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# 研究計畫撰寫

# HOW TO WRITE A FUNDABLE PROPOSAL:

## A Reviewer's Perspective

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# NSTC Funding rates

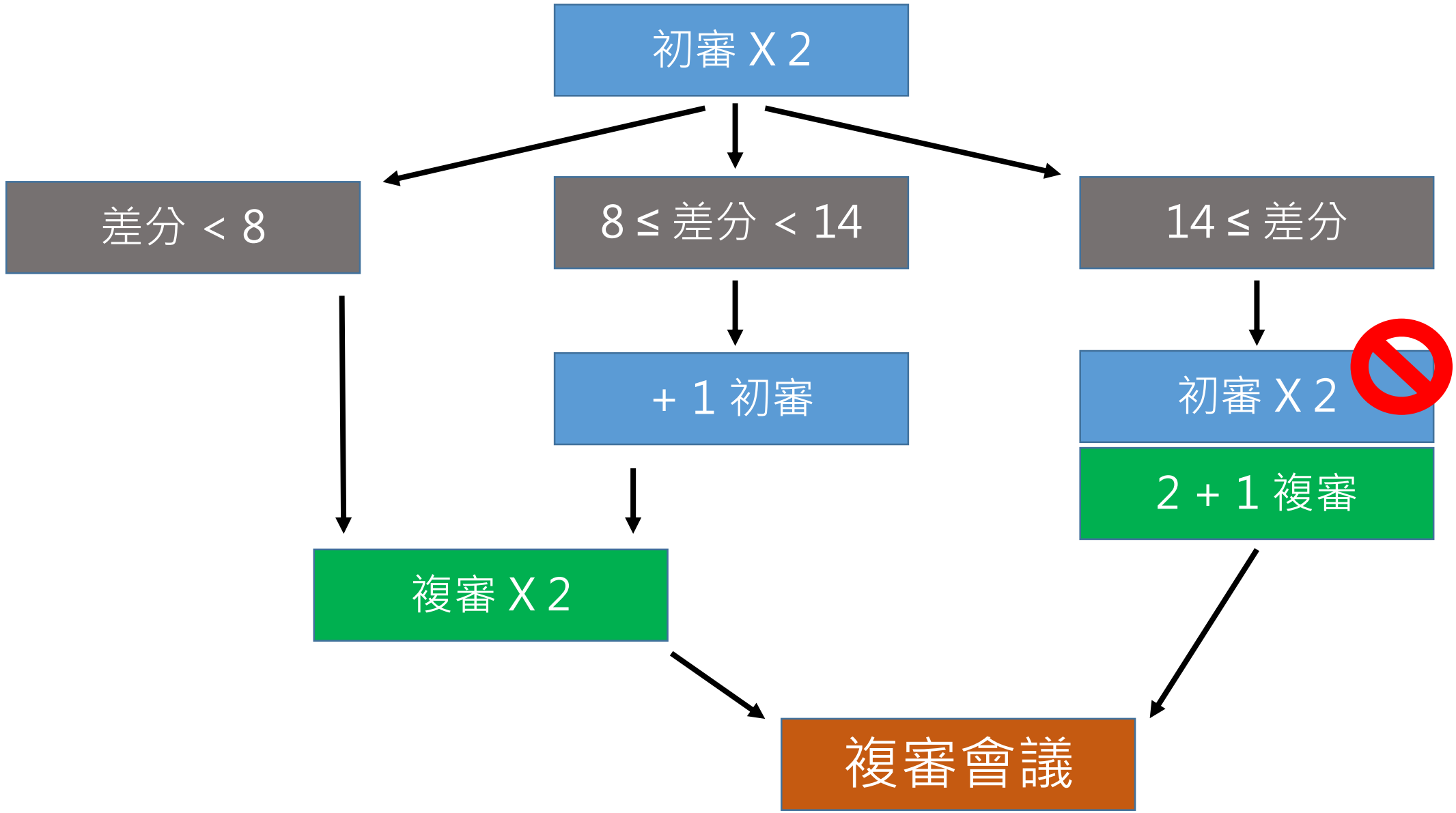
| Ranking | Score |
| --- | --- |
| 沒拿到計畫 (below 40-45%) | < 80 |
| 拿到計畫: top 40-45% | 80-84 |
| 多年期計畫: top 18-20% | > 85 |
| 第二件計畫: top 12% | > 88 |

