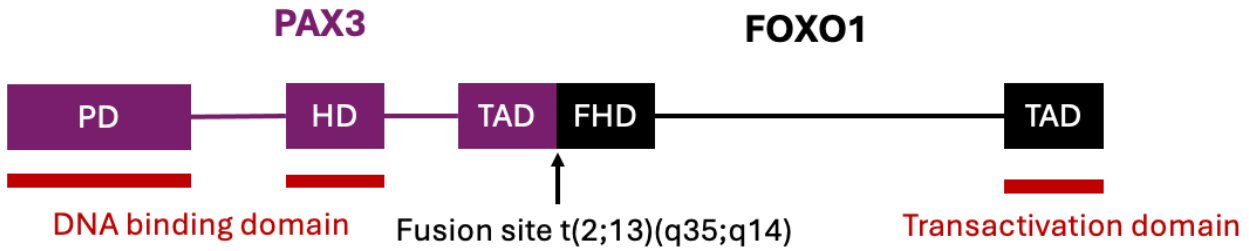
Alveolar RMS (ARMS)

- 60% of RMS cases
- No chromosomal translocations.
- Respond better to the radiation, chemotherapy, and surgery
- 5-year survival rate is 81%
  - 5-year survival upon relapse: 26%

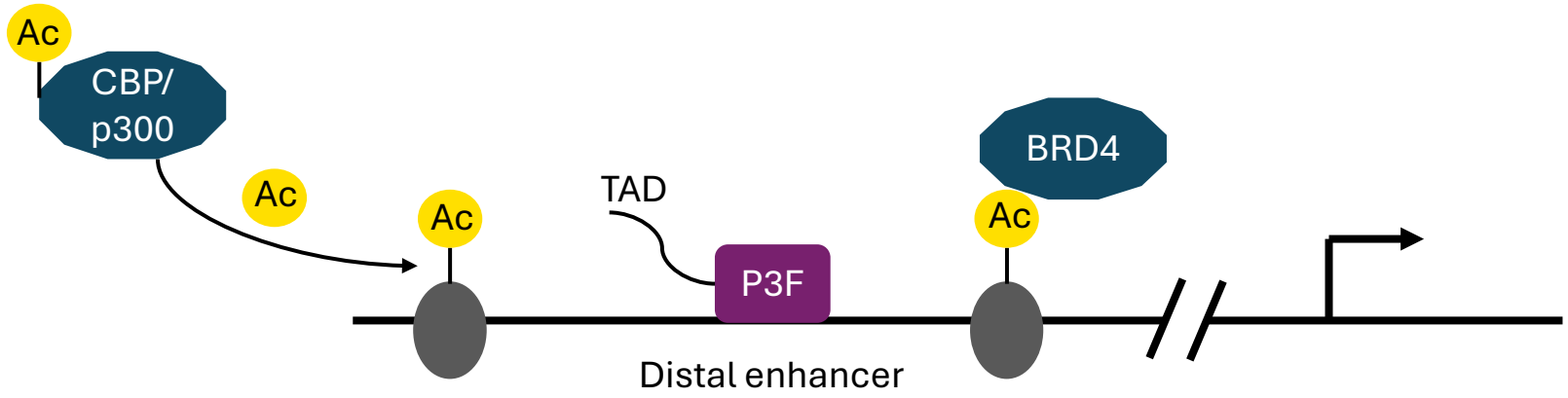
- 20% of RMS cases
- PAX3/7-FOXO1: t(2;13)(q35;q14) or t(1;13)(q36;q14)
- Higher relapse rate
- 5-year survival rate is 65%
  - 5-year survival upon relapse: 5%

Marshall and Grosveld, Skeletal Muscle, 2012
pappo et al., J Clin Onco, 1999

P3F1 cofactors are potential therapeutic targets for ARMS

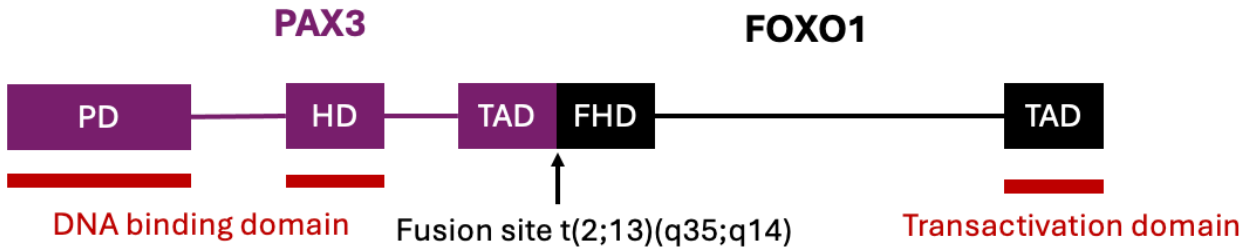


Previously identified P3F cofactors



Asante et al., Nat Commun, 2023
Das et al., EMBO Rep, 2024

P3F1 cofactors are potential therapeutic targets for ARMS



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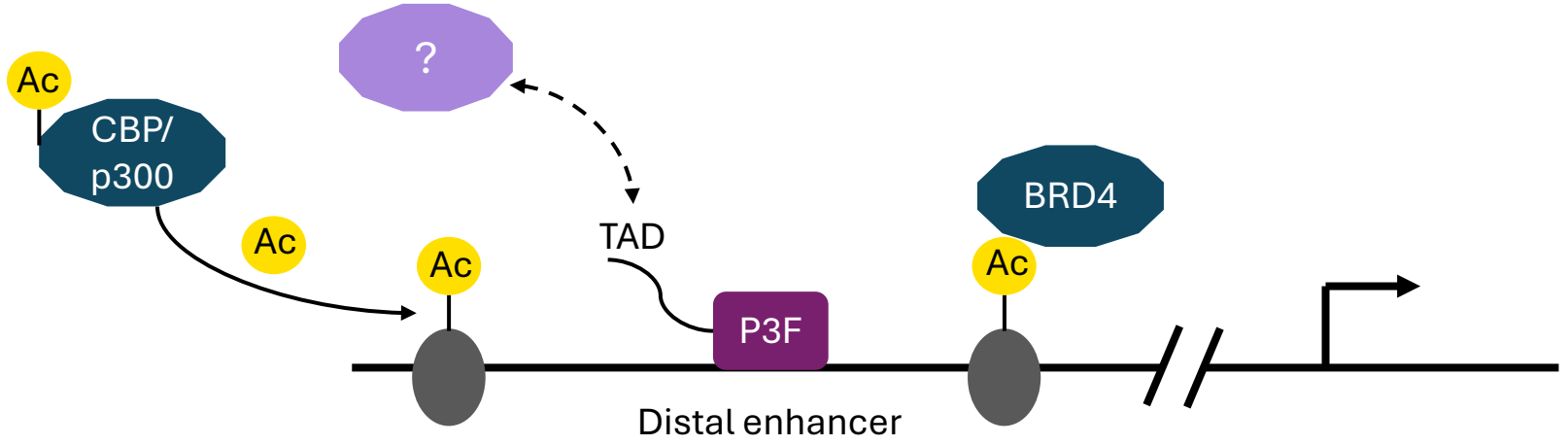


Current identified cofactors:

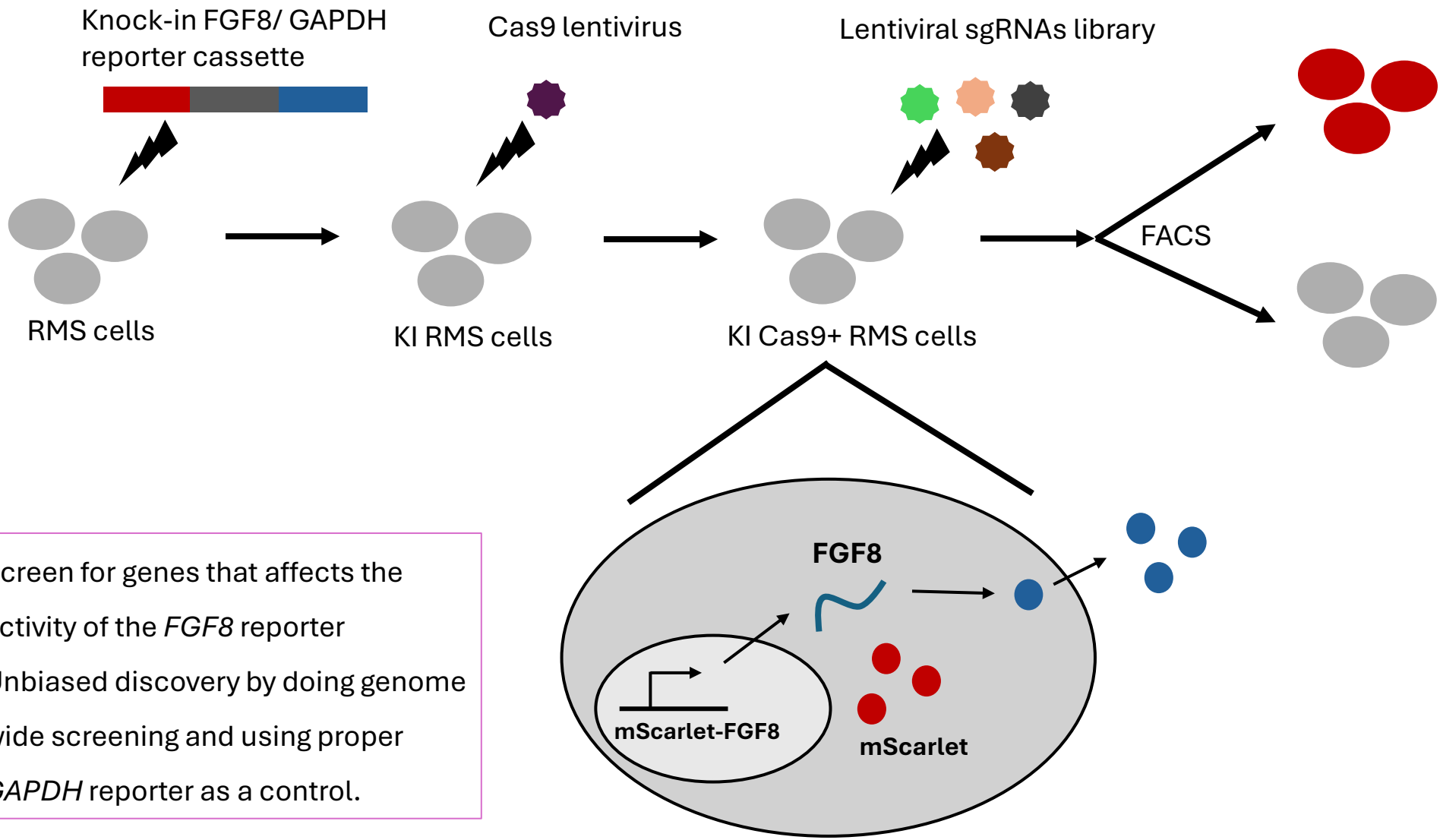
- General cofactors
- Are essential factors in normal cellular processes
- BRD4 inhibitors such as JQ1 has a high cell toxicity

