

## FVSP Faculty Application Checklist-DUE 1/19/2024 5PM EST

\_\_\_\_\_Completed cover page with prior mentorship history

\_\_\_\_\_Training/Registration requirements needed

\_\_\_\_\_Abstract of proposed work

\_\_\_\_\_NIH-format biosketch

### Submission Instructions

Convert the application to *one .pdf document*. Name the file using your last name, followed by an underscore, and your first initial. For example: Martyniuk\_C.pdf

Submit the following pages, via email attachment, to Dr. Chris Martyniuk ([cmartyn@ufl.edu](mailto:cmartyn@ufl.edu)). The subject line should read “FVSP Faculty Application”.

The FVSP Research Program runs 5/27/2024 to 8/07/2024 with final research presentations prior to the national symposium.

# 2024 Linda F. Hayward Florida Veterinary Scholars Program Faculty Application

<b>Name</b>	Helena Zomer
<b>Email address</b>	helenazomer@ufl.edu
<b>Proposed project title</b>	Role of estrogens skin wound healing
<b>Will you provide matching student stipend funding (\$3250)?</b>	Dept of Physiological Sciences will
<b>Source of project/research funding</b>	UF NIH OAIC Pepper Award; Wound Healing Society award.

**Prior student research mentees (last 5 years, if applicable):**

CLASS	STUDENT	PROJECT TITLE	STATUS
e.g. 2016			Completed/published/in progress
2022	Payton Corey	Placental matrix for skin wound healing	Completed
2023	Luis Parera	Veterinary stem cell bank	Completed

**If project qualifies for Morris Animal Foundation Student Scholarship Funding and you have identified a specific interested student, please provide their name and email address**

LAST NAME	FIRST NAME	EMAIL ADDRESS

I agree to obtaining all necessary approvals (e.g. IACUC/IRB/EH&S/VHRRRC – see below for specifics) to conduct the project with the student PRIOR to the commencement of the summer program, as well as submitting documentation of these approvals to the FVSP board by 5/11/2024

**YES/NO**

I agree to assisting my student prepare for the summer program during the Spring semester, which will include preparation of a study outline, and training in relevant laboratory techniques

**YES/NO**

I agree to plan for commencing the experiment/data collection by the beginning of the summer program (5/22/24)

YES/NO

I agree to be available to the student throughout the summer to assist with the experiment/data collection, preparation of the manuscript and poster.

YES/NO

	Needed (Yes/No)	Approval by 5/11/24 (Yes/No)?
IACUC Approval and Training	Yes	Yes
IRB Registration and Training	No	
Biological Agent Registration	No	
Biopath Registration	No	
Veterinary Hospital Research	No	
FERPA Training	No	
Biohazardous Waste Training	No	
Laboratory Safety Training	Yes	Yes

**Abstract of proposed student project** (1 page limit. This should mirror the aims page of a grant and CLEARLY indicate the student's role.)

Debilitating non-healing wounds disproportionately affect older adults and lead to physical restrictions, social isolation, psychological distress, and loss of independence. Current treatments do not take into consideration the particularities of aged skin and often fail to restore tissue homeostasis. The age-associated  $17\beta$ -estradiol (E2) deficiency plays a critical role in elderly impaired wound healing; however, there is still a critical knowledge gap on how to safely restore E2 signaling in the wounded skin. Given the progressive, degenerative effects of E2 deficiency, this research aims to investigate whether estrogen signaling can be modulated locally in impaired wounds of the elderly to promote robust healing using an unprecedented regenerative medicine approach. This study hypothesizes that estrogen signaling is required for proper wound healing and that modulation of estrogen signaling can improve repair in estrogen-deficient skin. Therefore, this study will test whether estrogens (17-a estradiol and 17-b estradiol) or bioactive factors extracted from the human placenta improve wound healing in aged mice models. The 2024 FVSP student will help to perform surgeries in mice (ovariectomies and skin biopsies), track wound closure and harvest samples at the end of the study (21 days after wounding). The student will learn several techniques including proper aseptic techniques, sterilizing materials, preparing the surgical room, anesthetizing mice, preparing the surgical site, performing the surgeries and evaluating wound healing. Additionally, they will learn how to handle and care for laboratory animals. The student will further their knowledge of endocrinology, especially regarding the physiological roles of estrogens, and the physiology of wound healing. This research is significant to help us understand how to improve skin wound healing for older adults. Beyond the impact on human health, this study may also help us determine whether estrogen deprivation (due to spaying or aging) affects companion animals.

