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# CGS-M Workshop

## Graduate Science Education Scholarship Team

Rebekah DeVinney, Outgoing Director for Scholarships  
Mackenzie Gutierrez, Student Lead  
Cameron Vanderwey, Stipend and Scholarship Officer  
Zach Marshall, Director for Scholarships

Nov 8, 2023

# Housekeeping

- Please mute during the presentation
- There will be breaks throughout the workshop for questions.
  - Put questions in the chat
  - Unmute and ask
- Slides will be posted on the GSE website.

# Agenda

- Background, Eligibility and Timelines
- Adjudication Criteria
- Application parts
  - Application form
  - Common CV
  - Research Proposal
  - Letters of Reference
- General Tips
- Resources

# Canada Graduate Scholarship-Masters (CGSM)

- Three agencies (Tri-council)
  - CIHR: Health Research
  - NSERC: Natural Sciences and Engineering
    - Does not fund human health research
  - SSHRC: Social Sciences and Humanities
- \$17,500/year, 1 year, non-renewable

# Canada Graduate Scholarship-Masters (CGSM)

- Uncertain about which agency to apply to? Ask here  
[https://www.nserc-crsng.gc.ca/students-etudiants/pg-cs/cgsm-bescm\\_eng.asp](https://www.nserc-crsng.gc.ca/students-etudiants/pg-cs/cgsm-bescm_eng.asp)
- CIHR [cgsma@cihr-irsc.gc.ca](mailto:cgsma@cihr-irsc.gc.ca)
- NSERC [schol@nserc-crsng.gc.ca](mailto:schol@nserc-crsng.gc.ca)
- SSHRC [fellowships@sshrc-crsh.gc.ca](mailto:fellowships@sshrc-crsh.gc.ca)
- Can only apply to one agency at a time!

# CGSM Eligibility

- Canadian or permanent resident
- First 12 months of program
- Can only apply to one agency
- Eligibility can be tricky
- Contact FGS Graduate Scholarship Officers with questions—they are the pros!

# CGSM Harmonization

- All applicants go through online portal managed by NSERC
  - <https://portal-portail.nserc-crsng.gc.ca>
  - Common application for all 3 agencies
- Applications are adjudicated at FGS not nationally
- Universities have a quota of awards (2023-24)
  - CIHR: 43
  - NSERC: 34
  - SSHRC: 36



# Indigenous and Black Scholars Awards

- Canadian Citizen self-identifying as Indigenous, Metis or Inuk
  - \$17,500 Indigenous Scholars Award
  - \$5000 supplement
  - <https://grad.ucalgary.ca/awards/award-opportunities/canada-graduate-scholarships-indigenous-scholars>
- Canadian citizens/PR who self-identify as Black will also be considered for the Support for Black student researchers
  - [https://www.nserc-crsng.gc.ca/Media-Media/NewsDetail-DetailNouvelles\\_eng.asp?ID=1364](https://www.nserc-crsng.gc.ca/Media-Media/NewsDetail-DetailNouvelles_eng.asp?ID=1364)



# Timelines

**CGS Masters Deadline:  
December 1, 2023  
5:59 PM MT/8:00 PM ET**

**Pay attention to countdown!**

**Contact REFEREES ASAP**

# When are results out?

- By April 1, 2024 on Research Portal
- Universities will send out results on same day via email
  - Successful, Unsuccessful, Waiting List
- Students can apply to up to 3 institutions, so there is a tumble down of offers if awards are declined



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**Questions???**



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# How to apply?

# The application

- Application in Research Portal
- Summary of the proposal (Lay Abstract)
- Research proposal (1 page)
  - Bibliography/Citations (+1 page)
- CGSM Canadian Common CV
  - Completed on CCV site, and attached to application in Research Portal
- Two referee assessments
- Transcripts
  - Uploaded to Research Portal

# Adjudication Criteria

- 50% Academic Excellence
  - Transcripts
  - Awards
  - Reference assessments (x2)
- 30% Research Potential
  - Research proposal
  - Common CV
  - Reference assessments (x2)
- 20% Personal Characteristics and Interpersonal Skills
  - Common CV
  - Reference assessments (x2)



# Application portal

- What you will see when you log in
- Timer
- Application info
  - Identification
  - Activity Details
  - Proposal summary

Research Portal

Canada

Profile Feedback

Home > Application Overview

Application Overview Sign out

27 days 3 hours 3 minutes until the funding agency deadline date; please consult your institution regarding internal deadlines, if applicable.  
Deadline Date: December 01, 2020 20:00 (eastern)