博士後名額: 15%
新進人員計畫通過率: 55%
隨到隨審計畫通過率: 89%

# Score Breakdown

| | Grant writing | Publications |
|---|---|---|
| 新進人員 | 80% | 20% |
| 非新進人員 | 70% | 30% |

# Review



# Study Section (複審會議)

- 學門召集人提出總分在前40-50%，但初複審評分差距大者討論

- 初審分數不可在複審會議調整

- 複審可討論是否調整複審評分，如有調整多在1-2分(原始分數)以內

- 複審可評判初審之審查品質與評語

# 撰寫研究計劃的心態

- 初複審大多都不會是同領域的專家，因此計畫撰寫必須簡單易懂
- 研究計畫在於展現邏輯與可行性，不是實驗程序或文獻整理
- 審查委員時間有限，你寫得越複雜冗長，他看得挫折感越深

# Clear, Simple, Short

# Major Elements of A Grant Proposal

| | |
|---|---|
| • Novelty & Significance<br>• Background | Motivation |
| • Preliminary data | Validation |
| • Aims<br>• Experimental designs<br>• Alternative hypothesis and difficulties | Execution |

# Novelty & Significance

Novelty of

- The biological phenomenon
- The mechanisms
- The technology

Significance that impacts

- Our understanding of a fundamentally important question?
- Our scientific practice (technology, treatment)?

