

**BIOGRAPHICAL SKETCH**

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NAME: Pernomian, Laena

eRA COMMONS USER NAME (credential, e.g., agency login): Pernomian L

POSITION TITLE: Postdoctoral Fellow

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 <i>(if applicable)</i>	Completion Date MM/YY YY	FIELD OF STUDY	
Integrated Adamantinense Colleges	BS	01/2005	12/2008	Pharmacy
University of Sao Paulo, Medical School of Ribeirao Preto	MS	07/2009	07/2011	Pharmacology
University of Sao Paulo, Medical School of Ribeirao Preto	PhD	07/2011	08/2015	Pharmacology
University of Sao Paulo, Faculty of Pharmaceutical Sciences of Ribeirao Preto	Postdoctoral Fellow	09/2015	09/2017	Bioinorganic Chemistry
University of Sao Paulo, Medical School of Ribeirao Preto	Postdoctoral Fellow	09/2017	07/2018	Biochemistry and Immunology
University of Sao Paulo, Medical School of Ribeirao Preto	Postdoctoral Fellow	05/2019	02/2022	Pharmacology
University of South Carolina, School of Medicine Columbia	Postdoctoral Fellow	02/2022	Current	Vascular biology

**A. Personal Statement**

Throughout my career, understanding mechanisms related to the development of cardiovascular dysfunction in hypertension and related diseases associated with potential sex differences has been a consistent theme. Initially, this purpose was fulfilled through my Bachelor of Science degree in Pharmacy at the Integrated Adamantinense Colleges in Brazil (Adamantina, Sao Paulo, Brazil; 2005-2009), which gave me my first experience in laboratory practices. Seeking to expand my scientific understanding of Pharmacology, I pursued my Master of Science degree. Given the research-oriented perspective of my program at the Department of Pharmacology at the University of Sao Paulo (Ribeirao Preto, Sao Paulo, Brazil; 2009-2011), I was given the opportunity to research basic pharmacology focused on hypertension with Dr. Lusiane Maria Bendhack. Subsequently, this training gave me the research skills I needed to obtain my Ph.D. in the Department of Pharmacology at the University of Sao Paulo (Ribeirao Preto, Sao Paulo, Brazil; 2011-2015) in a project focused on cardiovascular dysfunction in sepsis. Afterward, I transitioned to Bioinorganic Chemistry to develop my first postdoctoral training at the Faculty of Pharmaceutical Sciences of Ribeirao Preto at the University of Sao Paulo (Ribeirao Preto, Sao Paulo, Brazil; 2015-2017) focused on the synthesis and characterization of new ruthenium-based phthalocyanines used as photodynamic-therapy compounds in human breast cancer cells. Subsequently, I was introduced to Biochemistry and Molecular Pharmacology during my second postdoctoral training at the Department of Biochemistry and Immunology at the Medical School of Ribeirao Preto, University of Sao Paulo (Ribeirao Preto, Sao Paulo, Brazil; 2017-2018) to elucidate

the main agonist-receptor interactions in the development of new Angiotensin II and Bradykinin biased-agonists that modulate the cardiovascular system. Additionally, I developed another postdoctoral training at the Department of Pharmacology at the Medical School of Ribeirao Preto, University of Sao Paulo (Ribeirao Preto, Sao Paulo, Brazil; 2019-2022), focused on the mechanisms related to cardiac dysfunction and the extracellular matrix remodeling in acute myocardial infarction and hypertension. Currently, I have the opportunity to act on Cardiovascular Physiology, developing a project with male and female spontaneously hypertensive mice (called Schlager or BPH/2J mice) with the primary goal to partially reprogram specifically endothelial cells in an attempt to restore the normal vascular function and prevent hypertension, as a postdoctoral fellow at Dr. Camilla Ferreira Wenceslau's laboratory, at the School of Medicine Columbia, in the University of South Carolina (Columbia, South Carolina, United States).