Legend

- Received by Administrator:** The completed application has been successfully submitted to the institution by the applicant.
- Offered:** An offer has been made to the applicant by the institution.
- Alternate:** The application has been deemed meritorious in the institution's competition; however, due to its ranking, falls below the allocation cut-off. The applicant is therefore on the alternate list. Should an award become available due to a decline, an applicant on the alternate list may receive an offer.
- Not Offered:** The application has been deemed non meritorious in the institution's competition. Subsequent offers may NOT be made to the applicant.
- Ineligible:** The application has been deemed ineligible based on the eligibility criteria outlined in the funding opportunity description.
- Accepted:** The offer has been accepted by the applicant.
- Declined:** (a) the offer from the institution has been declined by the applicant; or (b) an offer from an institution has been accepted by the applicant; therefore, all other pending offers are automatically set to "Declined"; or (c) an offer that has not been accepted within 21 days from the date of offer.
- Deferred:** Before commencing an award, the applicant may defer an award for up to three years, for a maximum of one year at a time, but only for reasons of maternity, child rearing, illness, or health-related family responsibilities.
- Acceptance Withdrawn:** The acceptance of the offer has been withdrawn at the applicant's request.

Application

Status	Title	Funding Opportunity	Stage	Updated	Action
		Canada Graduate Scholarships-Master's Program	Application	2020-11-04 16:48:45	<a href="#">Edit</a> <a href="#">Preview</a>

Module Status

Status	Module Name	Status	Module Name
	<a href="#">Identification</a>		<a href="#">Summary of Proposal</a>
	<a href="#">Activity Details</a>		



# Identification

- If field of research is “Health” you will need a CIHR PIN
  - Natural Sciences
  - Social Sciences other options
- Register with CIHR here: <http://www.cihr-irsc.gc.ca/e/38201.html>
- Start early, it can take 1 full working day to get CIHR PIN

Application - Canada Graduate Scholarships-Master's Program Sign out

### Identification

**Applicant**

To modify this information, update the User Profile page.

Family Name: DeVinney First Name: Rebekah  
Middle Names:

**Application**

Application Title (required)

Language in which the proposal is written  English  French  
(required)

Field of Research Select

Start date or proposed start date of program of study Proposed end date of program of study

Number of months of graduate studies completed as of December 31 of year of application

Months of full-time study Months of part-time study

If you are successful in obtaining a Canada Graduate Scholarship will you consider applying for a Michael Smith Foreign Study Supplement?  Yes  No

**Proposed Host Organization**

**Proposed Host Organization #1**

Organization Select Clear Selection  
Faculty  
Department/Division Select Clear Selection

**Proposed Host Organization #2**

Organization Select Clear Selection  
Faculty  
Department/Division Select Clear Selection

**Proposed Host Organization #3**

Organization Select Clear Selection  
Faculty  
Department/Division Select Clear Selection

Save and validate Save and next





# Activity Details

- Sex and Gender portion important
- If yes, it will open window for explanation
  - Basic science: Sex of animals, cell lines.
  - Patient oriented: sex and gender considerations
- CIHR Sex and Gender Modules
- Talk to your supervisor!!

Home > Application Overview > Application

### Application - Canada Graduate Scholarships-Master's Program

Sign out

#### Activity Details

##### Certification Requirements

Does the proposed research involve humans as research participants? (required)  Yes  No

Does the proposed research involve animals? (required)  Yes  No

Does the proposed research involve human pluripotent stem cells? (required)  Yes  No

Does the proposed research involve controlled drugs and/or substances? (required)  Yes  No

##### For statistical purposes only

Does this application propose research involving Indigenous people? (required)  Yes  No

##### Sex- and Gender-Based Analysis

Are sex (biological) considerations taken into account in this proposal? (required)  Yes  No

Are gender (socio-cultural) considerations taken into account in this proposal? (required)  Yes  No

##### Keywords

List up to 10 keywords that best describe the proposal. (required)

1.	<input type="text"/>
2.	<input type="text"/>
3.	<input type="text"/>
4.	<input type="text"/>
5.	<input type="text"/>
6.	<input type="text"/>
7.	<input type="text"/>
8.	<input type="text"/>
9.	<input type="text"/>
10.	<input type="text"/>

##### Field of Study

Indicate and rank up to three primary fields of study relevant to your proposal, with #1 the most relevant and #3 the least relevant. (required)

1.	Select	<input type="button" value="Clear Selection"/>
2.	Select	<input type="button" value="Clear Selection"/>
3.	Select	<input type="button" value="Clear Selection"/>

