Abstracts & Titles

20.109 Communication Workshop 3

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MIT BE
BIOLOGICAL ENGINEERING

Communication Lab

Helping you communicate effectively.
mitcommlab.mit.edu/be/

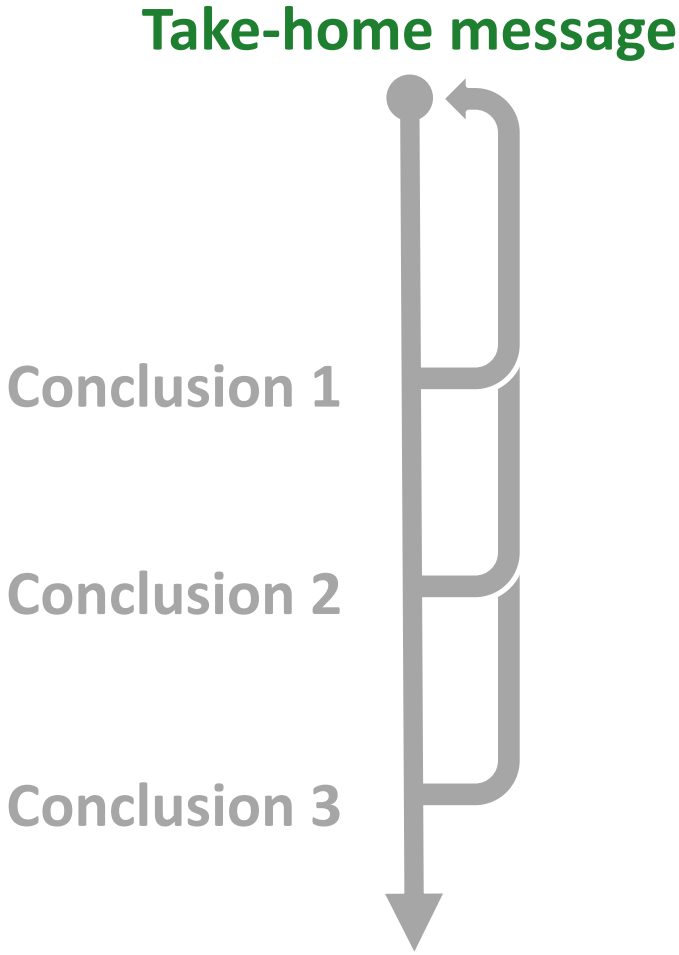
Untitled
Mark Rothko, 1968
Phillips Collection (Washington, DC)

Our Communication Workshops support your major assignments

Workshop 1: Figures (overview)	
Workshop 2: Figure Captions & Titles	Mod 1 Report
Workshop 3: Abstracts & Titles	
Workshop 4: Oral Presentations	Journal Article Presentation
Workshop 5: Manuscripts	Mod 2 Report
Workshop 6: Proposals	Research Proposal

Your title and abstract convey your take-home message

WHAT
Take-home message



Why was this an important study?

How does it further scientific thinking?

Why should anyone read your paper?

ACTIVITY – 5mins

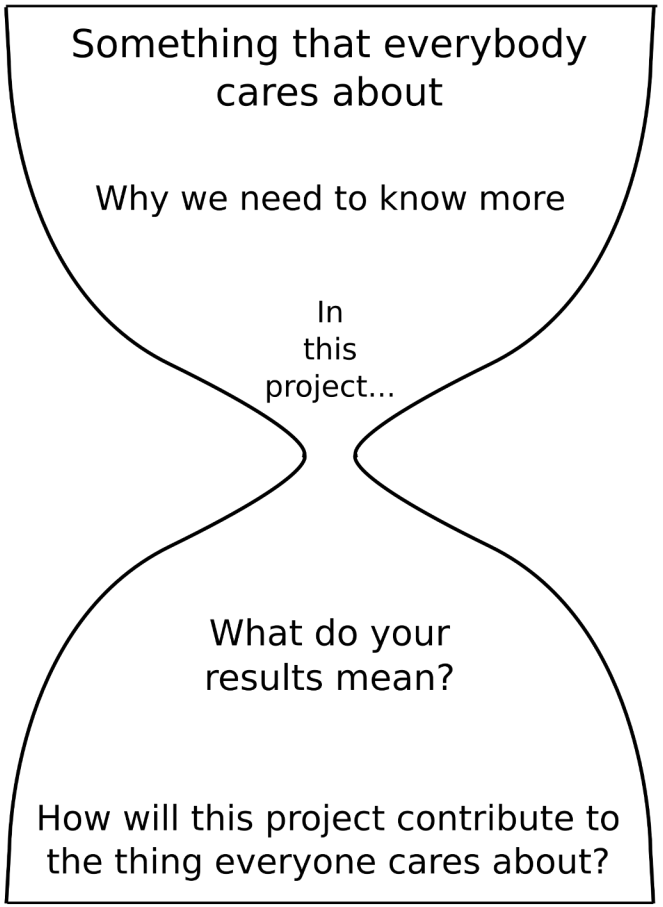
In groups of 2-3, **discuss which sentences in your abstract answer the following questions:**