## B. Positions, Scientific Appointments, and Honors

**2022 – Current** Postdoctoral Fellowship, University of South Carolina, School of Medicine Columbia  
**2019 – 2022** Postdoctoral Fellowship, University of Sao Paulo, Medical School of Ribeirao Preto, Department of Pharmacology  
**2017 – 2018** Postdoctoral Fellowship, University of Sao Paulo, Medical School of Ribeirao Preto, Department of Biochemistry and Immunology  
**2015 – 2017** Postdoctoral Fellowship, University of Sao Paulo, Faculty of Pharmaceutical Sciences of Ribeirao Preto, Department of Physics and Chemistry  
**2011 – 2015** Ph.D. degree, University of Sao Paulo, Medical School of Ribeirao Preto, Department of Pharmacology  
**2009 – 2011** Master of Sciences degree, University of Sao Paulo, Medical School of Ribeirao Preto, Department of Pharmacology  
**2005 – 2008** Bachelor's degree, Integrated Adamantinense College

**2022 – Current** Member, American Heart Association (AHA)  
**2022 – Current** Member, American Physiological Society (APS)  
**2022 – Current** Member, North American Vascular Biology Organization (NAVBO)

### Honors

**2023** Poster Award on APS Summit 2023 – Walter Bradford Cannon  
**2011** Didactics in Pharmacology Professor Alexandre Pinto Corrado”, School of Medicine of Ribeirao Preto – University of Sao Paulo

## C. Contributions to Science

- 1. Graduate Career:** My graduate research contributions focused on mechanisms related to vascular dysfunction in hypertension in rats. We found a specific impairment on C-type natriuretic peptide (CNP)-induced activation of cGMP-dependent protein kinase and sarco/endoplasmic reticulum calcium ATPase activation on renovascular hypertension in rats. In addition, during my Ph.D., we found an important negative modulation induced by CNP on mesenteric resistance arteries in septic rats. Furthermore, I contributed to several articles that described vascular and cardiac dysfunction in different animal models of cardiovascular diseases.
- 2. Postdoctoral Career:** As a postdoctoral trainee, my research has provided a compelling link between matrix metalloproteinases (MMPs) activation and the cardiovascular dysfunction with cellular phenotypic transition in acute myocardial infarction and in hypertension. Currently, I have characterized a model of hypertension in mice which leads to the spontaneous development of heart failure, and the impact of the endothelial cell phenotypic transitioning in the cardiovascular remodeling and dysfunction. As part of my observations, I have demonstrated that specific endothelial cell reprogramming represents a beneficial strategy to prevent the deleterious effects induced by hypertension in mice and in human hypertensive cells. This therapeutical approach can restore the endothelial function in human cells without leading to

senescence and cellular death. Additionally, I have contributed to several works which showed anti-tumoral and anti-angiogenic effects elicited by different ruthenium-based complexes in different tumoral cell lines, and the modulation of vascular function induced by some ruthenium-catecholamine complexes.