(Sun et al., Front Pharmacol, 2021)

→ Identify ARMS specific cofactor

Asante et al., Nat Commun, 2023
Das et al., EMBO Rep, 2024

Marker-based screening for P3F cofactors



Direct target screen

- ❑ Screen for genes that affects the activity of the *FGF8* reporter
- ❑ Unbiased discovery by doing genome wide screening and using proper *GAPDH* reporter as a control.

Name: Fatima Ejaz

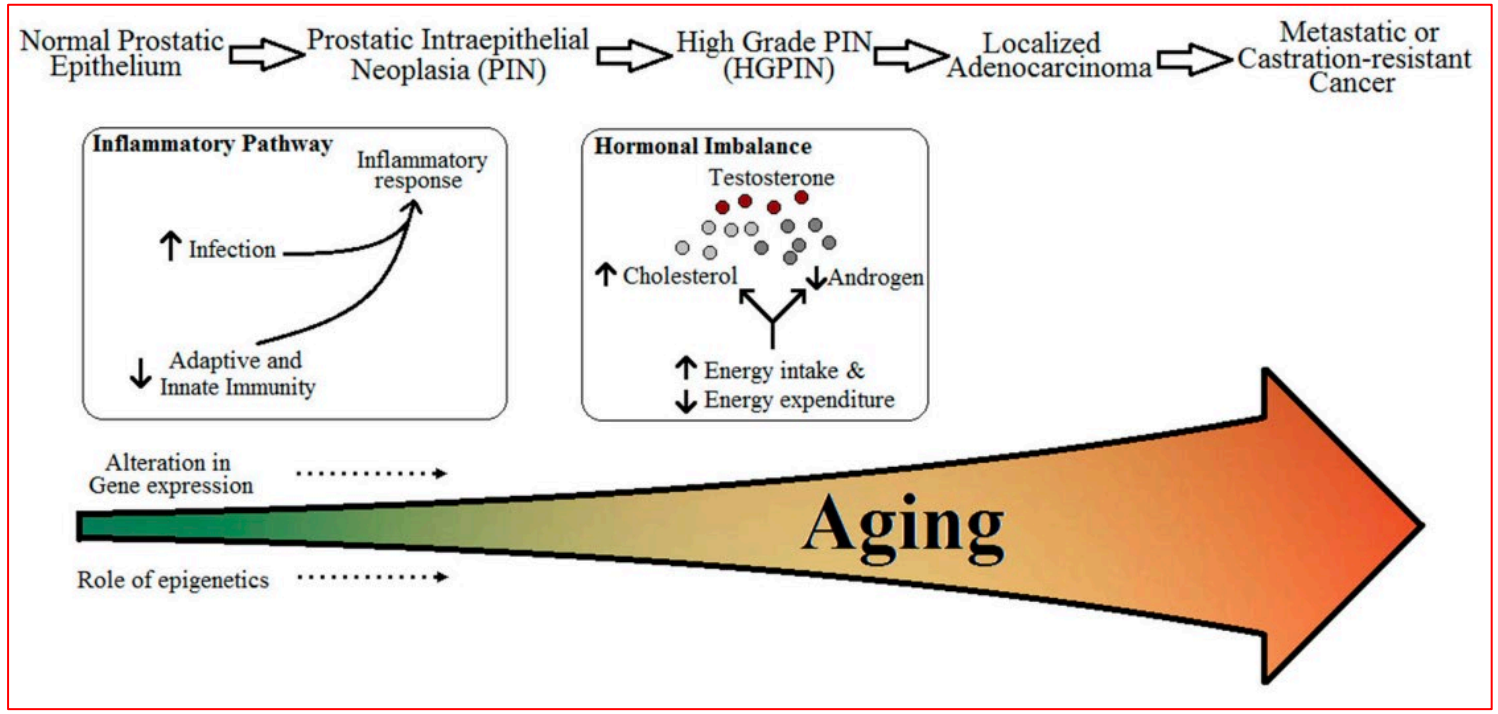
From Brooklyn, NY

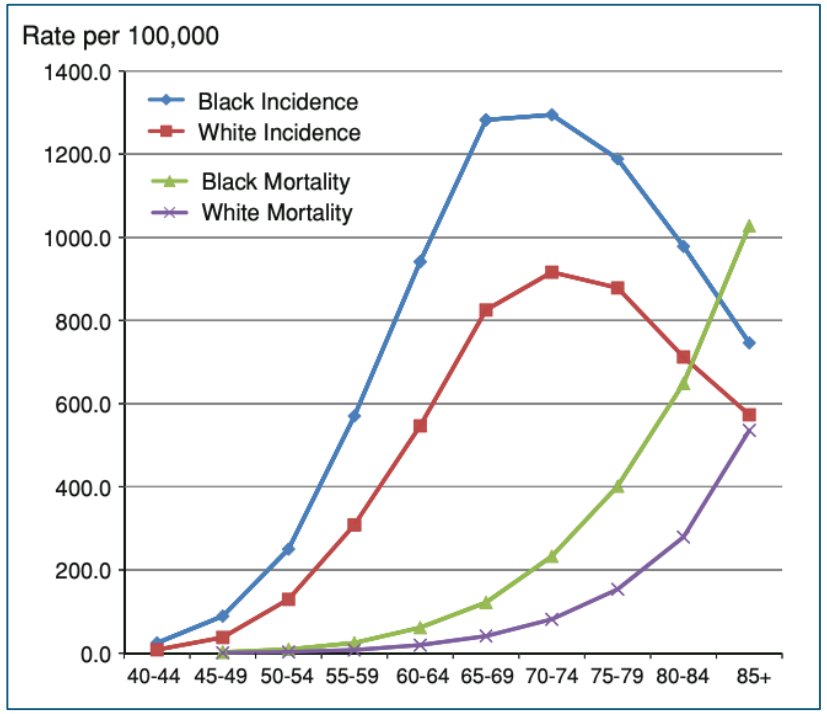
Hobbies: walking, learning languages

Third year Genetics PhD student in the Talos Lab

- Project: exploring age, lineage plasticity, and intratumor heterogeneity in Prostate Cancer

Prostate cancer and its heterogeneity remains a challenge





→ Most common non-cutaneous malignancy in men

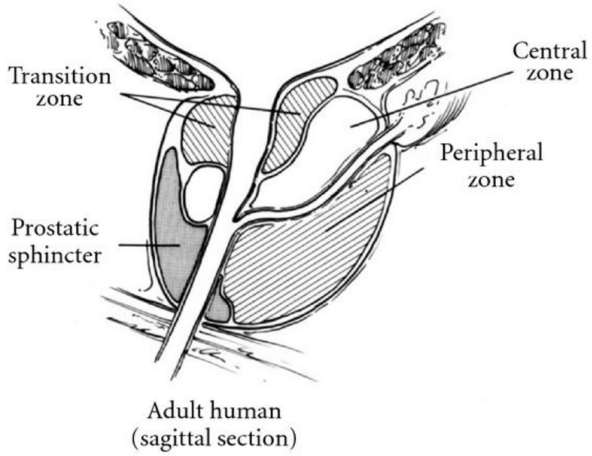
→ Age is the leading risk factor for PCa, followed by ethnicity

