Temerty Medicine

Annual Grant Writing & Research Resources Workshop

Hosted by the Office of the Vice Dean, Education & Research

June 23, 2021 – 9:00am to 11:30am

TEMERTY FACULTY OF MEDICINE
UNIVERSITY OF TORONTO

Temerty Faculty of Medicine Annual Grant Writing & Research Resources Workshop

Agenda

9:05am	**Opening Remarks** **Professor Justin Nodwell**, **PhD**, Vice-Dean, Education & Research
9:15am	**The Centre for Research & Innovation Support: Resources for U of T faculty** **Vinita Haroun**, Director, Centre for Research & Innovation Support **Professor Leah Cowen,** Associate Vice-President, Research
9:30am	**The Art and Science of Grant Writing** **Professor Tania Watts, PhD**, Department of Immunology and University of Toronto CIHR Delegate
10:00am	*Q&A – 15 minutes*
10:15am	**Core Facilities and Services in the Faculty of Medicine** **Natasha Christie-Holmes, PhD,** Research Operations Officer
10:35am	**Grant Fundamentals and How to Write a Persuasive Research Proposal** **Golnaz Farhat, PhD,** Grants and Awards Editor
11:15am	*Q&A – 15 minutes*

Resources and links discussed in the session

Centre for Research & Innovation Support (CRIS)

- https://cris.utoronto.ca/
- Research Roundup; https://cris.utoronto.ca/research_roundup/home/
- Slides https://www.beautiful.ai/player/-Mct3eucMPtRaQYrC2qA

Division of the Vice-President, Research & Innovation (VPRI)

- Division Website and Research Services Office (RSO); https://research.utoronto.ca
- RSO Staff Directory; https://research.utoronto.ca/contact-us
- Research Alerts; https://alerts.research.utoronto.ca/content/offcampus_notice
- Funding Opportunity Database ; https://research.utoronto.ca/funding-opportunities/db
- PIVOT Funding Database; https://research.utoronto.ca/fr/node/493
- PI Eligibility at UofT; https://research.utoronto.ca/engaging-research/who-can-be-principal-investigator-u-t
- Equity, Diversity and Inclusion; https://research.utoronto.ca/equity-diversity-inclusion/equity-diversity-inclusion

Temerty Faculty of Medicine Research Office

- What's New in research; https://medicine.utoronto.ca/research/whats-new-research-funding
- Grant Development; https://medicine.utoronto.ca/research/grant-development
- Internal College of Reviewers; https://medicine.utoronto.ca/form/sign-college-internal-scientific-reviewers
- Internal Grants, including Pathways grants; https://medicine.utoronto.ca/internal-funding-opportunities
- Guide for New Researchers (including a link for Faculty of Medicine faculty and learners to access Redcap): https://medicine.utoronto.ca/research/2015-guide-new-researchers

CORE FACILITIES WITHIN THE FACULTY OF MEDICINE

- Microscopy Imaging Lab; https://medicine.utoronto.ca/research/microscopy-imaging-laboratory
- Division of Comparative Medicine (The Animal Facility); https://dcm.utoronto.ca
- Flow Cytometry Facility; https://flowcytometry.utoronto.ca
- Combined Containment Level 3 Unit; https://medicine.utoronto.ca/combined-containment-level-3-unit

CIHR

- College of Reviewers, Become a College Member; https://cihr-irsc.gc.ca/e/49923.html
- Observer-ship Program; https://cihr-irsc.gc.ca/e/52119.html
- Research Net; https://www.researchnet-recherchenet.ca/rnr16/LoginServlet?language=E

NIH

- Sample Applications; https://www.niaid.nih.gov/grants-contracts/sample-applications

Contact Details of Speakers

- **Joanna King**, Moderator and Manager, Business & Research Administration – joanna.king@utoronto.ca
- **Professor Justin Nodwell**, **PhD**, Vice-Dean, Education & Research – medicine.research@utoronto.ca
- **Vinita Haroun**, Director, Centre for Research & Innovation Support - vinita.haroun@utoronto.ca
- **Professor Leah Cowen,** Associate Vice-President, Research – leah.cowen@utoronto.ca
- **Professor Tania Watts, PhD**, Department of Immunology and University of Toronto CIHR Delegate – tania.watts@utoronto.ca
- **Natasha Christie-Holmes, PhD,** Research Operations Officer - natasha.christie@utoronto.ca
- **Golnaz Farhat, PhD,** Grants and Awards Editor – golnaz.farhat@utoronto.ca

THE CENTRE FOR RESEARCH & INNOVATION SUPPORT (CRIS)

A RESOURCE HUB FOR U OF T FACULTY

June 23, 2021

Leah Cowen, AVP Research
leah.cowen@utoronto.ca

Vinita Haroun, Director CRIS
vinita.haroun@utoronto.ca

WHAT WE'D LIKE TO COVER...

1. About CRIS & Supports Available to Researchers
2. Discussion on Programming Ideas

PARTNERSHIP

Division of Vice-President, Research & Innovation (VPRI)

Libraries (UTL)

Information Technology Services (ITS)

Recognition of the many exceptional resources currently available to support research and innovation

CRIS MANDATE

AMPLIFY - NAVIGATE - RESPOND - FACILITATE

PRIORITY AREAS

Amplify

Increase visibility of research and innovation supports to the tri-campus community

Navigate

Broker access to new and existing supports and resources

Respond

Collaborate with central units and academic divisions to identify gaps and develop services and resources for emerging unmet needs

Facilitate (Collaboration)

Enable opportunities to bring people together, creating space and effective supports for sharing and partnership, within and outside of the University.

OUR VIRTUAL OFFERINGS

https://cris.utoronto.ca

Access existing research and innovation supports across the tri-campus
Find curated content on emerging issues and needs

AMPLIFY

INCREASE VISIBILITY OF EXISTING RESOURCES AND EXPERTISE

AMPLIFY - PROMOTIONS

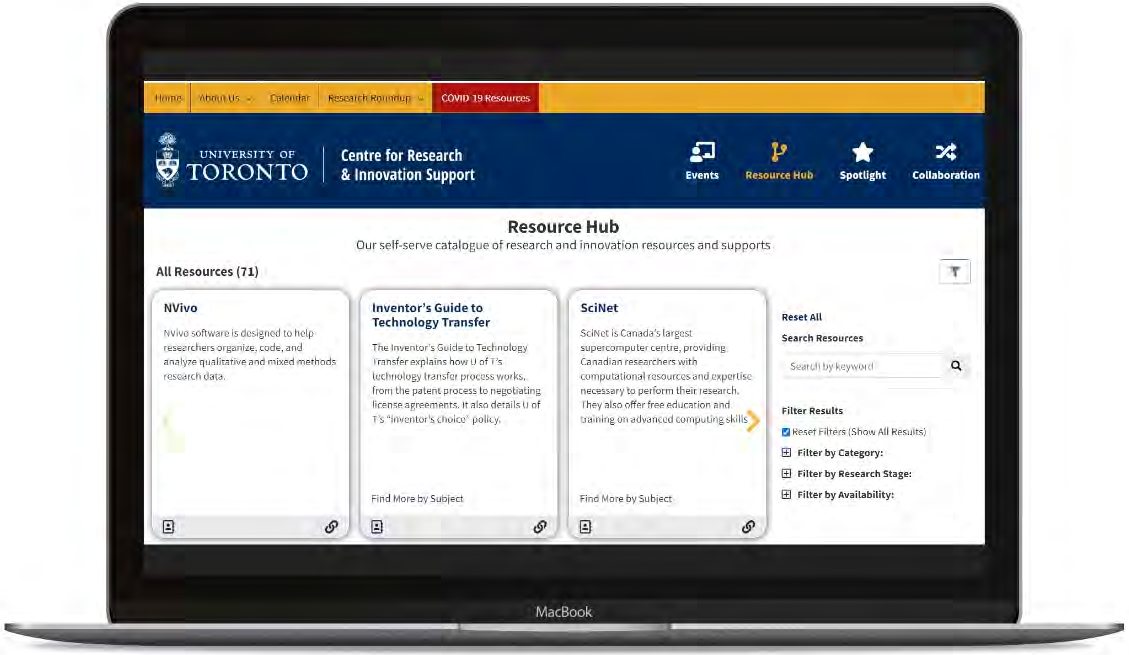
Join our mailing list - http://bit.ly/subscribeCRIS

- **Central Calendar of Training & Events**
  - **https://cris.utoronto.ca/featured-events/**
  - Integrates event listings into one central calendar
- **Research Roundup**
  - **https://cris.utoronto.ca/roundup/home**
  - A weekly digest of research and innovation communications
  - Includes new resources, funding calls, administrative updates
- **CRIS Compass**
  - **https://cris.utoronto.ca/about-us/cris-compass**
  - Bi-monthly newsletter highlighting CRIS core supports and new resources

BROKER ACCESS TO RESOURCES AND EXPERTISE

NAVIGATE: RESOURCE HUB

https://cris.utoronto.ca/resource-hub



- Catalogue of resources available across the tri-campus
- Self-serve search and filter
- Includes a variety of tools to support researchers
- Provides quick navigation to central services and offices

VIRTUAL NAVIGATION SERVICE

Goal: Provide virtual navigation service to continue to orient to resources, services,expertise

FIRESIDE CHATS WITH OVPI - FORTH THURS NOON

1:1 CONSULTATIONS FOR USE OF TOOLS

REDCap, Project Management, Facilitation Toolkit

- **Faculty want a consultation service to assist in navigating supports that are available across the university**
- **Complement our existing web-based self-serve resource hub**
- **Partner with Experts Across the University**
- **Formats:**

  Scheduled monthly drop-in virtual sessions will have an ‘ask me anything’ with a key topic