Show Table of Contents

# Common CV

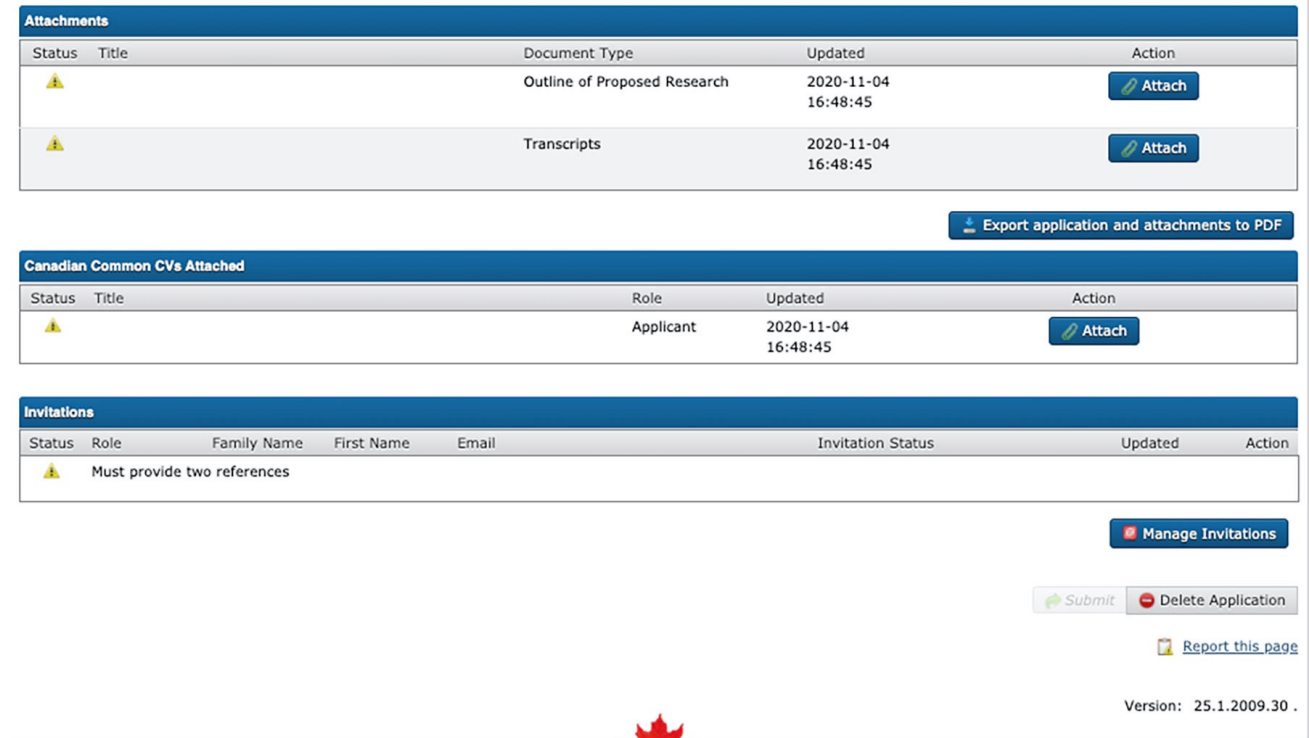
- Register for Common CV (CCV) on site
  - Do this ASAP if you haven't done so already
- Select the CGSM CCV from Funding dropdown menu
- Enter information about
  - Publications and Presentations
  - Awards
  - Extracurriculars/leadership activities
  - Leaves of absence and impact on research
- Keep criteria from each section in mind (Academics, Research Potential, Personal Characteristics).
- Demonstrate that you are well-rounded.
- [https://www.nserc-crsng.gc.ca/Students-Etudiants/CCV\\_CGSM-CVC\\_BESCM\\_eng.asp](https://www.nserc-crsng.gc.ca/Students-Etudiants/CCV_CGSM-CVC_BESCM_eng.asp)

# CCV-student perspective

- Start early
  - Not the most user-friendly site
- Have an updated CV to help you fill out the CCV
  - Copy and paste will make this task a lot easier
- Make sure to really highlight important experience both inside and outside academia:
  - Collaborations
  - Teaching, mentoring, supervising and/or coaching
  - Project management, organizing conferences
  - Outreach to community, science/research promotion
  - Charing committees

# Proposal and Attachments

- Research proposal and citations
- CCV
- Letters of reference
  - Fill in names and contact info and the system does the rest
- Transcripts



The screenshot displays a web application interface for managing proposals and attachments. It features three main sections: Attachments, Canadian Common CVs Attached, and Invitations. Each section contains a table with columns for Status, Title, Document Type, Role, Updated, Invitation Status, and Action. The Attachments section lists 'Outline of Proposed Research' and 'Transcripts'. The Canadian Common CVs Attached section lists 'Applicant'. The Invitations section shows a message 'Must provide two references'. Below the tables are buttons for 'Export application and attachments to PDF', 'Manage Invitations', 'Submit', and 'Delete Application'. A 'Report this page' link and a version number 'Version: 25.1.2009.30.' are also visible.

Attachments					
Status	Title	Document Type	Updated	Action	
⚠		Outline of Proposed Research	2020-11-04 16:48:45	<a href="#">Attach</a>	
⚠		Transcripts	2020-11-04 16:48:45	<a href="#">Attach</a>	

[Export application and attachments to PDF](#)

Canadian Common CVs Attached				
Status	Title	Role	Updated	Action
⚠		Applicant	2020-11-04 16:48:45	<a href="#">Attach</a>

Invitations							
Status	Role	Family Name	First Name	Email	Invitation Status	Updated	Action
⚠	Must provide two references						

[Manage Invitations](#)

[Submit](#) [Delete Application](#)

[Report this page](#)

Version: 25.1.2009.30.



