Hernandez Moura Silva, Ph.D.

Curriculum Vitae

Current address

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Education

University of São Paulo, Brazil	Immunology	Ph.D. (04/2011)
University of Brasília, Brazil	Molecular Biology	M.Sc. (04/2008)
University of Brasília, Brazil	Biology	Licentiate (07/2007)
University of Brasília, Brazil	Biology	B.S. (09/2005)

Professional Experience

Assistant Professor of Biology – Department of Biology
Massachusetts Institute of Technology
Core Member of The Ragon Institute of MGH, MIT & Harvard
2022-present

Bernard Levine Postdoctoral Fellow: Immunology/Immuno-metabolism
NYU School of Medicine: Skirball Institute of Biomolecular Medicine
Advisor: Juan J. Lafaille, Ph.D
The control of systemic immune-metabolic homeostasis by perivascular macrophages and the contribution of Regulatory T cells to the white adipose tissue physiology.
2012-2021

Ph.D. student in Immunology
University of São Paulo School of Medicine: Heart Institute
Advisor: Verônica Coelho, M.D., Ph.D.
Ph. D. Thesis: Operational tolerance in human renal transplantation: repertoire of B lymphocytes and Alo and autoantibodies.
2008-2011

M.Sc. Student in Molecular Biology
University of Brasília: Department of cell biology
Advisor: Marcelo M. Brígido, Ph.D.
Master thesis: Characterization of binding activity and effector function of humanized anti-human CD3 antibodies.
2006-2008

B.C. Student in Biological Sciences
University of Brasília: Department of cell biology
Advisor: Marcelo M. Brígido, Ph.D.
Bachelor thesis Dissertation: Construction of a bicistronic vector for heterologous expression of proteins of clinical interest.
2002-2005

Personal Statement

The main goal of my current research program is to understand the contribution of resident perivascular macrophages to tissue physiology and its impact in diseases such as metabolic syndrome and Type 2 diabetes. Type 2 diabetes is a devastating syndrome afflicting more than 34 million Americans. Unveiling the

mechanisms that are associated with the maintenance of metabolic homeostasis has great potential to inform the development of new therapies for metabolic related diseases.

My training has prepared me to lead a diverse research group to understand the underlying mechanisms deployed by immune cells to regulate tissue physiology. Since my undergraduate, masters and doctorate studies in Brazil, I am fascinated by how the immune system is fundamental not only in protecting us against infections but also supporting homeostasis. During my postdoctoral studies, I was able to establish a research program to evaluate the impact of immune cells for organ function and for the development of metabolic diseases. How exactly immune cells, such as perivascular macrophages, influence organ function and homeostatic parameters remain a major unanswered question in biology. To understand how perivascular macrophages contribute to organ functionality, I investigate molecular and cellular circuits that are deployed by these cells that have a direct impact in the organ physiology towards the goal of re-establishing homeostatic parameters in different pathological conditions.

This proposal integrates my expertise in immunology, cellular/molecular biology, high-resolution microscopy and immune-metabolism to address the important question of how perivascular macrophages contribute to the white adipose tissue activity. Addressing this question is essential for revealing novel targetable molecular pathways that can be used to tune the activity of the white adipose tissue in metabolic diseases such as diet-induced Type 2 diabetes.

I would like to address the issue of my long postdoctoral training. This was in large part due to Hurricane Sandy in 2012, which caused the completely loss of one animal facility at NYU and had a long impact on our animal colony that was only solved with the opening of a new vivarium in 2016; Additionally, my postdoctoral mentor had a major health issue, culminating in open heart surgery in May of 2020. My progress was also impeded by the current SARS-CoV-2 pandemic. Despite the delays brought by these events, my tenacity was crucial in overcoming these challenges. My proactiveness and diligent work provided me with an independent investigator experience during my post-doctoral training (For a long time I was responsible for keeping the lab running and mentoring junior staff while my mentor was ill) and provided me the independence to establish within the lab a completely novel, impactful, and very important research area, which will become the centerpiece of my independent career.

