

Writing research papers From idea to publication



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Habits of Productive Writers

1. Discuss authorship
2. Select journal
3. Write
4. Be responsible
5. Seek feedback
6. Submit manuscript
7. Review process
8. Respond to reviewers
9. Set milestones

Who is an author?

- Department chair: Provided space
- Lab chief: Provided funding
- Section head: Proposed basic experimental idea
- Postdoc: Oversaw work
- Grad student: Directed day-to-day expts
- Technician: Assisted grad student
- Lab aide: Made solutions, kept lab clean
- Colleague #1: Provided antibody
- Colleague #2: Edited manuscript

Criteria for Authorship

International Committee of Medical Journal Editors (2015)

1. Discuss authorship

- Criteria
- When to determine
- May need to indicate roles in ms

Acknowledgments

Who and what?

- Financial assistance
- Prior presentations
- Gifts of materials
- Technical assistance
- Advice
 - Research
 - Manuscript

Acknowledgments

"This work was supported by NIH (MH19806) and Educational Inventions, Inc. A preliminary report on this work was presented at the IBRO Meeting, 14 July 2011. We thank Maria Lima for providing an antibody for Protein DUQ, Hannah Lee for technical assistance and Mark Raskin for assistance in the preparation of this manuscript. One of the authors (LL) is a paid consultant for Educational Inventions, Inc."

2. Select journal carefully: Variables in selecting a journal

Read Instructions to Authors *Carefully*

- Format
- Length
- Style of references
- Sharing requirement
- Supplemental data
- Submission
 - Process
 - File types

3. Write

Start writing early

- Before all data collected
- Before equipment dismantled
- Before you have moved on

First: Outline the paper

- What are the issues?
- What to say about them?
- In what order?

First: Outline the paper

- Items to be included
 - What are the main points made by your data?
 - What is the hypothesis?
 - In what order do you wish to present results?
 - What are the points to discuss; best order?

Second: Write the first draft

- Focus on getting ideas onto paper
- Brainstorm
- Don't worry about grammar, aesthetics
- Cite references in text (e.g., insert "REF")

Third: Edit thoroughly

"If you try to write and edit
at the same time,
you will do neither well."

- Charles H. Sides

Third: Edit thoroughly

- Start with major alterations, then the details
- Finally, polish the style
- The final product should be
 - Logical
 - Easy to read
 - Concise

Summary of a hypothetical study

Adult male rats (Sprague Dawley, 250 gm) were given daily injections of amphetamine (5 mg/kg, i.p.). It was observed that motor activity as measured in an open field initial increased but that this effect gradually declined over 3 weeks.

4. Write responsibly

- Major issues
 - Fabrication
 - Falsification
 - Redundant publication
 - Plagiarism

Plagiarism

- What is plagiarism?
 - Presenting the work of others as your own
 - Text
 - Figures
 - Ideas

Plagiarism

What don't you need to cite?

Common knowledge

- Amino acids are the building blocks of protein.
- Immune system protects against pathogens.
- There are four blood types: A, B, A/B, and O.

Avoiding plagiarism

- keep good notes, records
 - indicate source of all ideas
 - use quotation marks if recording a quote
 - indicate when you are paraphrasing someone else
 - maintain list of references

In a published article

We have found that using a toxin at a *dose* that induces a *50%* loss of neurons is *optimal* for the study of neuroprotection.

Your manuscript

We have found that using a toxin at a *concentration* that induces a *large* loss of neurons is *best* for the study of neuroprotection.

Your manuscript

We have found that using a toxin at a *concentration* that induces a *large* loss of neurons is *best* for the study of neuroprotection.

Report from plagiarism checking software

We have found that using a toxin at a dose that induces a 50% loss of neurons is optimal for the study of neuroprotection. 4

5. Seek feedback

- Research
- Presentation
- Writing
- Language

Requires that you have established a network!

6. Submitting

- Read and follow instructions
- Include cover letter
 - Summary (a few sentences)
 - Indicate value to journal
 - Potential reviewers
 - Recommend
 - Well-known in field
 - No conflict of interest
 - To avoid

7. Understand the review process

- Editor receives, surveys manuscript
- Manuscript sent to reviewers for evaluation
- Reviewers provide editor with critique
- Editor makes decision

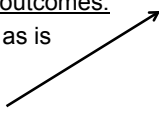
Criteria for evaluation

- Relevance
- Significance
- Content
- Writing

8. Deal with reviewers' comments

Possible outcomes:

- Accept as is
- Reject
- Revise



Your options:

- Revise ms
- Submit to another journal
- Appeal the decision

Cover letter for a revised manuscript

- Indicate that this is a revision
- Address each of reviewers' concerns
- Indicate changes you made

Cover letter for a revised manuscript

1. Reviewer #2 felt that more detailed information should be provided on the sampling procedure.

This information has been inserted (see p. 9).

