

Introduction to Biophysics Seminar

MBP 1015Y

Downtown: Stephanie Xie and Melanie Courtot
Uptown: Mark Chiew

Department of Medical Biophysics
University of Toronto

Land Acknowledgement

We wish to acknowledge the land we are meeting on today and work on every day. For thousands of years this has been the traditional land of the Huron-Wendat, the Seneca, and most recently, the Mississaugas of the Credit River. This sacred land has been a site of human activity for at least 15,000 years and is the subject of the Dish with One Spoon Wampum Belt Covenant. Today, this meeting place is still the home to many Indigenous people from across Turtle Island.

National Day for Truth and Reconciliation

[U of T Truth & Reconciliation Calls to Action](#)

[National Day for Truth and Reconciliation Inclusive
Employer Guide](#)



Orange Shirt Day and National Day for Truth & Reconciliation Commemoration
September 30 2026 10am - 11:30am

Takeaways from today's introduction

1. Explain how MBP1015 as a course operates
2. Tips and tricks for giving a fantastic talk
Anna Gordon, Senior Director, People Consultants UHN
3. Where you want to be in 5-6 years...example presentation
“The RNA binding protein Staufen1 regulates human erythropoiesis via post-transcriptional control of iron transport” Emily Tsao, MBP PhD Year 6 Candidate, Hope Lab
4. Describe how presentations will be facilitated and take questions

Schedule

Student year	Presentation length + discussion	Evaluation by	Graded
4	25 min + 5 min	Faculty	—
2 (PhD)	25 min + 5 min	Faculty	+
2 (MSc)	25 min + 5 min	Faculty	+
1	17 min + 3 min	Upper year students	—

In person attendance: Mandatory

- **You must attend 80% of uptown or downtown seminars
IN PERSON**
 - No need to attend both
 - You can choose which to attend on a weekly basis
 - Only 1 attendance a week is counted (even if you attend both seminars in person)
- **If you are facing challenges with attendance**
 - There is a 20% 'allowed' absence quota:
 - You can be absent 20% of seminars for any reason, no permission needed, and which 20% is up to you.
- **Schedule change is ok, but you must arrange it**
(Supervisors must be informed and agree to the schedule change too)

PRIZES!!

Best 2nd and 4th-year student best presentations (each) based on student and faculty evaluation:

- 1st Prize: \$150
- 2nd Prize: \$100
- 3rd Prize: \$50



2025-2026 Winners

Yiyan Wu, 1st Place

Madeline Rapley: 1st Place

Nancy (Lan Xin) Zhang: 2nd Place

Athulram Rajagopal: 2nd Place

Phoebe Lombard: 3rd Place

Nicholas Kleine: 3rd Place

Lessons in science communication from the Greats



Edward Osborne Wilson
(E.O. Wilson)

1

Give the science
meaning.



Stephen Jay Gould

2

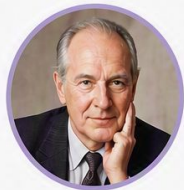
Build an
intellectual narrative.



Richard Dawkins

3

Make the central concept
crystal clear.



Lewis Thomas

4

Say complicated things
simply.



Richard Feynman

5

Make the audience
think with you.



Jane Goodall

6

Put the *human story*
inside the science.



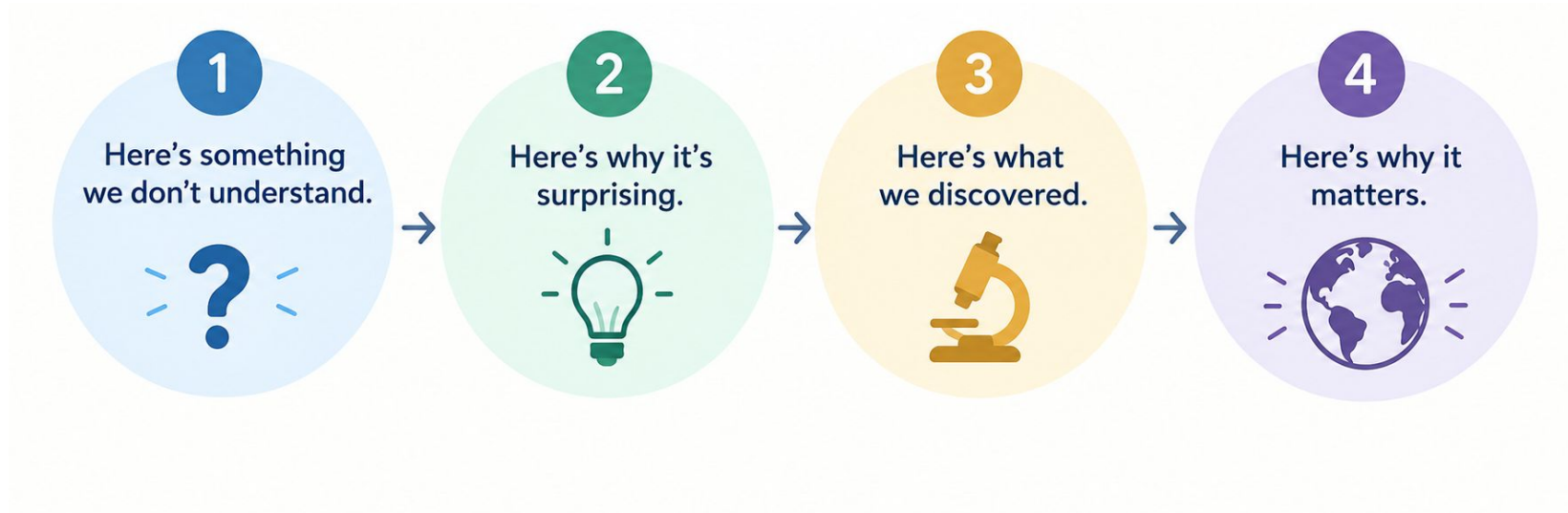
David Attenborough

7

Make the audience
care.

Multiple approaches to presentations...

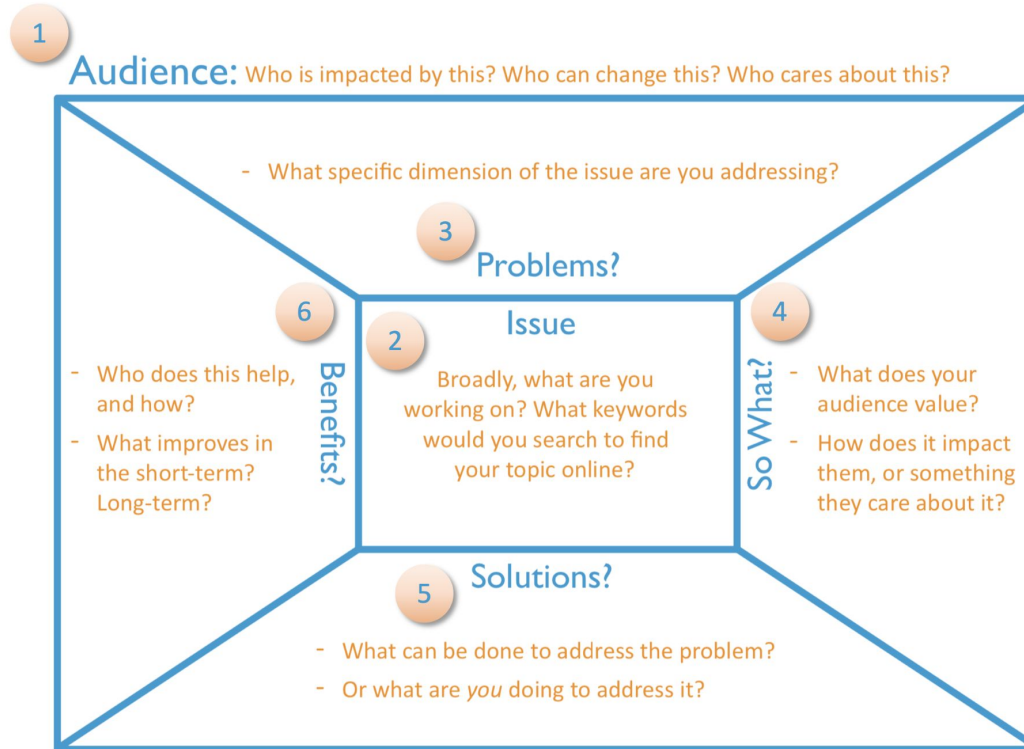
From Question to Impact



Public speaking is nothing more than having a conversation from your heart about something you are authentically passionate about.

Richard Greene "7 secrets of the greatest speakers"

The Message Box



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“Investigating post-transcriptional regulation of human erythropoiesis” Emily Tsao, MBP PhD Year 6 Candidate, Hope Lab
4. Describe how presentations will be facilitated and take questions



Giving Effective Presentations

Anna Gordon, Senior Director, People Consultants -
Research, Education, and Michener

Agenda

The Importance of Presentations

3 Steps for Effective Presentations

Thinking about “Presence”

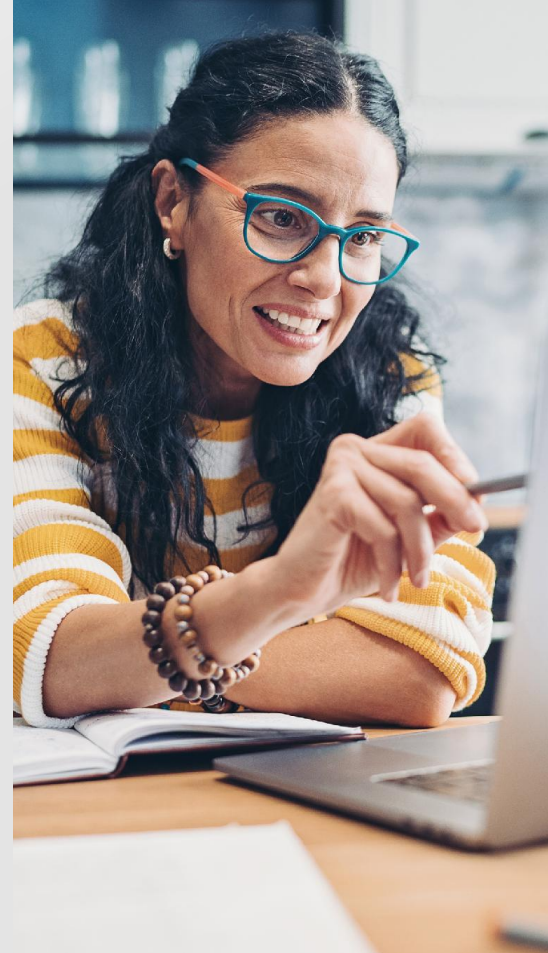
The Importance of Presentations

- Effective communications skills are a powerful career activator
- When it comes to making a powerful and effective presentation, the fundamentals will always apply

Powerful and effective presentation skills - Harvard Business Impact

Step 1: Prepare

- Don't write out a script – use key words as a memory aid
- If you are using PowerPoint:
 - List the key ideas and elaborate while speaking
 - Aim for no more than one slide for every minute
 - If presenting in person, use size 18 font or larger
 - Make sure the visuals are not too busy



Step 2: Practice

- Practice in front of the mirror or record yourself
- Time yourself and aim to leave 30 seconds to spare
- Speak slower – you're always speaking faster than you think
- Be aware of your intonation and how you use your hands and the physical space
- If you make a mistake, just keep going!
- Ask someone to count how many fillers you use ("um," "like," etc.)

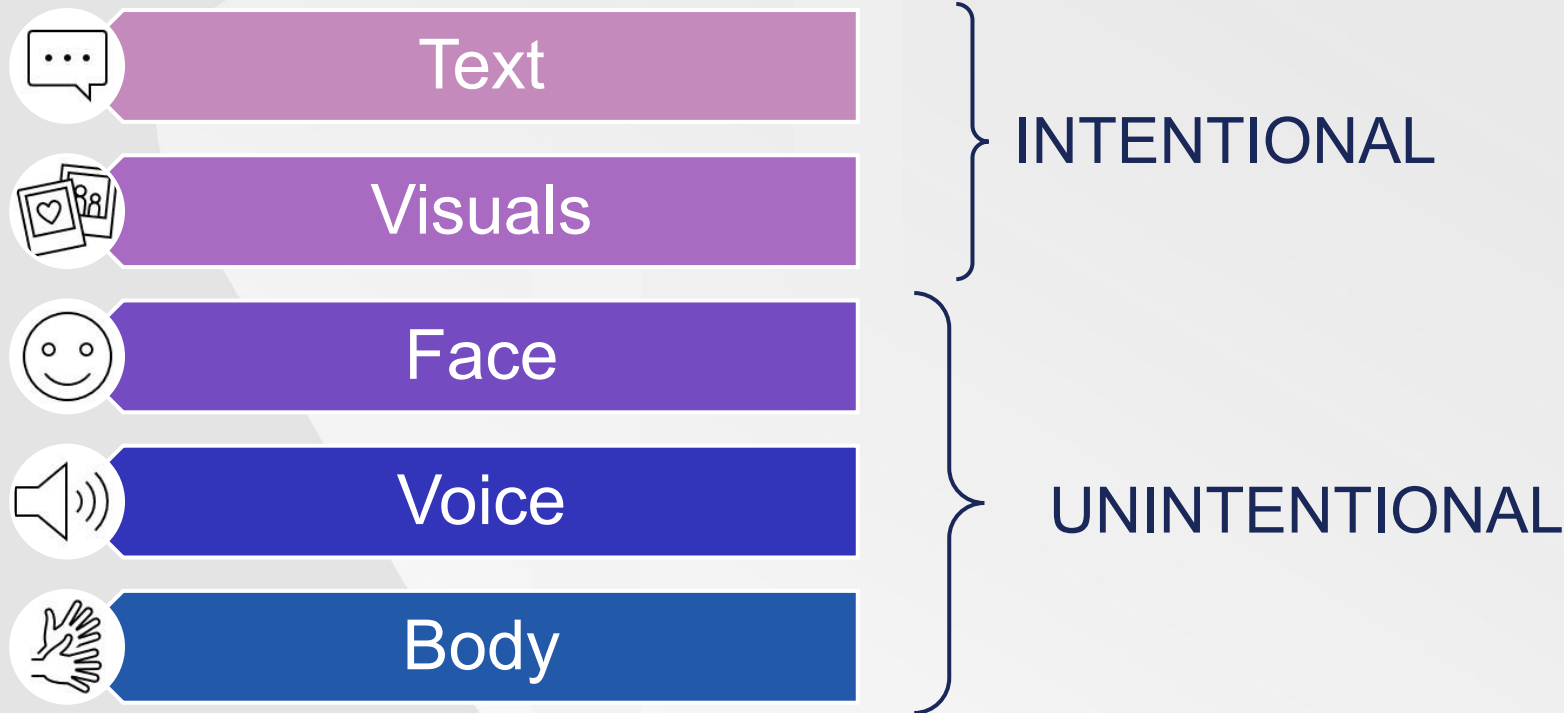


Step 3: Present

- Use the timer on your phone to keep on track
- Don't look at your slides – look at the audience and refer back to key words
- If you have trouble slowing down, take a breath at the end of each sentence
- Look at the audience's body language – are they engaged?
- If there is a Q&A you don't need to respond instantly – take time to think about your answer



Thinking about “Presence”



Presence Checklist

FACE

- ☐ Are you directing your gaze at the audience?
- ☐ Does your expression match the content?
- ☐ Are you focused on the task at hand?

VOICE

- ☐ Do you sound scripted or anxious?
- ☐ Are you talking too loudly or too quietly?
- ☐ Is your pitch awkward or monotone?

BODY

- ☐ What kind of stance are you taking?
- ☐ Can the audience see your hands?
- ☐ Are you facing the audience?
- ☐ How are you using the space?

Presenting in Virtual Spaces

- Keep your camera on
- Try to keep your shoulders visible
- Keep your focus on the meeting (maintain “eye contact”)
- Use virtual tools where appropriate



Any questions?