#### D. List of publications

1. **PERNOMIAN L**, TAN W, MCCARTHY CG, WENCESLAU CF. Reprogramming endothelial and vascular smooth muscle cells to prevent and treat hypertension. *Medical Hypotheses*, 2023; 179: 111162.
2. COSTA TJ, WILSON EW, FONTES MT, **PERNOMIAN L**, TOSTES RC, WENCESLAU CF, MCCARTHY CG. The O-GlcNAc dichotomy: when does adaptation become pathological? *Clin Sci (Lond)*. 2023 Nov 29;137(22):1683-1697.
3. DA ROCHA EV, FALCHETTI F, **PERNOMIAN L**, DE MELLO MMB, PARENTE JM, NOGUEIRA RC, GOMES BQ, BERTOZI G, SANCHES-LOPES JM, TANUS-SANTOS JE, CASTRO MM. Quercetin decreases cardiac hypertrophic mediators and maladaptive coronary arterial remodeling in renovascular hypertensive rats without improving cardiac function. *Naunyn Schmiedebergs Arch Pharmacol*. 2023; 396(5): 939-949.
4. GARCIA NF, MORAES C, REBELO MA, CASTRO FMP, PETERS SMGR, **PERNOMIAN L**, BLASCHE DE MELLO MM, CASTRO MM, PUGGINA EF. Low load strength training, associated with or without blood flow restriction increased NO production and decreased production of reactive oxygen species in rat aorta. *LIFE SCIENCES*, 294:120350, 2022.
5. COSTA TJ, LINDER BA, HESTER S, FONTES M, **PERNOMIAN L**, WENCESLAU CF, ROBINSON AT, MCCARTHY CG. The janus face of ketone bodies in hypertension. *Journal of Hypertension*. 2022; 40(11): 2111-2119.
6. PARENTE JM, BLASCHE DE MELLO MM, SILVA PHL, OMOTO ACM, **PERNOMIAN L**, OLIVEIRA IS, MAHMUD Z, FAZAN JR R, ARANTES EC, SCHULZ R, CASTRO MM. MMP inhibition attenuates hypertensive eccentric cardiac hypertrophy and dysfunction by preserving troponin I and dystrophin. *BIOCHEMICAL PHARMACOLOGY*, 193:114744, 2021.
7. MARTINS, T. J.; NEGRI, L. B.; **PERNOMIAN, L.**; FAIAL, K. C. F.; XUE, C.; AKHIMIE, R. N.; HAMBLIN, M. R.; TURRO, C.; SILVA, R. S. The Influence of Some Axial Ligands on Ruthenium-Phthalocyanine Complexes: Chemical, Photochemical, and Photobiological Properties. *FRONTIERS IN MOLECULAR BIOSCIENCES*, v.7, p.595830, 2021.
8. GASPARI, ANA P.S.; DA SILVA, ROBERTO SANTANA; CARNEIRO, ZUMIRA A.; DE CARVALHO, MARCELO RODRIGUES; CARVALHO, IVONE; **PERNOMIAN, LAENA**; FERREIRA, LUCIMARA P.; RAMOS, LOYANNE C.B.; DE SOUZA, GABRIEL AGUIAR; FORMIGA, ANDRÉ L.B. Improving Cytotoxicity against Breast Cancer Cells by Using Mixed-Ligand Ruthenium(II) Complexes of 2,2'-Bipyridine, Amino Acid, and Nitric Oxide Derivatives as Potential Anticancer Agents. *Anti-Cancer Agents in Medicinal Chemistry*, 21(12):1602-1611, 2021.
9. **PERNOMIAN, L**; PRADO, A. F.; SILVA, BRUNO R.; PAULA, T. D.; GRANDO, MARCELLA D.; BENDHACK, L. M. C-type natriuretic peptide-induced relaxation through cGMP-dependent protein kinase and SERCA activation is impaired in two kidney-one clip rat aorta. *LIFE SCIENCES*, 272: 119223, 2021.
10. ALVES, JACQUELINE QUERINO; **PERNOMIAN, LAENA**; SILVA, CÁSSIA DIAS; GOMES, MAYARA SANTOS; DE OLIVEIRA, ANA MARIA; DA SILVA, ROBERTO SANTANA. Vascular tone and angiogenesis modulation by catecholamine coordinated to ruthenium. *RSC Medicinal Chemistry*, v.11, p.497 - 510, 2020.
11. PRADO, ALEJANDRO F.; **PERNOMIAN, LAENA**; AZEVEDO, ALINE; COSTA, RUTE A.P.; RIZZI, ELEN; RAMOS, JUNIA; PAES LEME, ADRIANA F.; BENDHACK, LUSIANE M.; TANUS-SANTOS, JOSE E.; GERLACH, RAQUEL F. Matrix metalloproteinase-2-induced epidermal growth factor receptor transactivation impairs redox balance in vascular smooth muscle cells and facilitates vascular contraction. *Redox Biology*, v.18, p.181 - 190, 2018.
12. SILVA, B.R.; **PERNOMIAN, L.**; DE PAULA, T.D.; GRANDO, M.D.; BENDHACK, L.M. Endothelial nitric oxide synthase and cyclooxygenase are activated by hydrogen peroxide in renal hypertensive rat aorta. *EUROPEAN JOURNAL OF PHARMACOLOGY*, v.814, p.87 - 94, 2017.
13. DEBORTOLI, ANGELINA RAFAELA; ROUVER, WENDER DO NASCIMENTO; DELGADO, NATHALIE TRISTÃO BANHOS; MENGAL, VINICIUS; CLAUDIO, ERICK ROBERTO GONÇALVES; **PERNOMIAN, LAENA**; BENDHACK, LUSIANE MARIA; MOYSÉS, MARGARETH RIBEIRO; SANTOS, ROGER LYRIO DOS. GPER modulates tone and coronary vascular reactivity in male and female rats. *JOURNAL OF MOLECULAR ENDOCRINOLOGY*, v.59, p.171 - 180, 2017.