# Leaves of Absence and Impact on Research (CCV)

- When appropriate, outline extraordinary circumstances that may have delayed or interrupted:
  - 1) your completion of degree(s),
  - 2) record or research achievement, or
  - 3) your research career.
- Extraordinary circumstances include care of **family members, illness, disability or other exceptional factors.**
- Many agencies are allowing students to explain how COVID-related shutdowns affected research or course of study.

# Scholarship and Stipend Officer

- Cameron Vanderwey
  - Email(s): [awardsgse@ucalgary.ca](mailto:awardsgse@ucalgary.ca); [gseproj@ucalgary.ca](mailto:gseproj@ucalgary.ca)
- Scholarship Support
  - Advertise major scholarship and award programs to CSM graduate students and supervisors
  - Administer a subset of GSE scholarship programs
  - Assist CSM graduate students locate and apply for international, national, provincial, regional, and institutional scholarships and awards (e.g., interpret and navigate application guidelines and processes)
- Stipend Support
  - Set up, revise, terminate all CSM graduate student stipend payments



# Transcripts

- Attached to the CGSM application
- If you submitted a request to FGS prior to Nov 5, they will compile and send you your transcripts by Nov 24
- If you have not submitted a request to FGS, provide all of the following
  - Full Name
  - UCID #
  - Graduate Program and your Supervisor(s)
  - Confirmation you did not submit a previous transcript **request** to the Graduate Scholarship Office
  - A list of institutions you have attended.
- Send to [awardsgse@ucalgary.ca](mailto:awardsgse@ucalgary.ca). Deadline is 11:59 pm Friday Nov 10, 2023.
  - Note, this is a hard deadline

**Questions???**





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# How to Create a Strong Application

# How to Create a Strong Scholarship Application

- **Start early:**
  - Writing a good application takes time and planning. Multiple rounds of edits.
  - Good idea to discuss timeline with supervisor.
- **Know what you are applying for:**
  - Read the terms of reference to confirm you meet the eligibility criteria and understand what is required to complete the application.
- **Follow the rules:**
  - Reviewers check this (they really do!).
- **Write to a broader audience:**
  - Reviewers are diverse and will likely not be experts in your field.
- **Know how you are being evaluated:**
  - What are the selection criteria and how are they weighted.

# Top Reasons Good Students Don't Get Funded

- Not applying!
- Not following instructions – i.e. addressing criteria/stretching rules.
- Frustrating evaluators by making material hard to find.
- Content, context and/or impact of research not clearly stated.
- Proposal lacks hypothesis/research objective and has insufficient detail in the methods.
- Not addressing possible weaknesses in the application.
- A generic letter of reference – the letter is positive but gives no specifics and does not address criteria.

# Adjudication Criteria

- 50% Academic Excellence
  - Transcripts
  - Awards
  - Reference assessments (x2)
- 30% Research Potential
  - Research proposal
  - Common CV
  - Reference assessments (x2)
- 20% Personal Characteristics and Interpersonal Skills
  - Common CV
  - Reference assessments (x2)



# Academic Excellence – 50%

- As demonstrated by past academic results, transcripts, awards and distinctions:
  - Academic record (first class average)
    - Transcripts
  - Scholarships and awards held
    - Application form, CCV (Awards), reference assessments
  - Type of program and courses pursued
  - Course load
  - Relative standing (if available)
- **Since this is worth 50%, do everything you can to make sure you address all of the selection criteria:**
  - **Reference assessments**
  - **Address potential weaknesses head-on**



# Research Potential- 30%

- Refereed Contributions:

- Peer-Reviewed Publications
- Conference Presentations
- Invited Talks.
  - Include local talks too (i.e LiM symposium) as well as international ones.
  - State your role in each.
    - Ex. Conducted in vitro experiments for X publication (CCV).

- Scholarly Achievements:

- Teaching, Mentorship, Academic Conference participation, Organizational Leadership and Participation, Review Leadership and Participation, Community Involvement.



# Research Proposal

- Quality of your proposal
  - Specific, focused, feasible and clearly stated research questions/objectives/hypothesis
  - Methodology explained clearly
  - Significance and expected contributions to research
- Think about
  - What is new and important about your work?
  - What is the key question and how will you address it?
  - How does your work fit into the bigger picture?
  - What does success look like for your project?
  - Who and how will your research findings provide benefit?
    - Ex. Society? Research community? Should be beneficial whether you prove or disprove your hypothesis

# The Proposal

- **Develop sub-sections accordingly.**
- Project ideas should be concise and easily understood.
  - Rationale
  - Aims to address questions (include methods)
- Spacing = visually appealing
- Avoid complicated or field specific jargon
  - Better to use simple phrasing
  - Reviewers might not be in specific area of research
- Scan test:
  - Ask people outside your lab to review your proposal for clarity, brevity, and comprehension - overall, the more eyes, the better.