# Background

A concise summary of relevant literature

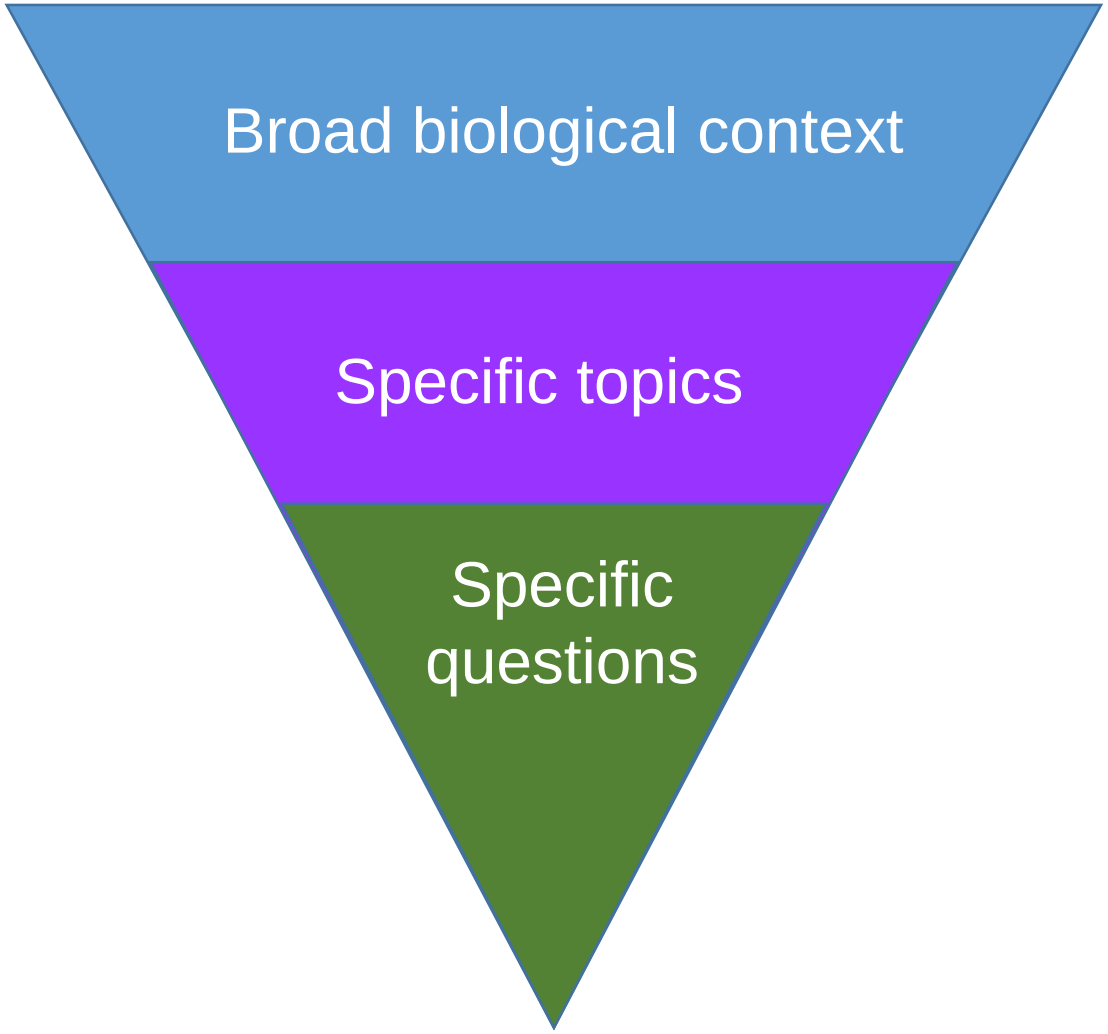
- Keep it around **2 pages** at most

Specify the knowledge gaps

- Don’t just vaguely say “the mechanisms are unclear”. Specify what the unknown part is.