14. DE PAULA, TIAGO DAL-CIN; SILVA, BRUNO R.; GRANDO, MARCELLA D.; **PERNOMIAN, LAENA**; DO PRADO, ALEJANDRO FERRAZ; BENDHACK, LUSIANE MARIA. Relaxation induced by the nitric oxide donor and cyclooxygenase inhibitor NCX2121 in renal hypertensive rat aortas. *EUROPEAN JOURNAL OF PHARMACEUTICAL SCIENCES*, v.107, p.45 - 53, 2017.
15. **PERNOMIAN, LAENA**; PRADO, ALEJANDRO F.; SILVA, BRUNO R.; AZEVEDO, ALINE; PINHEIRO, LUCAS C.; TANUS-SANTOS, JOSÉ E.; BENDHACK, LUSIANE M. C-Type Natriuretic Peptide Induces Anti-contractile Effect Dependent on Nitric Oxide, Oxidative Stress, and NPR-B Activation in Sepsis. *Frontiers in Physiology*, v.7, p.226, 2016.
16. MOREIRA, JOSIMAR D.; PERNOMIAN, LARISSA; GOMES, MAYARA S.; **PERNOMIAN, LAENA**; MOREIRA, RAFAEL P.; DO PRADO, ALEJANDRO F.; DA SILVA, CARLOS H.T.P.; DE OLIVEIRA, ANA M. Acute restraint stress increases carotid reactivity in type-I diabetic rats by enhancing Nox4/NADPH oxidase functionality. *EUROPEAN JOURNAL OF PHARMACOLOGY*, v.765, p.503 - 516, 2015.
17. PERNOMIAN, LARISSA; DO PRADO, ALEJANDRO F.; GOMES, MAYARA S.; **PERNOMIAN, LAENA**; DA SILVA, CARLOS H.T.P.; GERLACH, RAQUEL F.; DE OLIVEIRA, ANA M. MAS receptors mediate vasoprotective and atheroprotective effects of candesartan upon the recovery of vascular angiotensin-converting enzyme 2-angiotensin-(1-7)-MAS axis functionality. *EUROPEAN JOURNAL OF PHARMACOLOGY*, v.764, p.173 - 188, 2015.
18. PERNOMIAN, LARISSA; **PERNOMIAN, LAENA**; GOMES, MAYARA S.; DA SILVA, CARLOS H.T.P. Pharmacological significance of the interplay between angiotensin receptors: MAS receptors as putative final mediators of the effects elicited by angiotensin AT1 receptors antagonists. *EUROPEAN JOURNAL OF PHARMACOLOGY*, v.15, p.30347 - 30352, 2015.
19. PERNOMIAN, LARISSA; GOMES, MAYARA S.; **PERNOMIAN, LAENA**; MOREIRA, RAFAEL P.; CORRÊA, FERNANDO M.A.; DE OLIVEIRA, ANA M. Vasoprotective effects of neurocompensatory response to balloon injury during diabetes involve the improvement of Mas signaling by TGF-beta activation. *VASCULAR PHARMACOLOGY*, v.64, p.36 - 48, 2015.
20. **PERNOMIAN, LAENA**; PERNOMIAN, LARISSA; BARALDI ARAÚJO RESTINI, CAROLINA. Counter-regulatory effects played by the ACE - Ang II - AT1 and ACE2 - Ang-(1-7) - Mas axes on the reactive oxygen species-mediated control of vascular function: perspectives to pharmacological approaches in controlling vascular complications. *VASA (Bern)*, v.43, p.404 - 414, 2014.
21. DA CUNHA, N. V.; PINGE-FILHO, P.; PANIS, C.; SILVA, B. R.; **PERNOMIAN, L.**; GRANDO, M. D.; CECCHINI, R.; BENDHACK, L. M.; MARTINS-PINGE, M. C. Decreased endothelial nitric oxide, systemic oxidative stress, and increased sympathetic modulation contribute to hypertension in obese rats. *AMERICAN JOURNAL OF PHYSIOLOGY-HEART AND CIRCULATORY PHYSIOLOGY*, v.306, p.H1472 - H1480, 2014.
22. SILVA, BRUNO R.; **PERNOMIAN, LAENA**; GRANDO, MARCELLA D.; BENDHACK, LUSIANE M. Phenylephrine activates eNOS Ser1177 phosphorylation and nitric oxide signaling in renal hypertensive rat aorta. *EUROPEAN JOURNAL OF PHARMACOLOGY*, v.738, p.192 - 199, 2014.
23. SILVA, BRUNO R.; **PERNOMIAN, LAENA**; GRANDO, MARCELLA D.; AMARAL, JEFFERSON H.; TANUS-SANTOS, JOSE E.; BENDHACK, LUSIANE M. Hydrogen peroxide modulates phenylephrine-induced contractile response in renal hypertensive rat aorta. *EUROPEAN JOURNAL OF PHARMACOLOGY*, v.721, p.193 - 200, 2013.
24. SILVA, BRUNO R.; **PERNOMIAN, LAENA**; BENDHACK, LUSIANE M. Contribution of oxidative stress to endothelial dysfunction in hypertension. *Frontiers in Physiology*, v.3, p.1/441 - 5, 2012.
25. GASPAR, O. J.; BUTARELLO, S. S.; SALA JUNIOR, V.; **PERNOMIAN, LAENA**; HASEGAWA, D. I.; CINTRA, R. G. S.; TORRES, R. C. Preparação e estudo da estabilidade de emulsões do tipo o/a: poder emulsificante da lecitina de soja em comparação com agentes tensoativos sintéticos do tipo polissorbato 60 e 80. *OMNIA SAÚDE (FAI)*, v.4, p.46 - 51, 2007.