The results obtained in this proposal will open several new avenues to explore the convergence of diverse disciplines such as immunology, physiology and metabolism. Also, it will pave the way to a complete independence of the PD/PI by establishing an integrative, multidisciplinary, and innovative research program. Although the approach described here is ambitious, I believe that my background and experience will enable us to discover novel aspects of how VAMs regulate white adipose tissue functionality.

Finally, as an African-Latin-American establishing a new role in society, as an educator and independent investigator, I understand that developing new strategies to foster affirmative actions to create a more inclusive environment is imperative. I am committed to the increase of equity, diversity, and inclusion by proactively taking affirmative actions to include people from disadvantaged backgrounds in STEM. I am inspired by the fact that working with people from different cultures and backgrounds is a great catalyst for innovation and development of new approaches to solve day-to-day problems.

Mentorship Experience

Camila Pereira Queiroz Ph.D. Visiting student at NYU School of Medicine	Project: “Impact of C-MAF dependent macrophages in the large intestine muscularis layer vasculature”.
Jamil Zola Kitoko Ph.D. Visiting student at NYU School of Medicine	Project: “The contribution of brain resident perivascular macrophages to the Zika Virus mediated neuropathology”.
Graziele Zenaro Manin Undergraduate Student at State University of São Paulo	Project: “Delivery of tolerogenic peptides from the Heat shock protein 60 to Dendritic Cells using Anti-DEC205 antibodies”.

Honors and fellowships

Justice, Equity, Diversity and Inclusion (JEDI) Award – Life Science Editors Foundation	2021
Best poster presentation at the annual Skirball Institute of Biomolecular medicine retreat-NYU.	2016
Bernard Levine Postdoctoral Research Fellowship in Immunology	2014-2015
National Council for Scientific and Technological Development – CNPq (Brazil). Postdoctoral Research Fellowship	2012-2013
Capes Thesis Award – Honors Mention. Doctoral thesis elected as one of the three best of Brazil in the area Medicine II	2012
Coordination for improvement of Higher Education Personnel Foundation – CAPES (Brazil). Postdoctoral Research Fellowship.	2011
Honors mention for the oral presentation at the XXXIV Congress of The Brazilian Society for Immunology	2009
São Paulo Research Foundation – FAPESP (Brazil). Ph.D. Fellowship.	2008-2011
National Council for Scientific and Technological Development – CNPq (Brazil). PhD Fellowship.	2008

Selected Talks (oral presentations)

1) Perivascular macrophages in the intersection of tissue health and disease pathophysiology. *Neuroimmunometabolism - Keystone symposia*. Breckenridge, CO, US.	2022
2) Perivascular macrophages in the intersection of tissue health and disease pathophysiology. *Immunometabolism – XLVI Congress of the Brazilian society of Immunology*. São Paulo, Brazil.	2022
3) The contribution of Perivascular macrophages to the regulation of organ physiology. *Gordon Research Conference – Immunochemistry and Immunobiology*. Castelldefels, B, Spain.	2022
4) c-MAF dependent perivascular macrophages regulate diet induced metabolic syndrome. *Massachusetts General Hospital Physician-Scientist Seminar series*. Boston, MA. US.	2021
5) c-MAF dependent perivascular macrophages regulate diet induced metabolic syndrome. *Seminars in clinical research – The Rockefeller university*. New York, NY. US.	2021
6) c-MAF dependent perivascular macrophages regulate diet induced metabolic syndrome. *CFI Postdoctoral Fellow Seminar Series – University of Minnesota.* Minneapolis, MN. US.	2021