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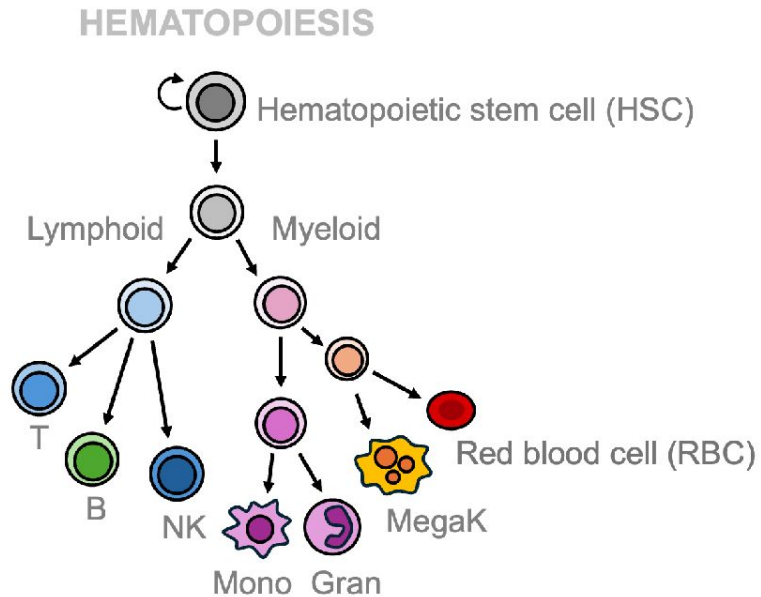
Investigating post-transcriptional regulation of human erythropoiesis

Emily Tsao

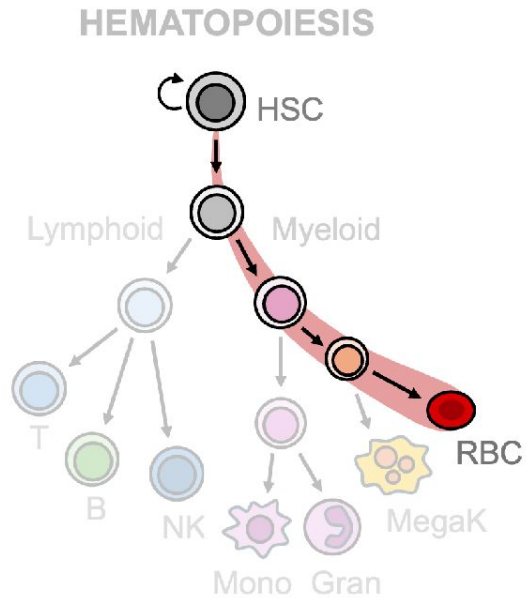
PhD Candidate, Hope Lab
University of Toronto / Princess Margaret Cancer Centre

September 23, 2026

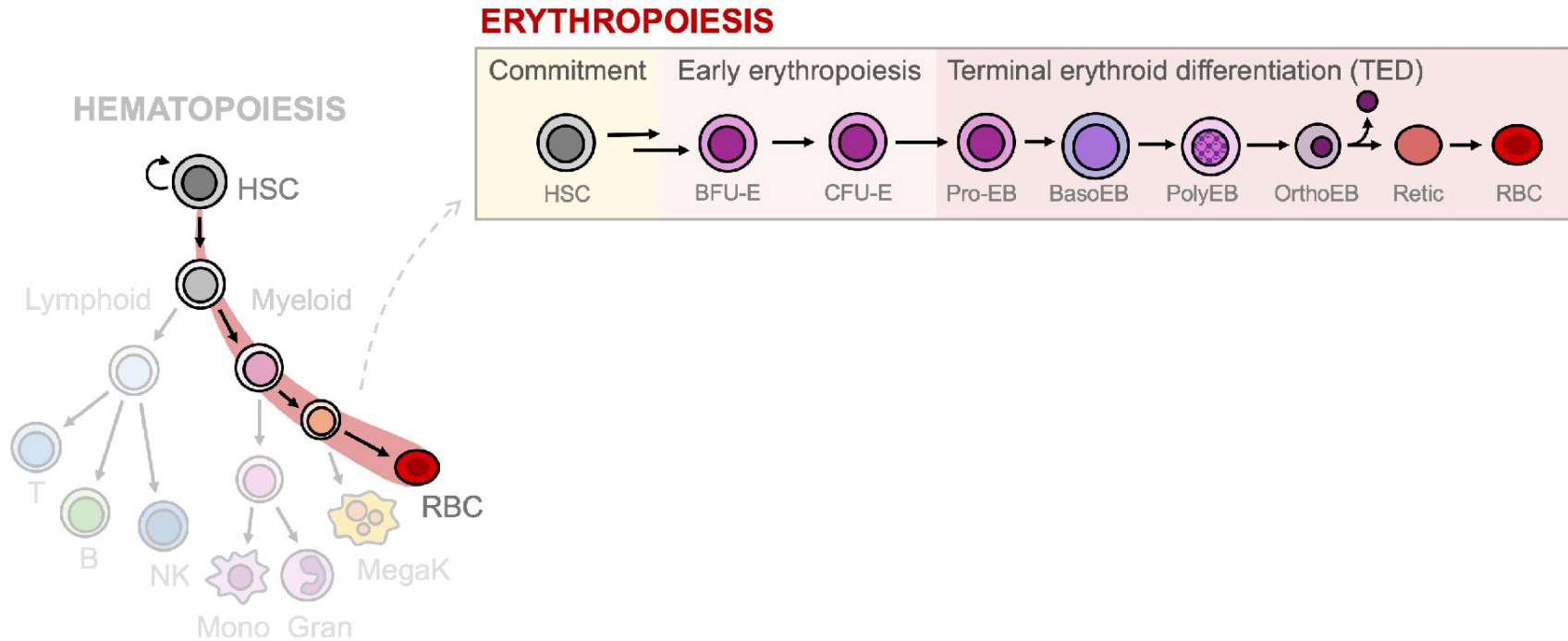
Hematopoiesis: the production of blood cells



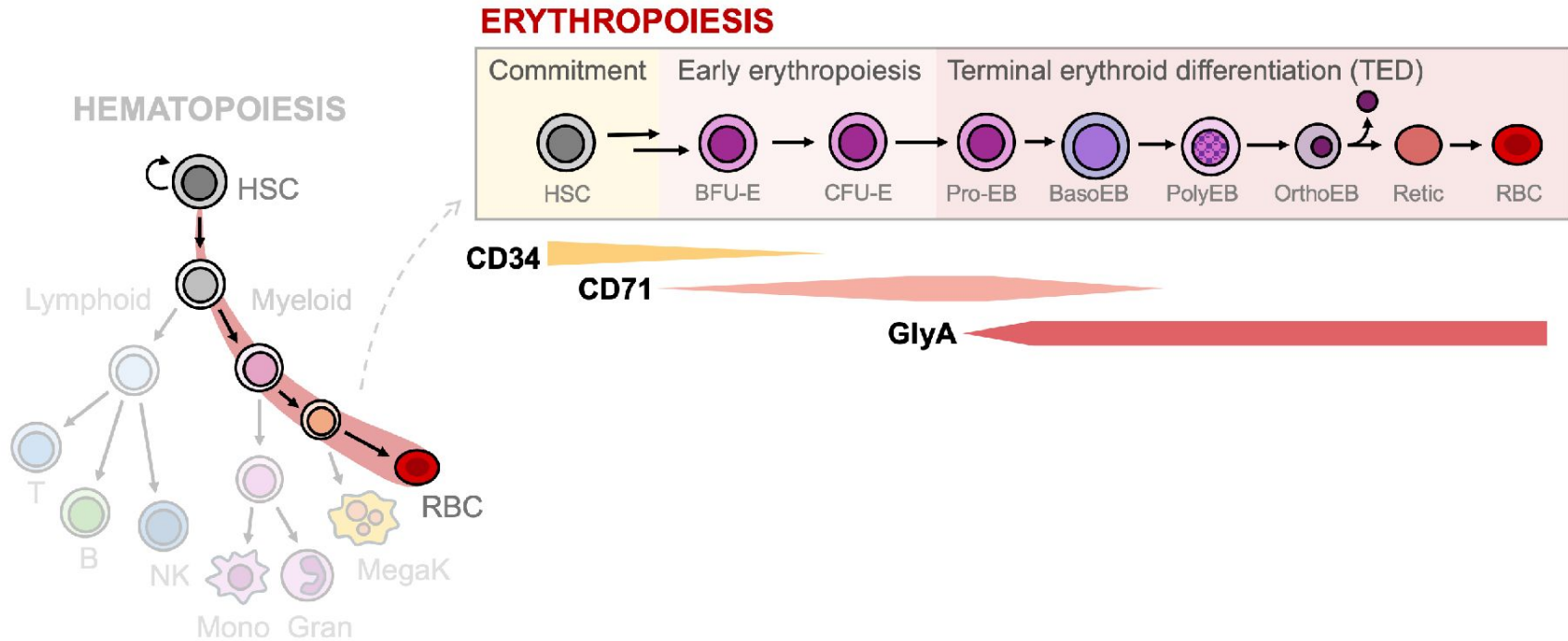
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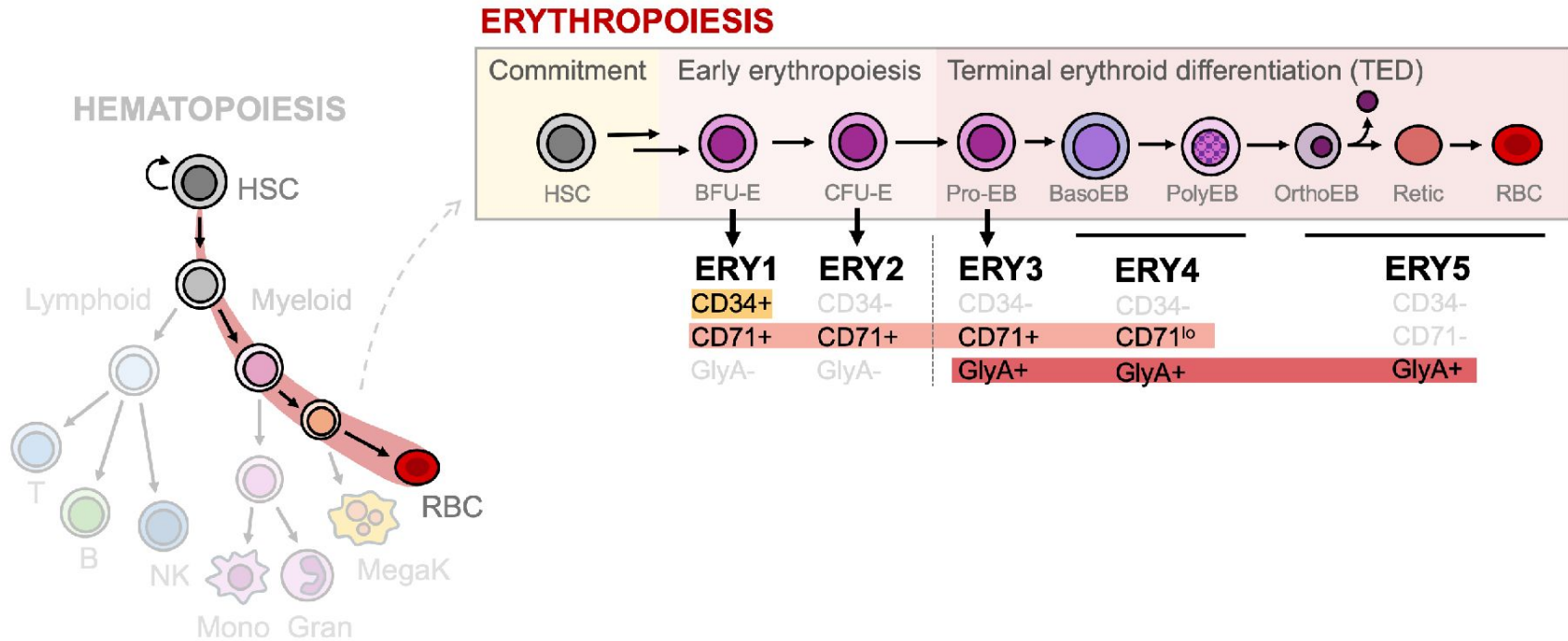
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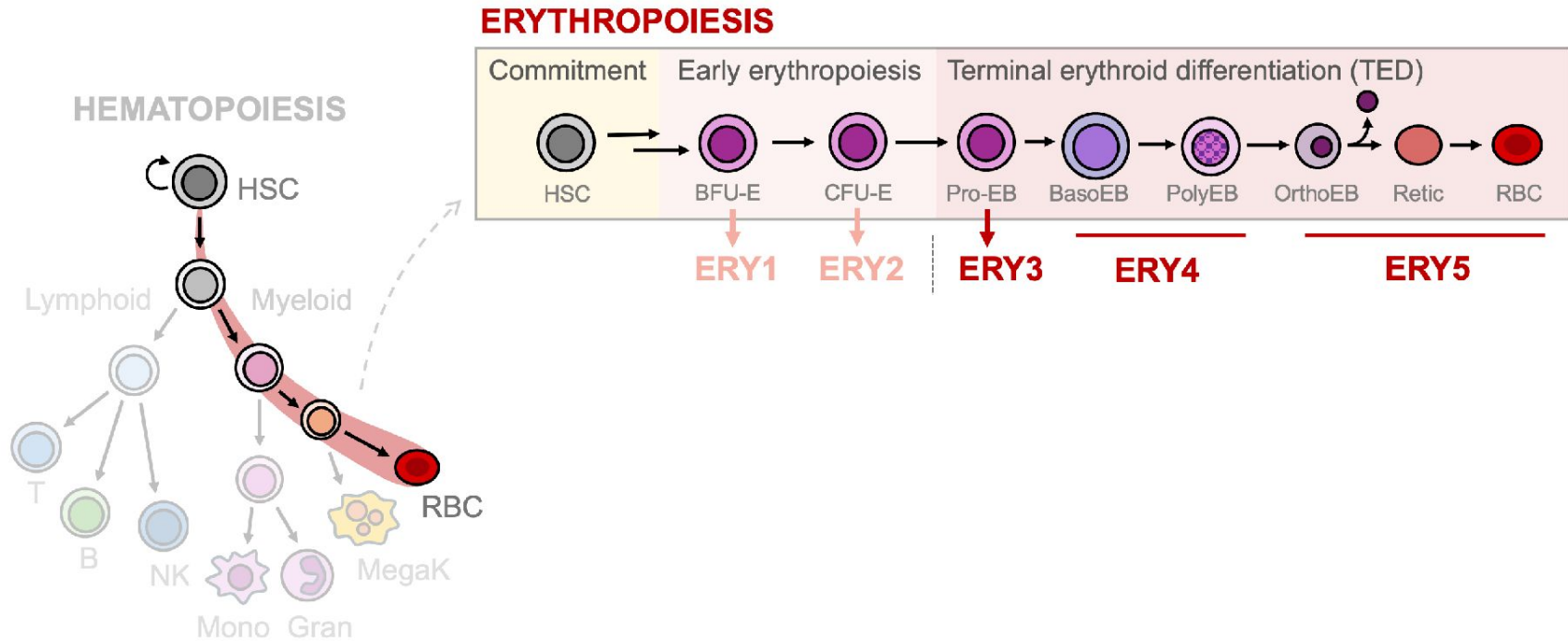
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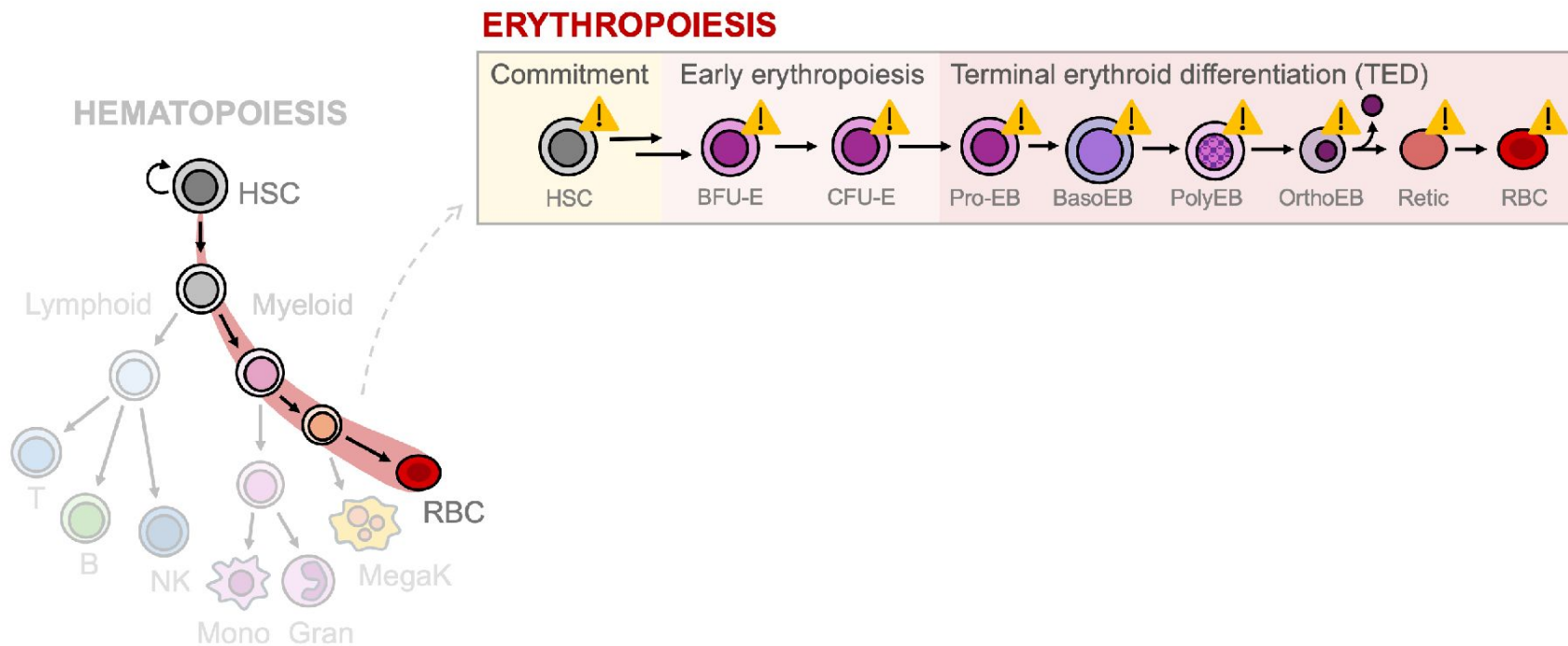
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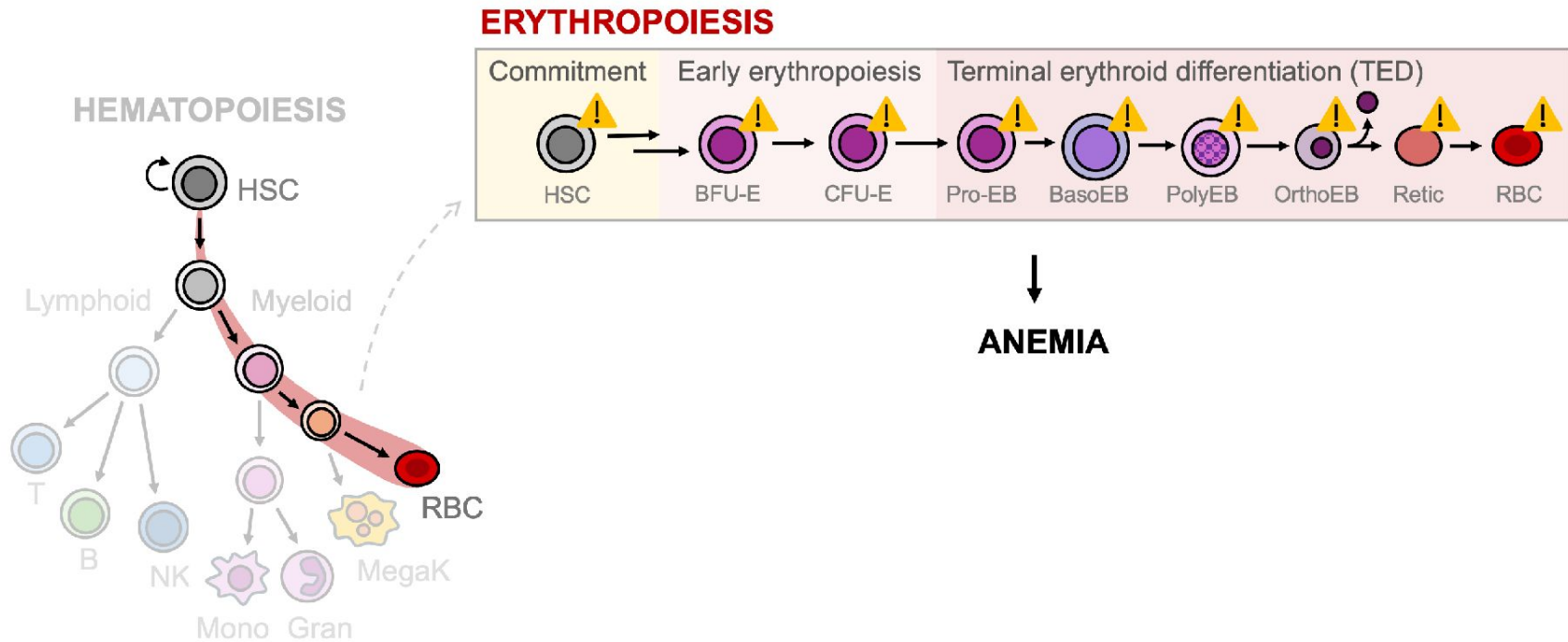
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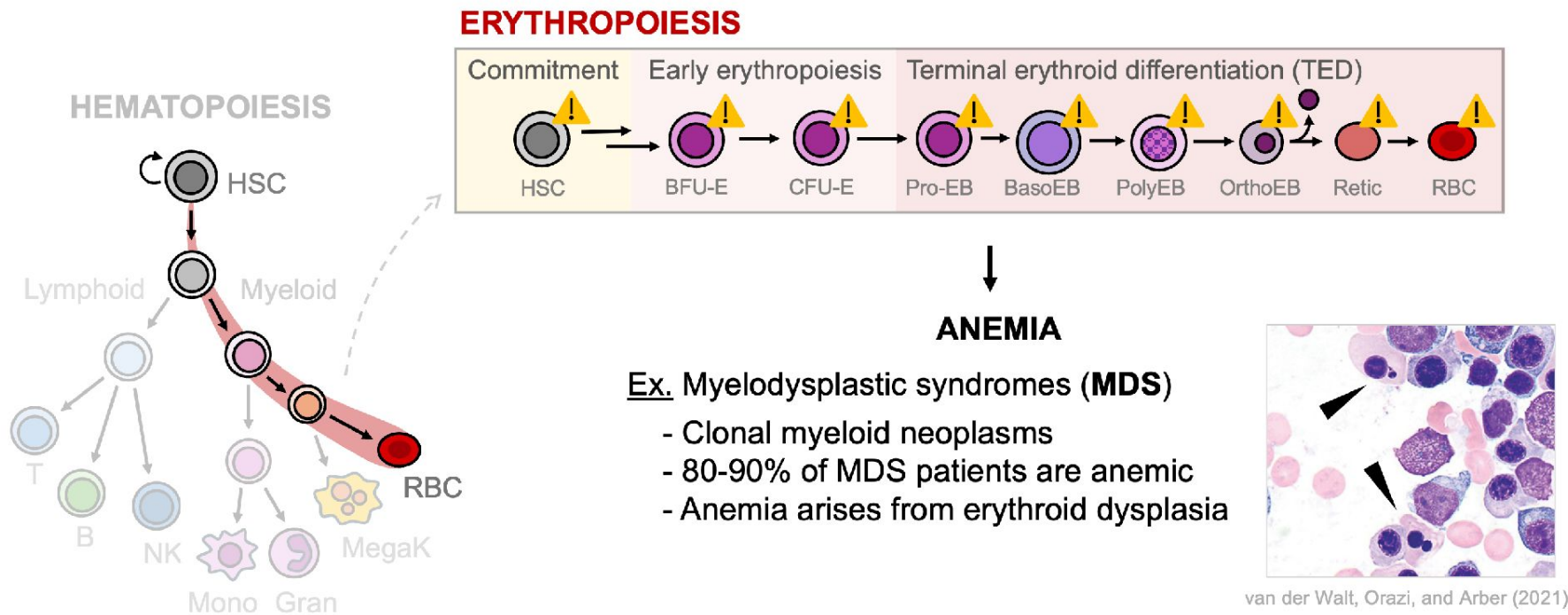
Perturbed erythropoiesis underlies anemia