  Ask me emails responded by email or phone consults

DATA REPOSITORIES & ADVANCED RESEARCH COMPUTING

Address FAQs: *How and where can I store data?*

Working Securely. Remote Data Collection & Storage

Spotlight Webpage

Research Repositories @ U of T

Information Video

UTL Dataverse

Webinar overviews hosted by UTL

Advanced Research Computing

Spotlight Webpage

Advanced Research Computing @ U of T

Information Video

Jupyter Hub for Researchers 101

A webinar on interactive computing environments

RESPOND TO EMERGING UNMET NEEDS

WORKSHOPS FOR GRANTS, AWARDS & HIGH IMPACT PUBLICATIONS

Faculty-faculty mentorship approach

NIH 101

NIH Program Officer & Panel of Experienced PI from the U of T Community

Two-page key takeaways

Panel of RSC Adjudicators

Advice from Senior U of T Leaders on putting together a successful application package

Nature Masterclass

Focus on Scientific Writing, Scientific Publishing, and One-on-one Abstract Review with Nature Editor

For thirty mid-career STEM researchers

TRAINING FOR RESEARCH TOOLS

Partner with technical experts to address research use cases

Project Management Tools for Researchers

Webinar & Hands-on Workshops

Downloadable Templates

REDCap, data capture tool

Webinars

Fall/Winter: Asynchronous Training Videos & Hands-on Workshops

Microsoft 365 for High Performance Collaboration

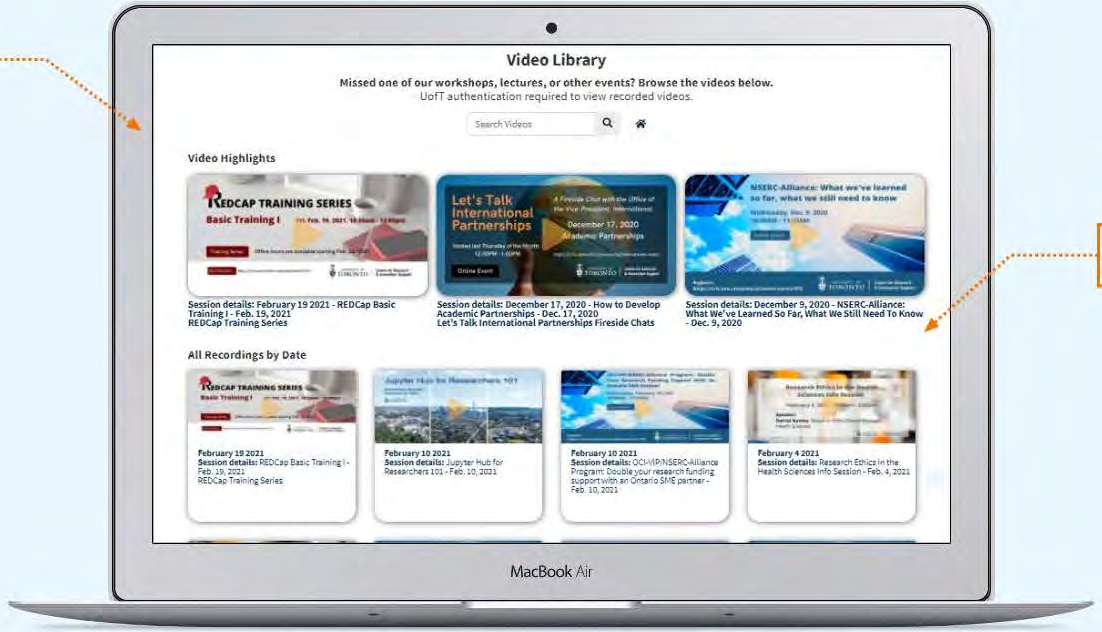
Optimizing the use of MS Teams, One Drive and SharePoint for Research Use Cases

HTTPS://CRIS.UTORONTO.CA/VIDEOS/

VIDEO LIBRARY

Missed one of our workshops, events, or information sessions? Browse the videos below.

VIDEO HIGHLIGHTS



ALL RECORDINGS BY DATE

ENABLE FACULTY-LED WORKSHOPS FOR INTERDISCIPLINARY AND TEAM RESEARCH

HTTPS://CRIS.UTORONTO.CA/COLLABORATION/

SUPPORT FOR FACULTY-LED WORKSHOPS & STRATEGIC ENGAGEMENTS

Consultation sessions to provide guidance in the planning and execution of both:

- faculty-led workshops; and
- engagement with faculty leadership, sponsors, and other research and innovation stakeholders of strategic importance.

Facilitation Toolkit

- This interactive toolkit provides guidelines, tools and templates to help research teams to plan and execute highly effective collaborative engagements.

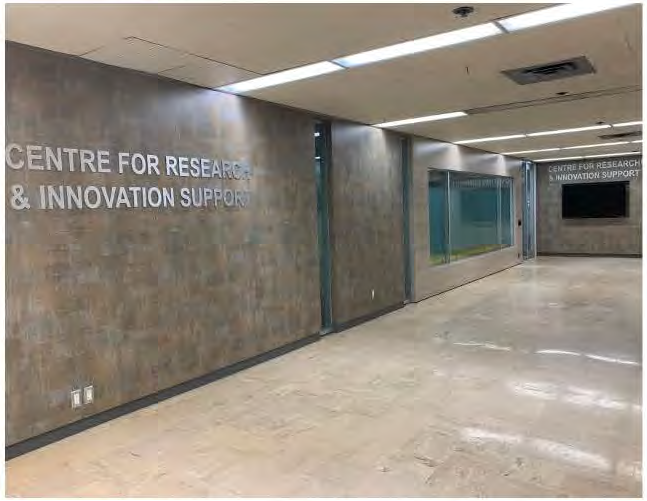
Workshops: Facilitating Highly Effective Engagements with Your Research Collaborators

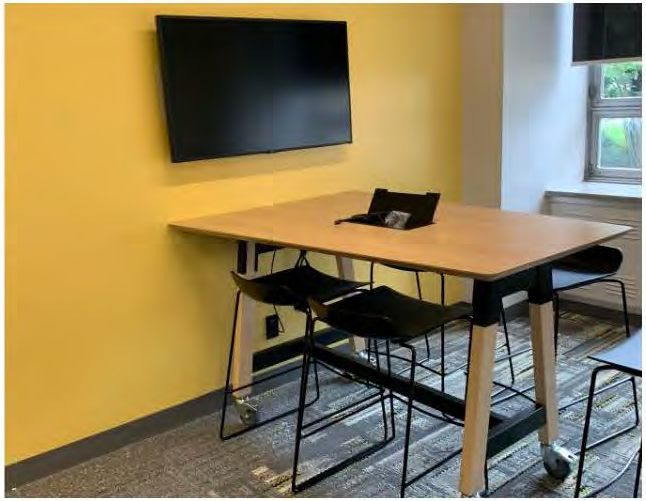
- July 22, 2021 | 10:30am - 12:00 pm

CRIS COLLABORATION SPACE

We look forward to inviting you to our newly renovated Collaboration Space when it is safe to do so!

This new space will be a hub for in-person and virtual workshops, and specialized research tool training.





OUR TEAM

Leah Cowen

Academic Advisor
AVP, Research

Vinita Haroun

Director

Christina Kim

Liaison Librarian

Krystyna Kongats

Collaborative Programs Officer

Prisca Obierefu

Research Technology Liaison

DISCUSSION

- How can else can CRIS support faculty researchers?
- What topics would you like us to consider in our Fall/Winter programming?
- What supports and resources are you looking for at the moment?

THANK YOU

Get in touch: cris@utoronto.ca

Subscribe: https://bit.ly/subscribecris

Temerty Medicine

The Art and Science of grant writing –
a writer and a reviewer's perspective

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June 23, 2021

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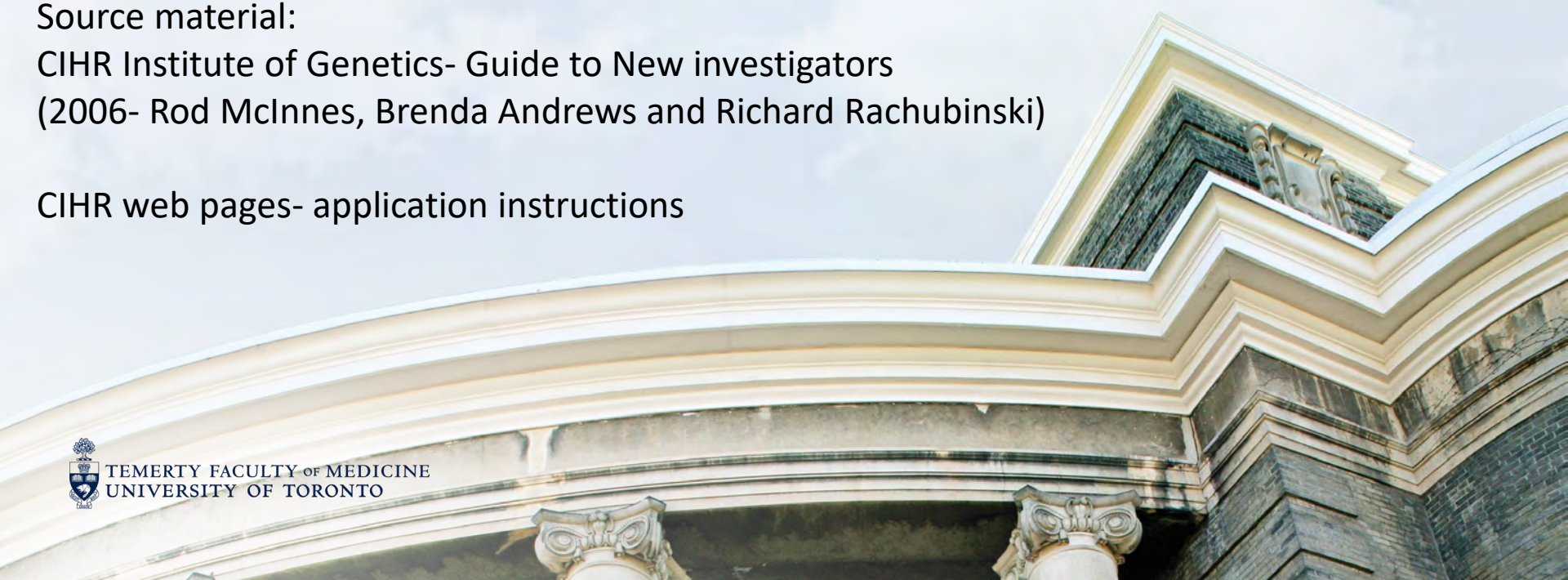
Source material:
CIHR Institute of Genetics- Guide to New investigators
(2006- Rod McInnes, Brenda Andrews and Richard Rachubinski)

CIHR web pages- application instructions



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Before you begin: What is your grant strategy- always plan ahead

How will you divide up your research interests into fundable packages suitable for different agencies?