# Putting It All Together, Tips for Scientific Writing

- Hook your reader early
  - Introduction at “newspaper” level—more general
  - State importance of work quickly
- Spoken language and common sense are generally better guides than a rule book.
  - Sometimes it is more important to be understood than it is to form a grammatically perfect sentence.
- Commas denote a pause in speaking.
  - Speak the sentence aloud to find pauses. Make it natural.
- Choose concrete language and examples.
- Don’t slow the reviewer down.
  - Avoid jargon, buzzwords, or overly technical language. Avoid use acronyms.



# Putting It All Together, Tips for Scientific Writing

- Use minimalism to achieve clarity
  - Keep sentences short and precise = Remove filler words
- Have a consistent theme and overall message
  - Ex. Refer to impact in intro then use it in the conclusion
- Limit each paragraph of proposal to a single message
  - Question → Aim → What/how/why → Conclude
  - Makes it clear and easy to follow
- Have multiple audiences review your proposal
  - Eg. colleagues, friends, partners



# Formatting: Aesthetics

- Don't cram as much text as possible into the document
- Consider using some of the following:
  - Space between paragraphs
  - Indentation
  - Headings
  - Bullets
  - **Bold** or underlined text

How set in stone are the project's and movement's names at this point? To grow faster, the movement needs to make a good first impression, taking advantage of anyone's fleeting first exposure to it so a person will want to learn more and believe it could actually offer a possible real solution or they won't bother. But this name, "The Venus Project", rather than encouraging one to listen with an open mind could cause one's antennae to go up, waiting for the crazy, not realistic, "out of this world" part. I'm guessing the Venus in the Venus Project comes from Jacques being in Venus, Florida, but to any newbie "Venus" means something "out there" on other planet, and I think that makes an easily avoidable bad first impression. The "Venus Project" name doesn't sound serious to me, it sounds childish. Also the name of the movement, "Zeitgeist", is not only needlessly non-self-descriptive (we're wasting valuable exposure time with a mysterious name - losing the opportunity that on each occasion when the name of the organization is mentioned, that in itself could be sending an introduction to a new idea, like if the name were "Technology Solves All Movement for a sloppy example), but it will also forever tie the movement to what some will call the conspiracy stuff (9/11, religion, etc.) because of your identically named movie Zeitgeist, and this will only distract and alienate from the RBE prize. I was in the 9/11 Truth Movement and saw up front & personal so many who had an instinctively negative visceral reaction to any suggestion that 9/11 was an inside job, that they would hear no more. Also, why alienate those with strong beliefs in their religion? Is it really necessary for us to first convince everyone they've been lied to about everything their whole life before introducing a sane alternative to a profit based society when there are no good jobs anymore even in the first world? People are desperate for an alternative and these other things I think are unhelpful distractions to a beginner's introduction to the possibility of another way. Activists for a new system won't get so many bites at the mainstream media exposure apple that we can afford to squander any by tying a hand behind our back with unimportant inconsequential stuff like names and logos. Perhaps if we eliminate these easily changed hurdles, the movement will grow faster and have less fuck and debunking charges to respond to. Trust me, I know that responding to 9/11 debunking charges is a full time job in itself, it's a rabbit hole. Unless we get away from the Zeitgeist movie name, we will be linked to the what people call the 'conspiracy' stuff. Of course, this suggestion should not in anyway detract from your contribution, Peter. You actually created the movement, right? and probably lots of us learned of BECAUSE of your movie's addressing of the 'conspiracy' stuff. This is truly only a request for a superficial and easily made to de-link the V.P. and a R.B.E. with the unrelated items others deem conspiracy and/or non-positive theories. I say easily because people's flyers, dvd sleeves, logos, stuff that is printed when needed, can be changed digitally on computers through existing technology generally available to those who print the stuff (just retyping, or simple editing, right?) and there are stockpiles of stuff with the current names on it that would be wasted I assume? Thanks in advance for your consideration, and please also address whom you think such a decision as to the movement's name should be made.