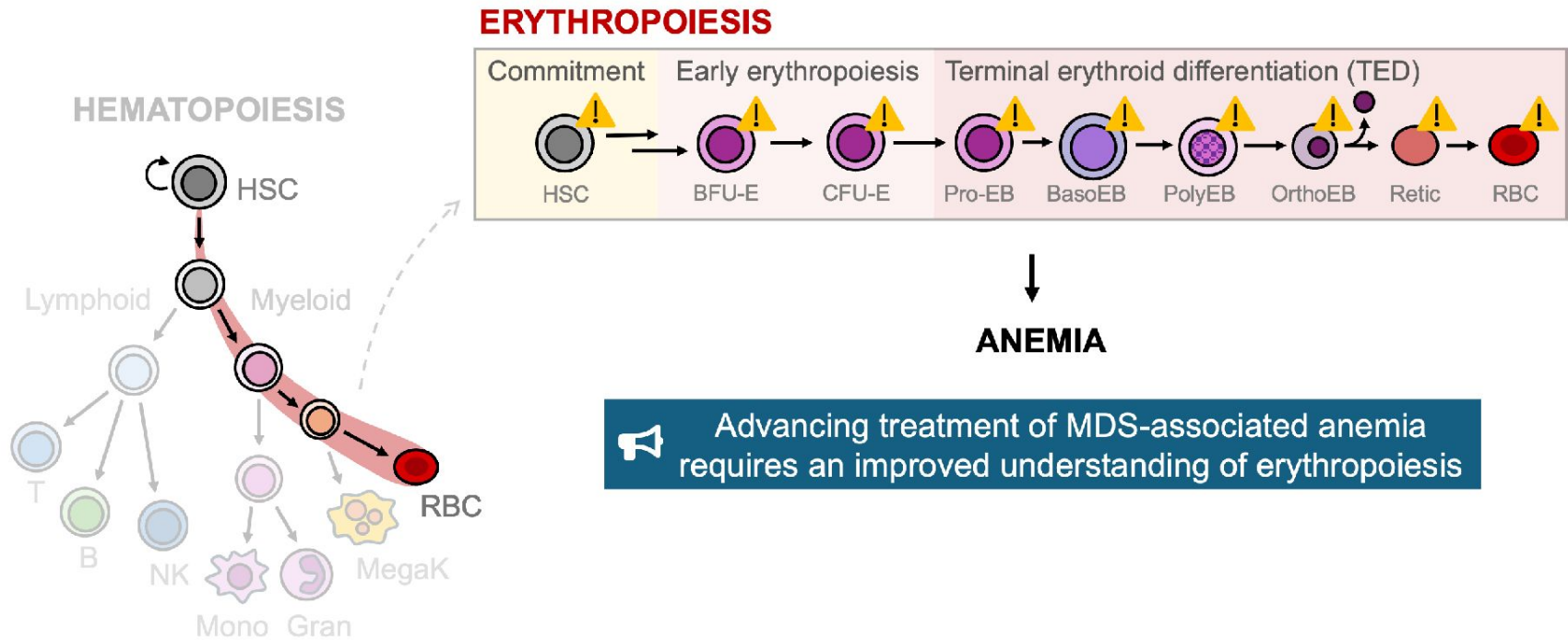
Perturbed erythropoiesis underlies anemia



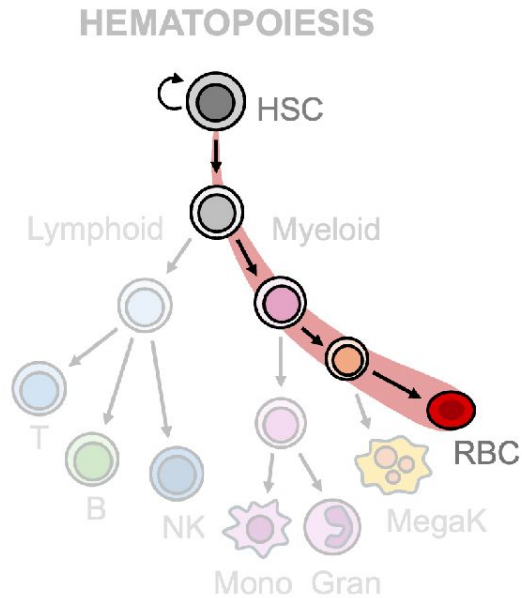
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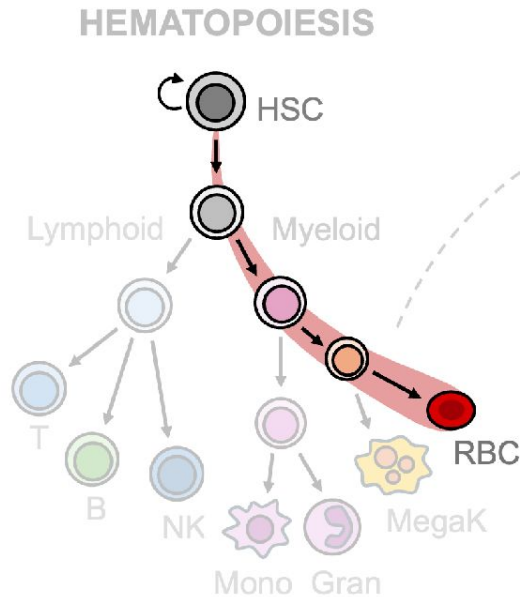
Perturbed erythropoiesis underlies anemia



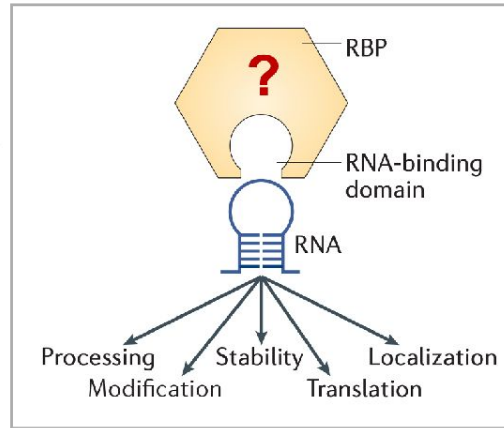
Post-transcriptional regulation of erythropoiesis is poorly understood



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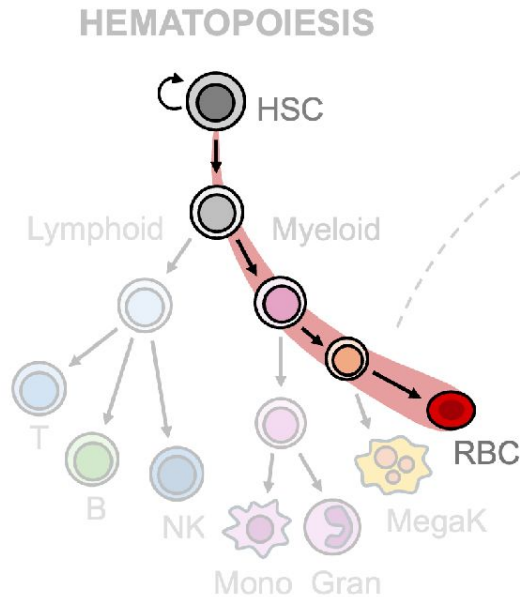


Post transcriptional regulation

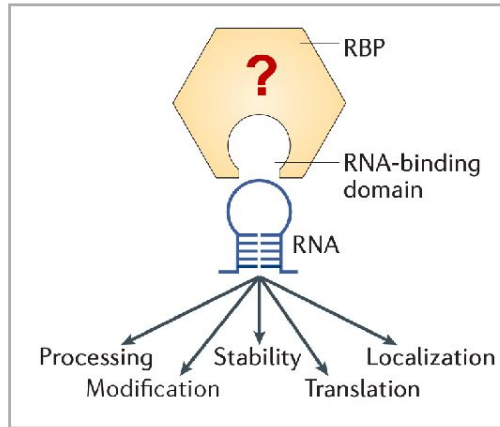


Few RNA binding proteins are known to regulate erythropoiesis

Post-transcriptional regulation of erythropoiesis is poorly understood



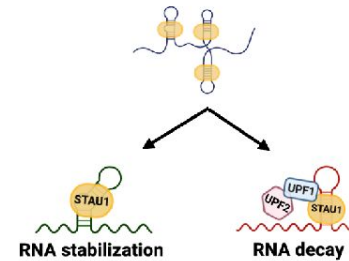
Post transcriptional regulation



Few RNA binding proteins are known to regulate erythropoiesis

Staufen1 (STAU1)

STAU1 binds dsRNA

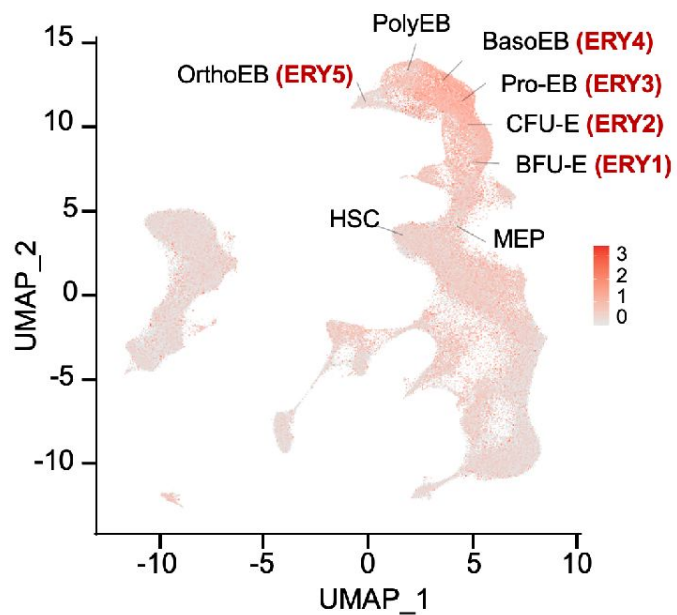


- Highly multifunctional
- Stem regulatory function in other tissues (ex. skin, adipose)
- No known function in the blood

① STAU1 is upregulated during erythropoiesis

STAU1 (Adult bone marrow)

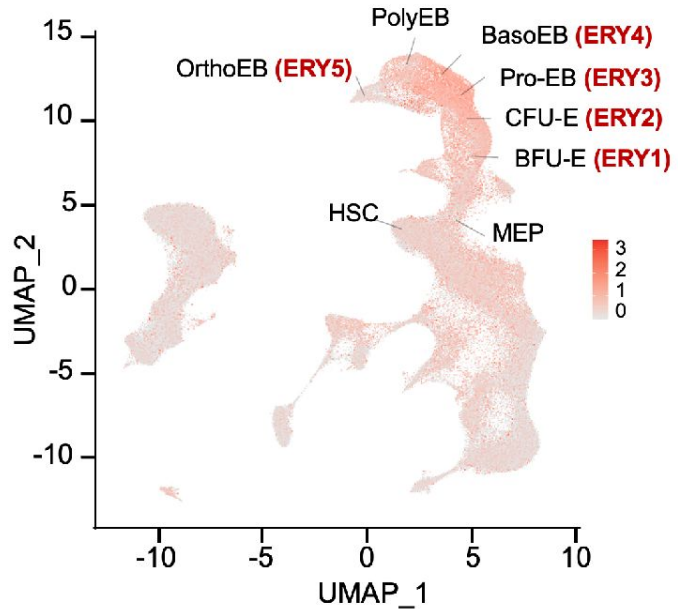
BoneMarrowMap 2024



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STAU1 (Adult bone marrow)

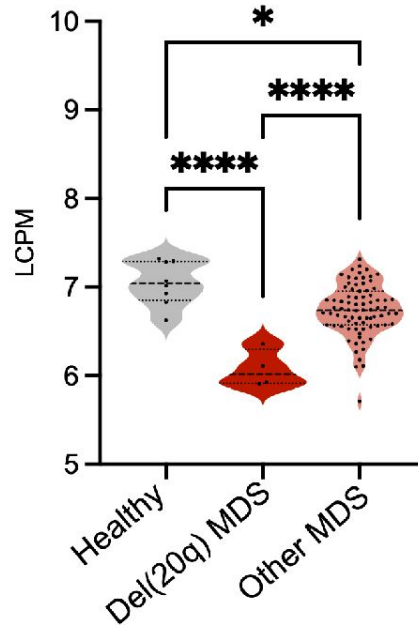
BoneMarrowMap 2024



② STAU1 is downregulated in MDS

STAU1 (CD34+ MDS bone marrow)

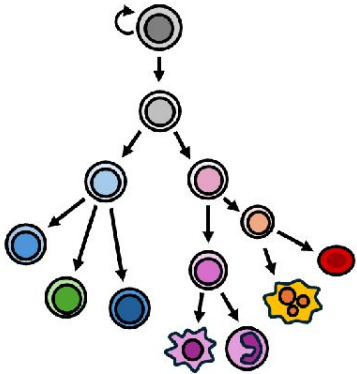
Pellegatti et al., 2018



We hypothesize that STAU1 regulates erythropoiesis, and that its loss contributes to the pathogenesis of MDS.