-NSERC Discovery grant-useful for first grant, harder to get once you have CIHR

-CIHR project grant- make sure you have a good track record in the area, substantive project, collaborators on things that you don't have a track record in; don't apply for 2nd CIHR project until you've published on the first one!

-Disease specific areas- Cancer (CCSRI, CRS), Heart and Stroke, MS society, Arthritis society

-New areas: pilot projects- catalyst grants, respond to RFAs, local funding-Dean's funds etc

Be aware of the regular deadlines for agencies of interest-start early!

Plan your internal grant review in advance: peer review committee or colleagues or FoM Research office- *make sure you get input from others!*

Make yourself a deadline well before the deadline to allow time for review and edits

Your internal reviewer(s) can be in your general area- not necessarily specific experts-make sure its understandable to them

Always have time to write- put aside- get input- re-read – Proof-Proof-Proof!

Always submit a polished document, appealing to look at, grammatically correct

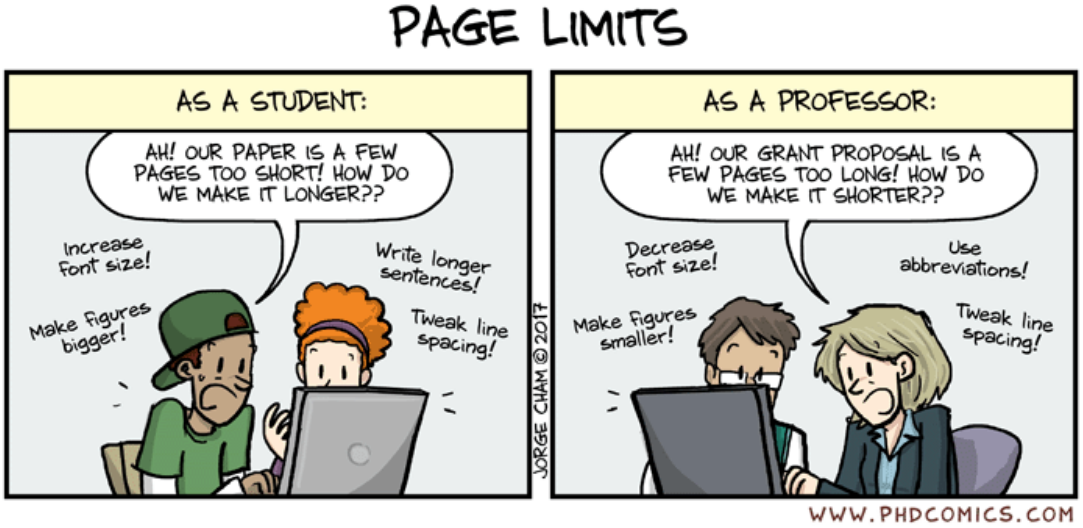
If you start thinking about the grant months in advance-then you have time to do some key preliminary experiments too!

Always follow the guidelines exactly

Correct size font- e.g. Times New Roman 12 point

Don’t try to squeeze more in by changing line spacing or margins

CIHR will reject the application if you don’t obey the rules or simply delete the extra pages making grant unintelligible to the reader



Remember- reviewers are volunteers- your peers- - make their job easy with clear, accurate writing and presentation.

Each reviewer may get 6-12 grants per CIHR panel meeting

Grant review process CIHR

Before registration: Panel members are invited to serve on a panel
After registration: CIHR/CHAIR/SO work together to make sure the panel has all the members it needs

Reviewer conflict of interest and expertise task: Reviewers go online and read the summaries of proposals, list of collaborators and indicate COIs and expertise: High, Med, Low, None

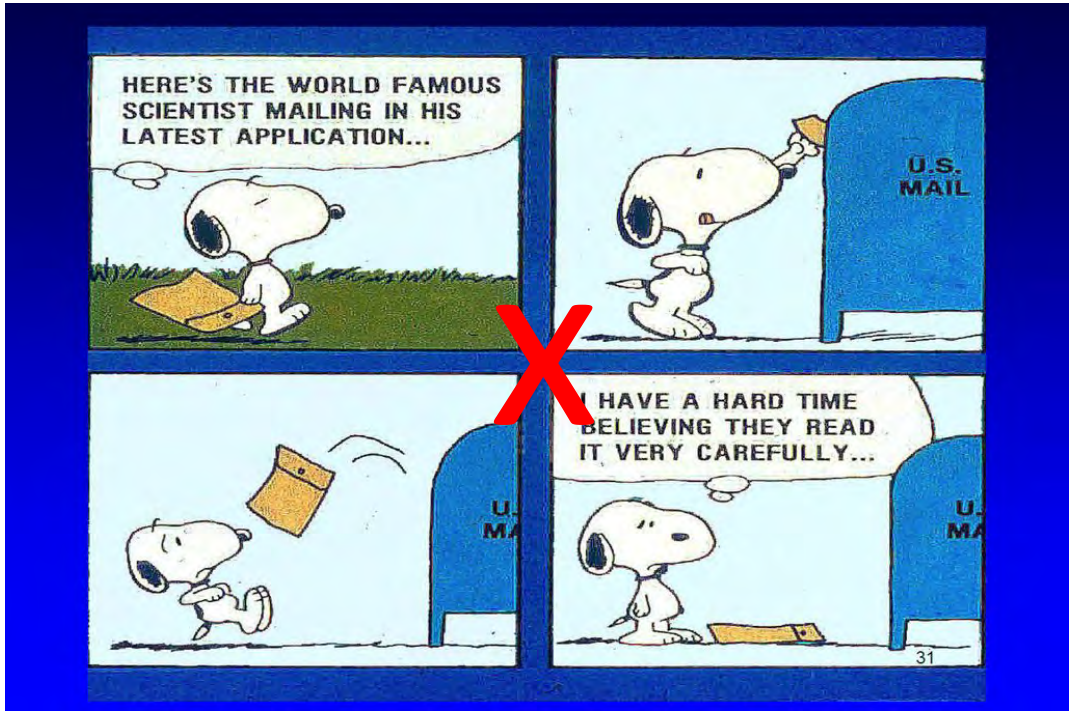
3 Reviewers assigned per grant- CIHR tries to get one with “High” expertise but sometimes just medium level of expertise, reviewer 3 may have “low” expertise

At the CIHR panel

At the beginning of the panel meeting- grants unlikely to be funded due to low preliminary score triaged- but can be rescued for discussion if panelist feels strongly
Triaged if: 2 reviewers have it in their bottom half; scores below a certain cutoff

As each grant comes up for discussion 15-20 minutes:

1. Anyone with COI leaves the room
2. Reviewer 1, 2 and 3 give their initial scores
3. Reviewer 1 gives a summary and critique, Review 2 and 3 in turn add additional points
4. Panel discusses
5. Scientific officer summarizes the discussion, reviews the notes to go back to the grantee
6. Consensus score agreed to, everyone votes(±0.5) *Ranking is key: top 15-16% only funded*
7. *Budget discussed; any other concerns flagged to CIHR (overlap, ethics etc.)*


HERE'S THE WORLD FAMOUS SCIENTIST MAILING IN HIS LATEST APPLICATION...
U.S. MAIL
I HAVE A HARD TIME BELIEVING THEY READ IT VERY CAREFULLY...
31

Criteria for reviewers from CIHR web pages

Concept:

Significance and impact of research
Creative, innovative?
Sound rationale?
Well defined goals?
Will it advance knowledge?
Substantive contribution relative to gaps?
Realistic

(not incremental)

Feasibility:

Approaches and methods:
-appropriate to the question?
-well defined, justified

Timelines realistic?
Identifies challenges and mitigation strategies?

Expertise and resources:
Does the applicant have the expertise, track record to get the project done

Are the resources needed available to the applicant

What gets the reviewers' enthusiasm?

Important problem/question, clearly stated

Exciting to the reviewers-likely to have impact

Easy to read, great flow, objectives and how you are going to achieve them clearly stated

Approaches appropriate for the project, with pitfalls and alternatives clearly stated

The reviewers have confidence that you are the person to get it done- or if there are gaps in your background, that you have identified appropriate collaborators

Timeline, approaches, number of personnel and budget are realistic

Great writing- the reverse pyramid structure

Great lead sentence is interesting and says what paragraph is about, the rest follows

(image from Rod McInnes talk)

Give the Big Picture

Write with simple clarity. Not too many abbreviations.

Don’t drown the reader in details, write for the generalist, with key details for the expert in the room

Why does an experiment need to be done

What do they need to know to follow the logic

CIHR Project grant

Summary of proposal

Sex and gender section

Summary of progress

Proposal

Budget and Budget justification
CV- most significant contributions

So you didn't get funded? What next?
Response to Reviews

Summary of Proposal

First impression to the readers- captures their attention!
-tells them what the grant is about

Title and summary can be changed for full grant- but needs to be similar

Used for registration and full grant- for reviewer recruitment and assignment

Need to have your overall grant plans and aims clear in your mind before registration deadline, then will flesh out for full grant.