1. What is the **problem**?
2. Where is the **gap**?
3. What did they **do**?
4. What is the **implication**?

Label sentences with titles such as:

Background
Results
Take-home message
Significance
Implication

An effective abstract is an hourglass-shaped message



General background

Specific background

Knowledge gap, Unknown

Take home message (HERE WE SHOW…)

Results

Implication

Significance

NOTE: very similar to *Nature* journal guidelines for formatting the summary paragraph of research articles

A Small-Molecule Inhibitor to the Cytokine Interleukin-4

Sean P. Quinnell, Becky S. Leifer, Stephen T. Nestor, Kelly Tan, Daniel F. Sheehy, Luke Ceo, Shelby K. Doyle, Angela N. Koehler, and Arturo J. Vegas*

Interleukin-4 (IL-4) is a multifunctional cytokine and an important regulator of inflammation. When deregulated, IL-4 activity is associated with asthma, allergic inflammation, and multiple types of cancer. While antibody-based inhibitors targeting the soluble cytokine have been evaluated clinically, they failed to achieve their end points in trials. Small-molecule inhibitors are an attractive alternative, but identifying effective chemotypes that inhibit the protein−protein interactions between cytokines and their receptors remains an active area of research. As a result, no small-molecule inhibitors to the soluble IL-4 cytokine have yet been reported. Here, we describe the first IL-4 small-molecule inhibitor identified and characterized through a combination of binding-based approaches and cell-based activity assays. The compound features a nicotinonitrile scaffold with micromolar affinity and potency for the cytokine and disrupts type II IL-4 signaling in cells. Small-molecule inhibitors of these important cell-signaling proteins have implications for numerous immune-related disorders and inform future drug discovery and design efforts for these challenging protein targets.

Background

Knowledge gap

"Here we" takeaway

Results

Implication / Significance

For every abstract, make sure you consider these **six** key aspects

1. Establish a clear argument, using Claim-Evidence-Reasoning (CER)
2. Your title and “here we show” statement convey the same message
3. Your problem statement and “here we show” statement are next to each other
4. Your results reflect your take home message
5. Use your ”here we show” to guide the type of background you include
6. The subject of each sentence leads to the subject of the next sentence

Create an argument to convince readers that your work is important

argument = **C**laim + **E**vidence + **R**easoning

Claim	A statement of our understanding about a phenomenon, about the outcome of a study, or about the author's view of the field
Evidence	Data to support the claim
Reasoning	Justification of the claim that shows **how** the evidence specifically supports the claim

Signaling words help your reader understand what part of the argument you are communicating

Claim	***Here*, we show** the bromodomain containing protein, BRD4, regulates transcription of PPARγ and C/EBPα.
Evidence	**Analysis** of BRD4 chromatin occupancy **reveals** … **Inhibition** of the bromodomain and extraterminal domain (BET) family of bromodomain-containing proteins **impedes** … ***Furthermore*, silencing** of these BRD4-occupied distal regulatory elements at the Pparg locus by CRISPRi **demonstrates** …
Reasoning	***Together*, these data establish** BET bromodomain proteins as time and context-dependent coactivators of the adipocyte cell state transition

Brown, J. D. et al. (2018). BET bromodomain proteins regulate enhancer function during adipogenesis. *PNAS*, *115*(9), 2144–2149.

Signaling words help guide the reader

Question + Experiment	Results	Answer/ Conclusion	Implication
To determine whether…, we…	We found…	We conclude that…	These results suggest that…
We asked whether…	Our results show…	Thus,…	These results may play a role in…
To answer this question, we…	Here we report…	These results indicate that…	Y can be used to…
X was studied by…			

Read lots of abstracts and collect useful phrases, choose **clarity** over originality.