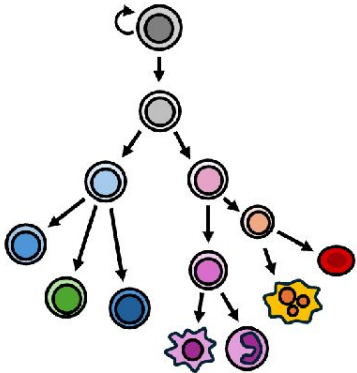
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① What is the **function** of STAU1 in hematopoiesis?

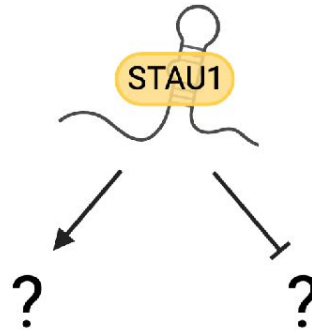


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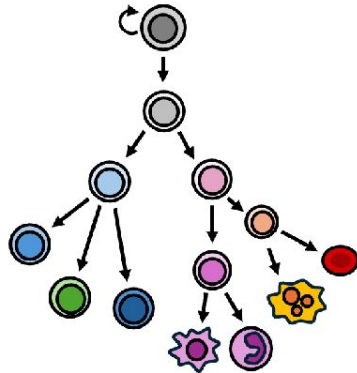


② What **pathways and processes** are regulated by STAU1?

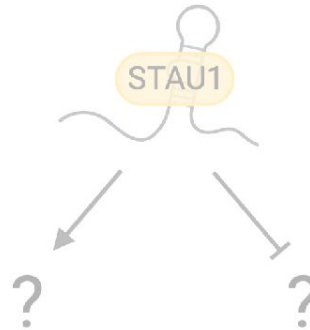


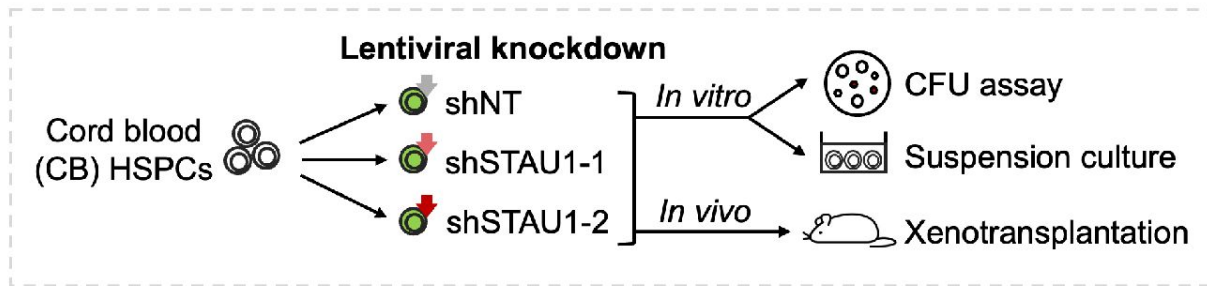
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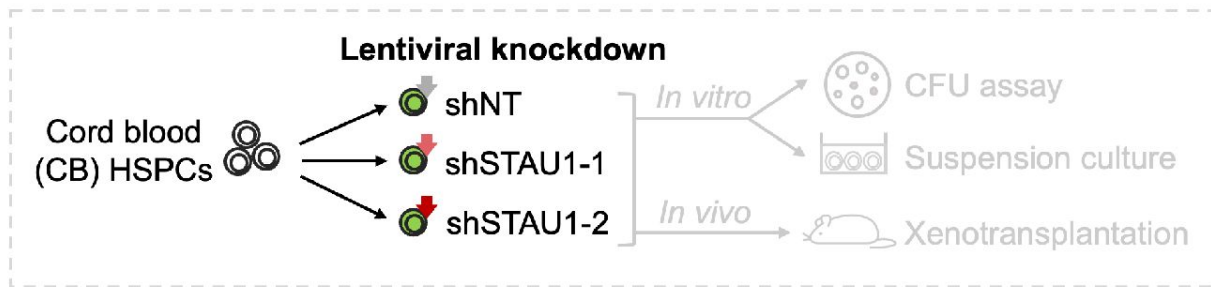
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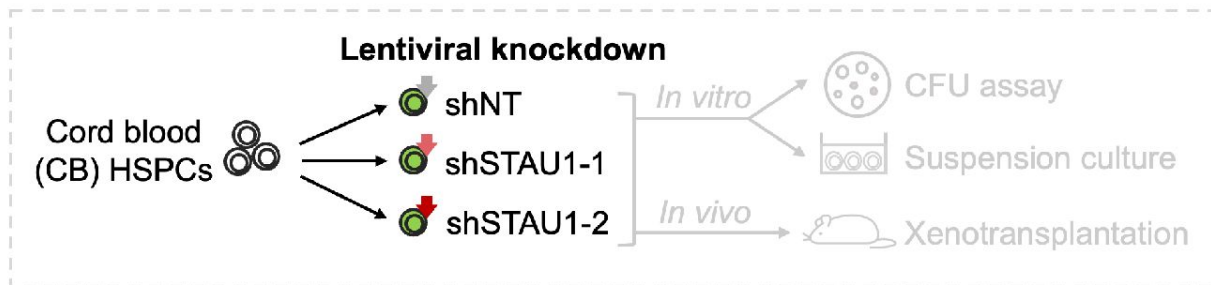


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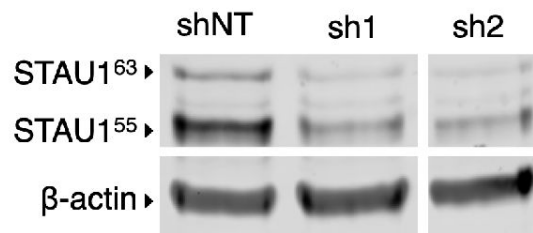


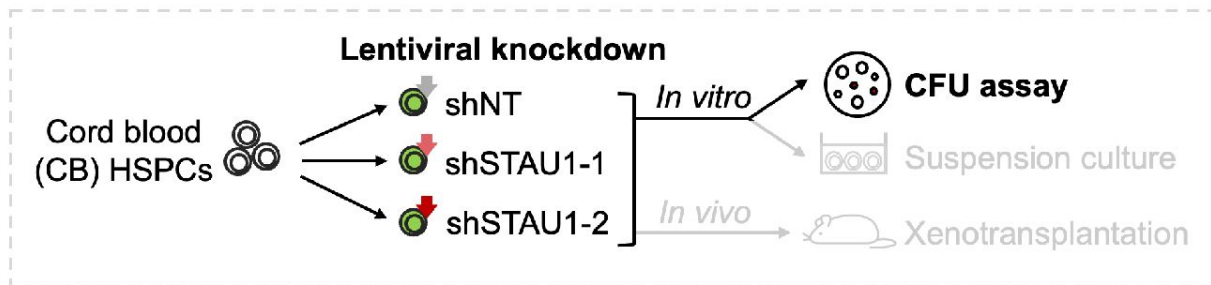


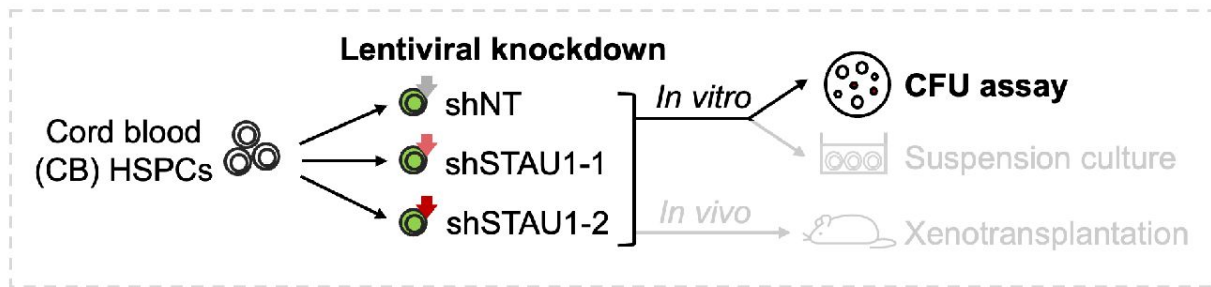




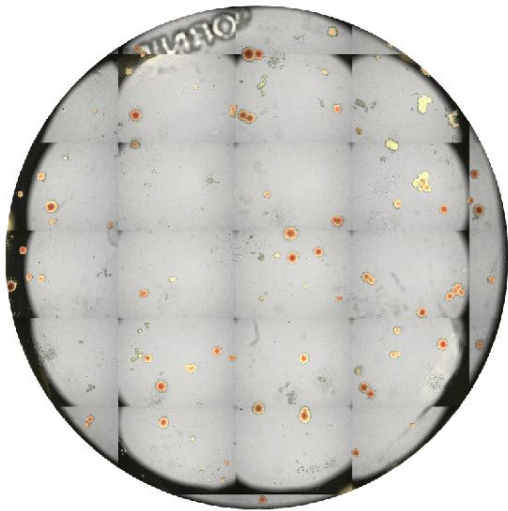
Western Blot in K562

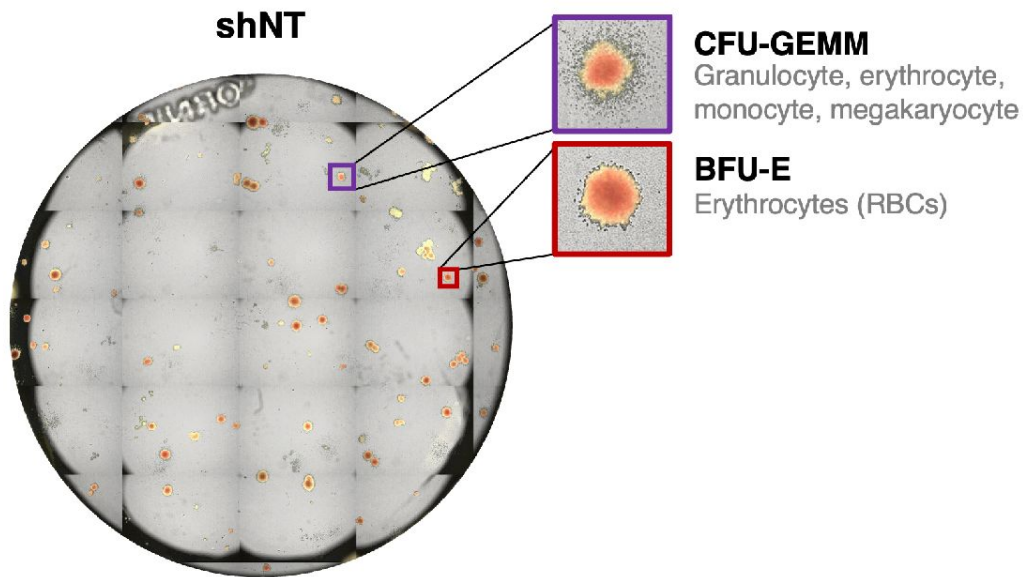
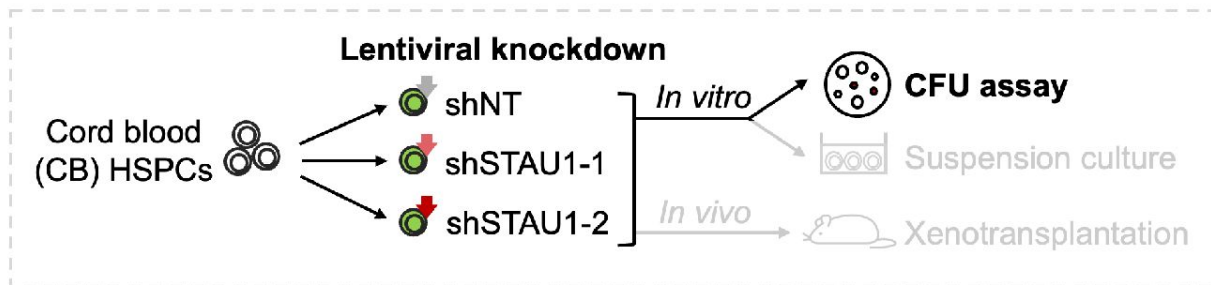


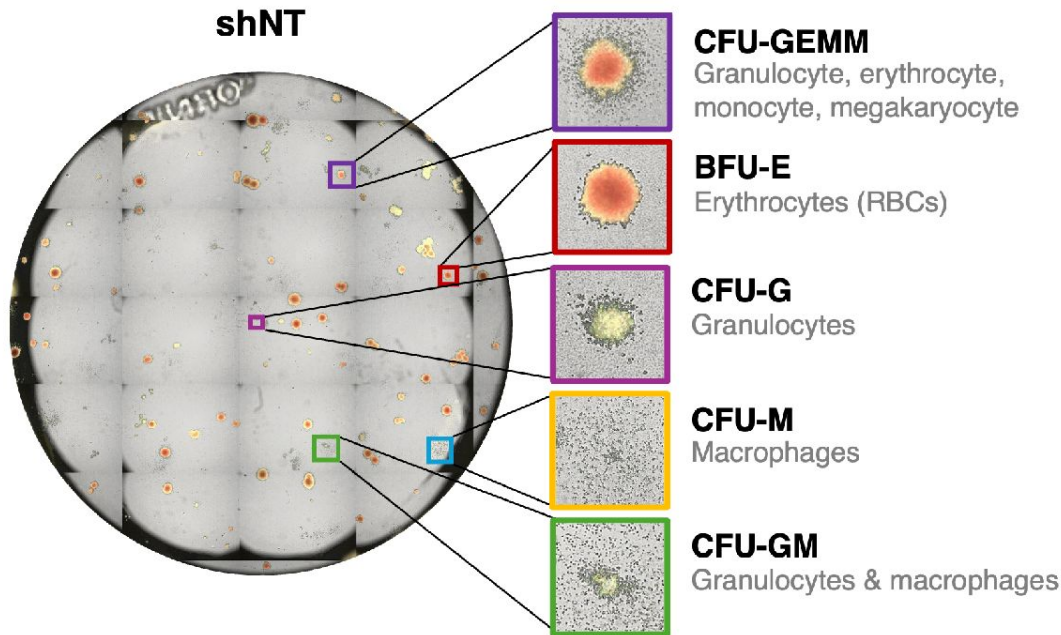
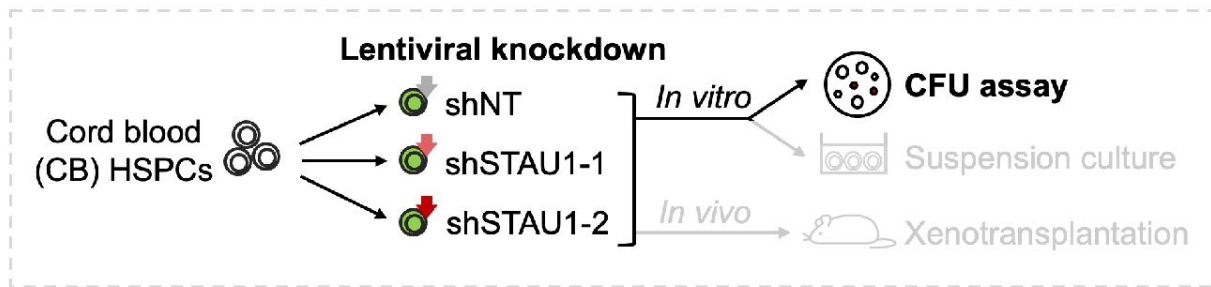