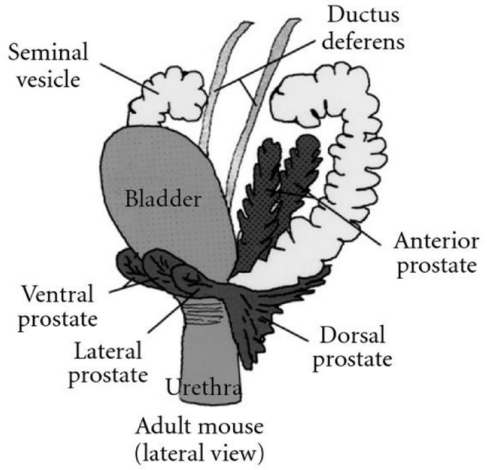
Brawley, O.W, *World J Urol*, 2012

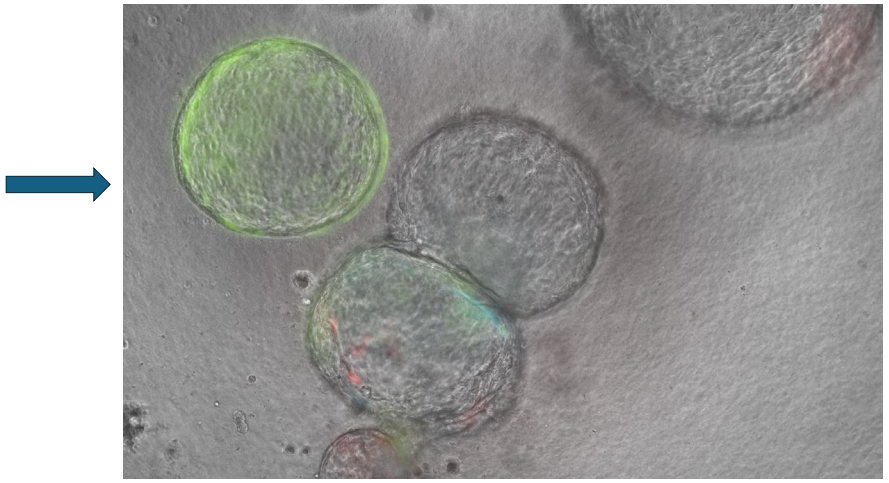
Vaidyanathan et al.,*gereriatics*,2016

Modeling prostate cancer ITH *in vivo*

ANATOMICALLY DIFFERENT

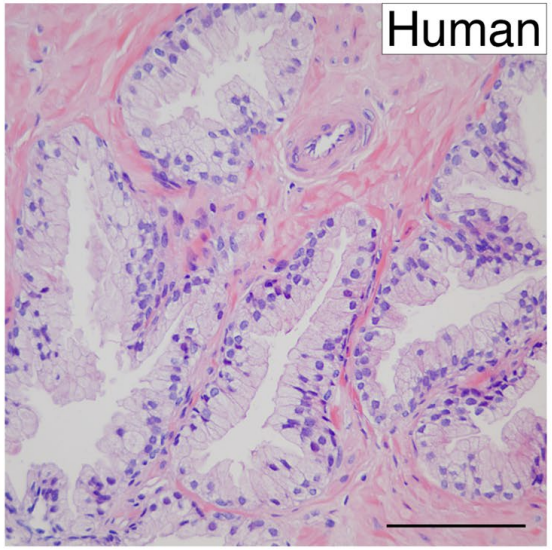


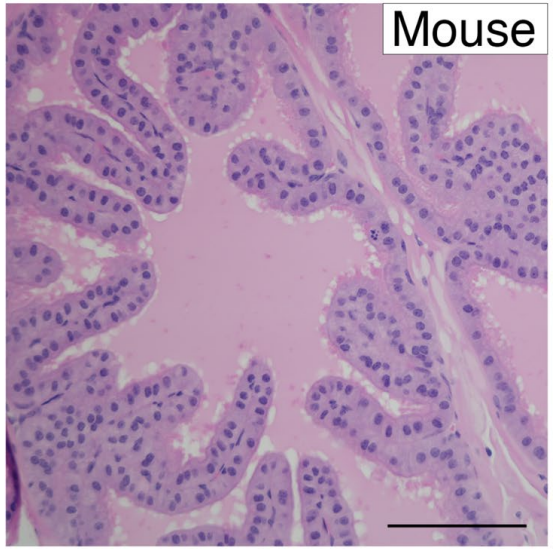




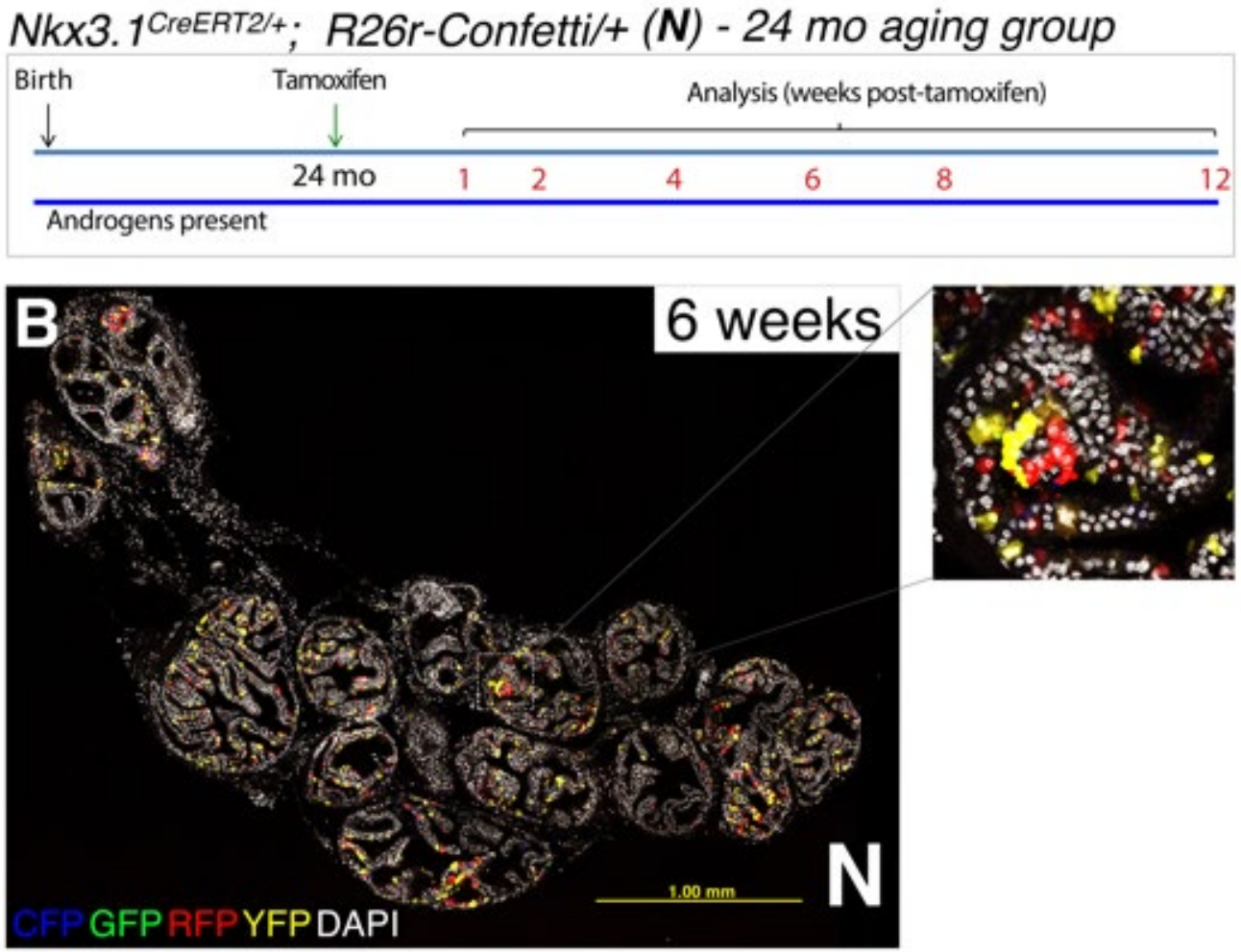