Your title should reflect your “here we show” take home message claim

Title:

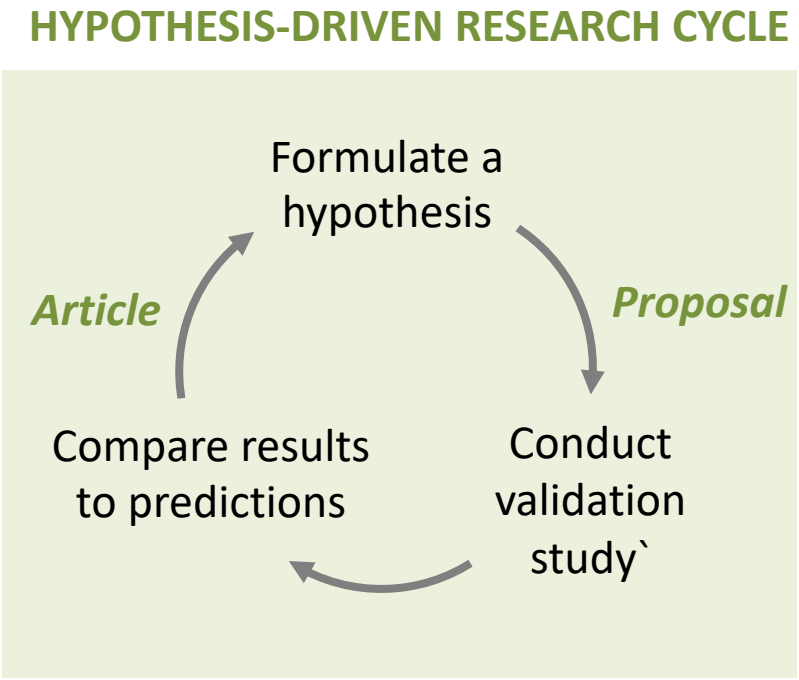
A Small-Molecule Inhibitor to the Cytokine Interleukin-4

“Here we show”:

Here, we describe the first IL-4 small-molecule inhibitor identified and characterized through a combination of binding-based approaches and cell-based activity assays.

Hypothesis vs. claim: motivation for study is distinct from conclusions drawn from data

- focus on what you **learned** more so than what you were hoping to achieve
- the cycle of hypothesis-driven research is communicated in different ways at different stages
  - research articles are used to convey findings of work done
  - communicating goals is more the focus of research proposals



Your knowledge gap and “here we show” statement should come sequentially

but identifying effective chemotypes that inhibit the protein−protein interactions between cytokines and their receptors remains an active area of research. As a result, no small-molecule inhibitors to the soluble IL-4 cytokine have yet been reported.

KNOWLEDGE GAP

Here, we describe the first IL-4 small-molecule inhibitor identified and characterized through a combination of binding-based approaches and cell-based activity assays.

HERE WE SHOW

This is a good check for you and helps your reader

Your results should reflect your take home message

Technology Focus

Here we show that RNA-seq can be used to identify mechanisms of drug action within a cell.

1. What data did you use?
2. What analysis tools?
3. Did you find any interesting pathways?

Biology Focus

Here we use a cell viability assay and analysis of RNA-seq data to understand the mechanism through which target cells have increased survival after drug treatment.

1. What did you learn about the mechanism from these assays?
2. What can you do next?

Be quantitative about the results that you include

To write your background, work backwards from your “here we show” statement

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Use the order of your sentence to guide your reader to the subject of the sentence

Cells were pelleted gently in order to remove supernatant without lysing cells.

In order to remove supernatant, cells were pelleted gently without lysing cells.

Without lysing, cells were pelleted gently in order to remove supernatant.

In order to remove supernatant without lysing cells, cells were pelleted gently.

What is the subject of this sentence?

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TIP 1: make novelty claims sparingly

- Unless you've read every paper, you don't really know if you're the first to discover something
- A surprising result: unanticipated, or against common dogma, but not unprecedented
- Appropriately qualified, there are certain "firsts" you do know…

TIP 2: varying sentence length can help your reader to stay engaged

TAR DNA-binding protein of 43 kDa (TDP-43) is an ubiquitous protein crucial to RNA processing. TDP-43 aberrant mislocalization to and aggregation in the cytoplasm is a common feature in many neurodegenerative diseases, including amyotrophic lateral sclerosis (ALS), and Alzheimer's disease (AD), making it an appealing therapeutic target. However, chemical probes directly targeting TDP-43 at a high affinity are lacking. Their discovery would prove useful to better elucidating mechanism to study the disease pathway of TDP-43, or perhaps to prevent TDP-43 aggregation. Here, we show that compound 95877382, a putative small molecule binder of TDP-43 identified by small molecule microarray (SMM) screening, appears to increase aggregation of TDP43-RRM12 in plate and can potentially alter endogenous TDP-43 localization to favor either the nucleus or the cytoplasm depending on dosage.