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Aplastic Anemia (AA) is a bone marrow failure disease where in approximately 20% of patients, the AA evolves into a myelodysplastic syndrome (MDS) or acute myeloid leukemia (AML), clonal disorders of hematopoietic cells. Studies have shown there is an association between shortened telomeres, advanced AA and increased risk of progression to MDS and AML. However, the mechanism on how shortened telomeres impact disease progression and response to treatment is not well understood. Progressive telomere shortening triggers cellular senescence but in a small proportion of cells, this is bypassed by activating the enzyme telomerase. Preservation of telomere length requires the activation of the telomerase complex, consisting of telomerase reverse transcriptase (hTERT) and an intrinsic RNA template (hTR). In the case of AA, telomerase activation and shortened telomeres may lead to an accumulation of chromosomal aberrations, evading senescence and apoptosis, providing a proliferative advantage of leukemic clones. Heterozygous mutations in the gene encoding the telomerase protein component hTERT are seen in approximately 10-15% of AA patients and result in short telomeres. We will investigate how mutations lead to telomere shortening and telomere dysfunction in cells in order to improve our understanding of the role telomerase plays in the pathogenesis of these disorders. Hypothesis: Aberrant telomerase activity from naturally occurring hTERT mutations in AA and AML, results in telomere shortening and genomic instability, contributing to bone marrow failure and disease progression. We will test this under the following aims: Aim 1. Biochemical characterization of hTERT mutants associated with AA and AML. Telomerase regulates telomere length at several levels. First, hTERT and hTR are transcribed, processed, and in the case of hTERT, translated. Second, telomerase localizes in the nucleus and assembles into an active complex. Third, the enzyme recognizes and is recruited to the telomere. Telomerase then catalyzes de novo addition of the telomeric sequence. Since each of these steps is indispensable, disruption of any one would decrease the efficiency of telomerase function. To understand the biochemical properties of these naturally occurring mutants, we have generated expression constructs bearing hTERT mutations found in patients with AA and AML and will test each biochemical activity in vitro. Catalytic activity will be measured using the telomeric repeat amplification protocol (TRAP), processivity measured using the conventional telomerase assay and the ability to interact with telomeric DNA measured with a primer binding assay. Aim 2. Generation of cell lines as surrogate models of human disease state. To better understand the effect of hTERT mutations in a cell culture model, we will utilize various cell models to create human cell lines that over-express the naturally occurring hTERT proteins. 2a. Hematological Cell Line: For initial characterization, we will stably express our mutants in a leukemic cell line, THP-1. 2b. Senescent Cell Line: We will also examine the effects of expressing our mutant hTERT proteins in BJ fibroblast cell, a telomerase negative cell line. These cells do not express telomerase and telomeres shorten with each division. This allows us to address whether expression of hTERT mutants are able to elongate telomeres and bypass senescence. 2c. Hematological Stem Cells: To address the function of mutant telomerase in hematopoiesis we will utilize a long term culture method using CD34+ hematopoietic stem cells. CD34+ cells will be collected from apheresis bone marrow transplant products and transfected with either a control vector or specific hTERT variants. In all 3 models, we will examine the effects of mutant hTERT on telomerase activity (TRAP assay), telomere length (Terminal Restriction fragment analysis), senescence (growth curves and B-galactosidase activity), chromosomal instability (cytogenetics and telomere induced foci assays), apoptosis (Annexin V staining) and the DNA damage response (DDR, clonogenic survival assays, and activation of the DDR via phosphorylation of ATM, Chk2, and p53) Aim 3. Affect of therapeutics on mutant telomerase. In addition to examining the contribution of hTERT mutations on disease progression, our cell model systems can be used to assess therapeutic responses. Each of our stable cell lines expressing either wt or mutant hTERT proteins will be treated with a selective chemotherapeutic panel from MDS and AML treatment protocols to determine how expression of mutant telomerase and difference in telomere lengths affects the viability of the cells via alamar blue viability assay. Outcomes such as cellular differentiation, telomerase activity and apoptosis will also be measured. By considering the role telomeres, telomerase and genomic stability play in the hematopoietic system, we can determine the replicative capacity of hematopoietic stem cells during tumour progression. This will provide insight in predicting response to therapeutics, determining most suitable treatment plan and a mechanism to monitor disease progression. Our studies will advance our understanding of bone marrow failure and AML disease progression in patients with hTERT mutations as well as lead to novel therapeutics for bone marrow failure syndromes.



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Aplastic Anemia (AA) is a bone marrow failure disease where in approximately 20% of patients, the AA evolves into a myelodysplastic syndrome (MDS) or acute myeloid leukemia (AML), clonal disorders of hematopoietic cells. Studies have shown there is an association between shortened telomeres, advanced AA and increased risk of progression to MDS and AML. However, the mechanism on how shortened telomeres impact disease progression and response to treatment is not well understood. Progressive telomere shortening triggers cellular senescence but in a small proportion of cells, this is bypassed by activating the enzyme telomerase. Preservation of telomere length requires the activation of the telomerase complex, consisting of telomerase reverse transcriptase (hTERT) and an intrinsic RNA template (hTR). In the case of AA, telomerase activation and shortened telomeres may lead to an accumulation of chromosomal aberrations, evading senescence and apoptosis, providing a proliferative advantage of leukemic clones. Heterozygous mutations in the gene encoding the telomerase protein component hTERT are seen in approximately 10-15% of AA patients and result in short telomeres. We will investigate how mutations lead to telomere shortening and telomere dysfunction in cells in order to improve our understanding of the role telomerase plays in the pathogenesis of these disorders. **Hypothesis: Aberrant telomerase activity from naturally occurring hTERT mutations in AA and AML, results in telomere shortening and genomic instability, contributing to bone marrow failure and disease progression.** This will be tested via the following:

