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: Edward Suarez Moreira Bahnson, PhD

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

POSITION TITLE: 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
Universidad de la República, Montevideo, Uruguay	BSc	11/2002	Biochemistry
Kent State University, Kent, OH	PhD	05/2010	Cell Biology / Bioinorganic Chemistry / Pharmacology
Northwestern University, Chicago, IL		02/2016	Research Fellow, Vascular Biology

A. Personal Statement

I am a junior faculty member with a long-standing interest in in redox vascular biology. I am interested in developing redox-based interventions using nanotechnology to target sites of arterial disease. My interest in redox biology began as an undergraduate studying analytical luminescent probes for the detection of reactive species. During my graduate training I majored in Cell Biology with Bioinorganic and Pharmacology minors. I focused on the redox biology and pharmacology of vitamin B12 derivatives in the vascular endothelium. In particular, I studied non-coenzyme functions of this micronutrient, and its redox activity in the endothelium. As a post-doctoral fellow, I conducted research on whole-animal integrated responses, the redox regulation of the vasculature, and the development of redox-based therapies for the treatment of arterial restenosis after surgical interventions. I have over 7 years of experience in vascular biology and how redox-interventions affect the vascular wall. In addition, I worked for 3 years in an analytical chemistry government lab performing toxicological screens of athletes. I apply this experience to the redox field for the quantitative detection of redox markers and reactive species. I currently have 20 published peer-reviewed articles and an h index of 11 (Google Scholar).

Besides my passion of scientific research, I have a strong commitment to excellent teaching and mentorship. Throughout my career, I have mentored 7 undergraduates, 4 graduate students (2 Masters and 2 PhD students in my lab), 6 rotation graduate students, and surgical residents. I encourage independent thinking, intra- and inter-laboratory collaborations, as I believe teamwork stimulates creativity and productivity. I hold weekly lab meetings where the mentee's work can be critically evaluated by a small group of researchers, and goals can be set. I hold regular one-on-one meetings to assess the trainee's progress, troubleshoot, and delineate goals and directions. I discuss the trainee's career goals and tailor my mentoring and expectations to match their objectives. I provide extensive training in professional development, like writing grants, reviewing papers, preparing presentations, making effective figures, and giving impactful talks. I encourage my students to submit abstracts to present at local and national meetings. Importantly, I set clear bi-directional feedback and expectations, as well as tangible deliverables such as abstracts, manuscripts, and reports. Even though I am a junior faculty member, I have taken advantage of many available resources to maximize my mentorship effectiveness. I have taken the PI Development Series offered by the Center for Faculty Excellence at UNC. I have joined the National Research Mentoring Network (NMRN). Additionally I have taken the Faculty Mentoring Workshop for Biomedical Researchers led by the Office of Graduate Education at UNC, and I have participated in annual Brown Bag Lunch Mentoring Workshops. Finally, I have taken the Culturally Aware Mentorship Workshop, part of the NRMN Mentor Training Core.

Diversity and inclusion. My personal experiences have strongly shaped my approach to diversity and inclusion as I am a Hispanic and LGBTQ person in the sciences. Throughout my training years it was noticeable that there is a lack of minority mentors and role models in the sciences. This has strongly motivated me to become a mentor to encourage Latinx and LGBTQ trainees to pursue careers in the sciences. In every aspect of my live, I proactively promote accepting and inclusive environments. I am currently member of our SACNAS chapter and I co-founded an organization called STEM Pride to "create a visible and interconnected community of LGBTQ+ and allied STEM students and professionals committed to pursuing their careers with pride."