Peer-Reviewed Publications

1. **Silva, Hernandez Moura**†; Kitoko, J.Z.; Queiroz, C.P.; Kroehling, L.; Matheis, F.; Lu Yang, K.; Ren-Fielding, C.; Littman, D.R.; Bozza, M.T.; Mucida, D.; Lafaille, J.J†. c-MAF dependent perivascular macrophages regulate diet induced metabolic syndrome.
   Science Immunology. 2021 Oct;6(64): eabg7506. doi: 10.1126/sciimmunol.abg7506. Epub 2021 Oct 1. PMID: 34597123. †*co-corresponding authors. Journal cover page.*

2. Samanta J; **Moura Silva, Hernandez**; Lafaille JJ; Fishell G; Salzer JL. Transcriptomic analysis of loss of Gli1 in neural stem cells responding to demyelination in the mouse brain.
   Scientific data. 2021 Oct 28;8(1):278. doi: 10.1038/s41597-021-01063-x.
3. Ledo JH; Zhang R; Mesin L; Mourão-Sá D; Azevedo EP; **Moura Silva, Hernandez**; Troyanskaya OG; Bustos V; Greengard P. Lack of a site-specific phosphorylation of Presenilin 1 disrupts microglial gene networks and progenitors during development.
   Plos One. 2021. doi: 10.1371/journal.pone.0247680
4. Ledo JH; Liebmann T; Zhang R; Chang JC; Azevedo EP; Wong E; **Silva, Hernandez Moura**; Troyanskaya OG; Bustos V; Greengard P**.** Presenilin 1 phosphorylation regulates amyloid-β degradation by microglia.
   Mol Psychiatry. **2020**. doi: 10.1038/s41380-020-0856-8.
5. Wu L; Hollinshead KER; Hao Y; Au C; Kroehling L; Ng C; Lin WY; Li D; **Silva, Hernandez Moura**; Shin J; Lafaille JJ; Possemato R; Pacold ME; Papagiannakopoulos T; Kimmelman AC; Satija R; Littman DR. Niche-Selective Inhibition of Pathogenic Th17 Cells by Targeting Metabolic Redundancy.
   Cell. **2020**, *182(3)*, 641-654.e20. doi: 10.1016/j.cell.2020.06.014.
6. Weinstock A*; **Silva, Hernandez Moura***; Moore KJ; Schmidt AM; Fisher EA. Leukocyte Heterogeneity in Adipose Tissue, Including in Obesity.
   Circ Res. **2020**, *126(11)*, 1590-1612. doi: 10.1161/CIRCRESAHA.120.316203. **Co-first authors*.
7. Garré JM; **Silva, Hernandez Moura**; Lafaille JJ; Yang G. P2X7 receptor inhibition ameliorates dendritic spine pathology and social behavioral deficits in Rett syndrome mice.
   Nat Commun. **2020**, *11(1)*, 1784. doi: 10.1038/s41467-020-15590-5.
8. Lee JY; Hall JA; Kroehling L; Wu L; Najar T; Nguyen HH; Lin WY; Yeung ST; **Silva, Hernandez Moura**; Li D; Hine A; Loke P; Hudesman D; Martin JC; Kenigsberg E; Merad M; Khanna KM; Littman DR. Serum Amyloid A Proteins Induce Pathogenic Th17 Cells and Promote Inflammatory Disease.
   Cell. **2020**, *180(1)*, 79-91.e16. doi: 10.1016/j.cell.2019.11.026.
9. **Silva, Hernandez Moura**†; Báfica A; Rodrigues-Luiz GF; Chi J; Santos PDA; Reis BS; Hoytema van Konijnenburg DP; Crane A; Arifa RDN; Martin P; Mendes DAGB; Mansur DS; Torres VJ; Cadwell K; Cohen P; Mucida D; Lafaille JJ†. Vasculature-associated fat macrophages readily adapt to inflammatory and metabolic challenges.
   J Exp Med. **2019**, *216(4)*, 786-806. doi: 10.1084/jem.20181049. †*co-corresponding authors. Journal cover page.*
10. Garré JM; **Silva, Hernandez Moura**; Lafaille JJ; Yang G. CX3CR1+ monocytes modulate learning and learning-dependent dendritic spine remodeling via TNF-α.
    Nat Med. **2017**, *23***,** 714–722. https://doi.org/10.1038/nm.4340.
11. Lavini-Ramos, C.; **Silva, Hernandez Moura**; Soares-Schanoski, A.; Monteiro SM; Ferreira LR; Pacanaro AP; Gomes S; Batista J; Faé K; Kalil J; Coelho V. MMP9 integrates multiple immunoregulatory pathways that discriminate high suppressive activity of human mesenchymal stem cells.
    Scientific Reports. **2017**, *7(1)*, 874. doi: 10.1038/s41598-017-00923-0.