Make your questions clear, which correspond to your aims

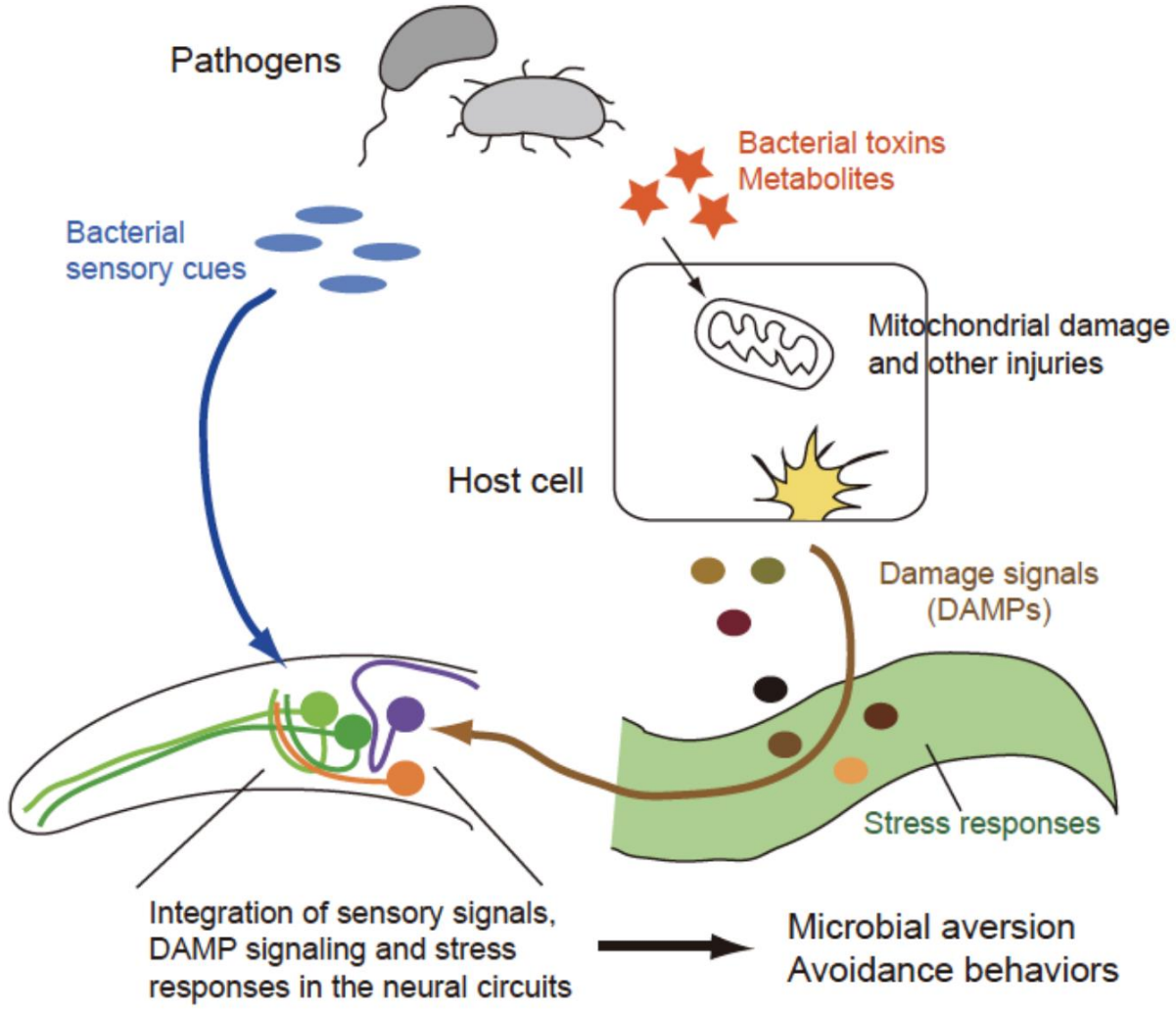
# Background


Broad biological context
Specific topics
Specific questions

# Background

Propose your hypothesis/model

- Hypothesis-driven proposals are favored over open-ended ones
- Visualize your model/hypothesis