**BIOGRAPHICAL SKETCH**

Provide the following information for the Senior/key personnel and other significant contributors.  
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Helena Debiazi Zomer

eRA COMMONS USER NAME (credential, e.g., agency login): HELENA\_ZOMER

POSITION TITLE: Research Assistant Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Santa Catarina State University, Brazil	DVM	12/2011	Veterinary Medicine
University of Sao Paulo, Brazil	MSc	12/2013	Cell Biology
Federal University of Santa Catarina, Brazil	PhD	08/2018	Developmental and Cell Biology
University of Illinois, Urbana, IL	Postdoc	09/2018-09/2021	Molecular and Cell Biology
University of Florida, Gainesville, FL	Research Assistant Professor	09/2021-present	Developmental and Cell Biology

**A. Personal Statement**

The main focus of my research has been on regenerative medicine approaches to improve skin wound healing and regeneration. My training as a veterinary doctor and a molecular, developmental, and cell biologist gives me a singular set of skills and a unique research perspective. As a veterinarian scientist, I follow the One Health concept – the multidisciplinary collaborative efforts to attain optimal health for people, animals, and our environment – so my research program aims to benefit both human and animal health. My expertise includes cell and molecular biology techniques, including cell culture, immunohistochemistry, western blotting, qPCR, flow cytometry and cell sorting, various animal models in mouse, rat, and rabbits, and histopathology. In addition, I have experience with transgenic mouse models (global and conditional knockouts and lineage tracing). I am currently transitioning from a trainee role to an independent research career and building my independent research program on skin regeneration at the University of Florida. In my first year and a half as a UF Research Assistant Professor, I was able to secure several internal and external grants to support my research, as exemplified below, mentor undergraduate and graduate students, and initiate prolific collaborations.

**Ongoing and recently completed projects that I would like to highlight include:**

1. University of Florida Claude D. Pepper Older Americans Independence Center P30AG028740  
H. Zomer, PI  
11/01/2023-10/31/2025  
A Regenerative medicine approach to restore estrogen signaling in older adults' chronic skin wounds
2. Wound Healing Society Research Grant  
H. Zomer, PI  
05/01/2023-04/30/2024  
Physiological modulation of mesenchymal stem/stromal cells secretome for skin wound healing
3. Michelson Found Animals Foundation

H. Zomer, Co-PI (P. Cooke, PI)

01/01/2022 – 12/31/2022

GnRH overexpression as a contraceptive strategy for companion animals

4. University of Florida College of Veterinary Medicine Fall Competition

H. Zomer, PI

31/12/2021-31/12/2022

Potential for a novel human-derived extracellular matrix to heal estrogen-deprived skin wounds

**B. Positions, Scientific Appointments, and Honors**

**Positions and Scientific Appointments**

2022-present Member, Wound Healing Society

2022-present Member, American Aging Association

2022-present Member, The Gerontological Society of America

2021-present Member, University of Florida Institute on Aging

2021-present Research Assistant Professor, Physiological Sciences, University of Florida, Gainesville, FL

2020-present Member, Society for the Study of Reproduction

2020-present Member, International Society for Stem Cell Research

2020-present Member, Tissue Engineering and Regenerative Medicine International Society

2018-2021 Postdoctoral Research Associate, Comparative Biosciences, University of Illinois, Urbana, IL.

2017-2018 Visiting Scholar, Department of Bioengineering, University of Washington, WA.

2014-2018 Graduate Research Assistant (Doctoral program), Cell Biology, Embryology and Genetics, Federal University of Santa Catarina, Brazil.

2012-2013 Graduate Research Assistant (Master program), Surgery, University of Sao Paulo, Brazil.

2011-2011 Veterinary Student Research Assistant, Animal Reproduction, Santa Catarina State University, Brazil.