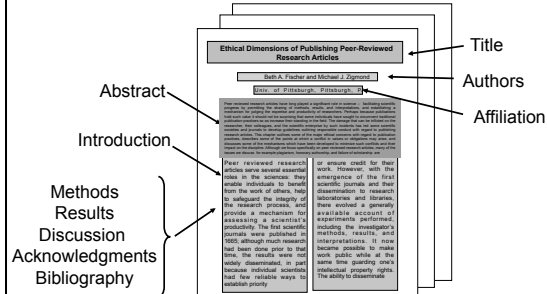
2. Reviewer #3 requested that ...

We have...

9. Set milestones

- Timeline for each article
- Daily or weekly writing requirement

Anatomy of a Research Article



Anatomy of a Research Article

- Title
- Authors
- Acknowledgements
- Address
- Abstract
- Introduction
- Methods
- Results
- Discussion
- Bibliography

Introduction

- What is its function?
- Organization
 1. What is the state of knowledge?
 2. What is the question?
 3. Statement of hypothesis (optional)
 4. Summary of results (optional)

~ 500 words

Introduction: common problems

- Too long
- Irrelevant material

Methods

- What is its function?

~1,500 - 2,000 words

Methods

- How much detail to present?
 - Method
 - Model of equipment
 - Sources (company; location)

http://www.edanzediting.com/content/write_order_and_intrad

Materials described first

Reagents and antibodies. Anti-caspase 3, anti-caspase 8 (C12), anti-caspase 9, anti-Bcl₂, anti-Bcl_{xL}, and BIP-conjugated secondary antibodies were obtained from New England Biolabs. Anti-cytochrome c (clone 7H8 2C12) was from BD Biosciences. Anti-Nava (NA-15) antibody was from Santa Cruz Biotechnology Inc. Anti-Bcl-2 (Ab-1) and anti-Bcl-xL (Ab-1) antibodies were from Merck Biosciences. Anti-BPS-1 antibody was obtained from Bethel Laboratories Inc. Anti-β-actin (AC-15) and anti-Puma (Ab-1) antibodies were purchased from Sigma-Aldrich. PCR primers and siRNAs were purchased from MWG Biotech.

Suppliers

References to save space

Immunofluorescence and siRNAs. Poly(I:C) was purchased from Amersham Biosciences. 5'-Triphosphate-conjugated DNA-siRNAs were transcribed in vitro from DNA templates as described [16]. They contained a T7 RNA Polymerase consensus promoter sequence followed by the sequence of interest to be transcribed (MFGA/shortstop/Kit, Ambion). Reactions were treated with DNase I (Ambion).

Clear subheadings

siRNAs were designed according to published guidelines [8]. 3' Overhangs were carried out as two deoxythymidine residues (dT₂). Sequences of specific siRNAs are listed in Supplemental Table 1. Nonsilencing control siRNAs were designed to contain random sequences that do not match within the human genome.

Detailed information given

Statistical test information

Cell culture. Human melanoma cell lines were a gift of M. Herlyn (Wistar Institute, Philadelphia, Pennsylvania, USA).

Analysis of lung metastasis. For metastasis analysis at day 10, we isolated genomic DNA from lungs. Mouse lungs were reduced to small pieces and digested overnight at 55 °C in a buffer containing 10 mM Tris, pH 8.0, 100 mM NaCl, 1 mM EDTA, 1% SDS, 0.5 mg/ml Proteinase K (Sigma-Aldrich), and 150 μg/ml Proteinase K (Sigma-Aldrich). Genomic DNA was purified by phenol/chloroform extraction. The amount of human and murine DNA was determined by quantitative PCR using the LightCycler FastStart Master Mix (Roche) together with the Universal Probe Library system (Roche). A 72-bp portion in the second intron of the human β-actin.

Statistics. For statistical analysis, 2-tailed Student's t test was used to assess the significance of mean differences. Differences were considered significant at a P value of 0.05 or less.

Reproducibility
What might lead to failure to reproduce?

Reproducibility
What might lead to failure to reproduce?

- Fraudulent data
- Incomplete report
- Failure to follow methods provided
 - Change in protocol by experimenter
 - Substitution of reagent or animal strain
 - Change by manufacturer

Methods: Common Problems

- Inaccurate
- Too little information
- Relies on reader finding another article

Possible consequences

Failure to replicate!

Results

- What is the function?
 - Provide the data collected
 - Allow readers to evaluate and interpret
- Amount of data to present? Varies
- How to present the data?

Full-length manuscripts:
~1,500-2,000 words
~ 7-9 figures

Ways to present data

1. Mention within the text
2. List in tables
3. Illustrate in figures

Tense in Results section

Introductory statement: present tense

"It is well-known that atmospheric pressure decreases prior to a tropical storm"

But in Results section: past tense

"Within 6 hours of tropical storms, atmospheric pressure decreased by $20 \pm 6\%$."