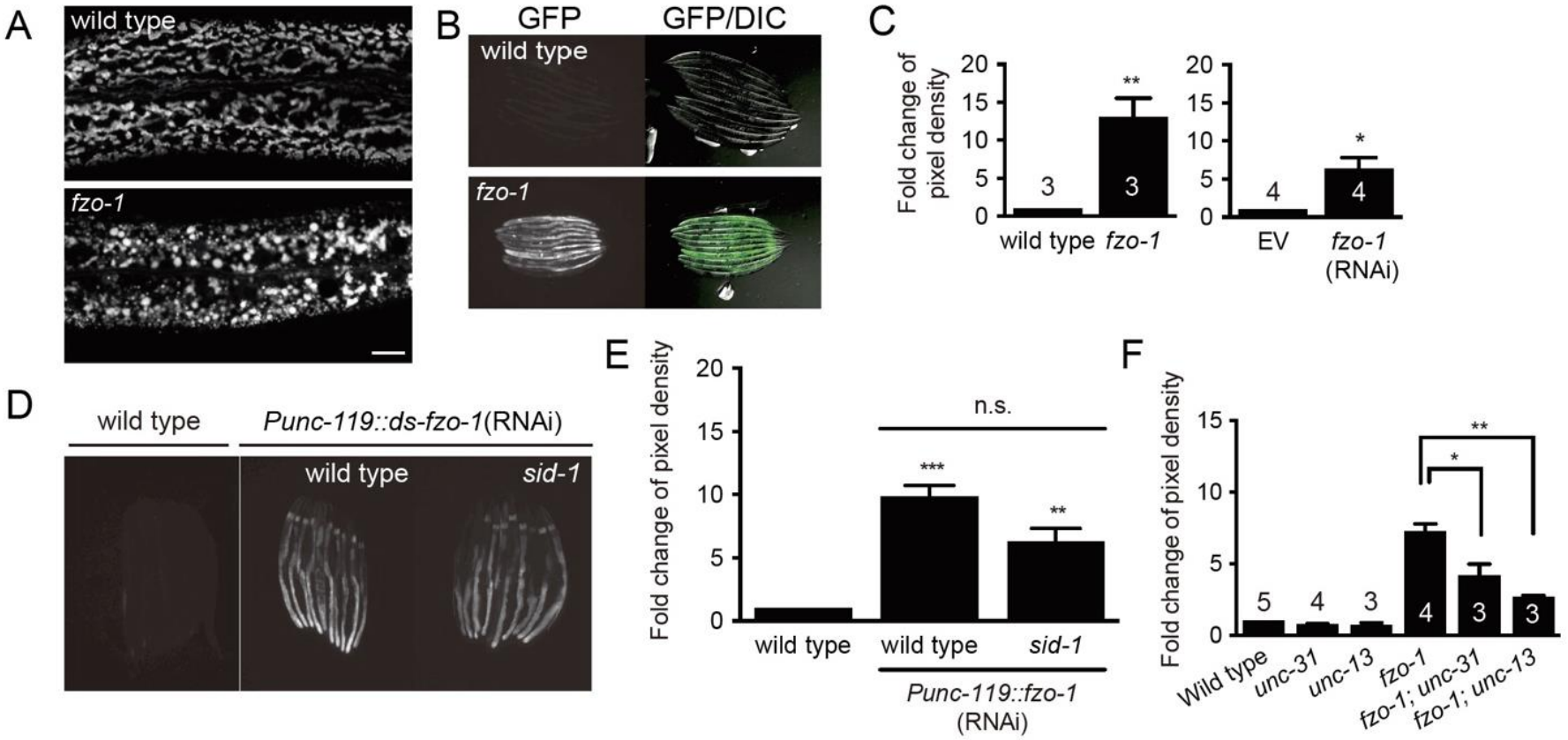
# Background

The hypothesis/model should:

- Be supported by preliminary data
- Fill our knowledge gaps
- Make testable predictions -> Your specific aims!

# Preliminary Data

Prepare high-quality data in standard formats



# How Preliminary is Preliminary Data?

- The amount and quality of preliminary data should warrant publications soon (30% - 50% of full data for a paper is good!)

- 國科會：計畫主持人使用自己已發表之近期學術論文或自己指導之學生學位論文研究 成果，應有引註且**比例適度**。

# Aims

The Aims should be independent but coherent.

For example,

- Aim 1 (with 2-3 subaims): genetics
- Aim 2 (with 2-3 subaims): biochemistry and cell biology
- Aim 3 (with 2-3 subaims): physiology and animal study

Do not base other Aims on an open-ended experiment

- Screens or omics-experiments should not be Aim 1

# Aims

The Aims should be independent but coherent.

Example:

**The Neural Basis for Bacterial Avoidance Behaviors under Mitochondrial Stress**

**Aims**

**Aim 1: Characterization of Bacterial Avoidance Behaviors under Mitochondrial Stress**

**Aim 2: Dissection of the Neuronal Circuits That Drive Bacterial Avoidance under Mitochondrial Stress**

**Aim 3: Investigation of Gut-Brain Signaling That Modulates Bacterial Avoidance Behaviors under Stress**

# Coherence within Aim

**Example 1**

Aim: Mechanisms of adhesion molecule signaling

1.1 Phenotypes of mutants that lack specific domains

1.2 Aggregation assays using culture cells

1.3 Examination of downstream signaling

**Example 2**

Aim: Mechanisms of dendrite self-repulsion

1.1 Generation of dendrite markers for live imaging

1.2 Membrane activity and dendrite repulsion

1.3 Cytoskeletal remodeling and dendrite repulsion

# Experimental Designs

For each sub-aim,

- Explain the rationale/hypothesis first
- Use diagrams whenever applicable
- Include proper control experiments
- Discuss anticipated results and alternative models

**DO NOT:**

- Describe detailed methods or procedures
- Simply say “we will do the same things as those in Aim 2.1”