**Professional Service**

2023-present Review Editor, Frontiers in Medicine – Dermatology Section

2022-present Co-chair, Skin, Wound Healing, and Inflammation Section, Tissue Engineering and Regenerative Medicine - Americas Chapter

2022-2023 Judge for the Best in Show Graduate Research Competition – Department of Physiological Sciences, University of Florida, Gainesville, FL

2020-2021 Treasurer, Research Trainee Group, University of Illinois, Urbana, IL

2017-2018 Member of the outreach project "Therapeutic application of mesenchymal stem cells in veterinary medicine" (Portuguese). Federal University of Santa Catarina, Brazil

2016-2017 Student representative of the Cell Biology and Development program, Federal University of Santa Catarina, Brazil

2015-2018 Leader in the outreach project "Evaluation of the knowledge and opinions of Brazilian pregnant women about umbilical cord blood banks" (Portuguese). Federal University of Santa Catarina, Brazil

**Ad hoc Reviewer**

Stem Cell Research and Therapy

Biology of Reproduction

Experimental Cell Research

PLOS One

Rejuvenation Research

**Honors**

2023 Travel Award, Tissue Engineering and Regenerative Medicine International Society Americas, Boston.

2022 Butler-Williams Scholar, National Institute on Aging, National Institutes of Health.

2022 Distinguished Travel Awardee, TERMIS Americas, Toronto, Canada.

- 2021 Society for the Study of Reproduction (SSR) Postdoctoral Poster Competition – 3<sup>rd</sup> place.
- 2021 Burroughs Wellcome Travel Fellowship for Underrepresented Minority (SSR).
- 2021 American Society of Andrology – Trainee Merit Award Finalist.
- 2021 Celebration of Research Top Award, University of Illinois College of Veterinary Medicine.
- 2020 Trainee Travel Award, Society for the Study of Reproduction.
- 2018 2<sup>nd</sup> place for Best Poster at the 1<sup>st</sup> TERMIS Americas Workshop, Brazil.
- 2018 3<sup>rd</sup> place for Best Poster at the 1<sup>st</sup> TERMIS Americas Workshop, Brazil.
- 2018 Best Ph.D. thesis from the Department of Cell Biology and Development from the Federal University of Santa Catarina, selected for national competition - 2018 Prize CAPES for Best Thesis, Brazil.
- 2017-2018 Coordination for the Improvement of Higher Education Personnel (CAPES) Ph.D. Internship abroad (PDSE) Fellowship, Brazil.

## C. Contributions to Science

**1. Mesenchymal stem/stromal cell biology:** Mesenchymal stem/stromal cells (MSCs) are multipotent stem cells found in virtually all adult tissues. They participate in homeostasis and repair and have been tested for multiple therapeutic applications. Although they hold particular promise for regenerative medicine applications and aging research, many questions remain regarding their biology which must be understood prior to clinical use. I have studied multiple aspects of MSC biology and their potential uses in novel cellular therapies, translational research, and biotechnology. My most recent paper focused on effects of *in vitro* aging in long-term cultured human MSCs. A previous paper explored rabbits as a model for human research, where we showed that rabbit adipose-derived MSCs are more proliferative than humans and less prone to cellular reprogramming *in vitro*. Furthermore, we published state-of-the-art review papers on MSC biology and applications. Together, these works demonstrate my expertise in regenerative medicine, stem cell biology, and related techniques such as primary cell cultures and *in vitro* assays.