Organoid Models for functional studies

HISTOLOGICALLY SIMILAR

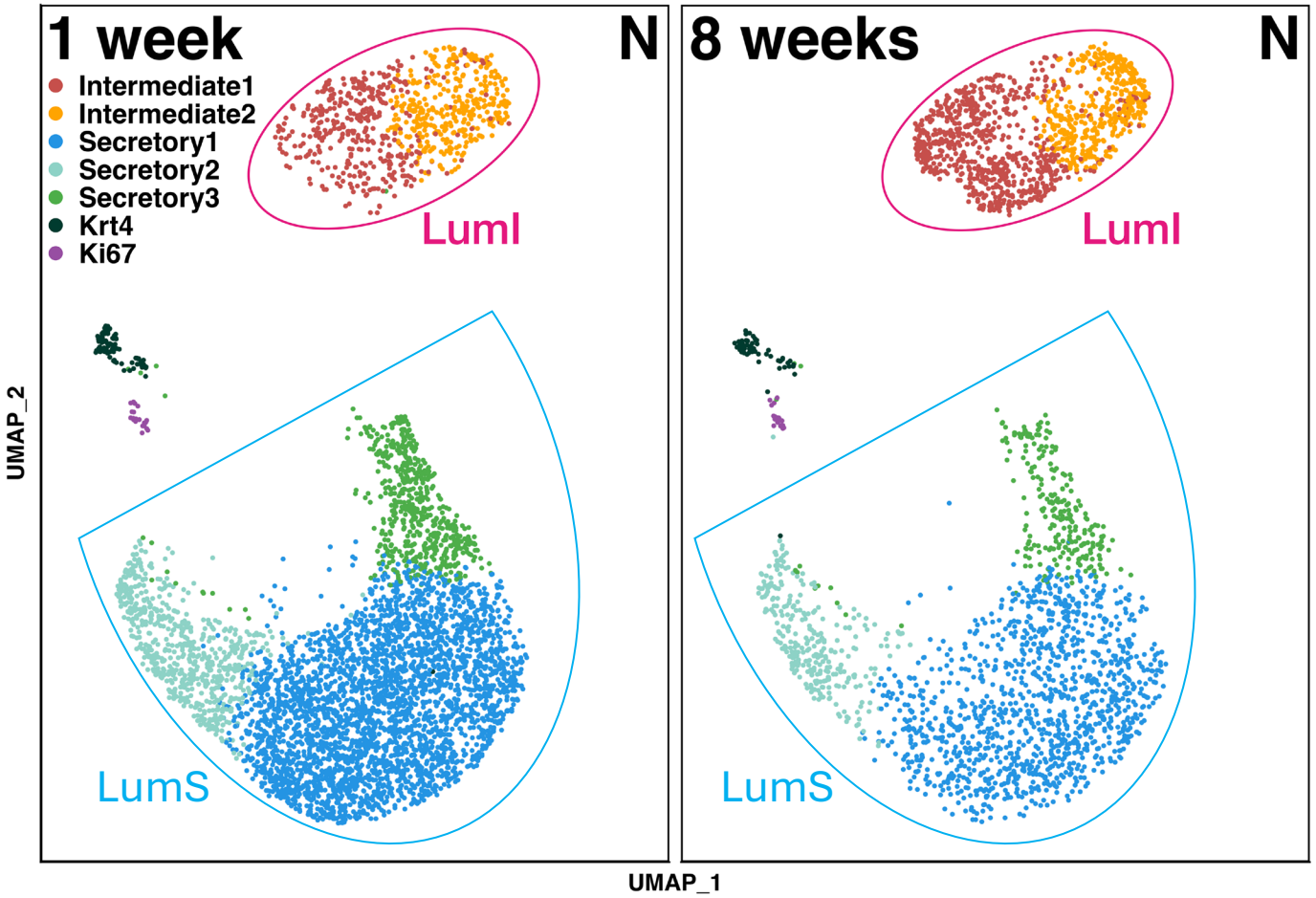


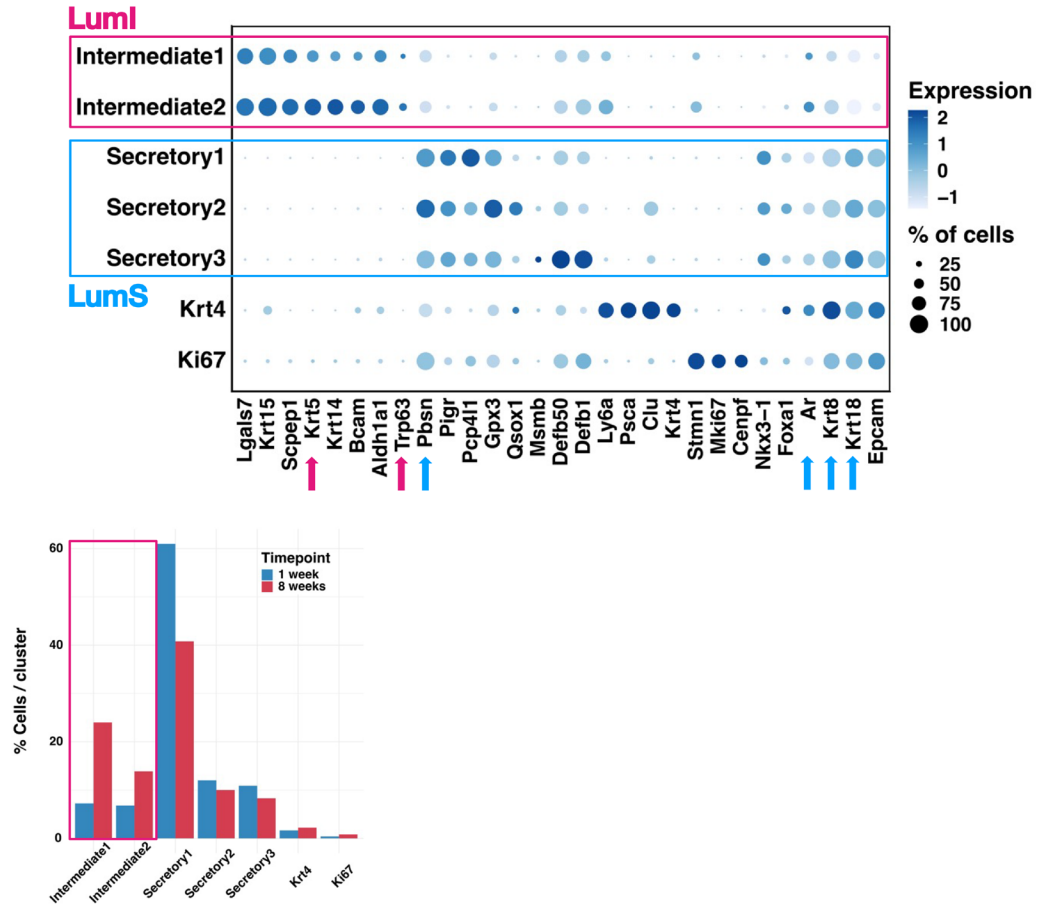


Whole organ mapping and clonal dynamics of aging mouse prostate



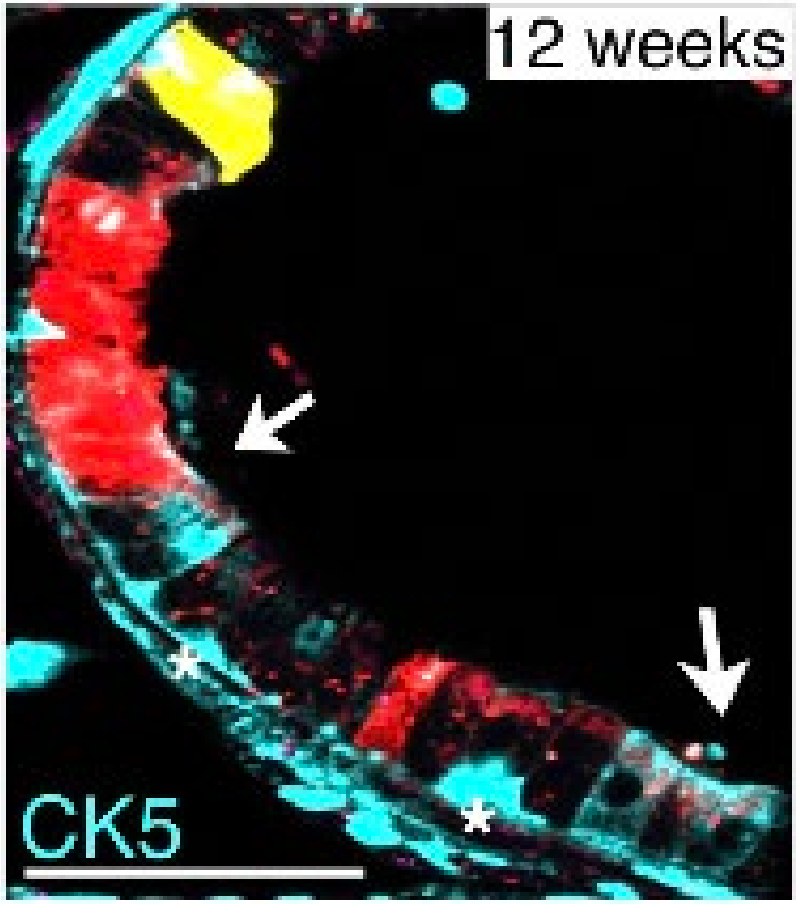
scRNAseq of Confetti^{+} Nkx3.1-lineage traced cells reveals cellular heterogeneity within the luminal layer