New/important knowledge – shorter sentences

Known/less critical knowledge – longer sentences

TIP 3: verb tense changes throughout abstract

Present Tense | Past Tense

Abstract

It is currently thought that life-long blood cell production is driven by the action of a small number of multipotent haematopoietic stem cells. Evidence supporting this view has been largely acquired through the use of functional assays involving transplantation. However, whether these mechanisms also govern native non-transplant haematopoiesis is entirely unclear. Here we have established a novel experimental model in mice where cells can be uniquely and genetically labelled in situ to address this question. Using this approach, we have performed longitudinal analyses of clonal dynamics in adult mice that reveal unprecedented features of native haematopoiesis. In contrast to what occurs following transplantation, steady-state blood production is maintained by the successive recruitment of thousands of clones, each with a minimal contribution to mature progeny. Our results demonstrate that a large number of long-lived progenitors, rather than classically defined haematopoietic stem cells, are the main drivers of steady-state haematopoiesis during most of adulthood. Our results also have implications for understanding the cellular origin of haematopoietic disease.

Current/existing knowledge – **present tense**

New work done to add to knowledge – **past tense**

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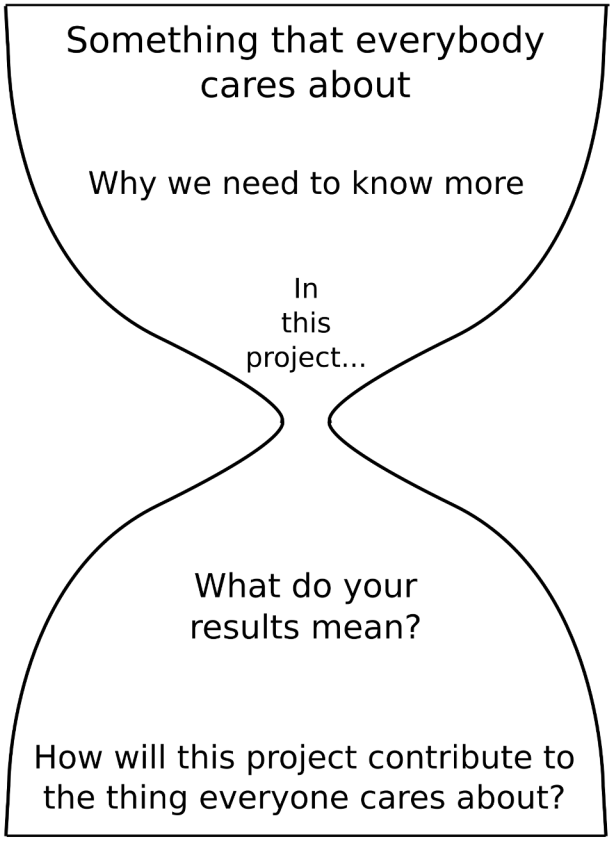
Remember to answer these questions for your reader in your abstract

1. What is the **problem**?

2. Where is the **gap**?

3. What did you **do**?

4. What is the **implication**?



Reminders for Abstracts & Titles:

- **Highlight your take-home message**: identify your research question & your contribution
- Focus on **findings**, not methods.
- Be **succinct**.
- Be **quantitative**.
- Write your titles as **messages**

Our next steps

- Slides will be posted on the wiki (“Communication” tab)

Your next steps

- Use the checklists to write great titles and abstracts and design great figures
- Make a Comm Lab appointment to get feedback on your titles/abstracts/figures or anything communication related as you work on your Mod 1 report
- Start thinking about presentations, slide design, and journal clubs as you go to other classes and lectures!

Additional resource for scientific writing strategies

"The Science of Scientific Writing" by George Gopen and Judith Swan
https://www.americanscientist.org/blog/the-long-view/the-science-of-scientific-writing

discusses common reader expectations for where information appears, including concepts such subject-verb separation, the "topic position" (information at the beginning of a sentence) versus the "stress position" (information at the end of a sentence), etc.