### Publications:

- a) Atanásio S. Vidane, **Helena D. Zomer**, Bruna M. M. Oliveira, Carina F. Guimarães, Cláudia B. Fernandes, Felipe Perecin, Luciano A. Silva, Maria A. Miglino, Flávio V. Meirelles, Carlos E. Ambrósio. Reproductive stem cell differentiation: extracellular matrix, tissue microenvironment, and growth factors direct the mesenchymal stem cell lineage commitment. *Reproductive Sciences*, v. 20, i.10, p. 1137-1143, 2013. doi: 10.1177/1933719113477484
- b) **Helena D. Zomer**, Atanásio S. Vidane, Natália N. Gonçalves, Carlos E. Ambrósio. Mesenchymal and induced pluripotent stem cells: general insights and clinical perspectives. *Stem Cells and Cloning: Advances and Applications*, v. 2015, i. 8, p. 125-134, 2015. Doi: 10.2147/SCCAA.S88036
- c) **Helena D. Zomer**, Kelly C. S. Roballo, Natália N. Gonçalves, Thais B. Lessa, Fabiana F. Bressan, Andrea G. Trentin, Flavio V. Meirelles, Carlos E. Ambrósio. Distinct features of rabbit and human adipose-derived mesenchymal stem cells: implications for biotechnology and translational research. *Stem Cells and Cloning: Advances and Applications*, v.2018, i. 11, p.43-54, 2018. Doi:10.2147/SCCAA.S175749
- d) Priscilla B. Delben\*, **Helena D. Zomer**\*, Camila A. Silva, Rogério S. Gomes, Fernanda R. Melo, Patricia Dillenburg-Pilla, Andrea G. Trentin. Human adipose-derived mesenchymal stromal cells from face and abdomen undergo replicative senescence and loss of genetic integrity after long-term culture. *Experimental Cell Research*, v. 406 i. 1 p. 112740, 2021 Doi: 10.1016/j.yexcr.2021.112740. **\*Contributed equally.**

**2. Skin wound healing and regeneration:** In this project, I compared two sources of human mesenchymal stem/stromal cells and their respective secretomes, which are rich in secreted factors, in association with a commercial collagen-based biomaterial using tissue engineering techniques for skin wound healing. I found novel results regarding the influence of the source of mesenchymal stem/stromal cells in the clinical outcome of cell therapies and regarding macrophage polarization over time during the process of wound healing, factors that may affect the way cell therapies will be performed in the future. Dermal-derived mesenchymal stem/stromal cells presented better overall

results than adipose-derived cells in the context of wound healing. The main findings of this project are published in the following papers listed, and other results, including the proteomic analysis of the secretome of dermal- and adipose-derived mesenchymal stem/stromal cells, will be included in a new article currently in preparation. Furthermore, in 2018 we published a comprehensive review describing skin wound healing in mice and humans, which contributed to the broader field of skin wound healing research using mice models and has become an important resource, as demonstrated by its rapidly increasing citations (328 to date). These accomplishments demonstrate my expertise in wound healing and mouse models.

#### Publications:

- a) **Helena D. Zomer**, Andrea G. Trentin. Skin wound healing in humans and mice: challenges in translational research. *Journal of Dermatological Science*, v. 90 i. 1 p. 3-12, 2018. Doi: 10.1016/j.jdermsci.2017.12.009
- b) **Helena D. Zomer**, Gisele K. S. Varela, Priscilla B. Delben, Diana Heck, Talita S. Jeremias, and Andrea G. Trentin. In vitro comparative study of human mesenchymal stromal cells from dermis and adipose tissue for application in skin wound healing. *Journal of Tissue Engineering and Regenerative Medicine*, v.13, p. 729-741, 2019. Doi: 10.1002/term.2820.
- c) **Helena D. Zomer**, Talita S. Jeremias, Buddy Ratner, and Andrea G. Trentin. Mesenchymal stromal cells from dermal and adipose tissues induce macrophage polarization to a pro-repair phenotype and improve skin wound healing. *Cytotherapy*, v. 22, i. 5, p. 247-269, 2020. Doi: 10.1016/j.jcyt.2020.02.003
- d) **Zomer HD**, de Souza Lima VJ, Bion MC, Brito KNL, Rode M, Stimamiglio MA, Jeremias TDS, Trentin AG. Evaluation of secretomes derived from human dermal and adipose tissue mesenchymal stem/stromal cells for skin wound healing: not as effective as cells. *Stem Cell Res Ther*. 2024 Jan 17;15(1):15. doi: 10.1186/s13287-023-03630-y.