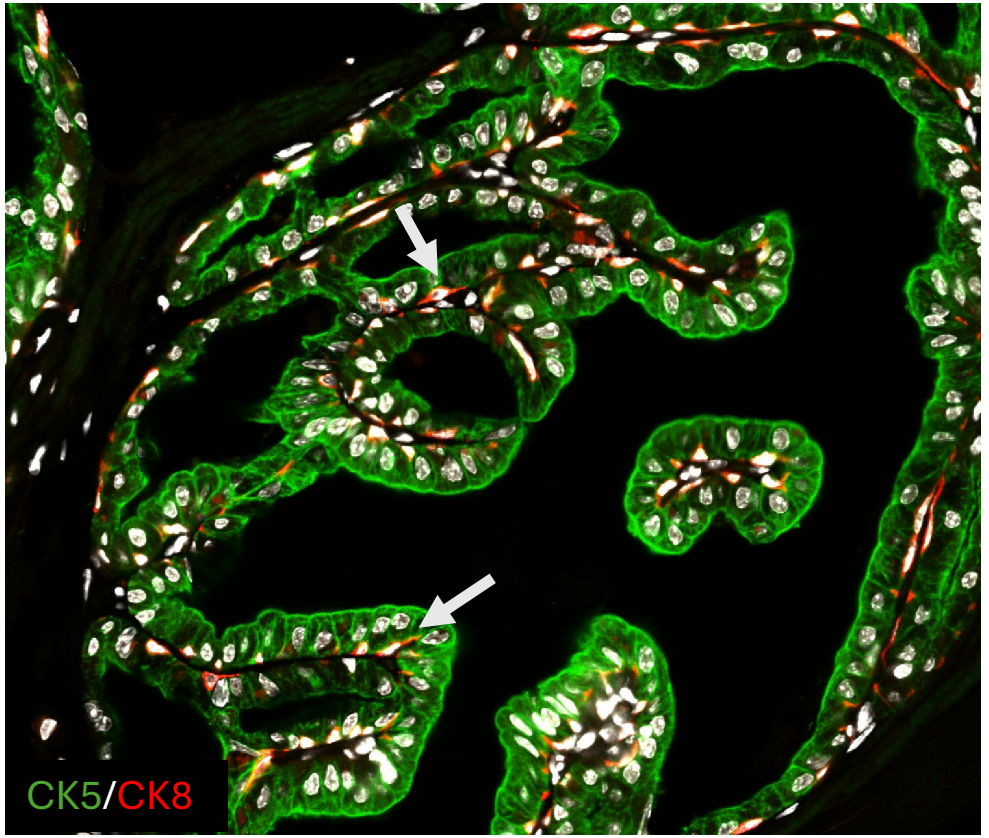


Luo F et al., biorxiv, in reviews

CK5+/CK8+ intermediate cells in young and aging mouse prostate



2 months



2 years

Aging-Induced Lineage Plasticity: Unveiling the Roots of Intratumor Cellular Heterogeneity

- **Intermediate states**
- **P63/Wnt4: transcriptional regulation**
- **Clonal dynamics**


Yijie Kang
Ph.D. student, Graduate Program in Genetics, SBU
Koo Lab at CSHL

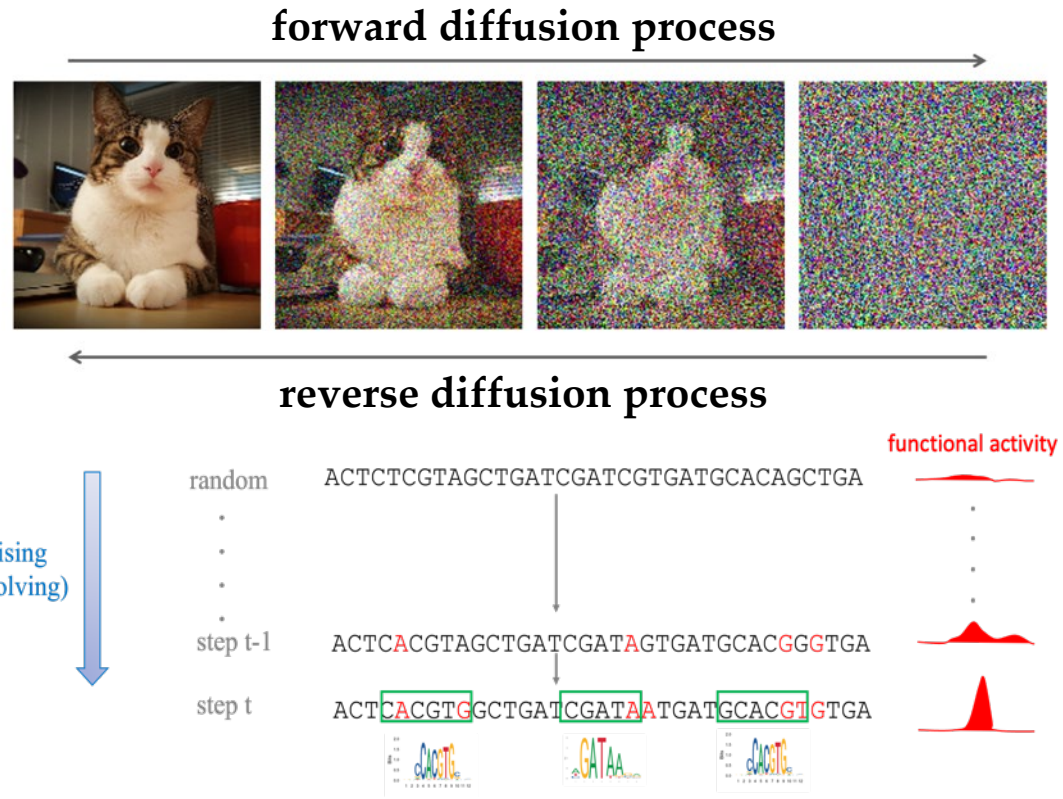
Deep Learning Model & Model Interpretation for Regulatory Genomics

Stony Brook University

Cold Spring Harbor Laboratory

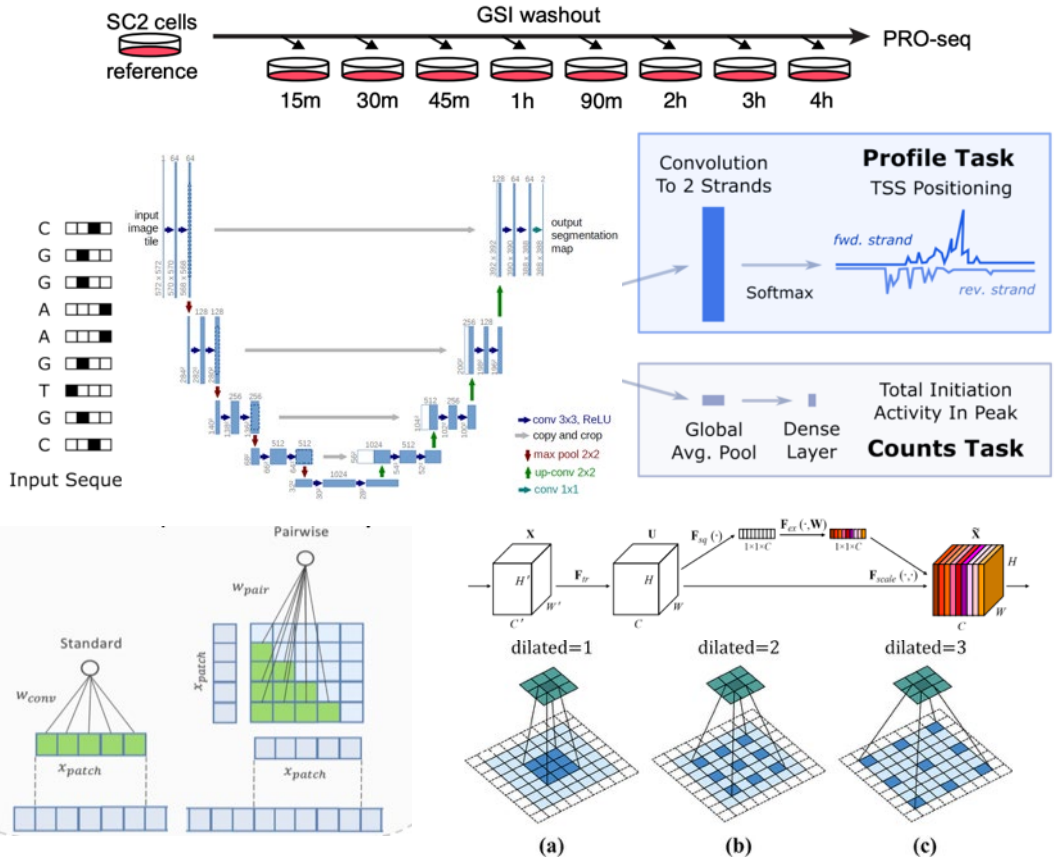
Functional Activity → DNA sequence:

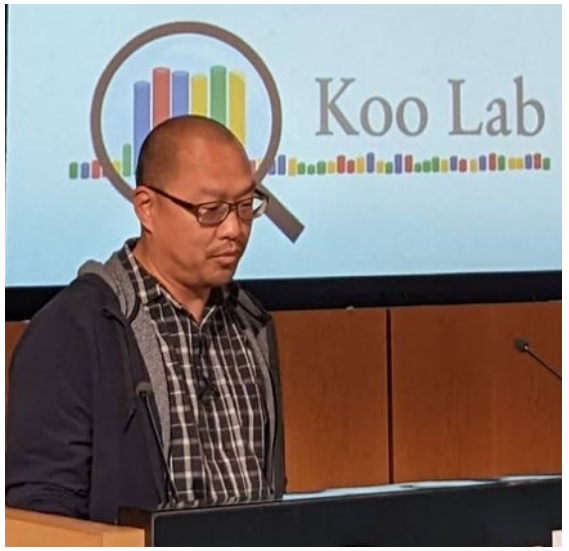
DNA Discrete Diffusion (D3)