Need to include enough specifics so that the panel chair can find reviewers who understand the approaches/techniques used

Summary of Proposal- First impressions count!

CIHR instructions:

Background and importance

Goals/research aims

Methods/approaches/expertise

Expected outcomes

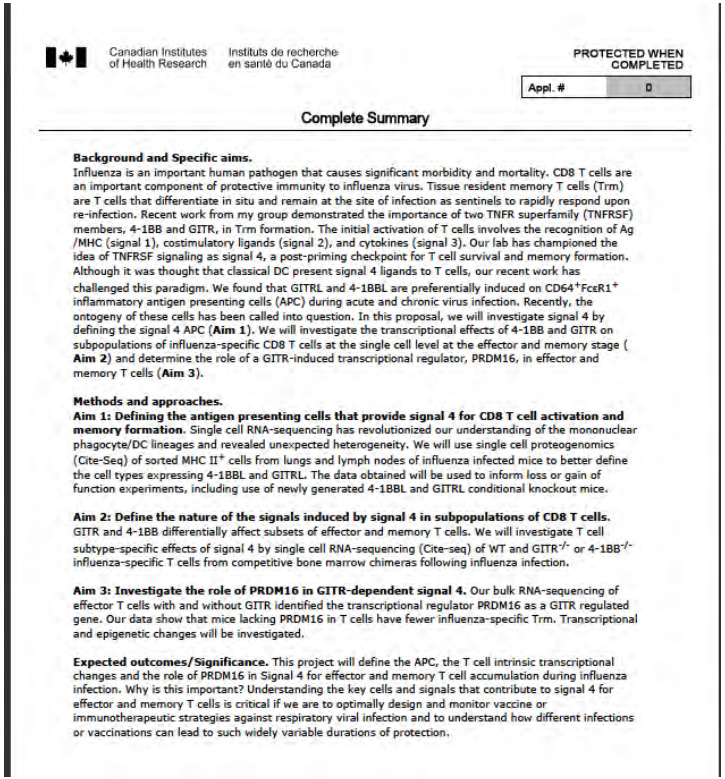
My advice:

First- state the problem, big picture question--importance- capture reviewers' interest, set the stage for your goals/hypothesis.

List specific aims with a title, and a brief summary of the question you will ask and a brief summary of how you will do it. Human research: *Study subjects.*

End with a summary of what will we learn from your study and how this will impact the field-why should we care about this?

If room- indicate what you and your collaborators bring to the table to ensure success, time frame.



Canadian Institutes of Health Research | Instituts de recherche en santé du Canada

PROTECTED WHEN COMPLETED

Appl. # 0

Complete Summary

Background and Specific aims.
Influenza is an important human pathogen that causes significant morbidity and mortality. CD8 T cells are an important component of protective immunity to influenza virus. Tissue resident memory T cells (Trm) are T cells that differentiate in situ and remain at the site of infection as sentinels to rapidly respond upon re-infection. Recent work from my group demonstrated the importance of two TNFR superfamily (TNFRSF) members, 4-1BB and GITR, in Trm formation. The initial activation of T cells involves the recognition of Ag /MHC (signal 1), costimulatory ligands (signal 2), and cytokines (signal 3). Our lab has championed the idea of TNFRSF signaling as signal 4, a post-priming checkpoint for T cell survival and memory formation. Although it was thought that classical DC present signal 4 ligands to T cells, our recent work has challenged this paradigm. We found that GITRL and 4-1BBL are preferentially induced on $CD64^{+}FcεR1^{+}$ inflammatory antigen presenting cells (APC) during acute and chronic virus infection. Recently, the ontogeny of these cells has been called into question. In this proposal, we will investigate signal 4 by defining the signal 4 APC (**Aim 1**). We will investigate the transcriptional effects of 4-1BB and GITR on subpopulations of influenza-specific CD8 T cells at the single cell level at the effector and memory stage (**Aim 2**) and determine the role of a GITR-induced transcriptional regulator, PRDM16, in effector and memory T cells (**Aim 3**).

Methods and approaches.
Aim 1: Defining the antigen presenting cells that provide signal 4 for CD8 T cell activation and memory formation. Single cell RNA-sequencing has revolutionized our understanding of the mononuclear phagocyte/DC lineages and revealed unexpected heterogeneity. We will use single cell proteogenomics (Cite-Seq) of sorted $MHC\ II^{+}$ cells from lungs and lymph nodes of influenza infected mice to better define the cell types expressing 4-1BBL and GITRL. The data obtained will be used to inform loss or gain of function experiments, including use of newly generated 4-1BBL and GITRL conditional knockout mice.

Aim 2: Define the nature of the signals induced by signal 4 in subpopulations of CD8 T cells. GITR and 4-1BB differentially affect subsets of effector and memory T cells. We will investigate T cell subtype-specific effects of signal 4 by single cell RNA-sequencing (Cite-seq) of WT and $GITR^{-/-}$ or $4\text{-}1BB^{-/-}$ influenza-specific T cells from competitive bone marrow chimeras following influenza infection.

Aim 3: Investigate the role of PRDM16 in GITR-dependent signal 4. Our bulk RNA-sequencing of effector T cells with and without GITR identified the transcriptional regulator PRDM16 as a GITR regulated gene. Our data show that mice lacking PRDM16 in T cells have fewer influenza-specific Trm. Transcriptional and epigenetic changes will be investigated.

Expected outcomes/Significance. This project will define the APC, the T cell intrinsic transcriptional changes and the role of PRDM16 in Signal 4 for effector and memory T cell accumulation during influenza infection. Why is this important? Understanding the key cells and signals that contribute to signal 4 for effector and memory T cells is critical if we are to optimally design and monitor vaccine or immunotherapeutic strategies against respiratory viral infection and to understand how different infections or vaccinations can lead to such widely variable durations of protection.

1st paragraph- big world problem, honing down to specific questions and introduces the aims

Visually easy to read- leave some spaces
Make sure the aims are clearly spaced out
List the main technique in each aim (e.g. single Cell RNA-sequencing)

Ended with expected outcomes –significance- Why is it important to do this work?

If room-put in your expertise

Summary of Progress -2 pages- new

Would be more aptly called context

1. Progress –productivity

-what did you achieve with the previous funding cycle- relevant to this application
-if a new grant highlight how your previous work leads to this grant
-if a new investigator-chance to show how this grant builds on your PDF expertise
-could also explain how its different from your PDF mentors work (*letter helpful too*)

2. Contextualize this application in relation to your other grants

-if you hold multiple grants, how does this one fit into your overall program
-chance to address issues of perceived overlap before they arise

3. COVID impact- keep this short – highlight how productivity impacted

Sex and gender task

Sex- biological variable *Gender-socio-cultural factor*

It is important not only to fill out the boxes for how sex and gender will be addressed in your research, but also to work it into your proposal as part of your ”**research design, methods, analysis and interpretation, and/or dissemination of findings** ”

Useful to take the sex and gender online course from CIHR (see CIHR sex and gender page) https://cihr-irsc.gc.ca/e/50836.html

The sex and gender section is now specifically brought up in every review, and grantees who fail to address it or do so in a superficial way without including in the actual grant, may score lower

The Proposal

Should stand alone-don't assume they have read the summary first

The aims- research plan- should be about half the document- write this first

Then write the background, previous related work, preliminary results section to support it

End with significance

Include **figures** in the 10-page grant- must be big enough to read
-A graphic abstract summarizing the aims can be helpful on the first page
-Critical unpublished preliminary data
-references not included - add as a separate file

The Proposal -structure

Opening paragraph- Overview or synopsis of the grant- big picture question
-why is it important, context, significant new knowledge to be obtained, introduce the main aims

Background and previous related work:
Review of previous work by you and others-sufficient to understand proposal
Provide the rationale that logically leads to the current proposal, leads into the aims

Research plan: write around the specific aims (~2 to 4, typically 3)
Lead in each aim with the stated goal; then how you will test/investigate
Can have sub-aims
Experimental plan, sequence, techniques and timelines (figures embedded)
Potential pitfalls and alternatives, preliminary data to show feasibility
Expertise- why you are the one to do this, collaborators for technical gaps
(Note this can be reinforced in the progress section and CV (most significant contributions)
Significance- conclude with reiterating the significance of the project

Some pitfalls to avoid

- Your grant rises and falls on aim 1- if aim 1 fails, then there is no point doing aim 2 and 3- if there is any risk to aim 1, reviewers will be less inclined to support the whole grant
- Your grant is too ambitious- way more than can be reasonably done with a team of your size/budget in the time frame; too broad in scope, too many aims
- Grant is too complex to follow- so many alternatives that reviewer can't figure out what you want to do first- make sure your preferred approach is clear and what is a back up
- Your grant is the obvious next step in a project you started as a post-doctoral fellow and the panel thinks you are competing with PDF mentor- Get a letter from the former mentor clearly stating what is yours to take
- Solid grant, but fails to win the enthusiasm of the panel and rise to the top of the pile-did you drown them in detail? really make sure the significance and impact is clear

Appendices- Reviewers DO NOT have to read these

Up to 5 publications can be added- only add those relevant to the specific proposal and only if you refer to them within the proposal otherwise looks like padding (ref list is already in the CV).

-judicious use of figures- reviewer does not have to look at these.
Critical figures must be in the grant, supporting panels in the appendices
Don't use this to get around space limitations; too many appendices puts off reviewers

Useful place to add other key elements:
e.g. consent forms and study questionnaires are legitimate additions

There is currently much debate at CIHR about limiting appendices.
I don't read them all, just if I want to look something up. Reviewer can find publications online anyway- although they do not have to do so.

Collaborators or Coapplicants?