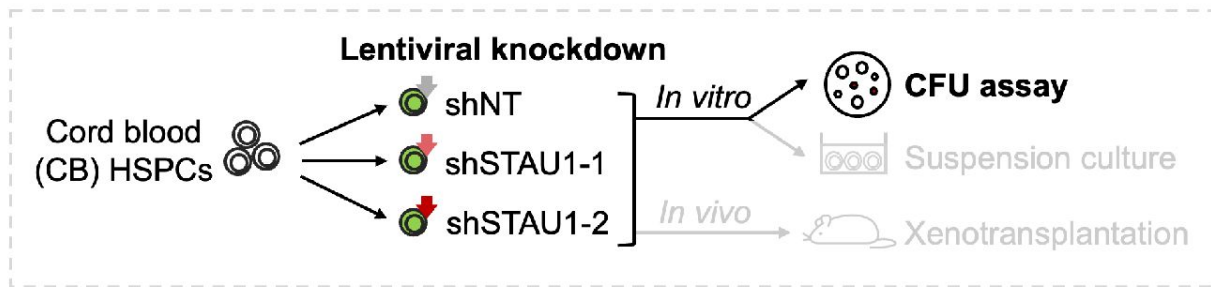


shNT

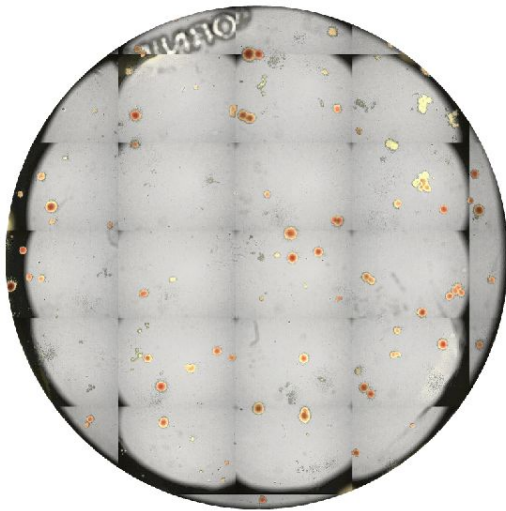


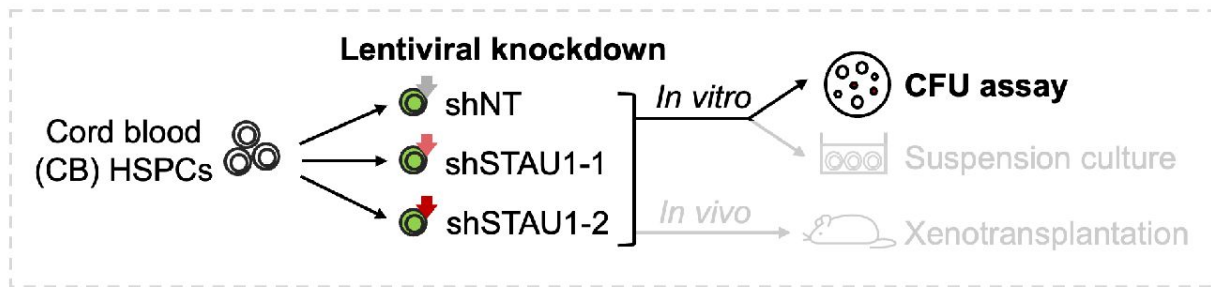
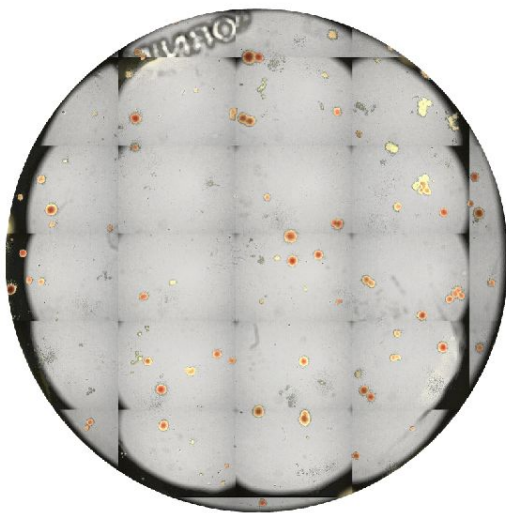
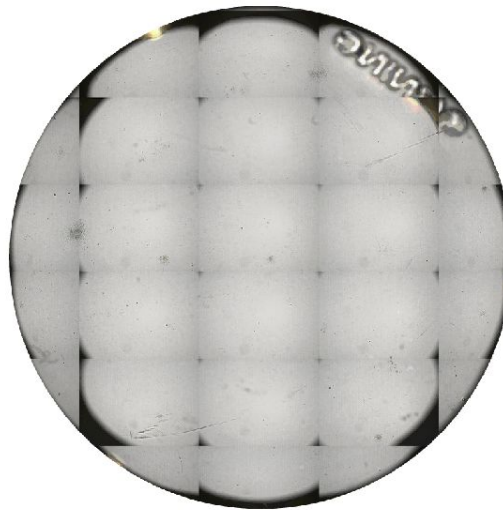
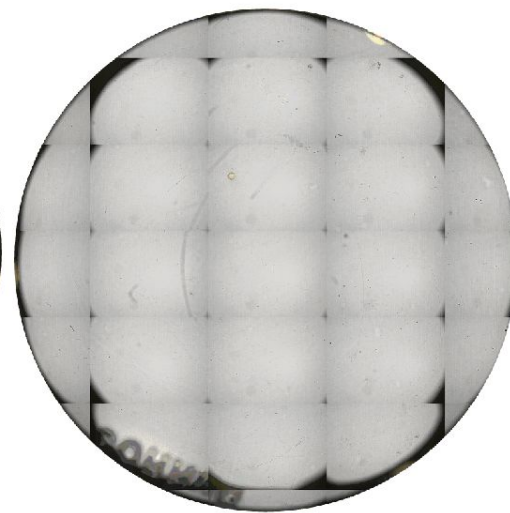


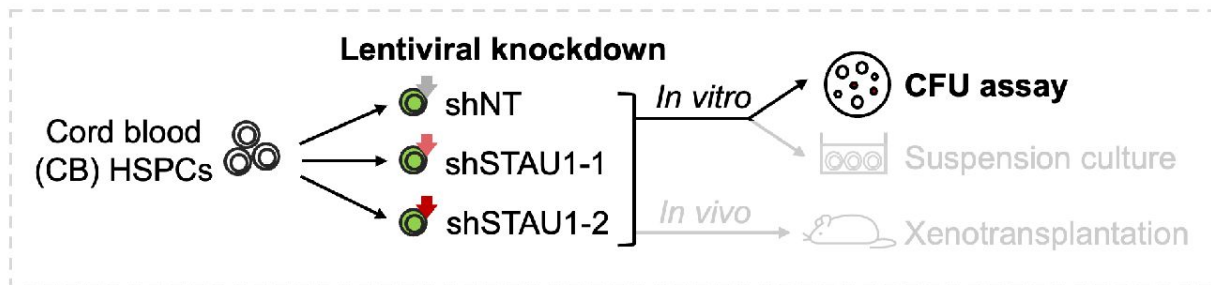




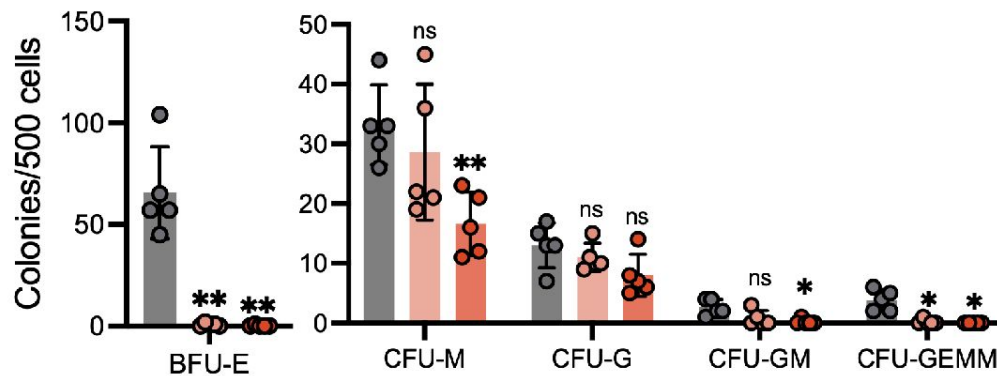
shNT



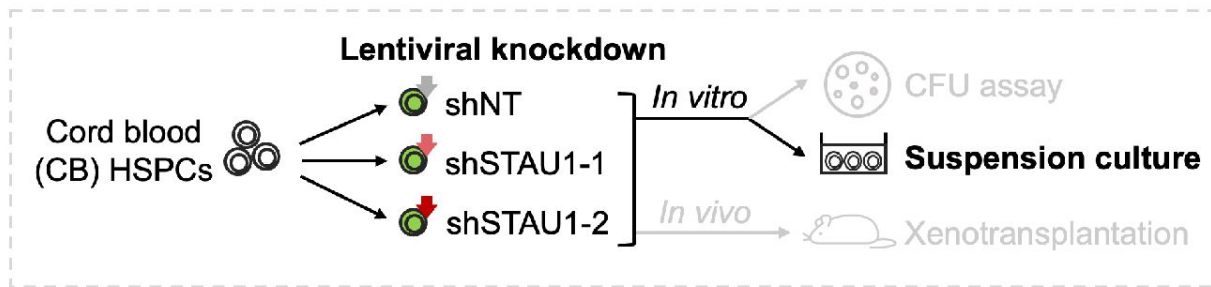
**shNT****shSTAU1-1****shSTAU1-2**

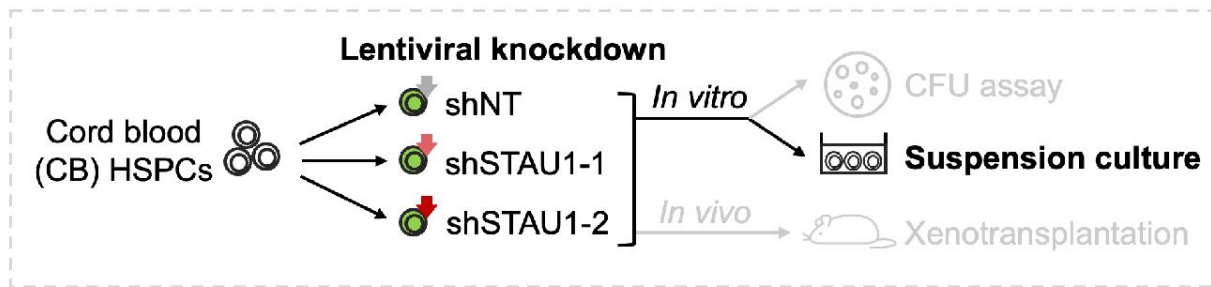


Colony forming unit assay

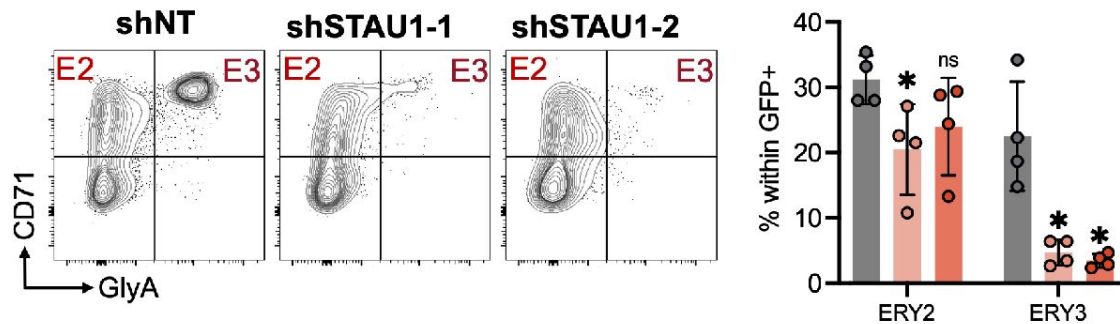


STAU1 knockdown inhibits erythropoiesis.



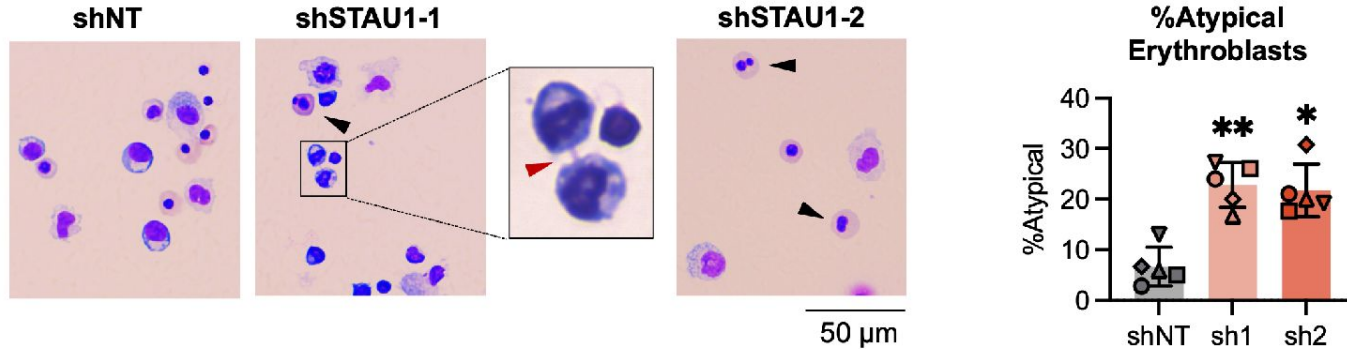
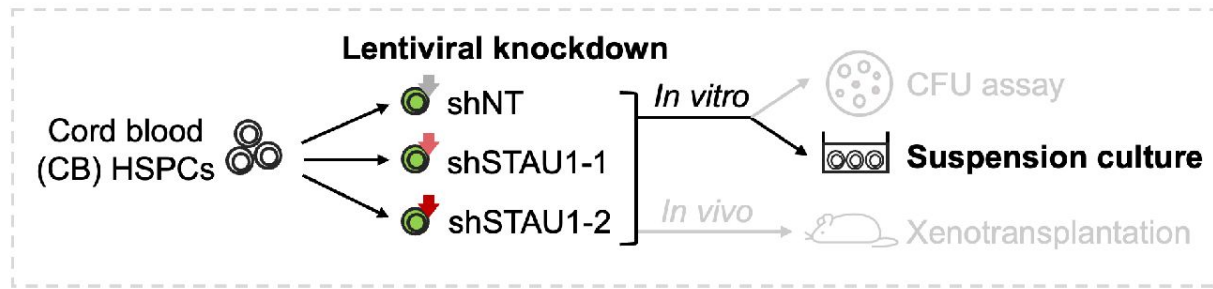


Day 7 in Erythroid Culture

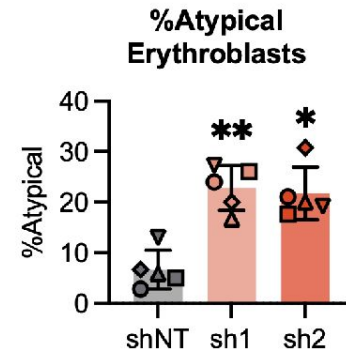
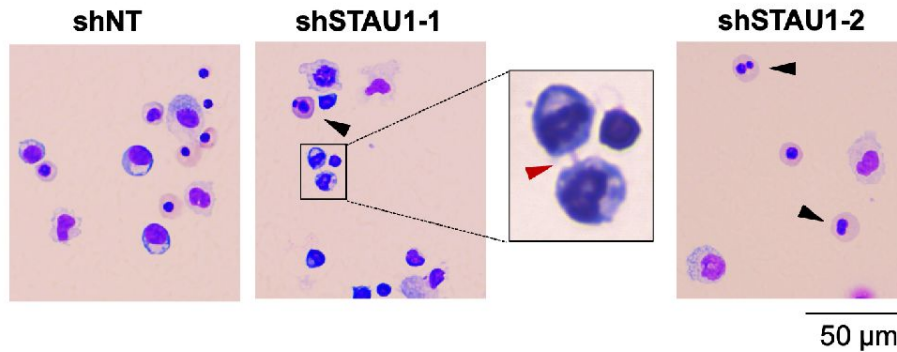
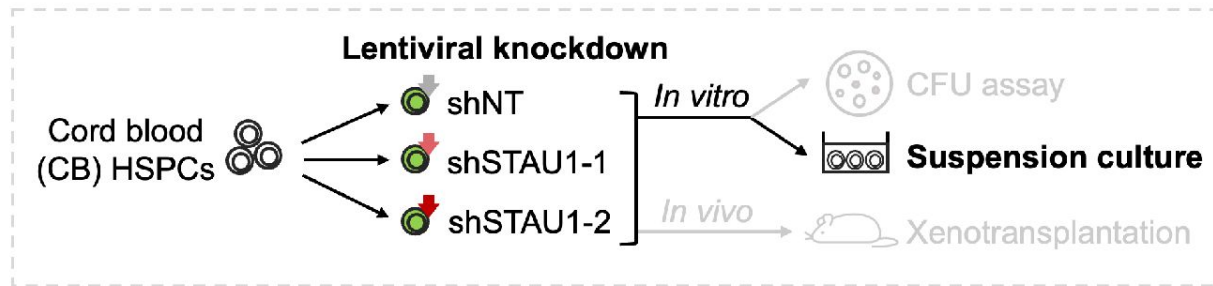


STAU1 knockdown impairs entry to terminal erythroid differentiation (TED).

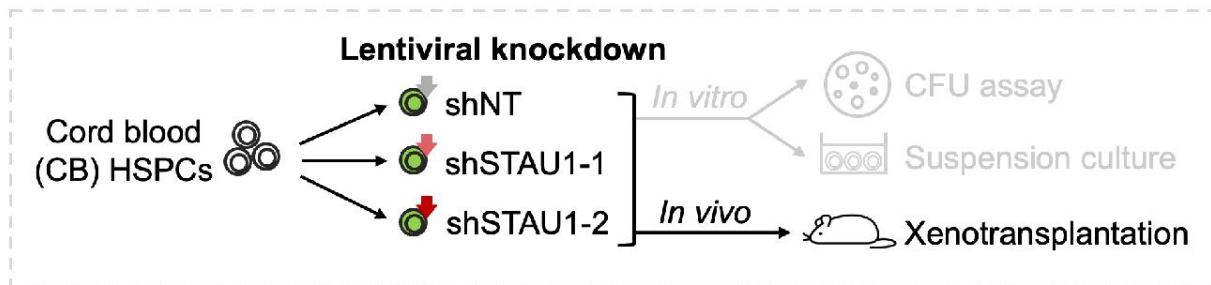
shNT shSTAU1-1 shSTAU1-2

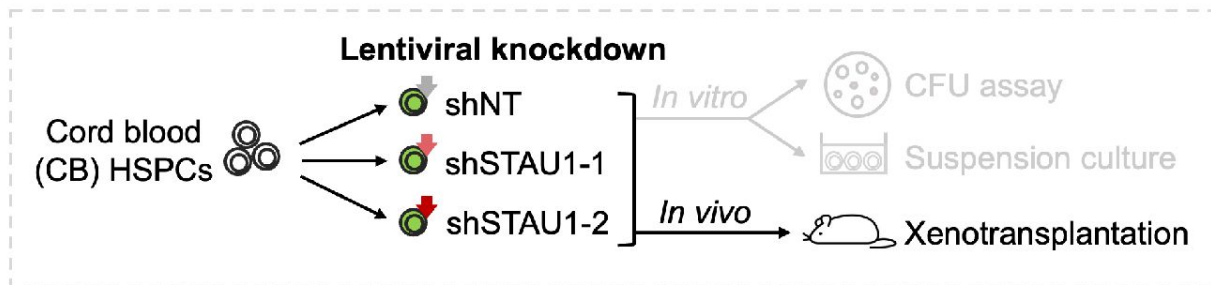


STAU1 loss increases the frequency of morphologically atypical erythroblasts.