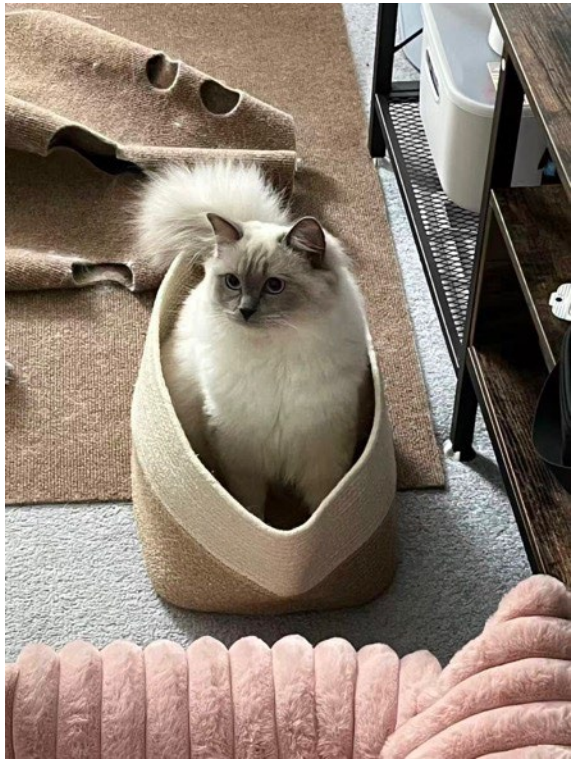
DNA sequence → Functional Activity:

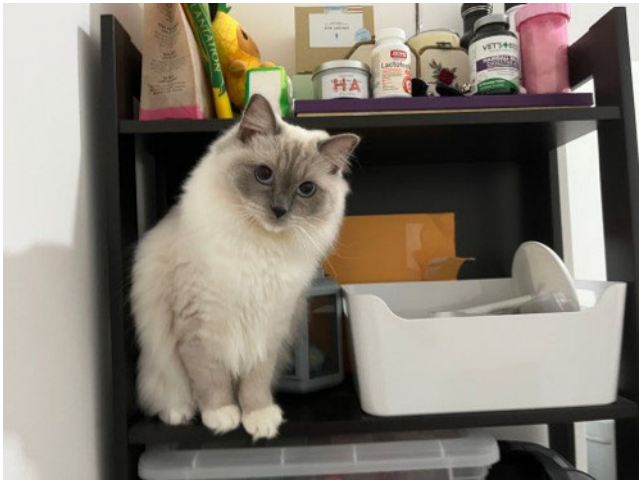
Predictive Model & Model Interpretation




Koo Lab


Suffolk's
fast track
to lifesaving
stroke care.

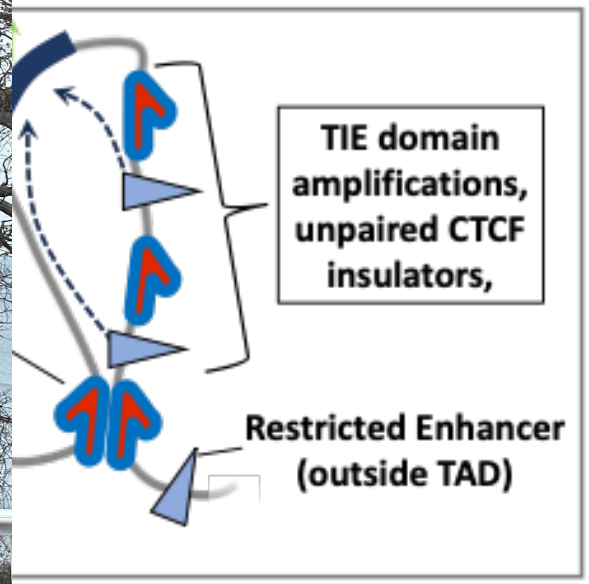




Rahme Lab

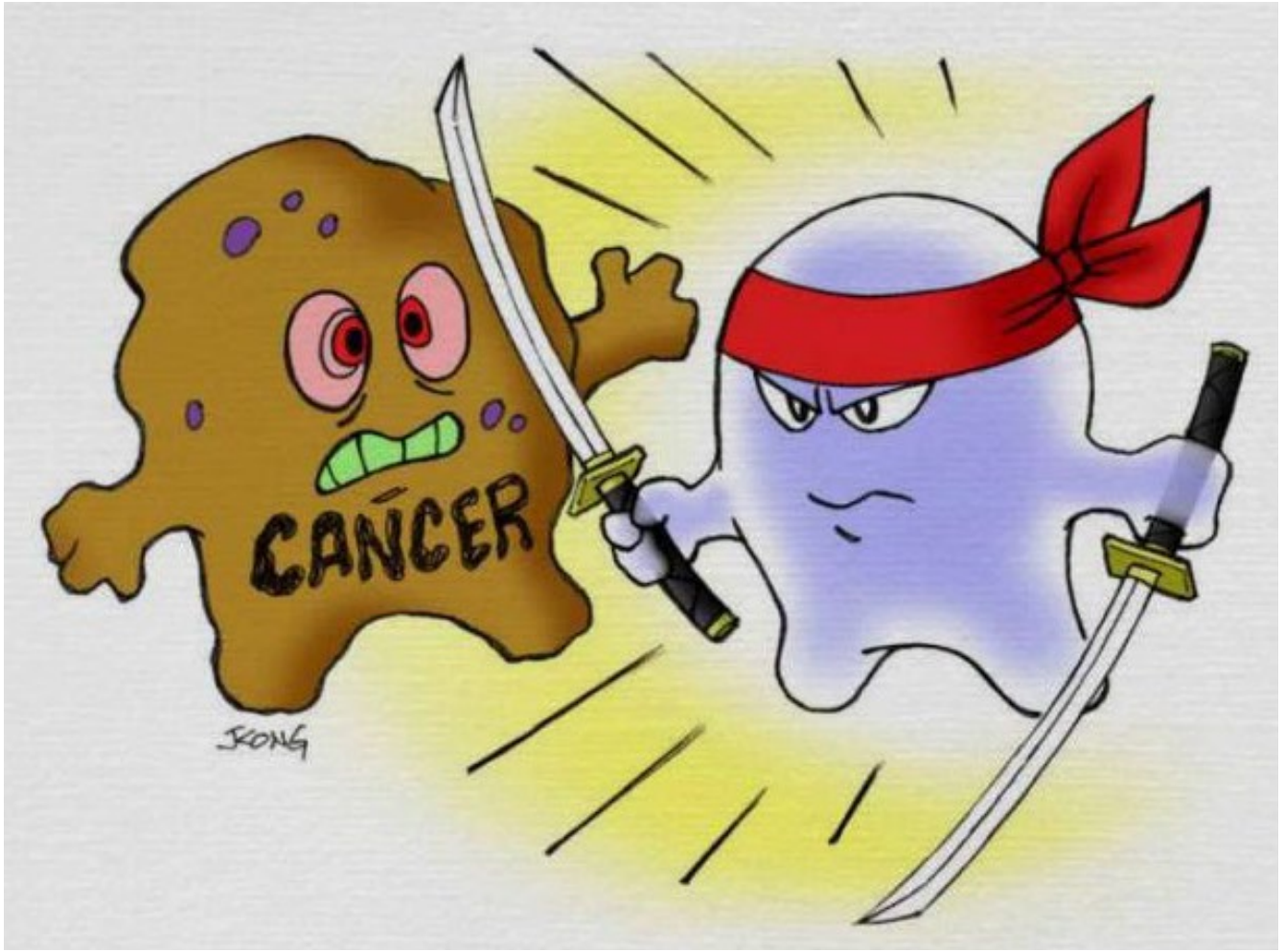
CANCER EPIGENETICS

Amplification



NA: TIE domain amplifications yield npaired CTCF sites. Aberrant romoter interactions unleashed.