Nominated PI and Principal applicants-direct the research

Co-applicant- actively engaged in the research, does not direct it

Collaborator-provides a specific service, technique, reagent, access to equipment or study population, statistical methods.

Letters of support- people who will give advice

Previous supervisor: Better not to have them on your grants pre-tenure-need to establish independence at least on a subset of projects; Can be helpful to get a letter of support acknowledging access to reagents, project continuation

Budget and Budget Justification

Personnel
Keep it reasonable- 1 tech or RA; 1 PDF, 1 or 2 grad students
List by name if already hired
Be specific about what they will do in the grant- assign to specific tasks

Materials, supplies, services
Provide details on the more expensive items –e.g. costs for RNA-seq

Currently, CIHR applies a ~23% ATB cut to allow more grants to be funded
I don't recommend obvious padding or panelists will cut
But don't be too modest, as you can expect to get less than asked for.

CV module –most significant contributions

Update/edit your CV for each grant

Tailor the 5 “most significant contributions” section to this grant

What expertise prepares you for success in this grant?

Could be publications, a leadership role, clinical practice, policy development, strategic training- you can mix and match the contributions that best exemplify your qualifications for the specific proposal

So you didn't get funded- what next?

Were you triaged? Read the reviews- did they understand your grant? Were you too ambitious? Not ambitious enough, flaws in logic?

Did you just miss? 3.9 very good but not the top tier? Why? If there were fixable flaws- resubmit. Add a collaborator? If there is nothing specific, but you failed to excite the reviewers consider whether you framed your question correctly to illustrate the importance of the problem and how your grant will deliver.

Show your reviews to an experienced colleagues and get some advice!

The response to reviews

Response to reviews- 2 pages allowed

Must upload all the reviews- including SO notes-if you don't include-reviewers don't have to read

Response should not require any other document– in responding- quote the specific comment and then indicate your response

Be courteous and brief… do not imply that the reviewer is incompetent- even if they were- just address the criticisms factually and professionally

Consider joining a grant panel (or the observer program) as it can give great insights into what works and does not

"I have an idea .. but I'll need at least 2 hours to go through my self censorship process before speaking."

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So you didn’t get funded- what next?

Do you go back right away- or wait out a cycle? Time between reviews and next grant is short. If you can readily address reviews, by all means, revise and go back. But if additional experiments are required, might be better to sit out next cycle so that you can go back with a stronger grant… avoid reviewer fatigue!

Don’t get discouraged: persistence-with 15-16% success rate may have to try several times

If score isn’t improving after several tries-reconsider the approach

Was it flawed or uninteresting relative to competing grants-rethink?
Was it exciting but ahead of its time-too preliminary—try to find short term catalyst or innovation grant to get some preliminary data

Time management

- Give yourself time to write
- Plan your day to do your most important work early in the day
- Block off some time to write uninterrupted
- Ration your time- you need to say yes to important things, don't get distracted by the unimportant
- When writing- I turn off my email notifications and look at only when I'm ready for a break

Research grant writing in progress.

Summary

Start early

Organization

Write with simplicity and clarity

Big picture/appropriate details

Preliminary results/track record

Internal review- Revise-revise-revise

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Temerty Medicine

Core Facilities and Services

Natasha Christie-Holmes, Research Operations Officer

natasha.christie@utoronto.ca

June 23, 2021

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- Dedicated management teams to provide specific technical expertise, training and protocol development assistance for research personnel

- Maximizing the impact of funding success to propel research at a Faculty-wide level and support future grant applications

- Supported through cost-recovery structures and strategic planning of grant-associated operational funding

https://medicine.utoronto.ca/core-facilities-services

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Division of Comparative Medicine (DCM)

- Interim Director: David Hanwell, DVM, PhD
- Manager: Frank Giuliano, RMLAT
- http://www.dcm.utoronto.ca/
- Federally and Provincially accredited Animal Care program at the Faculty of Medicine
- Preeminent veterinary technical staff including 5 Masters level animal technicians
- Over 60, 000 ft^2 dedicated to *in vivo* research, including germfree, gnotobiotics and SPF+ exclusion
- Multiple full animal imaging modalities on-site supported by dedicated technical expert

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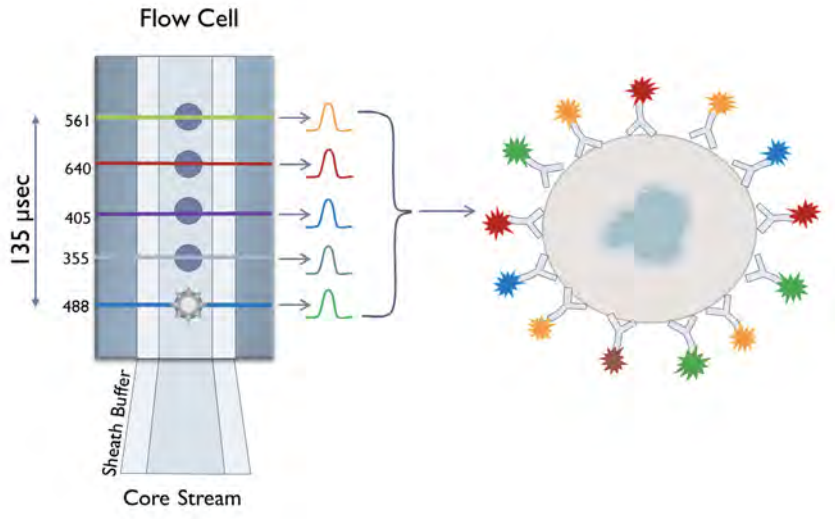
Flow Cytometry Facility

- Director: Tania Watts, PhD
- Manager: Natalie Simard, PhD
- http://flowcytometry.utoronto.ca/
- Equipped with 7 analyzers (3 to 5 laser each; up to 18 colour acquisition) and 3 cell sorters allowing for large multiparameter analysis
- Supported by dedicated operators with extensive FCM knowledge and over 20 years of experience
- Comprehensive training program partnership with Expert Cytometry(ExCyte™) and SickKids Hospital for research personnel



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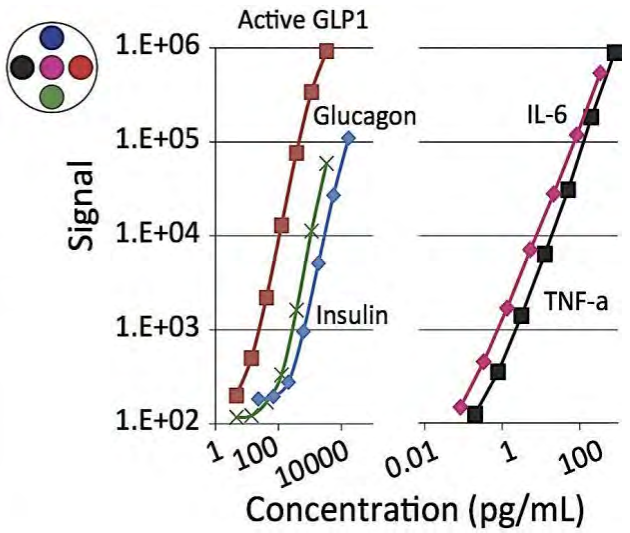
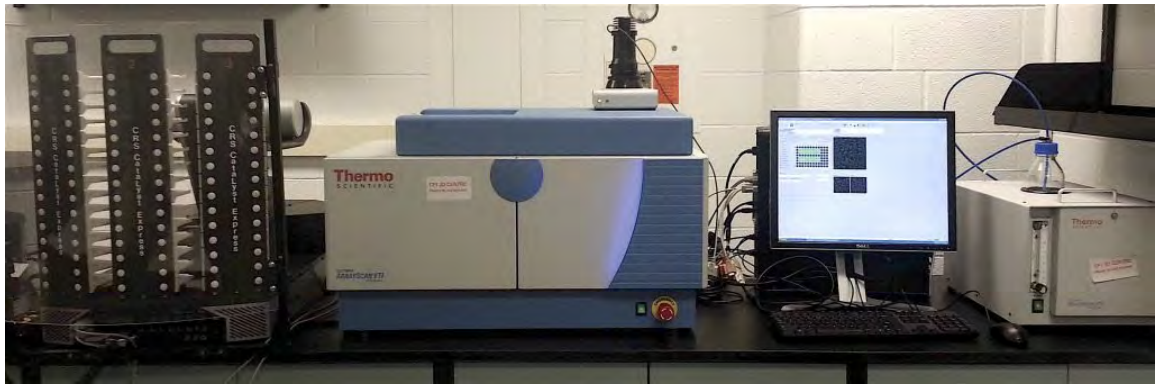
Diet, Digestive tract and Disease (3D) facility

- Director: Herb Gaisano, PhD
- Manager: Alexandre Hardy, PhD
- Multiple analytic platforms to facilitate molecular investigations
- Various imaging platforms from molecular level to full small animal scans
- Partnership with DCM to provide technical expertise in animal imaging