1. Cartaya A, Maiocchi S, Bahnson EM. Nanotherapies for Treatment of Cardiovascular Disease: a Case for Antioxidant Targeted Delivery. Curr Pathobiol Rep. 2019 https://doi.org/10.1007/s40139-019-00196-4. PMCID: Pending
2. Buglak NE, Batrakova EV, Mota R, and **Bahnson ESM**, "Insights on Localized and Systemic Delivery of Redox-Based Therapeutics," Oxidative Medicine and Cellular Longevity, vol. 2018, February 14, 2018. PubMed ID:29636836 PMCID: PMC5832094
3. Mota R, Homeister JW, Willis MS, and **Bahnson, EM** "Atherosclerosis: Pathogenesis, Genetics and Experimental Models." In: eLS. John Wiley & Sons Ltd, Chichester. October 2017 doi: 10.1002/9780470015902.a0005998.pub3
4. Gregory, EK, Webb A, Vercammen JM, Kelly ME, Akar B, can Lith R, **Bahnson EM**, Jiang W, Ameer GA, Kibbe MR. Inhibiting intimal hyperplasia in prosthetic vascular grafts via immobilized all-trans retinoic acid. J Control Release. 2018 Mar 28; 274:69-80 PubMed PMID:29391231; PMCID:PMC5847482.

B. Positions and Honors

Positions and Employment

6/97-7/00 **Teaching Assistant**, School of Medicine, Universidad de la República, Montevideo, Uruguay
1/01-12/03 **Analytical Lab Assistant**, Doping Control Laboratory, Ministry of Sports. Montevideo, Uruguay
5/02-12/03 **Teaching Assistant**, School of Science, Universidad de la República, Montevideo, Uruguay
1/04-05/06 **Teaching Assistant**, Dept. of Chemistry, Kent State University, Kent, OH
6/06-6/07 **Research Assistant**, Dept. of Chemistry, Kent State University, Kent, OH
7/09-2/10 **Teaching Assistant**, Integrative Medical Sciences, NE Ohio Medical University, Rootstown, OH
3/10-3/16 **Postdoctoral Research Fellow**, Northwestern University, Feinberg School of Med., Chicago, IL
2/15-6/16 **Adjunct Faculty**, Health Sciences, Blitstein Institute, Hebrew Theological College, Chicago, IL
3/16-7/16 **Research Assistant Professor**, Northwestern University, Feinberg School of Med., Chicago, IL
8/16-present **Assistant Professor**, University of North Carolina, School of Medicine, Chapel Hill, NC

Other Experience and Professional Memberships

Society Membership:
2009 Member, American Heart Association
2010 Member, Society for Redox Biology and Medicine
2010-2016 Candidate Member, Association for Academic Surgery
2011-2016 Member, National Postdoctoral Association
2013 Member, National Organization of Gay and Lesbian Scientists and Technical Professionals
2015-2017 Member of the Trainee Council, Society for Redox Biology and Medicine
2016-2017 Vice-Chair of the Trainee Council, Society for Redox Biology and Medicine
2016-2018 Member of the Professional Development Committee, Society for Redox Biology and Medicine
2018-present Council Member and Chair of Junior Awards. Society for Redox Biology and Medicine

Peer Review Duties: Journal of Coordination Chemistry, Journal of Surgical Research; Redox Biology; Nitric Oxide, Oxidative Medicine and Cellular Longevity.

Honors
1996 Scholarship Award to participate at the 28th Dr. Bessie F. Lawrence Summer Science Camp at the Weizmann Institute of Science, Rehovot, Israel
2004 Full Assistantship at the School of Biomedical Sciences. Kent State University, Kent, OH
2005 Omicron Delta Kappa (ΟΔΚ) Honor National Leadership Society
2006 Who is Who among Students in American Universities and Colleges
2006 Phi Beta Delta (ΦΒΔ) International Scholars Honor Society
2006 Phi Beta Delta (ΦΒΔ) Graduate Student Award for International Education

2007 Kent State University Inventor's Recognition Ceremony
2014 Best Presentation at the Nitric Oxide – Nitrite/Nitrate Conference. Cleveland, OH
2014 Larry Oberley Young Investigator Award. SFRBM 2014. Seattle, WA
2015 SFRBM Young Investigator Award. SFRBM 2015. Boston, MA
2018 Society for Free Radical Research International Award. SFRRI 2018. Lisbon, Portugal.