Fueling immune cells in the fight against cancer

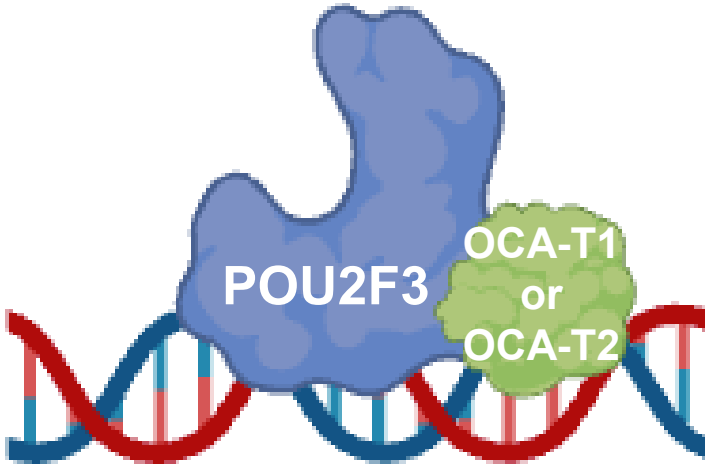


Tim Maher
Dr. Semir Beyaz Lab
CSHL

Functions of the Co-Activators OCA-T1/2 in SCLC

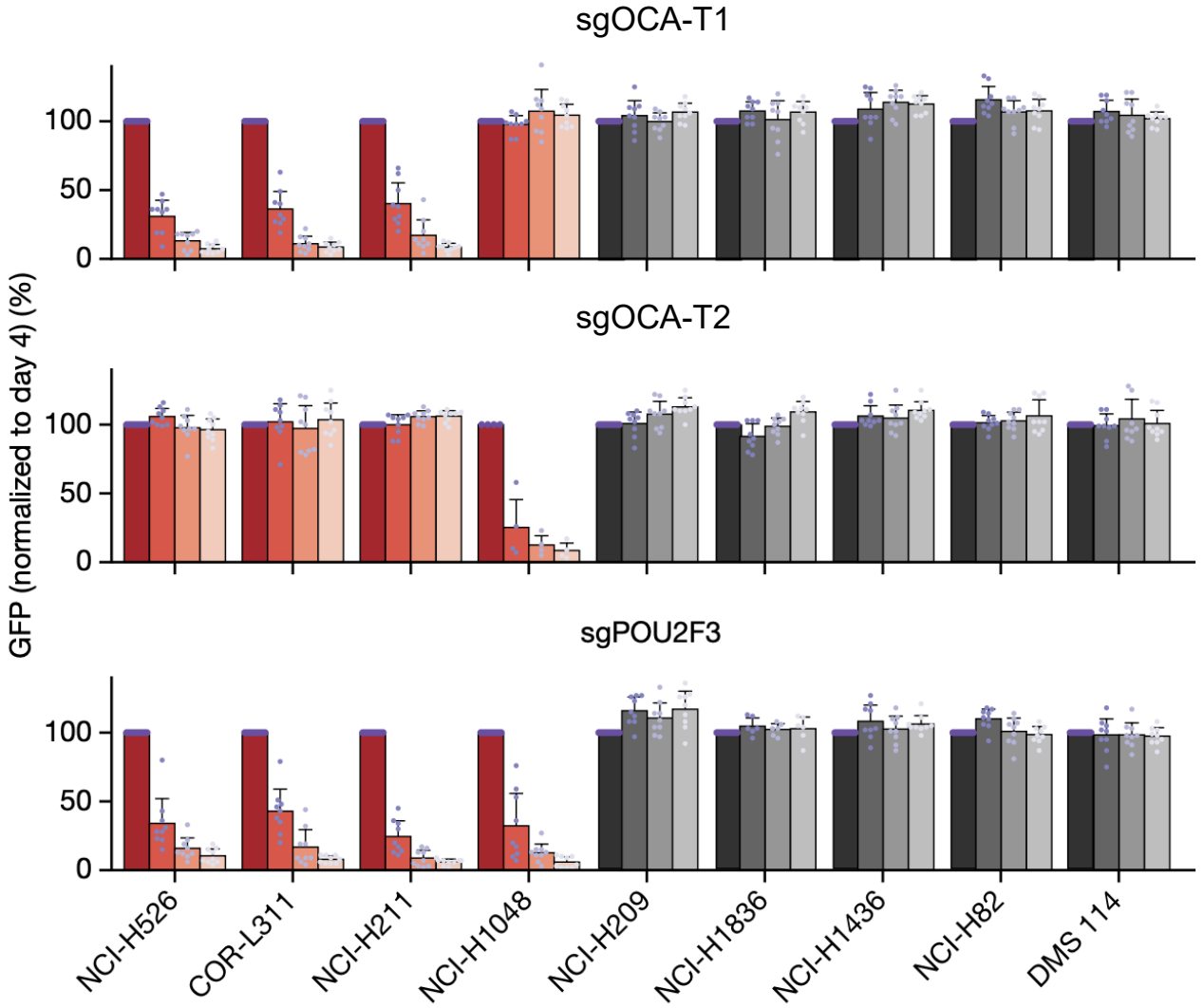
Kamil Taneja
MD/PhD Student
Vakoc Lab
Cold Spring Harbor Lab
Genetics Speed Science 2025

POU2F3 and OCA-T1/2 Drive SCLC



How are these OCA-T proteins different?

Transcriptional Activation and Repression
Cis-Regulatory Elements
Chromatin Remodeling and Binding

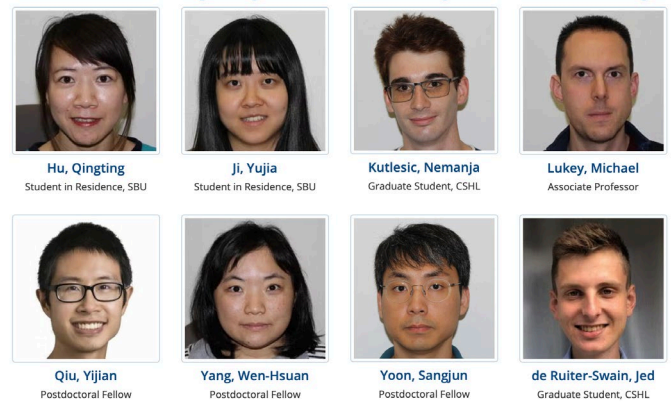


Wu et al. Nature 2022

Importance and Significance

- First look at paralog-specific roles of OCA-T1 vs OCA-T2 in cancer.
- Reveal how they diversify POU2F3 transcriptional programs (activation, repression, CRE control).
- Establish a general model of how paralogous co-factors could shape cancer epigenomes.

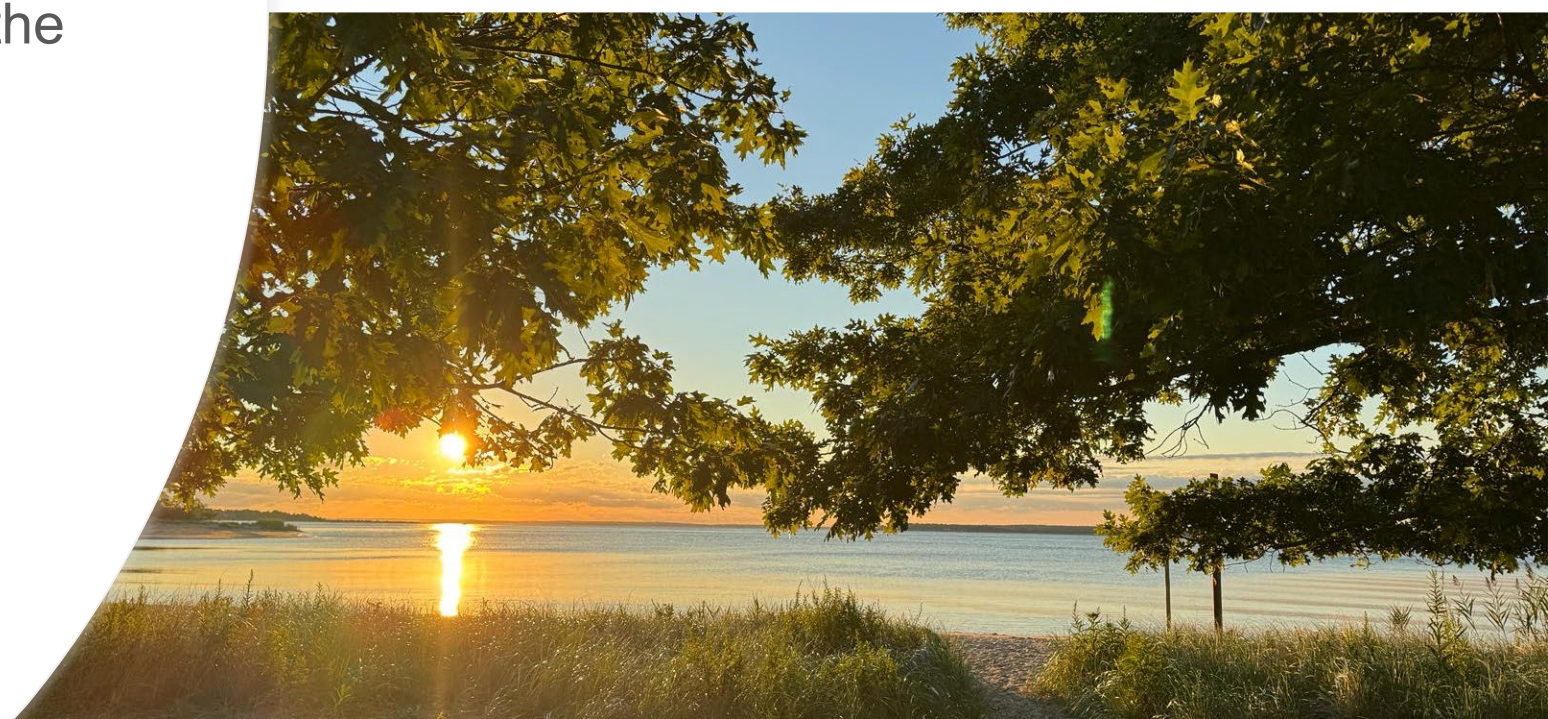
Investigating the role of cadaverine metabolism in cancer