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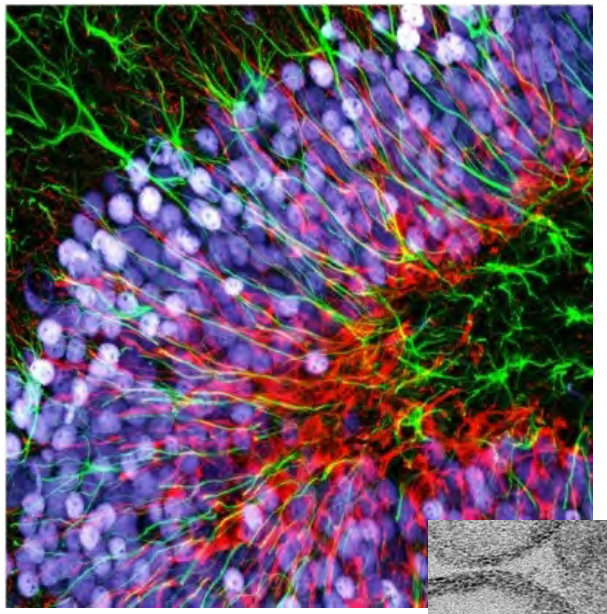
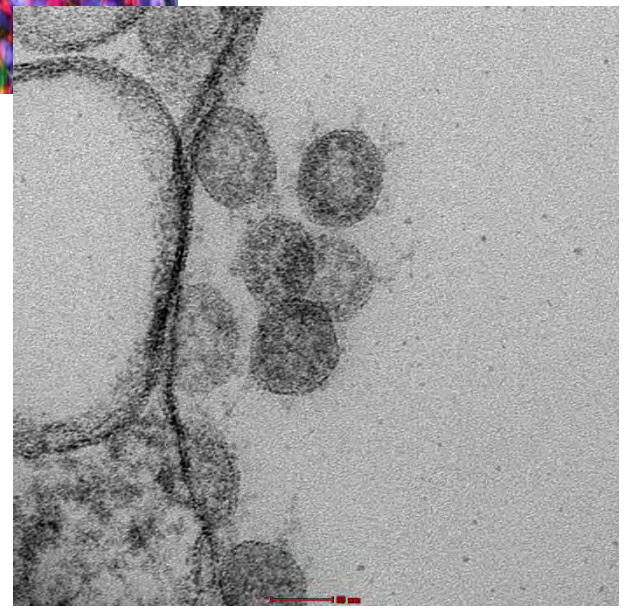
Microscopy Imaging Lab (MIL)

- Director: Stephen Girardin, PhD
- Manager: Lindsey Fiddes, PhD
- Consolidated microscopy core including confocal, fluorescence, scanning (SEM) and transmission (TEM) electron microscopes
- Expanding Cryo-EM capabilities
- Expert technical team trains research personnel in microscopy techniques and development of protocols
- Dedicated preparatory lab for SEM/TEM samples, Equipped for Cryo-TEM preparation
- Providing full-service microscopy (prep and scanning)





TEM of Vero cells infected with SARS-CoV-2, 120,000x
(Isolated in C-CL3 Unit, Imaged by MIL)
Banerjee et al, 2020

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Combined Containment Level 3 (C-CL3) Unit

- Director: Scott Gray-Owen, PhD
- Manager: Betty Poon, MSc
- Federally licensed facilities for research involving RG3 pathogens
- Dedicated regulatory team providing guidance, validation and oversight
- Facilities for small animal *in vivo* studies and molecular *in vitro* research

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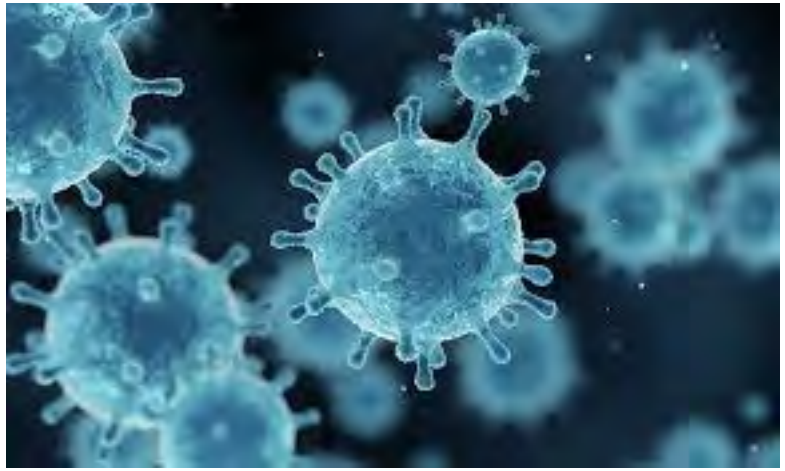

Virology Core Lab and Biobank

- Director: Scott Gray-Owen, PhD
- Manager: Betty Poon, MSc
- New, adaptive CL2+ space for viral research
- Foundational work on seasonal coronaviruses, HIV
- Extends TFoM infectious disease expertise to support other Faculties
- Leveraging opportunities for collaboration and building foundation for future studies on COVID-19 samples

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Central Sterilization Service (CSS)

- Providing glass-washing, laundry and sterilization services
- Centralized stock of glass and plasticware for all MSB researchers to access
- Multiple sterilization cycles daily allowing flexibility for lab schedules
- After-hours autoclaves available to trained users

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Core Facilities add value in grants

Build the foundation for early-stage investigators

- Established infrastructure, expertise and support

Show sustainability for established investigators

- Requested infrastructure can be well implemented
- Ongoing support for maintenance/operations

https://medicine.utoronto.ca/core-facilities-services

Temerty Medicine

How to Write a Persuasive Grant Proposal

June 23, 2021

Golnaz Farhat, PhD

Grants & Awards Editor, Office of the Vice Dean, Education & Research

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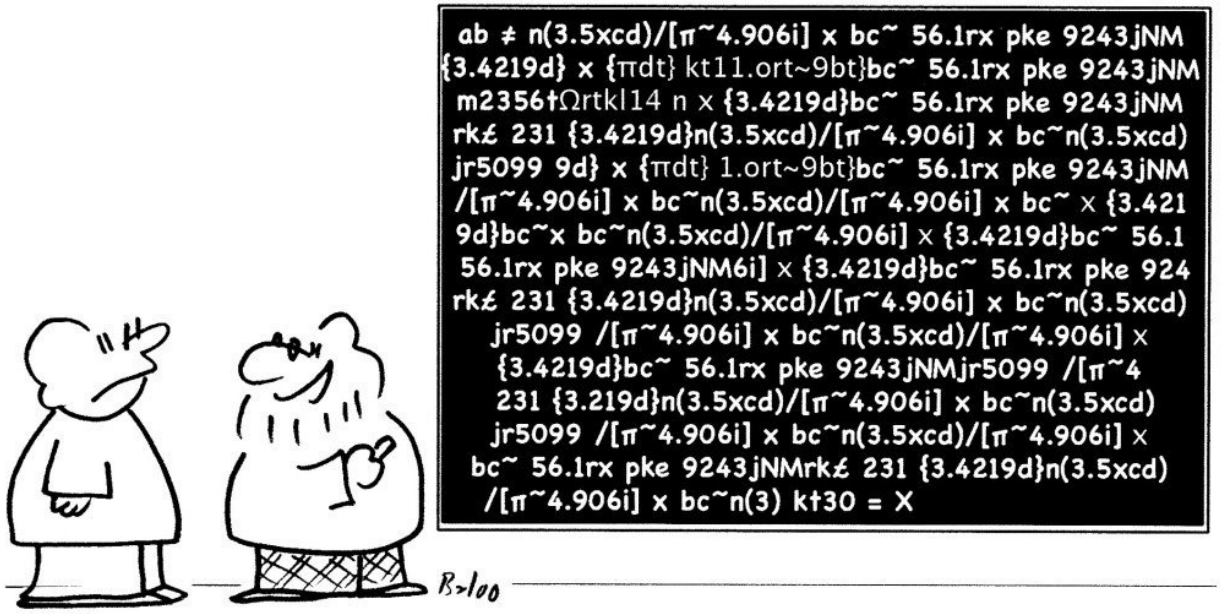
Proposal writing is different from academic writing

- The facts are not enough
- You must persuade your reader
- A well-crafted and strategic sales pitch

Proposal writing is a skill that can be learned

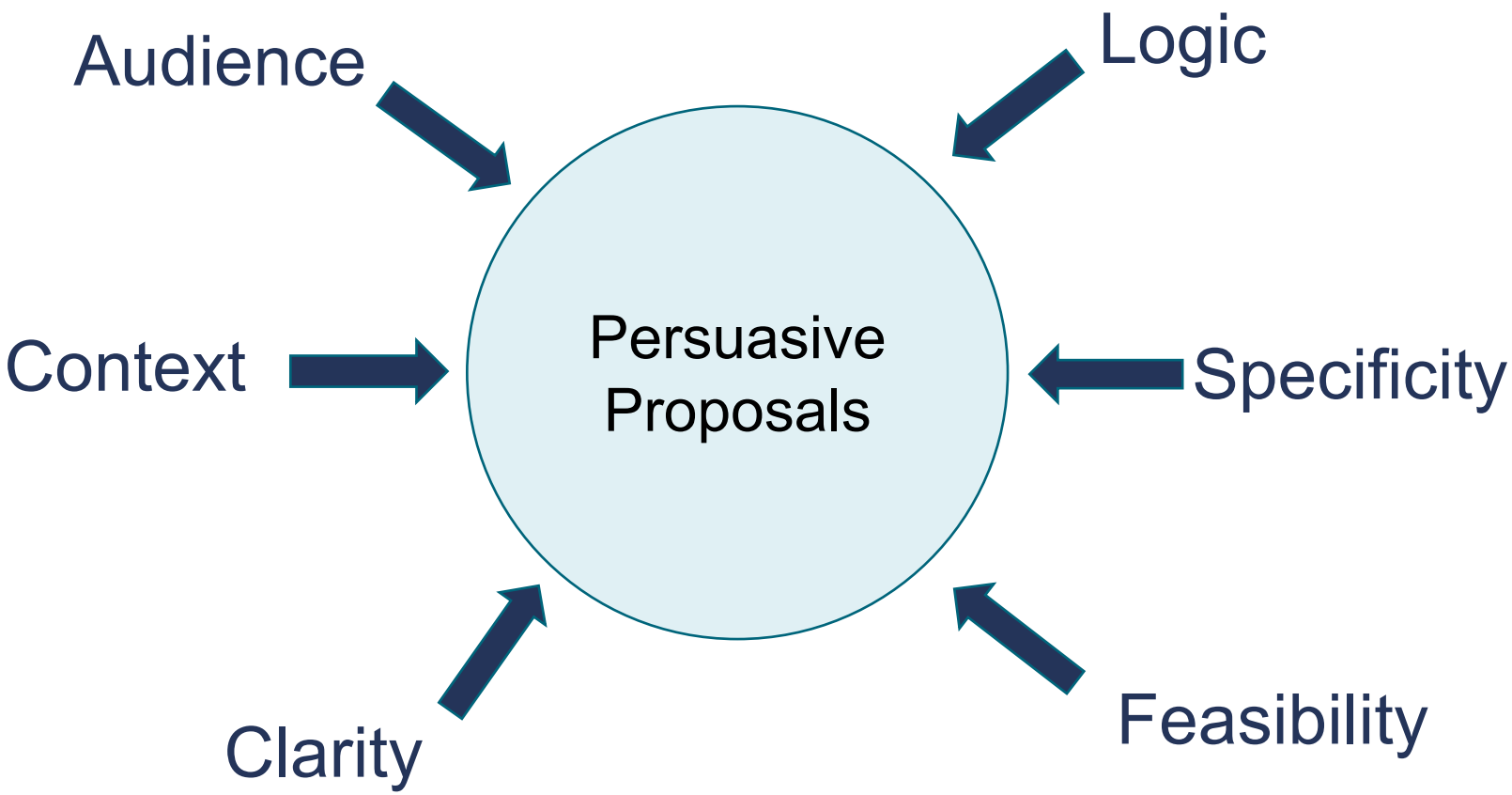
There is no magic formula for a successful proposal