# Visualize Your Experimental Designs

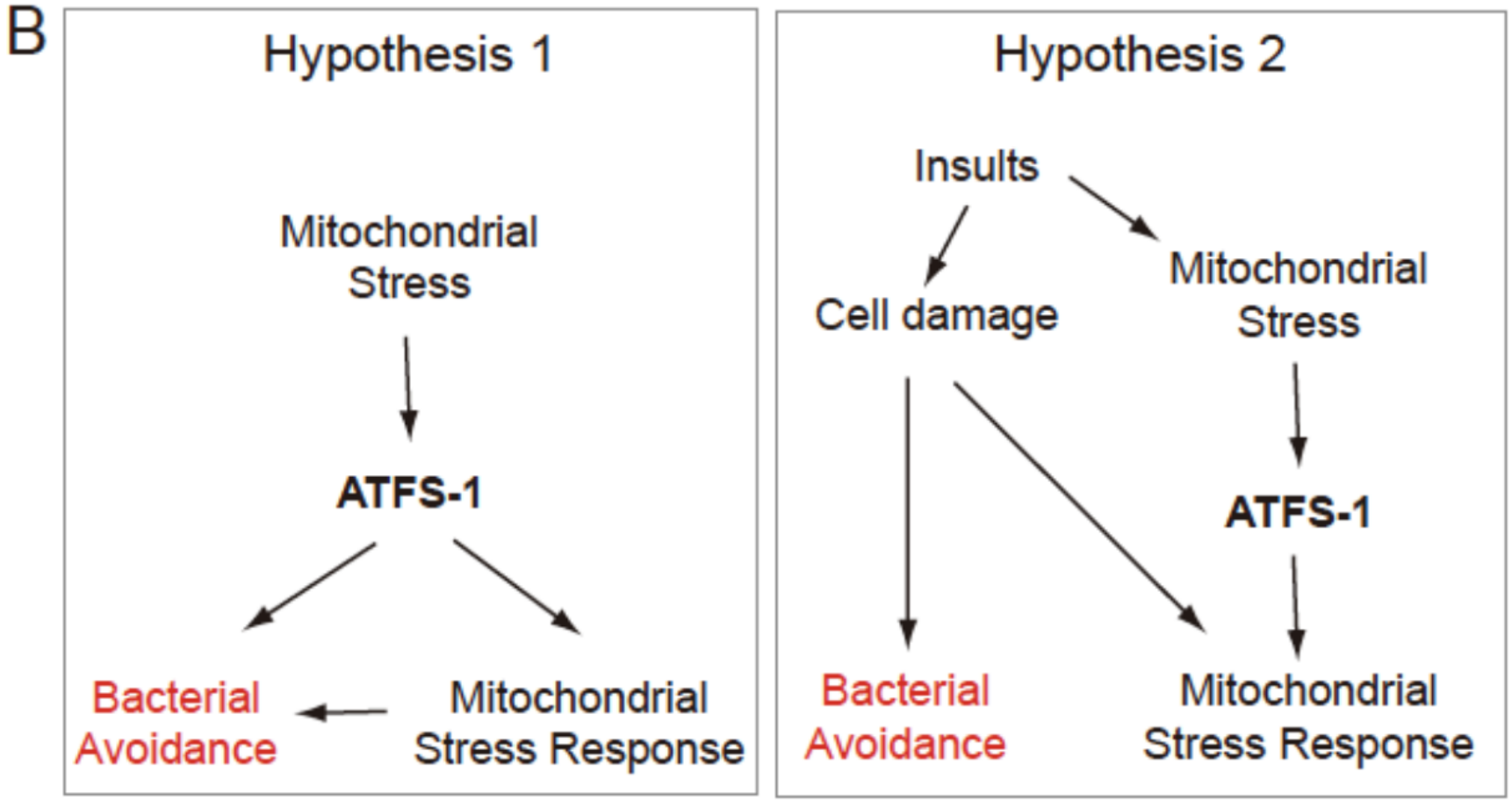
wild type

*rde-1* mutant
RNAi-resistant

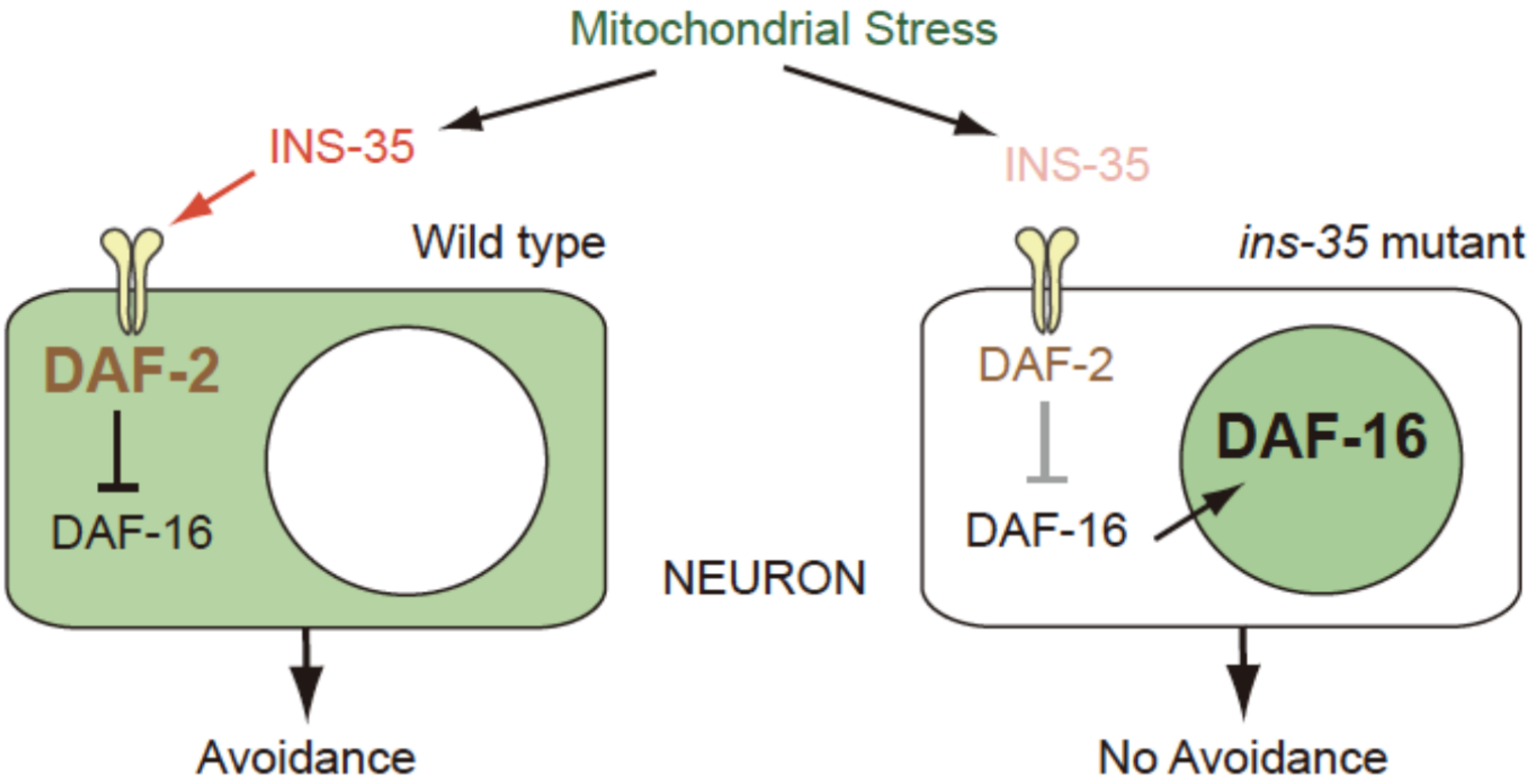
*rde-1; Pelt-2::RDE-1*
intestine-specific RNAi

*rde-1; Pdpy-7::RDE-1*
hypodermis-specific RNAi

# Make Predictions based on Models



# Make Predictions based on Models



# Alternative Hypothesis & Controls

- Discuss alternative hypothesis/results in each aim/subaim
- Propose controls for all experiments that apply

# Tips for Writing

Persuasive writing:

- Conclusion goes first (in the “topic sentence”)
- List several lines of supporting evidence

Avoid long and complex sentences

Avoid jargons

Do not write up to page limit (25 pages) – too long!!

# Tense & Voice

## Tense (時態):

- Present tense (現在式): facts, principles, models, theories, concepts,
- Past tense (過去式): past discoveries, results in the current study

## Voice (語態): active (主動態) v.s. passive (被動態)

Example:

**1**: ROS **inhibits** actin polymerization through downregulation of the Arp2/3 complex

**2**: Actin polymerization **is inhibited** by decreased Arp2/3 mediated by ROS signaling

# Things that Sink Your Grant

- Long Materials & Methods section
- Little experimental designs
- -Omics studies without a hypothesis
- Dense & lengthy writing full of grammatical errors

# Schedule Your Writing

Start writing no later than October
(NSTC submission system opens in November)

Do not do the last-minute submission

Apply your IRB or other permits ahead of time

# Rejection

Successful rebuttal is very rare

Common reasons for rejection

- Lack of novelty or significance
- Poor writing: little rationale, lengthy methodology
- Unsatisfactory publication record
  - Long publication hiatus
  - Lots of papers in black-list journals
  - Lack of research focus

# Resubmission

- New publications are necessary but not sufficient

- Be prepared for one more round of rejection
  - Get funding from other sources

- Improve your rejected grant proposal
  - New data
  - Reorganization
  - Polished writing