**Aim 1. Biochemical characterization of hTERT mutants associated with AA and AML.** Telomerase regulates telomere length at several levels. First, hTERT and hTR are transcribed, processed, and in the case of hTERT, translated. Second, telomerase localizes in the nucleus and assembles into an active complex. Third, the enzyme recognizes and is recruited to the telomere. Telomerase then catalyzes de novo addition of the telomeric sequence. Since each of these steps is indispensable, disruption of any one would decrease the efficiency of telomerase function. To understand the biochemical properties of these naturally occurring mutants, we have generated expression constructs bearing hTERT mutations found in patients with AA and AML and will test each biochemical activity in vitro. Catalytic activity will be measured using the telomeric repeat amplification protocol (TRAP), processivity measured using the conventional telomerase assay and the ability to interact with telomeric DNA measured with a primer binding assay.

**Aim 2. Generation of cell lines as surrogate models of human disease state.** To better understand the effect of hTERT mutations in a cell culture model, we will utilize various cell models to create human cell lines that over-express the naturally occurring hTERT proteins. 2a. Hematological Cell Line: For initial characterization, we will stably express our mutants in a leukemic cell line, THP-1. 2b. Senescent Cell Line: We will also examine the effects of expressing our mutant hTERT proteins in BJ fibroblast cell, a telomerase negative cell line. These cells do not express telomerase and telomeres shorten with each division. This allows us to address whether expression of hTERT mutants are able to elongate telomeres and bypass senescence. 2c. Hematological Stem Cells: To address the function of mutant telomerase in hematopoiesis we will utilize a long term culture method using CD34+ hematopoietic stem cells. CD34+ cells will be collected from apheresis bone marrow transplant products and transfected with either a control vector or specific hTERT variants. In all 3 models, we will examine the effects of mutant hTERT on telomerase activity (TRAP assay), telomere length (Terminal Restriction fragment analysis), senescence (growth curves and B-galactosidase activity), chromosomal instability (cytogenetics and telomere induced foci assays), apoptosis (Annexin V staining) and the DNA damage response (DDR, clonogenic survival assays, and activation of the DDR via phosphorylation of ATM, Chk2, and p53)

**Aim 3. Affect of therapeutics on mutant telomerase.** In addition to examining the contribution of hTERT mutations on disease progression, our cell model systems can be used to assess therapeutic responses. Each of our stable cell lines expressing either wt or mutant hTERT proteins will be treated with a selective chemotherapeutic panel from MDS and AML treatment protocols to determine how expression of mutant telomerase and difference in telomere lengths affects the viability of the cells via alamar blue viability assay. Outcomes such as cellular differentiation, telomerase activity and apoptosis will also be measured. By considering the role telomeres, telomerase and genomic stability play in the hematopoietic system, we can determine the replicative capacity of hematopoietic stem cells during tumour progression. This will provide insight in predicting response to therapeutics, determining most suitable treatment plan and a mechanism to monitor disease progression. **Our studies will advance our understanding of bone marrow failure and AML disease progression in patients with hTERT mutations as well as lead to novel therapeutics for bone marrow failure syndromes**



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Aim 1. Biochemical characterization of hTERT mutants associated with AA and AML.

Aim 2. Generation of cell lines as surrogate models of human disease state.

Aim 3. Affect of therapeutics on mutant telomerase

Telomerase regulates telomere length at several levels. First, hTERT and hTR are transcribed, processed, and in the case of hTERT, translated. Second, telomerase localizes in the nucleus and assembles into an active complex. Third, the enzyme recognizes and is recruited to the telomere. Telomerase then catalyzes de novo addition of the telomeric sequence. Since each of these steps is indispensable, disruption of any one would decrease the efficiency of telomerase function. To understand the biochemical properties of these naturally occurring mutants (**Aim 1**), we have generated expression constructs bearing hTERT mutations found in patients with AA and AML and will test each biochemical activity in vitro. Catalytic activity will be measured using the telomeric repeat amplification protocol (TRAP), processivity measured using the conventional telomerase assay and the ability to interact with telomeric DNA measured with a primer binding assay.