- Fundamental building blocks
- Practice



"It's a foolproof formula for writing grant applications."

Considerations for a persuasive proposal



Start early

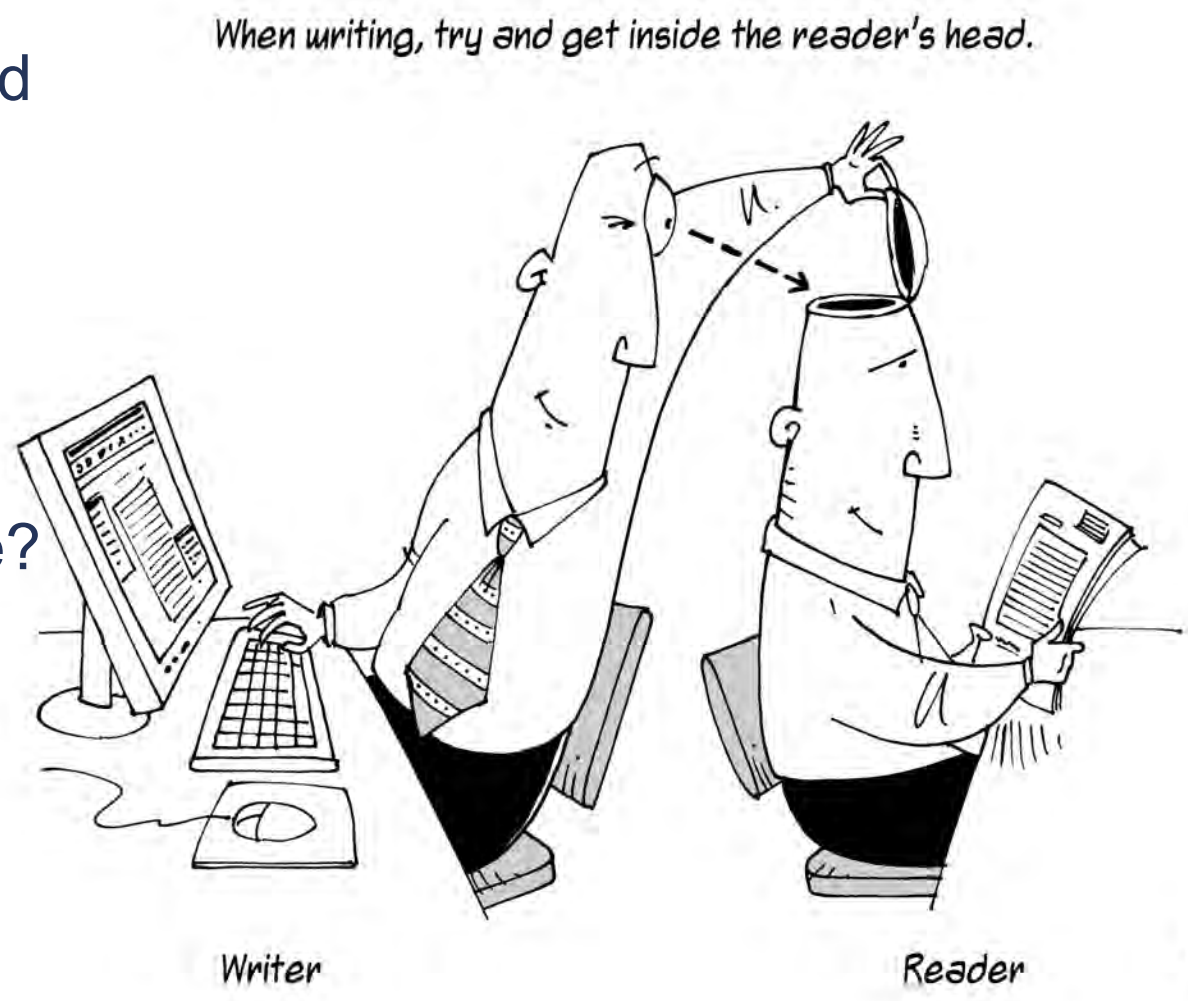
Successful proposal writing takes

TIME

Understand your audience

- They are busy, distracted, tired, and bored
- They are reviewing many proposals
- They are skeptical

- What are their area and level of expertise?
- What are their goals?



Convince the reviewer from the first page

- Is the problem important?
- What is the overall goal?
- What specifically will be done?
- What is the payoff?

Context

"the circumstances that form the setting for an event, statement, or idea, and in terms of which it can be fully understood and assessed"

- Helps the reviewer understand the problem
- Helps the reviewer relate to the problem
- Helps the reviewer focus on the problem
- Makes your work relevant
- Makes your work current
- Through story-telling, plays on the reviewer's emotions

Set the context in your introduction

Is the problem important?

The bacterium *Coxiella burnetii* can spread from farm animals to humans, causing the flu-like illness, Q fever, and a chronic form of the disease commonly manifested as endocarditis. *C. burnetii* is found worldwide, and can cause epidemics, such as the recent one in the Netherlands where thousands of people were infected. It has also been detected among U.S. military personnel and is highly prevalent in US environmental samples. Chronic Q fever, if left untreated, is associated with a high mortality rate (>60%). Chronic *Coxiella* infections are very difficult to treat because they require a prolonged antibiotic regimen lasting up to 4 years. Moreover, antibiotic resistant strains are prevalent. The inhospitable environment within a lysosome-derived vacuole is the preferred growth medium for C. burnetii. The unique ability of C. burnetii to thrive in this acidic vacuole is the key to its virulence. However, metabolic pathways critical to the pathogen's intracellular growth are unknown, mainly due to the unavailability of appropriate genome-scale approaches. This gap in knowledge is an important problem because it has hindered both the understanding of C. burnetii's basic biology and pathogenesis, and the development of better therapies.

Set the context and define the problem

Current state of the science

Relevant scientific background

Knowledge GAP

Context is not just for the introduction

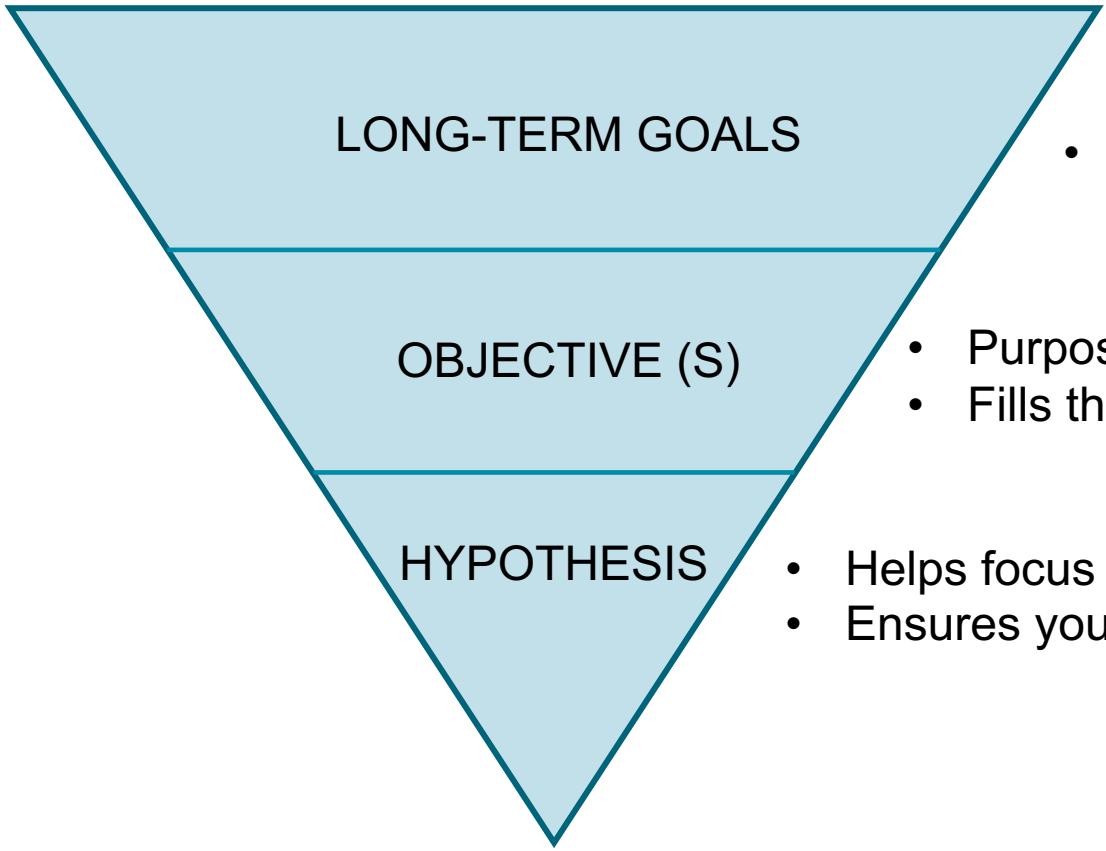
- Methods
- Collaborations
- Human resources
- Timeline
- Budget

WHY?