3. Transcriptional regulation of spermatogenesis: As a postdoc, I studied male infertility using transgenic mouse models and *in vitro* systems. A significant challenge to the field is the absence of specific markers to identify Sertoli cells, which hampers the establishment of pure Sertoli cell primary cultures. We published two peer-reviewed articles on this topic, one review and one original paper describing a novel method to obtain pure mouse Sertoli cell populations by lineage tracing using a transgenic mouse line and cell sorting. In addition, we deleted TDP-43, a transcriptional factor relevant to human health, in male germ cells and Sertoli cells using specific Cre-Lox systems to understand how it affects fertility. These findings were recently published in the *Journal of Biological Chemistry* and *Biology of Reproduction*. Another manuscript currently in preparation demonstrates the role of Nelfb, an RNA pol II pausing factor in Sertoli cell function. This work demonstrates my expertise in transgenic mouse models and molecular and biochemistry techniques such as PCR/qPCR, Western blotting, plasmid preparations, and transfections, as well as my proficiency as a cellular and molecular biology scientist.

#### Publications:

- a) **Helena D. Zomer**, Prabhakara P. Reddi. Mouse Sertoli cells isolation by lineage tracing and sorting. *Molecular Reproduction and Development*, v. 87, p. 871–879, 2020; doi:10.1002/mrd.23406
- b) **Helena D. Zomer**, Prabhakara P. Reddi. Characterization of rodent Sertoli cell primary cultures. *Molecular Reproduction and Development*, v. 87, p. 857–870, 2020; doi:10.1002/mrd.23402
- c) Katie Campbell, Yidin Xu, Chin Patel, Jeremy M. Rayl, **Helena D. Zomer**, Hari P. Osuru, Michael Pratt, Patcharin Pramoonjago, Madeline Timken, Lyndzi M. Miller, Abigail Ralph, Kathryn M. Storey, Yiheng Peng, Jenny Drnevich, Clotilde Lagier-Tourenne, Philip C. Wong, Huanyu Qiao and Prabhakara P. Reddi. Loss of TDP-43 in male germ cells causes meiotic failure and impairs fertility in mice. *Journal of Biological Chemistry*, v. 297, i. 5, p. 101231, 2021. doi: 10.1016/j.jbc.2021.101231

d) **Helena D. Zomer**, Hari P. Osuru, Apoorv Chebolu, Jeremy M. Rayl, Madeline Timken, Prabhakara P Reddi. Sertoli cells require TDP-43 to support spermatogenesis. *Biology of Reproduction*. v. 107, p. 1345-1359, 2022; doi: 10.1093/biolre/ioac165.

4. Science outreach on umbilical cord blood banking: The donation of umbilical cord blood to public banks is essential to increase the probability of finding compatible donors for hematopoietic stem cell transplants. In this questionnaire-based study, we found that the main reason for non-donation is the lack of information about umbilical cord blood banking. Better informing pregnant women is expected to increase donation rates for (1) global clinical use, improving the chances of finding compatible hematopoietic stem cell donors for patients in the line for transplants, and (2) expanding umbilical cord blood medical research. This study was the first of its kind in Brazil, a country with great potential to substantially contribute to the globally available umbilical cord blood repository. This study was an outreach project that I developed during my PhD in Brazil and show my commitment as a scientist to increase science accessibility and spread scientific knowledge to the general public. This was my first experience leading a group that included two paid medical students and one PhD collaborator. I independently conceived the idea, designed the study, and wrote the proposal which was reviewed and submitted by my PhD supervisor, Dr. Andrea Trentin, for an internal grant competition at the Santa Catarina Federal University. Our project was ranked Top #2 and was awarded for two consecutive years. Results of this project were presented at the 2020 International Society for Stem Cell Research Meeting and published in *Cell and Tissue Banking*, and was my first paper as the corresponding author.

Publication:

a) **Helena D. Zomer**, Ana Julia G. Gonçalves, Jessica Andrade, Aloisio Benedetti, Andrea G. Trentin. Lack of information about umbilical cord blood banking leads to decreased donation rates among Brazilian pregnant women. *Cell and Tissue Banking*, v. 22, i. 4, p. 597-607, 2021; doi: 10.1007/s10561-021-09903-1

**Complete list of Published work in My Bibliography:**

<https://www.ncbi.nlm.nih.gov/myncbi/helena.zomer.1/bibliography/public/>