To better understand the effect of hTERT mutations in a cell culture model, we will utilize various cell models to create human cell lines that over-express the naturally occurring hTERT proteins (**Aim 2**). **2a. Hematological Cell Line:** For initial characterization, we will stably express our mutants in a leukemic cell line, THP-1. **2b. Senescent Cell Line:** We will also examine the effects of expressing our mutant hTERT proteins in BJ fibroblast cell, a telomerase negative cell line. These cells do not express telomerase and telomeres shorten with each division. This allows us to address whether expression of hTERT mutants are able to elongate telomeres and bypass senescence. **2c. Hematological Stem Cells:** To address the function of mutant telomerase in hematopoiesis we will utilize a long term culture method using CD34+ hematopoietic stem cells. CD34+ cells will be collected from apheresis bone marrow transplant products and transfected with either a control vector or specific hTERT variants. In all 3 models, we will examine the effects of mutant hTERT on telomerase activity (TRAP assay), telomere length (Terminal Restriction fragment analysis), senescence (growth curves and B-galactosidase activity), chromosomal instability (cytogenetics and telomere induced foci assays), apoptosis (Annexin V staining) and the DNA damage response

In addition to examining the contribution of hTERT mutations on disease progression, our cell model systems can be used to assess therapeutic responses (**Aim 3**). Each of our stable cell lines expressing either wt or mutant hTERT proteins will be treated with a selective chemotherapeutic panel from MDS and AML treatment protocols to determine how expression of mutant telomerase and difference in telomere lengths affects the viability of the cells via alamar blue viability assay. Outcomes such as cellular differentiation, telomerase activity and apoptosis will also be measured. By considering the role telomeres, telomerase and genomic stability play in the hematopoietic system, we can determine the replicative capacity of hematopoietic stem cells during tumour progression. This will provide insight in predicting response to therapeutics, determining most suitable treatment plan and a mechanism to monitor disease progression. ***Our studies will advance our understanding of bone marrow failure and AML disease progression in patients with hTERT mutations as well as lead to novel therapeutics for bone marrow failure syndromes.***



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## Personal Characteristics and Interpersonal Skills - 20%

- Work experience
  - CCV
- Leadership experience
  - CCV, reference assessments
- Project management including organizing conferences and meetings
  - CCV, reference assessments
- The ability or potential to communicate theoretical, technical, and/or scientific concepts clearly in written and oral formats
  - Research proposal, references, awards, CCV
- Involvement in academic life
  - references, CCV
- Volunteerism/community outreach
  - references, CCV

**Questions??**



# References

- **Ask early:** Give your referees time to write a good assessment.
- **Choose wisely:** ask your potential referees if they can provide you with a positive, strong reference; one of them should be your current supervisor or someone who is familiar with your academic work.

NOTE: Tri-councils are research awards, so it is best to have researchers write your assessments.

- **Follow up - Don't be shy!** Remind your referees of the deadline a week or more before the reference is due.



# Reference Assessment

**Do not just ask** someone for a reference. Be proactive and make it easy for your referee to write a good assessment:

- Provide the review criteria.
- Ask them to address the criteria (provide examples).
- Provide transcripts and a CV: highlight accomplishments or areas you wish to have covered in the assessment.
- Meet to discuss.
- Inform them of the deadline & REMIND them.



# Letters of Reference: The Student Perspective

- Carefully choose/suggest terminology
  - Do your research on a ‘successful applicant’.
- **How are these letters scored?**
- Total points for each section should correlate approximately with number of examples your referees provide.
  - Introduction – few sentences; describe your relationship capacity and context
  - Research Ability – Critical Thinking, Independence, Organizational Skills, Originality, Perseverance, Interest in Discovery
  - Leadership Ability – single paragraph
- Give your referee some guidance.
  - List attributes, key words, examples etc.
  - Length and depth in each section.



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**Questions??**



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# Application support



# Getting support for writing your application

- Plan your **support network**: your supervisor, your program (is there a department workshop?)
- Consult current scholarship holders in your program

# Support through the GSE Scholarship Team

- Students writing Tri-council masters scholarships matched with postdoc and peer mentors
- [CGSM Support](#) to access form for review by postdocs or peer mentors
- Peer mentoring Drop-in sessions (TBA)
  - Nov 28th 9:30am-11:30am
  - Nov 30th 1pm-3pm

# FGS resources

- All require registration to attend
  - <https://grad.ucalgary.ca/awards/award-opportunities/canada-graduate-scholarships>
- Graduate Leaders Circle Scholarship Cafes. 30 min 1 on 1 mentoring sessions
  - Nov 14, 2023, 10-noon
- GLC drop in sessions: Nov 21 (1-2:30); Nov 24 (10-11:30), Nov 29 (1-2:30)
- Recorded workshops given by FGS Scholarship team





**Good luck on your  
application!!!**

# Links

- Agency website.
  - [https://www.nserc-crsng.gc.ca/Students-Etudiants/PG-CS/CGSM-BESCM\\_eng.asp](https://www.nserc-crsng.gc.ca/Students-Etudiants/PG-CS/CGSM-BESCM_eng.asp)
- FGS link
  - <https://grad.ucalgary.ca/awards/award-opportunities/canada-graduate-scholarships>
- Common CV
  - <https://ccv-cvc.ca/>