Logic: Your proposal should be logical and consistent

- Logic is a tool of persuasion
- Appeal to the reader's sense of what is reasonable and logical
- Each part of the argument should flow logically into the next
- Check for inconsistencies or gaps in your arguments

Define your goals in a logical way



- “Big picture”

- Purpose of the proposal
- Fills the knowledge GAP

- Helps focus the research
- Ensures you achieve your aims

What is the overall goal?

Define your goals in a logical way

Our long-term goal is to understand the molecular details of *Coxiella burnetii*'s distinctive physiology, and to apply this knowledge to developing novel therapeutic strategies. Towards attaining this goal, the overall objective of this application is to identify metabolic pathways that are vital to *C. burnetii's* intracellular growth. Our central hypothesis is that *C. burnetii* evolved from a tick-associated ancestor by acquiring critical metabolic genes through horizontal gene transfer (HGT).

How to write your specific aims

- Aims should communicate WHAT you are going to do and HOW you are going to do it
- Give each aim an active title
- Aims should be related but independent
- Aims should be specific and should have a clear endpoint
- Aims should test a hypothesis or accomplish an objective
- Aims should be feasible within the time frame of the grant

What specifically will be done?

Example of specific aim

Aim1. Identify metabolic pathways that distinguish *C. burnetii* from tick-associated Coxiella.

Because Coxiella species present in ticks do not replicate within a lysosome-derived vacuole, our working hypothesis is that genes critical to *C. burnetii*'s unique intracellular physiology will not be present in tick-associated Coxiella.

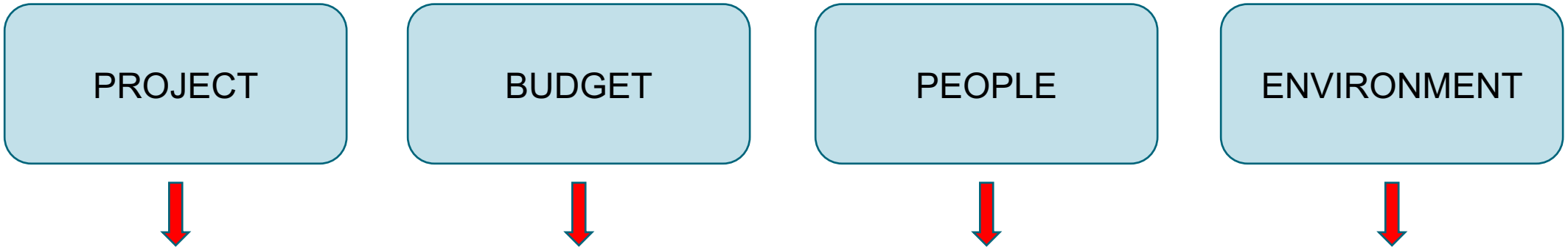
We will sequence the complete genome of *C. burnetii*'s closest known relative—a Coxiella species present in the soft tick *Ornithodoros rostratus*, and by comparative genome analyses, we will identify metabolic genes and pathways unique to *C. burnetii*.

What is the payoff?

Don’t forget to include an impact statement

The proposed research will be impactful because once metabolic processes important to C. burnetii’s intracellular growth are identified, new pharmacological agents that block these pathways can be developed to treat chronic Q fever more effectively.

Feasibility



Specificity adds credibility

The more specific you are in your arguments, the more credible your arguments will be.

"This research will have a meaningful impact on…."

"Identifying the metabolic genes unique to *C. burnetii* will allow us to identify new therapeutic targets……"

Specificity: Give concrete examples

"We have built a highly synergistic research team…"

Examples of past productivity : publications, patents, awards, grants, etc.

"Uncontrolled type 2 diabetes can lead to significant complications…"

Examples of complications: heart disease, nerve damage, vision loss, etc.

Specificity: Use hard facts and numbers

"…an impressive publication track record…"
VS
"…23 peer-reviewed publications in 10 years…"

"…cancer is a significant health problem…"
VS
"…cancer will affect 1 in 3 Canadians in their lifetime…"

Specificity: Avoid intensifiers

Very

Interestingly

Strikingly

Excitingly

Significantly

Remarkably

They immediately invite skepticism

Specificity: Use strong verbs

WEAK	STRONG
Examine	Isolate
Explore	Determine
Evaluate	Identify
Study	Define
Investigate	Discover
	Elucidate
	Ascertain

What follows will necessarily be specific

Clarity: Make your proposal easy to read

Communicate your ideas in the simplest and most precise way possible.

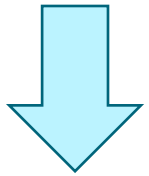
Clarity: Write clearly, plainly, and concisely

- Short words
- Short sentences
- Short paragraphs
- Avoid jargon and highly technical terms
- Limit your use of acronyms to 2 or 3
- Use strong verbs and the active voice

> *"I am writing a longer letter than usual because there is not enough time to write a short one."*
>
> Blaise Pascal,
> *Lettres Provinciales* (ca. 1657)

Clarity: Keep it simple – short words, short sentences

Using phosphorescence imaging as a form of biological oximetry, we confirmed the oxygen poor environment of the gut lumen and demonstrated the existence of a dynamic equilibrium with an established gradient whereby the mammalian gut releases oxygen into the gut lumen.



We used phosphorescence imaging to characterize oxygen gradients in the gut lumen and found higher levels near the gut wall.

Clarity: Remove unnecessary words

"Moreover, we show that sharks are larger than otters. Thus, sharks should be considered in ocean management plans. Finally, sharks are also faster swimmers than otters."

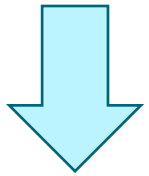
"We show that sharks are larger than otters and should be considered in ocean management plans. Sharks also swim faster than otters."

"In a recent study in 2015, Smith *et al*. showed that giraffes are larger than squirrels."

"Giraffes are larger than squirrels (Smith *et. al*., 2015)"

Clarity: Turn nouns into verbs

"During DNA damage, recognition of Protein 1 by Protein 2 results in recruitment of Protein 3 and repression of cell proliferation genes."



"During DNA damage Protein 1 recruits Protein 2 and Protein 3, which together repress cell proliferation genes."

Clarity: Avoid noun strings

NASA continues to work on the International Space Station astronaut living-quarters module development project.

NASA is still developing the module that will provide living quarters for the astronauts aboard the International Space Station.

Clarity: Pay attention to sentence flow

Old information to new Information

Cocoa, from which chocolate is made, contains flavonoids. The flavonoids present in cocoa have been shown to relax blood vessels and lower blood pressure. When blood pressure is lowered, there is a reduced risk of health problems such as stroke and coronary heart disease.

Clarity: Break up text with headings, bullets, and figures

<u>Grant proposal title grant proposal title grant proposal title:</u>

Use white space in your grant proposal to make it easier to read for the reviewers. It guides the eyes of the reviewer and helps them digest complex information. Use white space in your grant proposal to make it easier to read for the reviewers. It guides the eyes of the reviewer and helps them digest complex information. Use white space in your grant proposal to make it easier to read for the reviewers. It guides the eyes of the reviewer and helps them digest complex information. Use white space in your grant proposal to make it easier to read for the reviewers. It guides the eyes of the reviewer and helps them digest complex information. Use white space in your grant proposal to make it easier to read for the reviewers. It guides the eyes of the reviewer and helps them digest complex information. Use white space in your grant proposal to make it easier to read for the reviewers. It guides the eyes of the reviewer and helps them digest complex information. Use white space in your grant proposal to make it easier to read for the reviewers. It guides the eyes of the reviewer and helps them digest complex information. Use white space in your grant proposal to make it easier to read for the reviewers. It guides the eyes of the reviewer and helps them digest complex information. Use white space in your grant proposal to make it easier to read for the reviewers. It guides the eyes of the reviewer and helps them digest complex information. Use white space in your grant proposal to make it easier to read for the reviewers. It guides the eyes of the reviewer and helps them digest complex information.

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- Use bulleted lists to help highlight important information like aims
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Use Headings to Break Up Text and Guide Reviewer

It guides the eyes of the reviewer and helps them digest complex information. Use white space in your grant proposal to make it easier to read for the reviewers. It guides the eyes of the reviewer and helps them digest complex information. Use white space in your grant proposal to make it easier to read for the reviewers. It guides the eyes of the reviewer and helps them digest complex information.

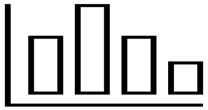

Figure 1 Use figures to communicate complex concepts

Use white space in your grant proposal to make it easier to read for the reviewers. It guides the eyes of the reviewer and helps them digest complex information. Use white space in your grant proposal to make it easier to read for the reviewers. It guides the eyes of the reviewer and helps them digest complex information. Use white space in your grant proposal to make it easier to read for the reviewers. It guides the eyes of the reviewer and helps them digest complex information. Use white space in your grant proposal to make it easier to read for the reviewers. It guides the eyes of the reviewer and helps them digest complex information.

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Final tips

- Start early
- Consider your audience
- Engage the reviewer on the first page
- Revise, revise, revise

Thank you!

Email: golnaz.farhat@utoronto.ca