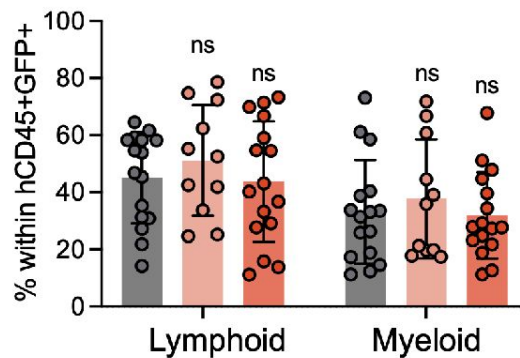


STAU1 loss recapitulates key features of MDS.

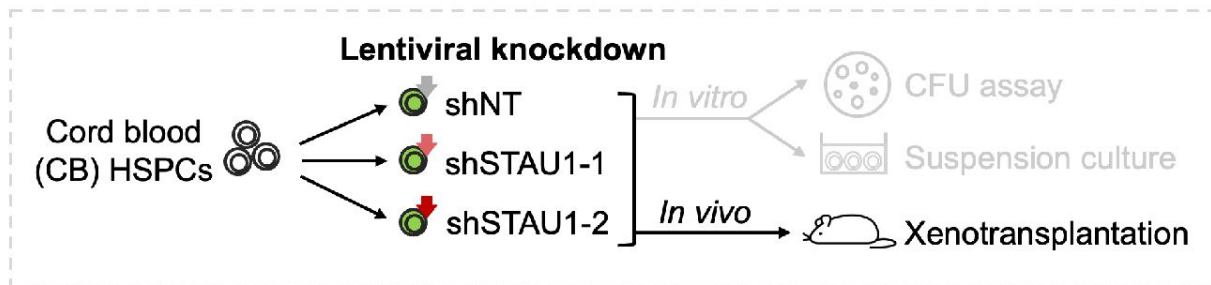
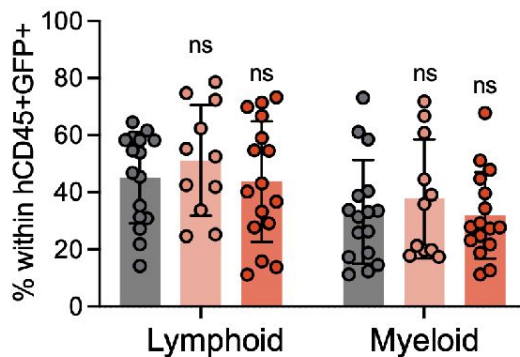
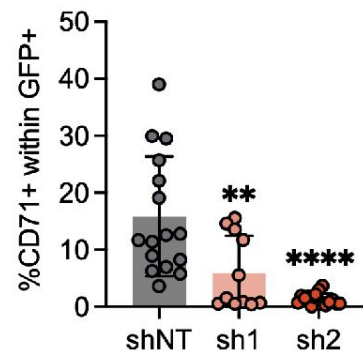


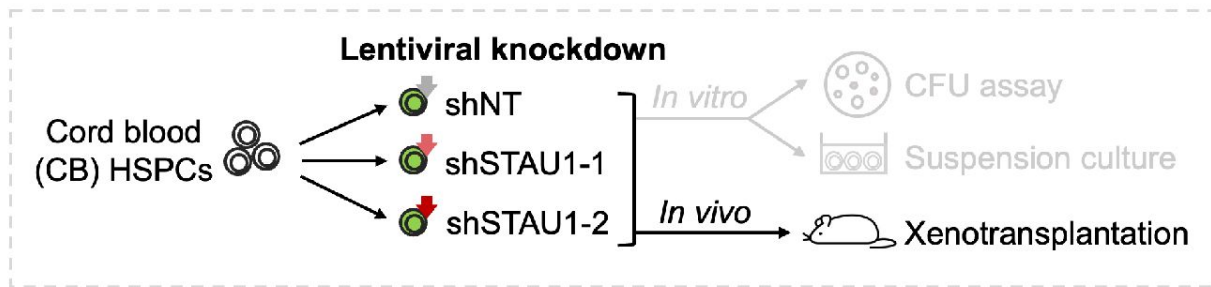
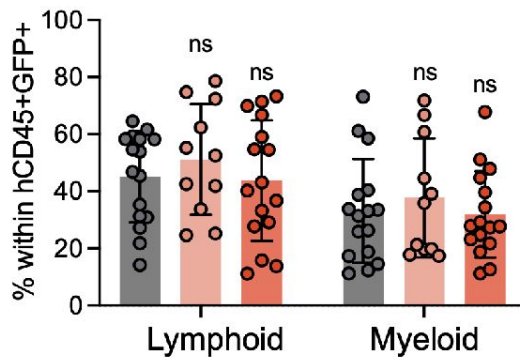
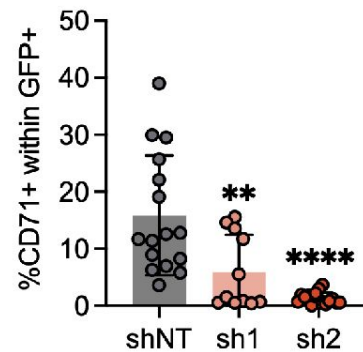


Lymphoid/Myeloid Balance (16wk)



shNT shSTAU1-1 shSTAU1-2

**Lymphoid/Myeloid Balance (16wk)****Erythroid (16 wk)**

**Lymphoid/Myeloid Balance (16wk)****Erythroid (16 wk)**

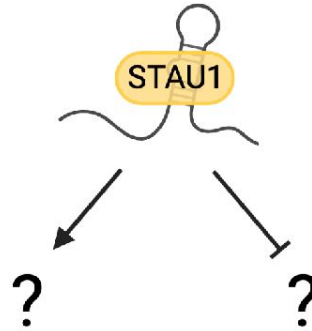
The erythroid defect imposed by STAU1 loss can be perpetuated long-term by the HSC.

We hypothesize that STAU1 regulates erythropoiesis, and that its loss contributes to the pathogenesis of MDS.

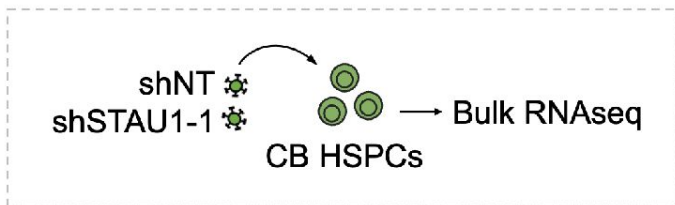
① What is the **function** of STAU1 in hematopoiesis?



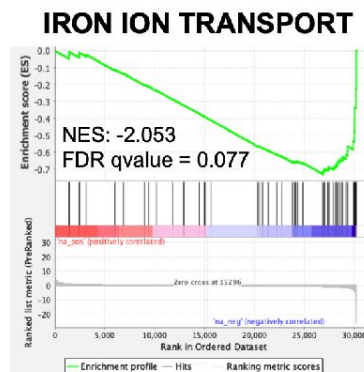
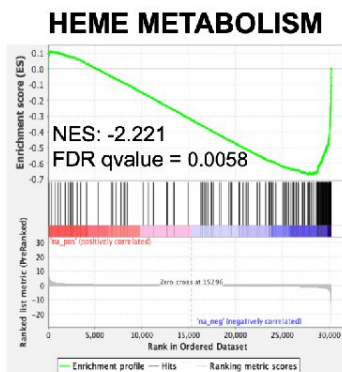
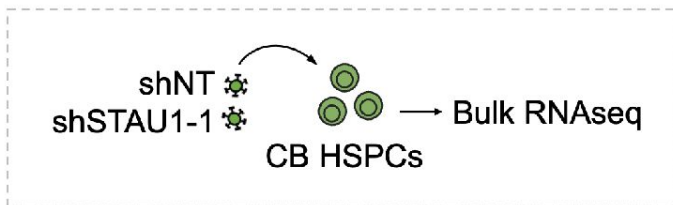
② What **pathways and processes** are regulated by STAU1?



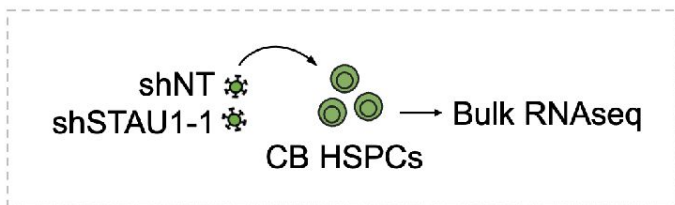
STAU1 loss compromises iron metabolism programs



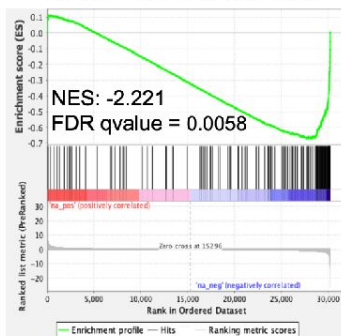
STAU1 loss compromises iron metabolism programs



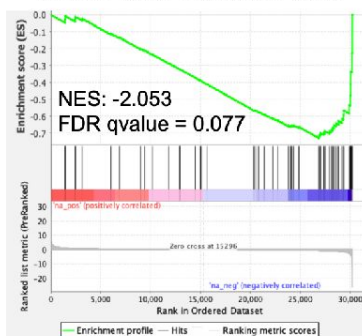
STAU1 loss compromises iron metabolism programs



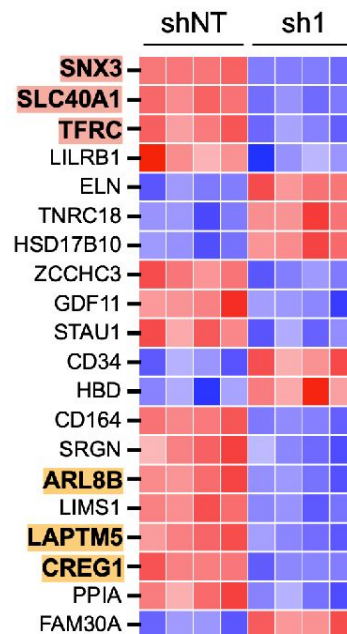
HEME METABOLISM



IRON ION TRANSPORT



TOP 20 DEGs



Z-score

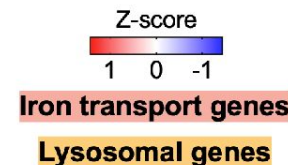
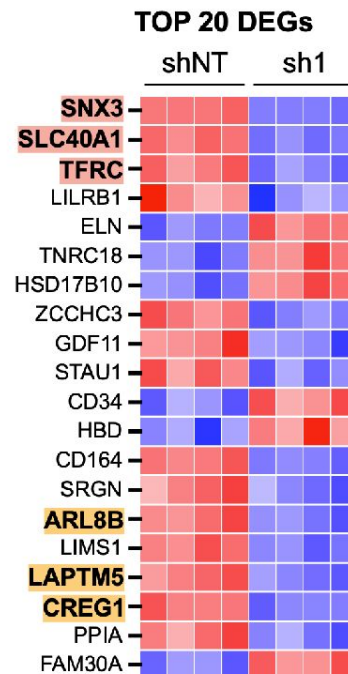
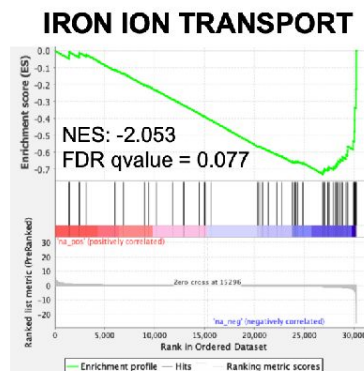
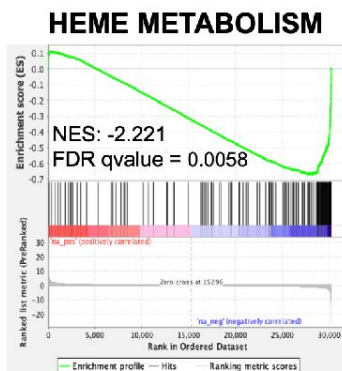
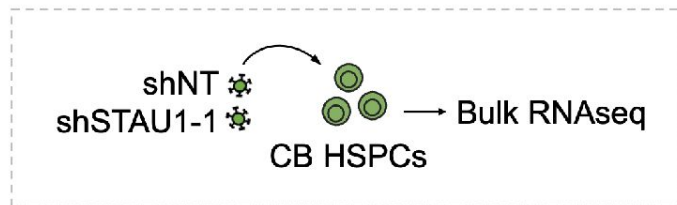


1 0 -1

Iron transport genes

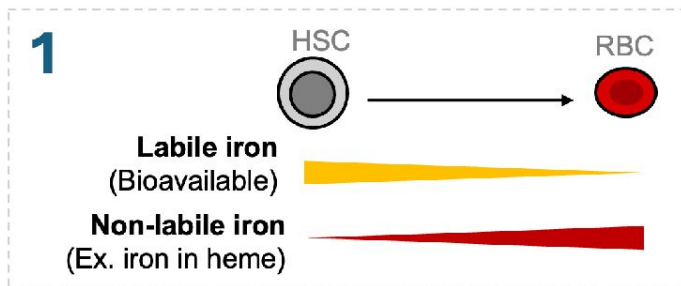
Lysosomal genes

STAU1 loss compromises iron metabolism programs

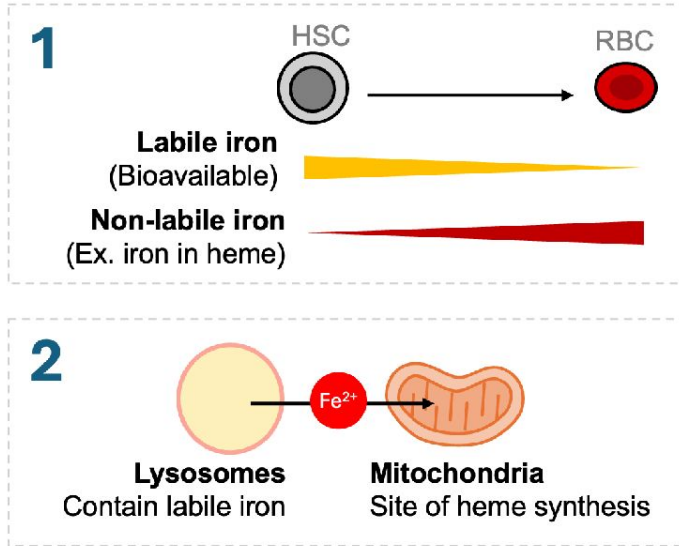


Is this dysregulation of iron metabolism functionally detectable?