Order of presentation

What you did What & how you present

- | | |
|------------|-----------------------|
| 1. Expt. A | 1. Expt. D |
| 2. Expt. B | 2. Expt. B |
| 3. Expt. C | 3. Expt. A |
| 4. Expt. D | 4. Expt. C |

Historical

Logical

When can you delete data?

- When it is a peripheral to your story?
- When it complicates your story?

Results: Common Problems

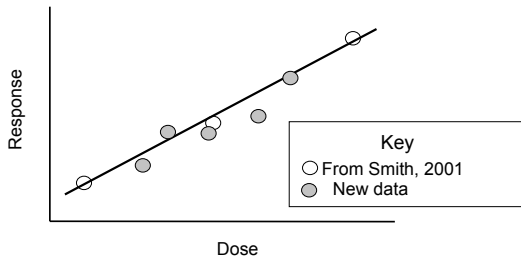
- Use of present tense
- Too little or too much information
- Too much discussion
- Historical rather than logical order
- Misleading presentation of data

Redundant publication

- Is it "redundant"?

	Yes	No
– data in conference abstract	<input type="checkbox"/>	<input type="checkbox"/>
– same data, different journal	<input type="checkbox"/>	<input type="checkbox"/>
– different journal & language	<input type="checkbox"/>	<input type="checkbox"/>
– same data on website	<input type="checkbox"/>	<input type="checkbox"/>
– data included in review article	<input type="checkbox"/>	<input type="checkbox"/>
– expansion of published data set	<input type="checkbox"/>	<input type="checkbox"/>

How to combine data?



Preliminary study (2001) + Expanded study (2004)

Add to text: "For comparison, we have provided data that have been previously published (Smith, 2001)."

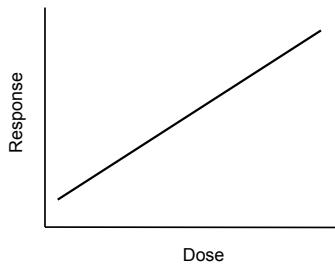
Guidelines

- Eliminate reasonable sources of confusion
- Author is responsible for clear communication

Falsification



Fabrication



Discussion

- What is its function?
- What should you include?
- In what order?

Discussion

Organization

1. Your observations
2. Patterns and relationships in your data set
3. Exceptions within your data set
4. Relation to previous work in the field
5. Theoretical or practical implications
6. Summary and conclusions

~1,500 words maximum

Discussion: Common Problems

- Poorly organized
- Inadequate scholarship
- Repeats introduction
- Doesn't compare results with others
- No discussion of alternative explanations

Abstract

- What is its function?
- What should you include?
- In what order?
- How long should it be?

Abstract

organization

1. Introduction
2. Method
3. Results (past tense)
4. Discussion
5. Final summary

Maximum:
250 words

...and therefore conclude that the treatment will have no effect.
244 245 246 247 248 249 250

Bibliography

What to cite?

- Your friends' papers?
- Your papers?
- Recent review?
- Recent research paper?

Bibliography

- Cite earliest original references
- Include your own work
- Include (and deal with) contradictory findings
- Limited use of reviews ok
- Usually no more than ~6/point, 70 total
- Check each reference
 - Supports your point?
 - Accurate?

Impact factor

- What is it? Measure of citations per journal
- Why seek high impact journal?
 - Paper will be taken more seriously
 - Can help your career
 - Jobs
 - Salary
 - Promotion
 - Grants
 - Students

How to get your paper into a high-impact journal

- Have a hot topic of broad interest
- Have a very thorough set of experiments
 - Use several approaches
 - Examine hypothesis from many angles

How to get your paper into a high-impact journal

- Have a hot topic of broad interest
- Have a very thorough set of experiments
- Make it easy for editor, reviewer to appreciate
 - Strong, short title and compelling abstract
 - Convincing cover letter
 - Focus on critical information
 - Move less critical results, methods to supplement
 - Use clear, concise English (get feedback first!)

How to get your paper into a high-impact journal

- Have a hot topic of broad interest
- Have a very thorough set of experiments
- Make it easy for editor, reviewer to appreciate
- If junior, seek well known person as author
- Best to focus on positive findings

Example: Development of new treatment

- Establish models
 - In vitro
 - In vivo
- Look at dose, time
- Use multiple measures
 - Behavior
 - Biochemistry
 - Immunochemistry
- Explore mechanisms

Pros and cons of aiming high

- Advantages
 - Higher impact journal
 - Bigger impact on field
 - Bigger impact on career
- Disadvantages
 - Less time to carry out subsequent studies
 - Will be expected to share your models, reagents
 - Could get “scooped”