12. Sujino T; London M; Hoytema van Konijnenburg DP; Rendon T; Buch T; **Silva, Hernandez Moura**; Lafaille JJ; Reis BS; Mucida D. Tissue adaptation of regulatory and intraepithelial CD4+ T cells controls gut inflammation.
Science. **2016**, *352(6293)*, 1581-6. doi: 10.1126/science.aaf3892.
13. Lin J; Yang L; **Silva, Hernandez Moura**; Trzeciak A; Choi Y; Schwab SR; Dustin ML; Lafaille JJ. Increased generation of Foxp3(+) regulatory T cells by manipulating antigen presentation in the thymus.
Nat Commun. **2016**, *7*, 10562. https://doi.org/10.1038/ncomms10562.
14. Samanta J; Grund EM; **Silva, Hernandez Moura**; Lafaille JJ; Fishell G; Salzer JL. Inhibition of Gli1 mobilizes endogenous neural stem cells for remyelination.
Nature. **2015**, *526*, 448–452. https://doi.org/10.1038.
15. Coelho V; Saitovitch D; Kalil J; **Silva, Hernandez Moura**. Rethinking the multiple roles of B cells in organ transplantation.
Curr Opin Organ Transplant. **2013**, *18(1)*, 13-21. doi: 10.1097/MOT.0b013e32835c8.
16. **Silva, Hernandez Moura**; Takenaka MC; Moraes-Vieira PM; Monteiro SM; Hernandez MO; Chaara W; Six A; Agena F; Sesterheim P; Barbé-Tuana FM; Saitovitch D; Lemos F; Kalil J; Coelho V. Preserving the B-cell compartment favors operational tolerance in human renal transplantation.
Mol Med. **2012**, *18*,733-43. doi: 10.2119/molmed.2011.00281.
17. Moraes-Vieira, PM; Takenaka, MC; **Silva, Hernandez Moura**; Monteiro, SM; Agena, F; Lemos, F; Saitovitch, D; Kalil, J; Coelho, V. GATA3 and a dominant regulatory gene expression profile discriminate operational tolerance in human transplantation.
Clinical Immunology. **2011**, *142(2)*, 117-126. doi:10.1016/j.clim.2011.08.0.
18. Moraes-Vieira, Pedro Manoel M.; **Silva, Hernandez Moura**; Takenaka, Maisa C.S.; Monteiro, Sandra Maria; Lemos, Francine; Saitovitch, David; Kalil, Jorge; Coelho, Verônica. Differential monocyte STAT6 activation and CD4+CD25+Foxp3+ T cells in kidney operational tolerance transplanted individuals. *Human Immunology*. **2010**, *71(5)*, 442-450. doi: 10.1016/j.humimm.2010.01.022.
19. **Silva, Hernandez Moura**; Vieira, Pedro M.M.M.; Costa, Patricia L.N.; Pimentel, Bárbara M.S.; Moro, Ana M.; Kalil, Jorge; Maranhão, Andrea Q.; Coelho, Verônica; Brigido, Marcelo M. Novel humanized anti-CD3 antibodies induce a predominantly immunoregulatory profile in human peripheral blood mononuclear cells. *Immunology letters*. **2009**, *125(2)*, 129-136.

List of references

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