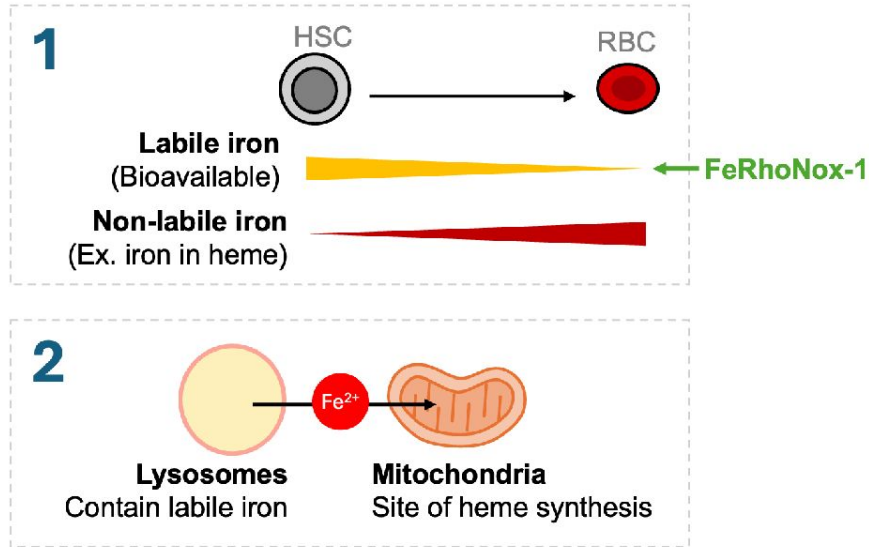
STAU1 loss elevates intracellular labile iron levels



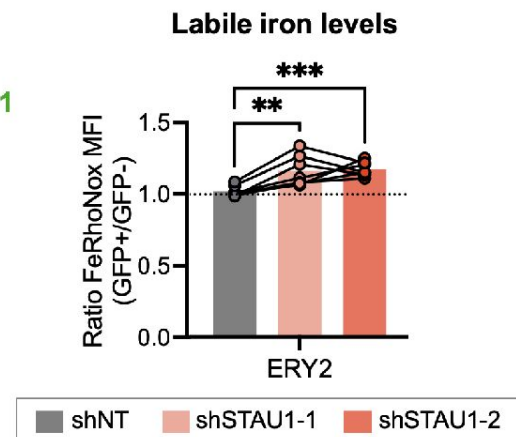
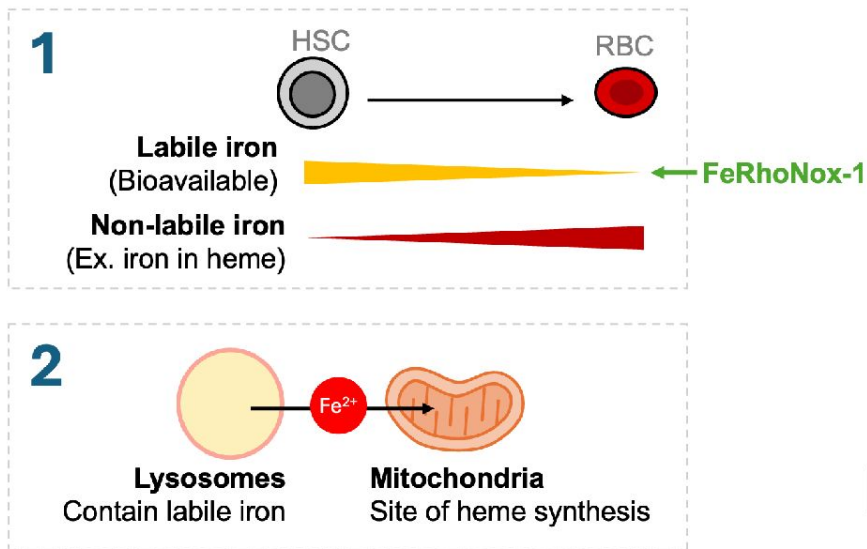
STAU1 loss elevates intracellular labile iron levels



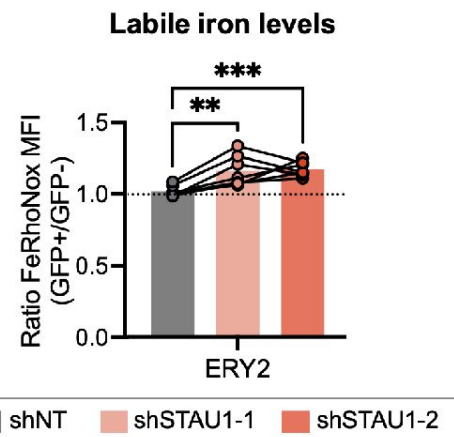
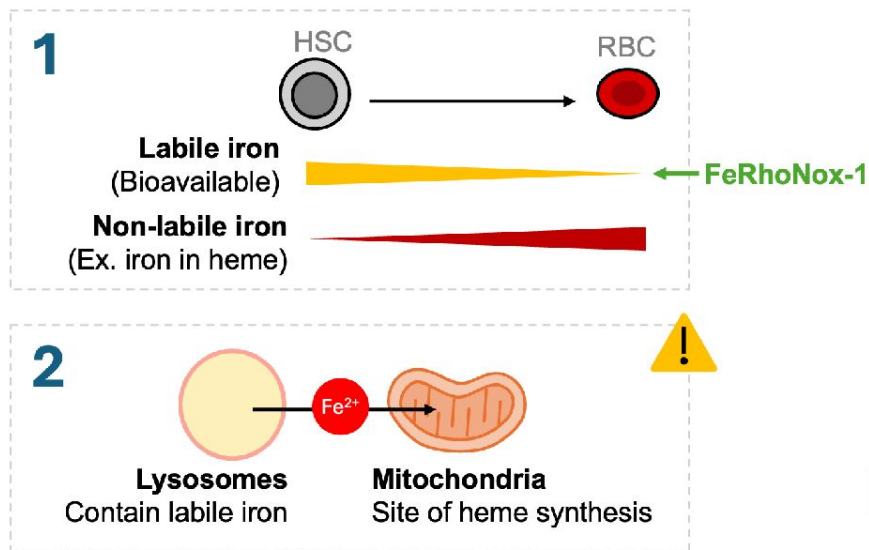
STAU1 loss elevates intracellular labile iron levels



STAU1 loss elevates intracellular labile iron levels

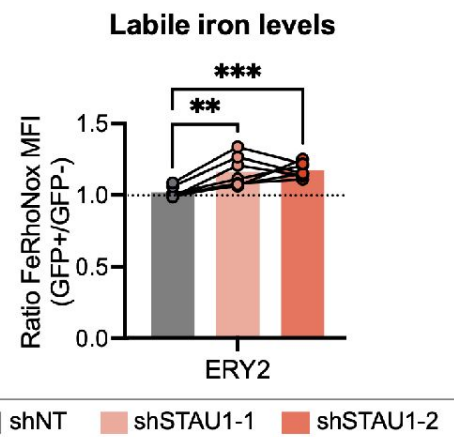
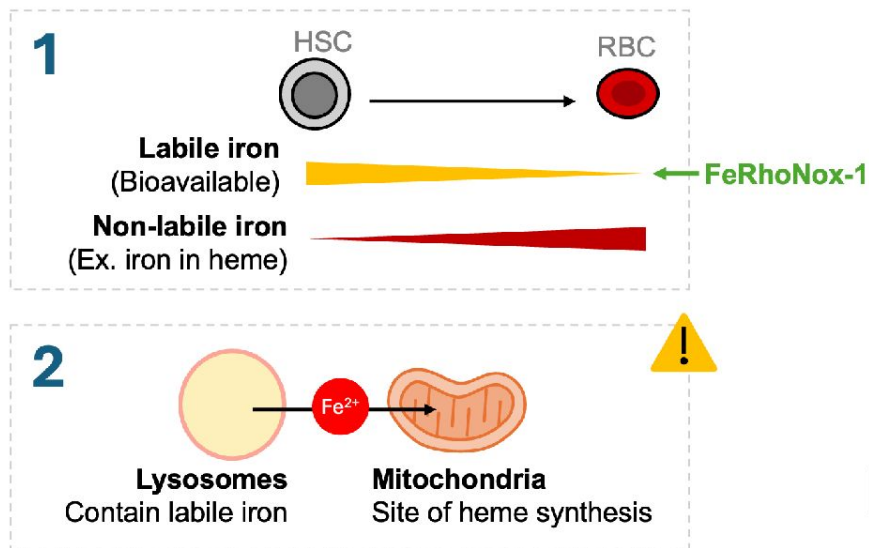


STAU1 loss elevates intracellular labile iron levels



STAU1 knockdown impairs erythroid iron trafficking.

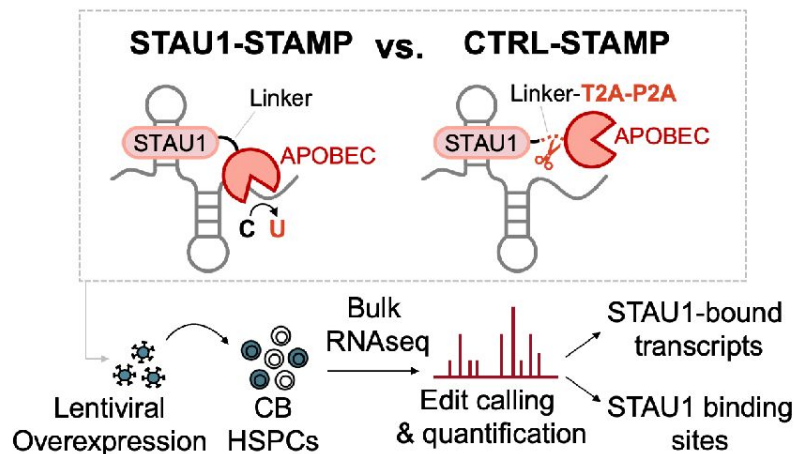
STAU1 loss elevates intracellular labile iron levels



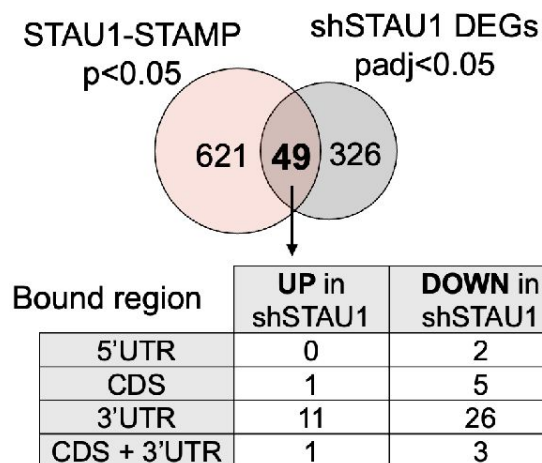
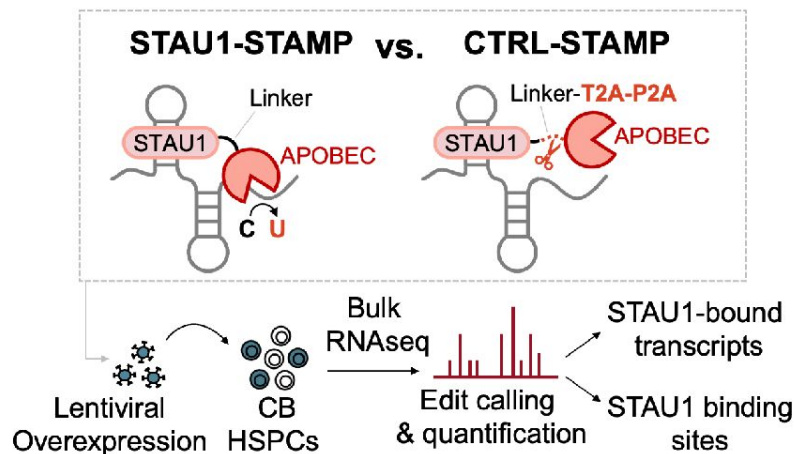
STAU1 knockdown impairs erythroid iron trafficking.

How does STAU1 loss enact this dysregulation of iron transport?

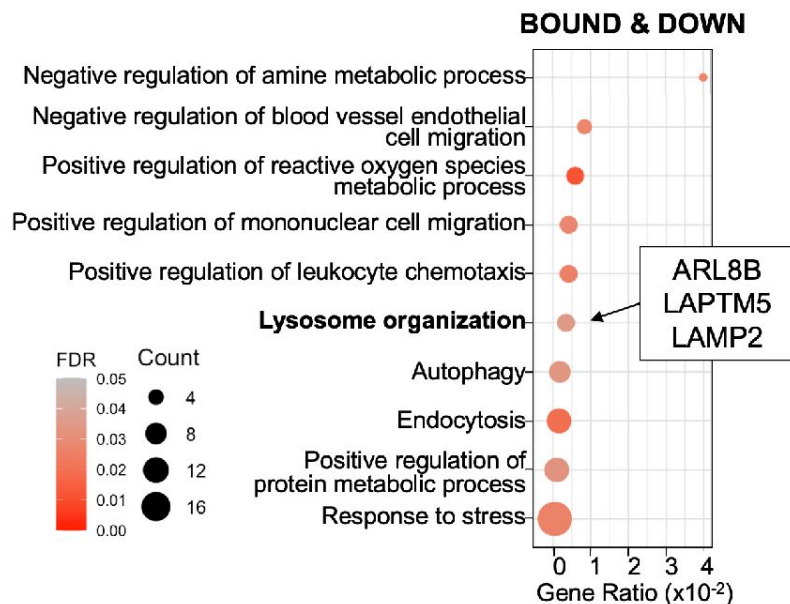
Surveying Targets by APOBEC-Mediated Profiling (STAMP)



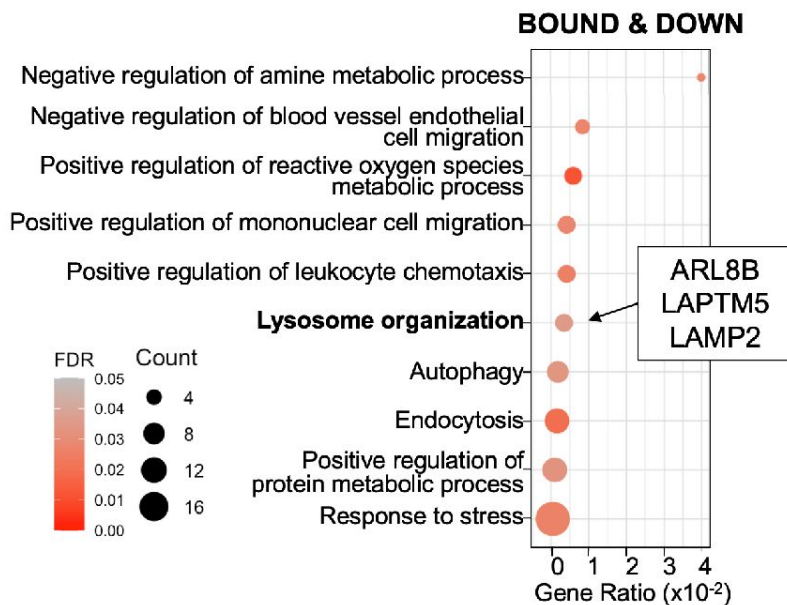
Surveying Targets by APOBEC-Mediated Profiling (STAMP)



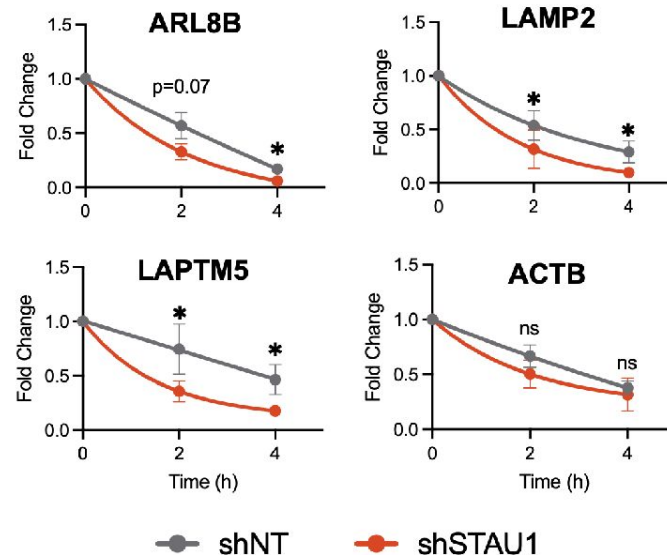
STAU1 binds and stabilizes lysosome-associated transcripts



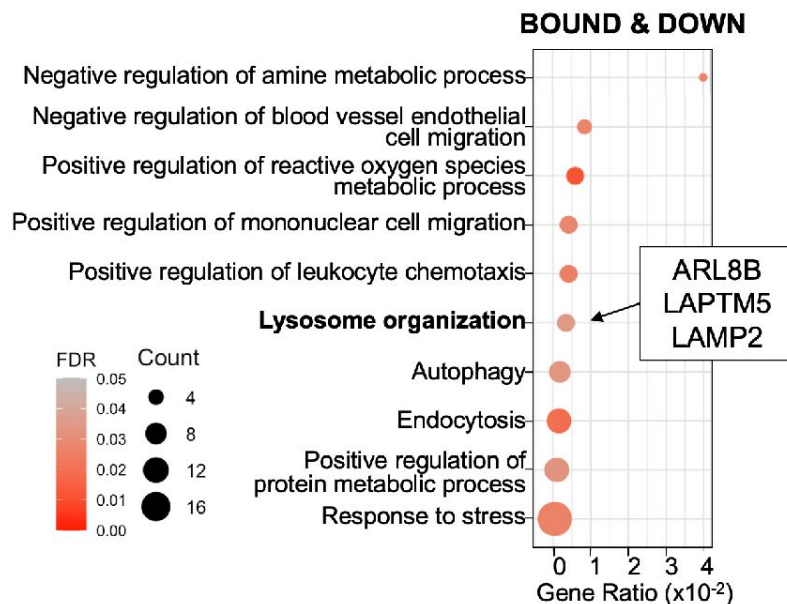
STAU1 binds and stabilizes lysosome-associated transcripts