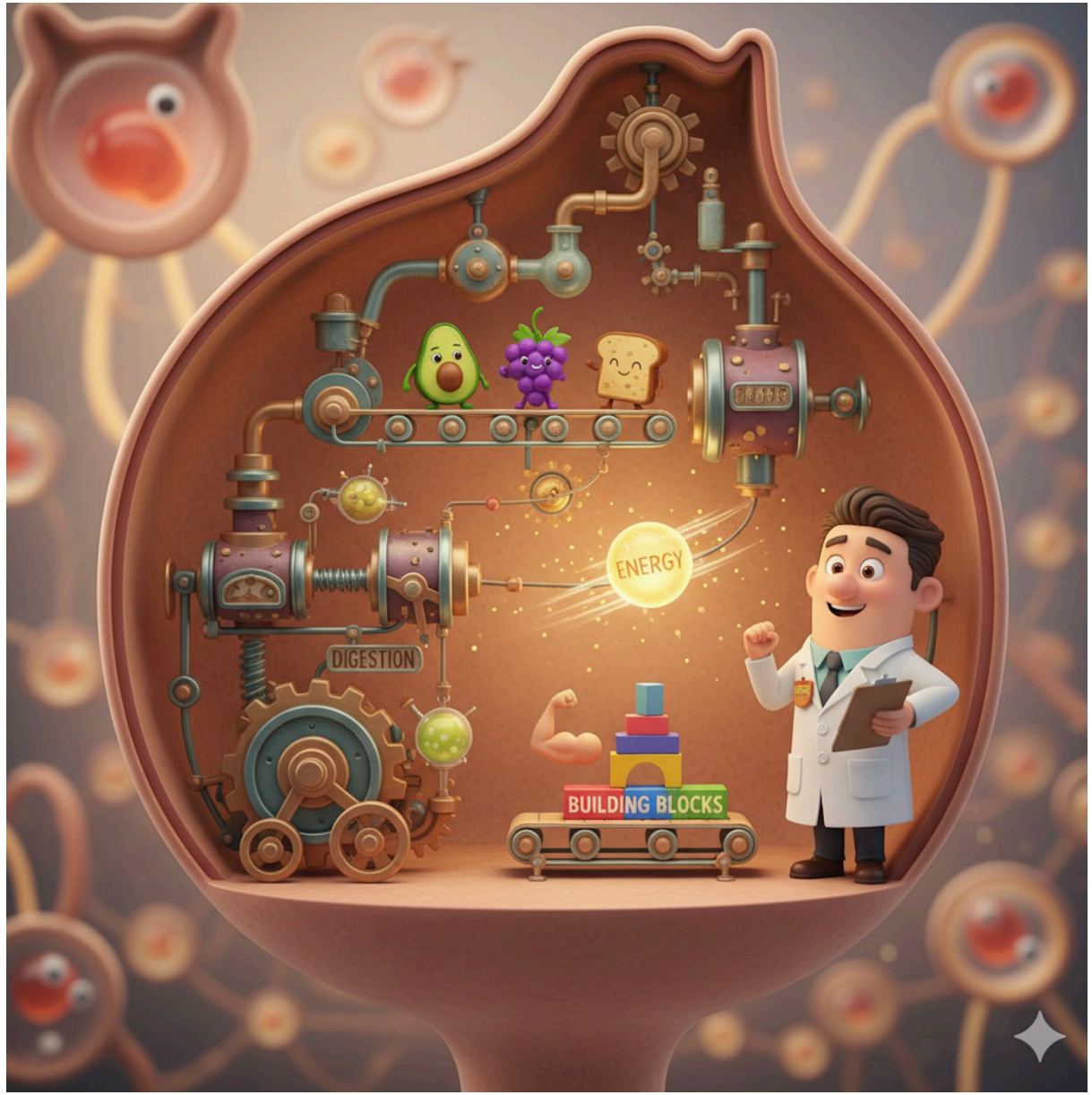
- Qingting Hu(Tina)
- Dr. Michael Lukey lab

- 🏕️ **Hiking & Camping:** Always ready for an outdoor adventure.

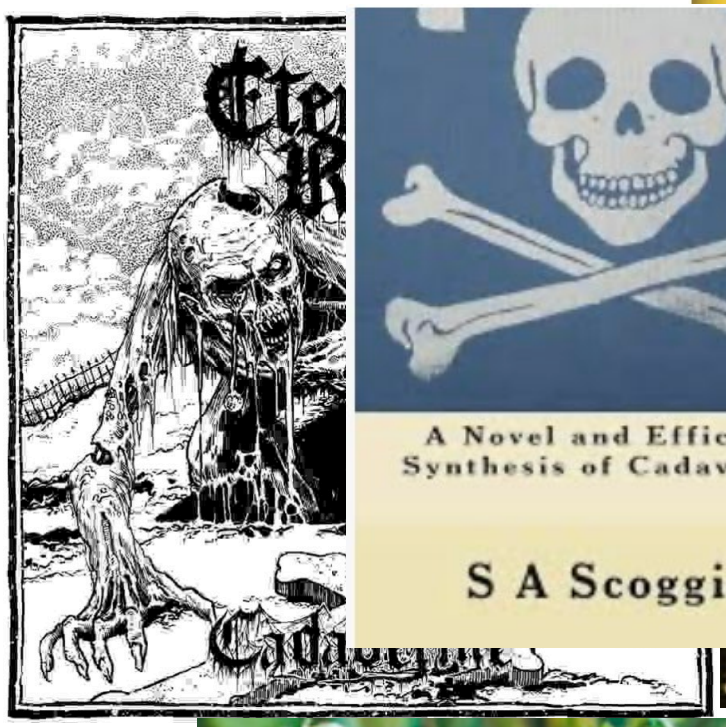
- 🎬 **Movie Enthusiast:** My second favorite kind of dark room after the microscopy suite.

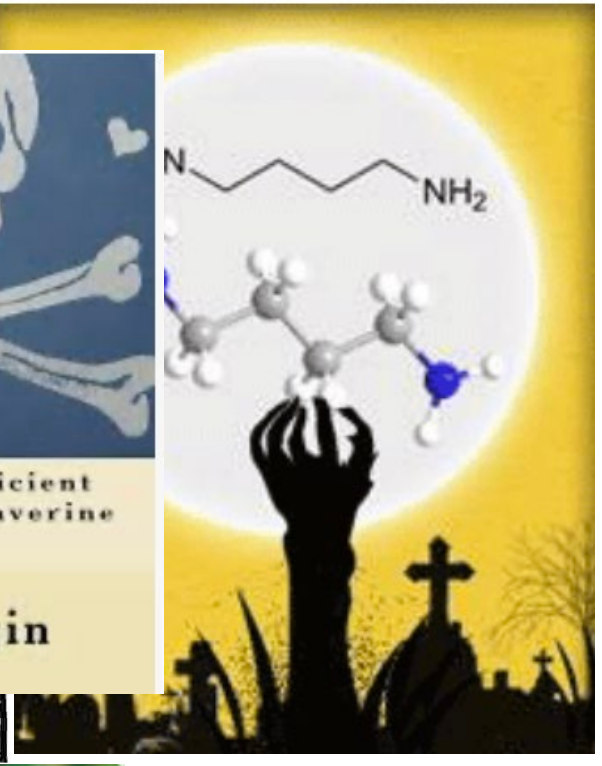


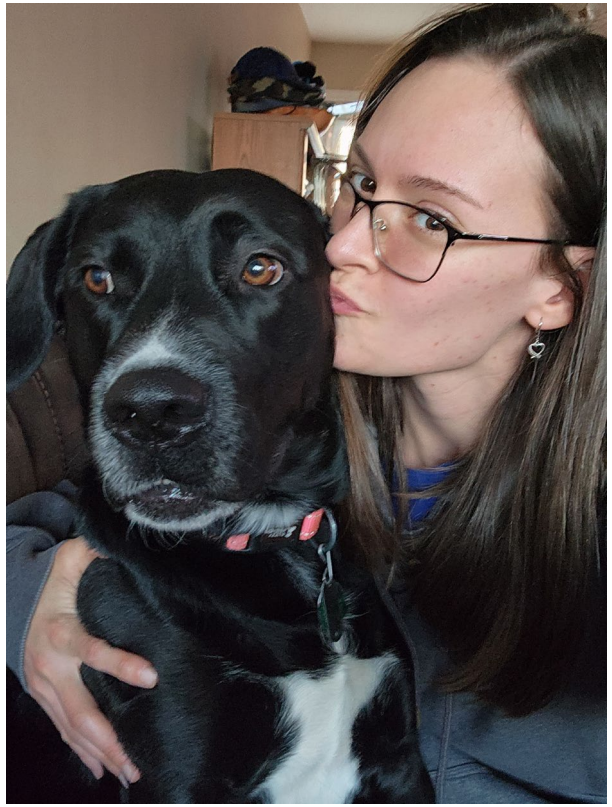
Cancer Metabolism



cadaverine







Speed Science 2025

Katie Donnelly-Sharon
van der Velden Lab
September 3rd, 2025

Typhoid Mary: The Asymptomatic *Salmonella* Carrier

Granulomas are an immune cell “fortress” against infection

- **Granulomas** are organized clusters of immune cells that surround a pathogen to control its growth and prevent it from spreading in tissue

Failure of initial immune response

Development of Granulomas

- I study how **granulomas** are formed and maintained, with a focus on the role of a key immune cell called the **inflammatory monocyte**