## E. Submitted article

1. **Laena Pernomian**, Marcela M. Blascke de Mello, Juliana Montenegro Parente, Jéssica M. Sanches-Lopes, José Eduardo Tanus-Santos, Luciana Tabajara Parreiras e Silva, José Antunes-Rodrigues, Raoni da Conceição dos Santos, Lucila Leico Kagohara Elias, Alexandre Todorovic Fabro, Carlos Alberto A. Silva, Rubens Fazan, Richard Schulz, Michele Mazzaron de Castro. The New Hydrogen Sulfide Donor 4-Carboxyphenyl-Isothiocyanate Decreases Blood Pressure, and Promotes Cardioprotective Effect Through Oxidative Stress Attenuation, and Inactivation of the Nuclear Factor Kappa B/Matrix Metalloproteinase 2 Axis in Hypertension. *Life Sciences*. 2024.

2. Marcela M. Blascke de Mello, Viviano Gomes de Oliveira Neves, Juliana Montenegro Parente, **Laena Pernomian**, Carina Amarante Pedersoli, Isadora de Souza, Eliane Candiani, Rita de Cassia A. Tostes, Richard Schulz, Michele Mazzaron de Castro. Sarcoplasmic Reticulum Calcium ATPase (SERCA) proteolysis by matrix metalloproteinase-2 contributes to hypertrophic vascular remodeling and dysfunction in early renovascular hypertension. *Biochemical Pharmacology*. 2024.

## **F. Citations**

**Google Scholar citations: 500** (available: "<https://scholar.google.com/citations?hl=en&user=snoCuCEAAAAJ>", accessed 04/04/2024 at 3:12 pm).

## **G. Student mentorship**

1. Ryan Hill – graduate student (2024-current)
2. Callie Clarke – medical student (2022)
3. Eduardo Vieira da Rocha – graduate student (2020-2022)
4. Francisco Falchetti – graduate student (2019-2022)

## **H. Event organization**

2019: Workshop on Pharmacology – Ribeirao Preto, Sao Paulo, Brazil

2018: The 10<sup>th</sup> Edition of the Summer School of Medicine (SSM10) – Ribeirao Preto, Sao Paulo, Brazil

2015: Workshop on Confocal Microscopy – Ribeirao Preto, Sao Paulo, Brazil

## **I. Scientific Journal Referee**

- International Journal of Molecular Sciences (2019-current)
- Journal of Pharmacy and Pharmacology (2017-current)
- Biosensors (2018-current)
- Biomolecules (2021-current)
- Frontier in Cell and Developmental Biology (2021-current)
- Journal of the American Heart Association – JAHA (2023-current)

## **J. Review Editor**

- Frontiers in Physiology (2022-current)
- Co-Topic Editor – Frontiers in Physiology (2024 – current)