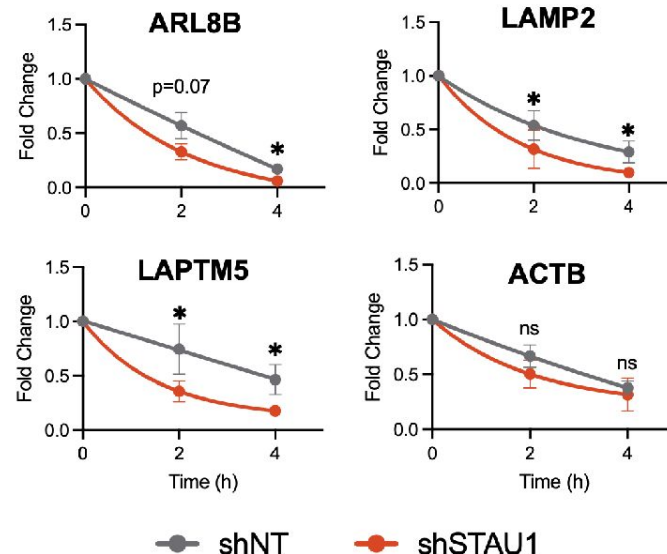
Actinomycin D mRNA decay curves



STAU1 binds and stabilizes lysosome-associated transcripts

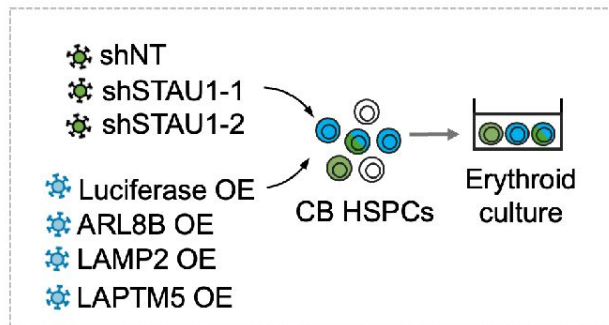


Actinomycin D mRNA decay curves

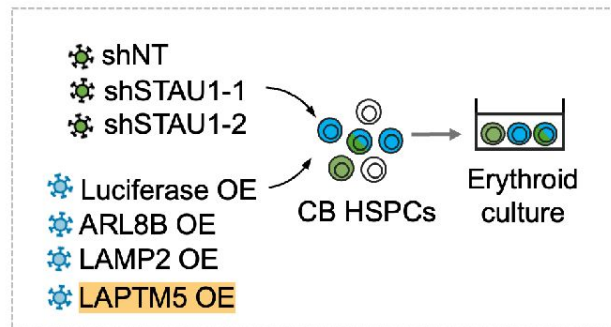


***ARL8B*, *LAMP2*, and *LAPT5* are lysosomal mRNAs stabilized by STAU1**

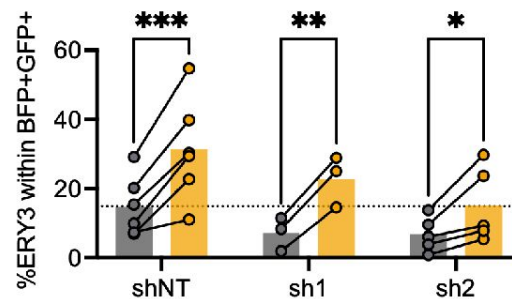
LAPTM5-OE partially rescues STAU1-KD



LAPTM5-OE partially rescues STAU1-KD

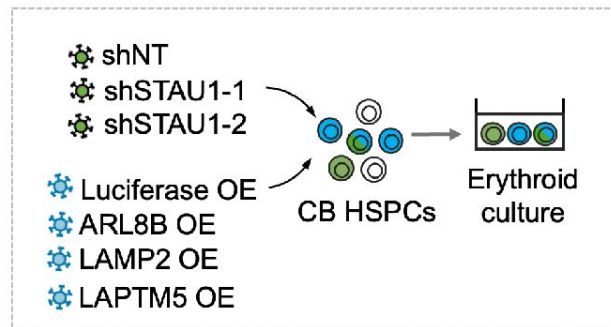


%ERY3 within BFP+GFP+

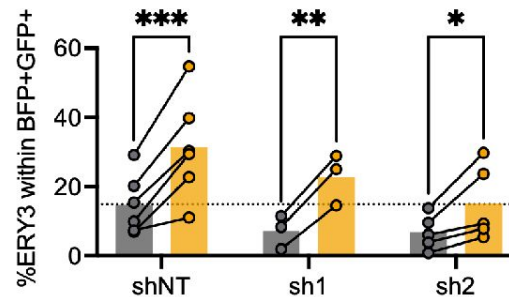


■ LUC OE ■ LAPTM5 OE

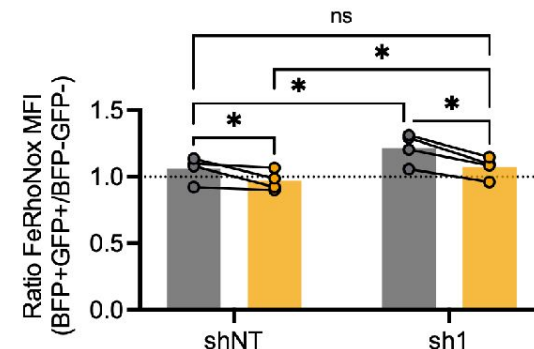
LAPTM5-OE partially rescues STAU1-KD



%ERY3 within BFP+GFP+

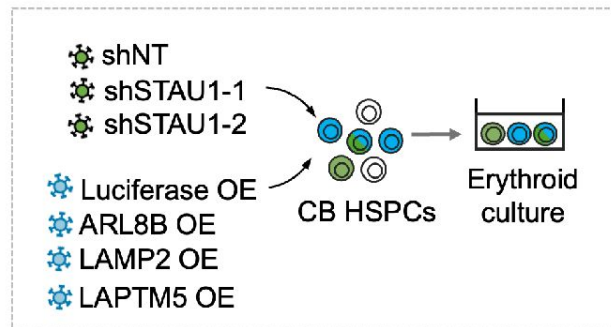


Labile Iron Levels

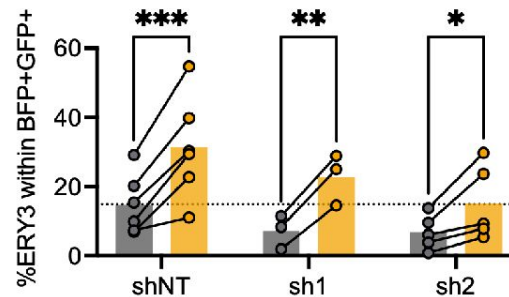


■ LUC OE ■ LAPTM5 OE

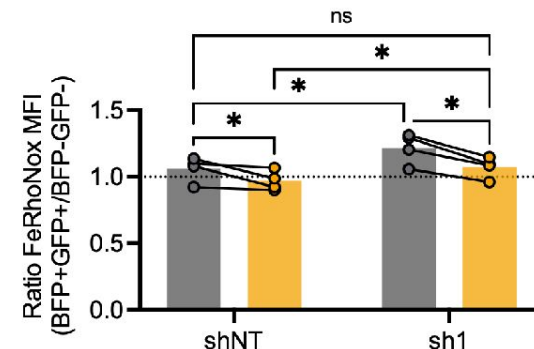
LAPTM5-OE partially rescues STAU1-KD



%ERY3 within BFP+GFP+



Labile Iron Levels



■ LUC OE ■ LAPTM5 OE

LAPTM5 is a key downstream target of STAU1.

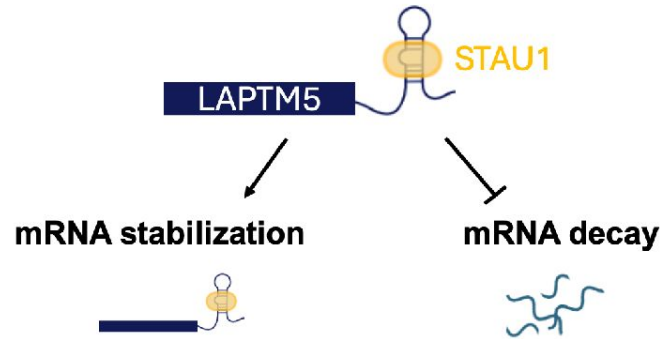
Conclusion: working model

STAU1 binds lysosome-associated transcripts



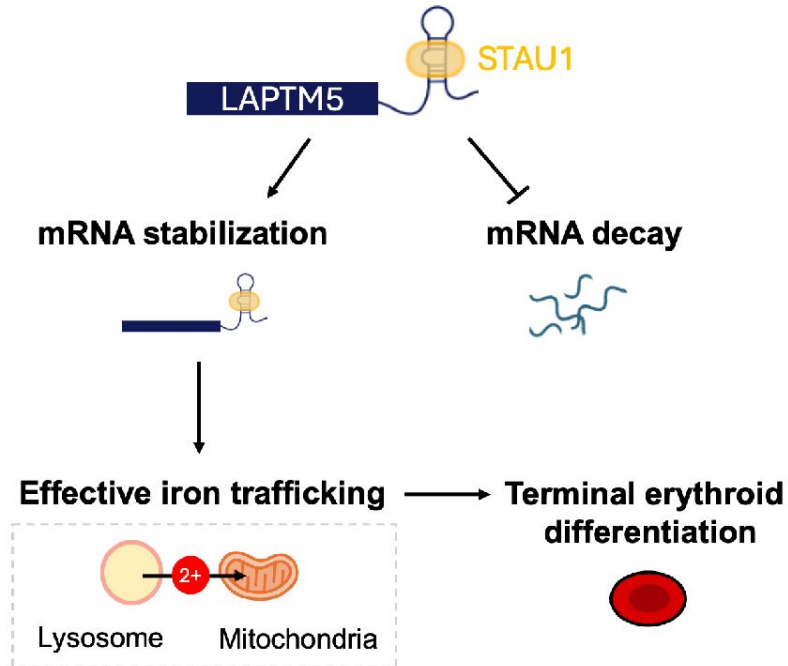
Conclusion: working model

STAU1 binds lysosome-associated transcripts



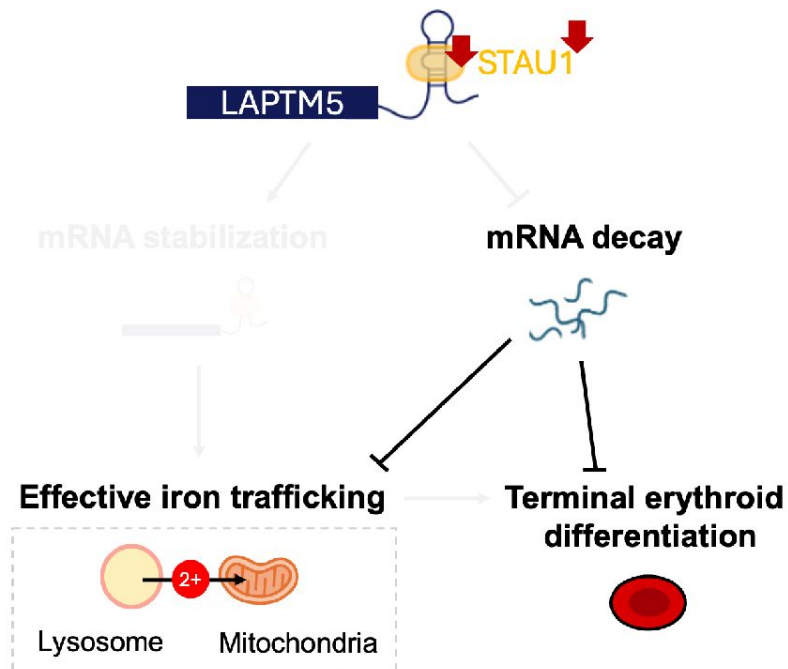
Conclusion: working model

STAU1 binds lysosome-associated transcripts



Conclusion: working model

STAU1 binds lysosome-associated transcripts



Conclusions

1. STAU1 is an essential post-transcriptional regulator of human erythropoiesis
2. Loss of STAU1 recapitulates key features of MDS
3. STAU1 binds and stabilizes lysosomal transcripts to enable effective iron trafficking

Conclusions

1. STAU1 is an essential post-transcriptional regulator of human erythropoiesis
2. Loss of STAU1 recapitulates key features of MDS
3. STAU1 binds and stabilizes lysosomal transcripts to enable effective iron trafficking

Future directions

1. How does LAPTM5 participate in iron trafficking?
2. Is perturbed iron trafficking a broad feature of MDS?

Thank you for listening! 😊

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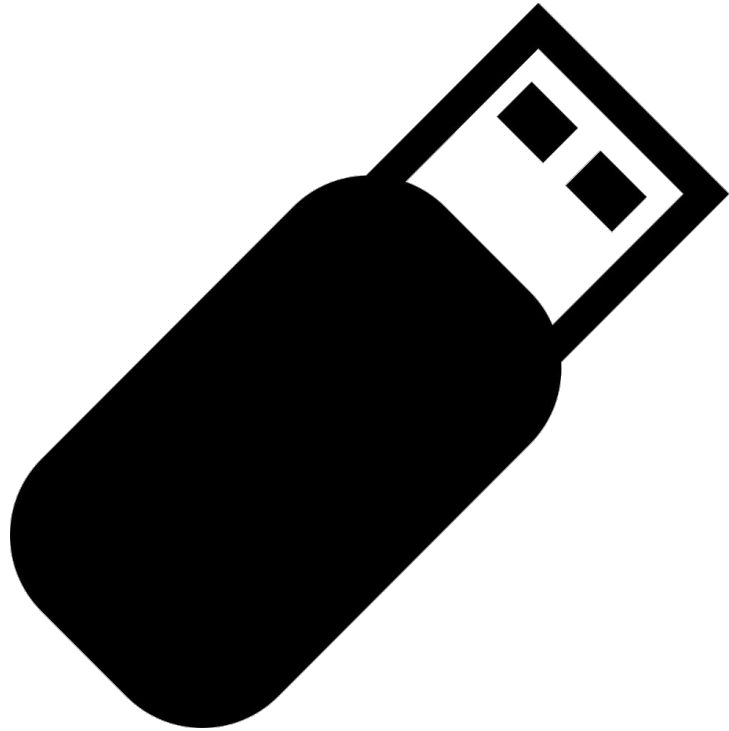
Dr. Gene Yeo
Eric Koffman, PhD
Brian Yee
Dr. Stefan Aigner
Steven Blue

Core Facilities

PM Flow
SickKids TCAG



Cord blood + patient sample donors!



- **Bring talk on a USB**
- Roll with the punches
- Have an extra copy of your slides
- Test, test, test
- Turn off notifications
- Factor 15 mins for PMH elevators

Adapted from Ellis SE, CC BY 4.0

<https://leanpub.com/universities/courses/jhu/cbds-communication>

Questions after talks

- Priority will be questions from the live audience
- Feel free to use the raise hand feature of Zoom during the talk
- Usual priority of questions
 1. Students
 2. Other faculty
 3. Stephanie/Melanie



DON'T: distract your audience and use up your space with template junk
DO: maintain picture ratios

Questions

- **Repeat the question back to the audience**
- Take a moment to think
- It's ok to say “I don't know”



Presenter #1:

Organization:

- ☐ Outlined background accurately
- ☐ Indicated work's place in the field
- ☐ Identified problem early in talk
- ☐ Described personal contributions
- ☐ Had coherent narrative with a logical flow
- ☐ Delivered appropriate abstract, on time
- ☐ Finished presentation on time
- ☐ Clear take-home message and next steps

/100

Content/Science:

- ☐ Described methods clearly
- ☐ Evaluated results critically
- ☐ Demonstrated significance of project
- ☐ Rigor of approach and conclusions
- ☐ Avoided jargon
- ☐ Answered questions calmly and clearly

/100

DON'T: wave your laser pointer around

Presentation:

- ☐ Slides legible and understandable
- ☐ Data labeled well
- ☐ Appropriate amount of information on each slide
- ☐ Voice audible, pace reasonable, well-modulated
- ☐ Used audiovisual tools effectively
- ☐ "Sparkle" or enthusiasm
- ☐ Materials produced by others clearly identified and cited

/100

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Course coordinators
(Questions about course
content or other course
related items etc)

MBP department
coordinator (Questions
about course grading etc)

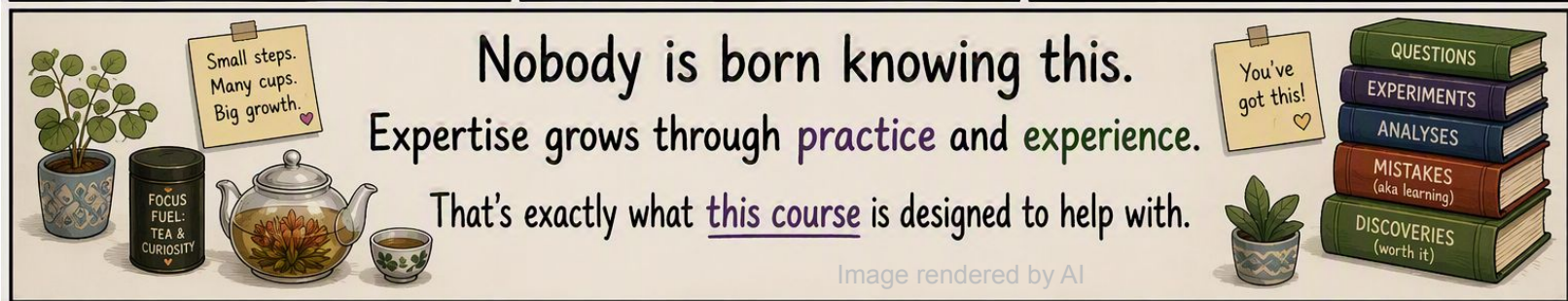
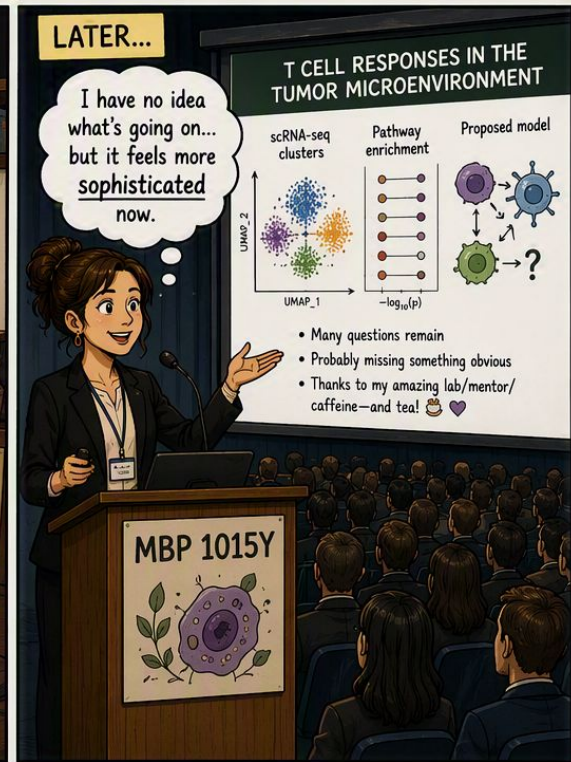
MBP Course TA
(Practical questions etc.)

Deadlines

- **23 September 2026:** Seminar titles to Jasmin (jasmin.dhillon@utoronto.ca)
You can change your title later. Don't overthink it.

If you have not sent your title, please do!!

- **Thursday before your presentation (The week before):** email abstract to Jasmin
- Links to evaluation forms for faculty and students will be sent out every week on the seminar date.



Thank you!

- Slides from M. Hoffman, M. Akens, F. Gaiti, M. Courtot, S. Xie
- MBP “dream” team: Laurie Ailles, Charles Berger, Chau Dang, Jasmin Dhillon, Merle Casci