C. Contributions to Science

1. *Non-coenzyme roles of vitamin B12 in the vasculature.* The overarching focus of my research has been to study vascular redox biology. During my doctorate, I started focusing on the synthesis and characterization of vitamin B12 derivatives as pharmacological agents for the vasculature. I developed a method to synthesize vitamin B12 derivatives with potential pharmacological applications. This work resulted in a patent that was licensed to PamLab LLC, a Louisiana-based pharmaceutical company. My research on the redox properties of cobalamin lead to the discovery that the reduced form of B12, reacts with superoxide as fast as superoxide dismutase. This work, published in JACS has over 70 citations to date (Google Scholar). To study the cellular processing of B12 in the vascular endothelium, I was involved in the development of an innovative analytical technique, we named "cold trapping." This technique allows for the accurate differentiation of natural vs artifactual forms of B12. Finally, I studied the protective properties of B12 as a cellular redox regulator. Altogether my work made a significant contribution to further the understanding of the role of vitamin B12 in the vasculature beyond its coenzyme activities, and the potential use of B12 derivatives for pharmacological intervention.

   a. Patent: **Suarez-Moreira E**, Brasch NE. Inventors. Method of synthesis of the sodium salt of N-acetyl-L-cysteinylcobalamin. USA 7,777,0460. 2010 August 17.
   b. **Suarez-Moreira E**, Yun J, Birch CS, Williams JH, McCaddon A, Brasch NE. Vitamin B(12) and redox homeostasis: cob(II)alamin reacts with superoxide at rates approaching superoxide dismutase (SOD). J Am Chem Soc. 2009 Oct 28;131(42):15078-9. PubMed PMID: 19799418. PMCID:N/A
   c. **Moreira ES**, Brasch NE, Yun J. Vitamin B12 protects against superoxide-induced cell injury in human aortic endothelial cells. Free Radic Biol Med. 2011 Aug 15;51(4):876-83. PubMed PMID: 21672628; PMCID: PMC3163124.
   d. **Suarez-Moreira E**, Hannibal L, Smith CA, Chavez RA, Jacobsen DW, Brasch NE. A simple, convenient method to synthesize cobalamins: synthesis of homocysteinylcobalamin, N-acetylcysteinylcobalamin, 2-N-acetylamino-2-carbomethoxyethanethiolatocobalamin, sulfitocobalamin and nitrocobalamin. Dalton Trans. 2006 Nov 28;PubMed PMID: 17088966; PMCID: PMC2754772.

2. *Redox-based therapies to inhibit restenosis.* My long-term goal is to develop a specific targeted therapy for the vasculature to normalize the redox imbalance of injured arteries. In order to successfully develop a redox-based therapy for the vasculature it is important to understand how these interventions act on the vasculature. My research efforts have focused on how nitric oxide- and nrf2-based therapies regulate the cells in the vascular wall following arterial injury. We have identified novel and specific effects of nitric oxide donors as well as Nrf2 activators on the arterial wall. Our findings shed light into vasculoprotective redox mechanisms. Moreover, they led to the rational design of redox-based approaches that we incorporated in targeted systems described in 3: targeted drug delivery for the vasculature.

   a. Buglak NE, Jiang W, **Bahnson ESM**. Cinnamic aldehyde inhibits vascular smooth muscle cell proliferation and neointimal hyperplasia in Zucker Diabetic Fatty rats. Redox Biol. 2018 Oct;19:166-178. PubMEd PMID: 30172101; PMCID: PMC6122148
   b. **Bahnson ESM**, Vavra AK, Flynn ME, Vercammen JM, Jiang Q, Schwartz AR, Kibbe MR. Long-term effect of PROLI/NO on cellular proliferation and phenotype after arterial injury. Free Radic Biol Med. 2016 Jan;90:272-86. PubMed PMID: 26627935; PMCID: PMC4698201.
   c. **Bahnson ESM**, Havelka GE, Koo NC, Jiang Q, Kibbe MR. Periadventitial adipose tissue modulates the effect of PROLI/NO on neointimal hyperplasia. J Surg Res. 2016;205(2):440-445. PubMed PMID: 27664894; PMCID: PMC5081220.
   d. Havelka GE, **Moreira ES**, Rodriguez MP, Tsihlis ND, Wang Z, Martinez J, Hrabie JA, Kiefer LK, Kibbe MR. Nitric oxide delivery via a permeable balloon catheter inhibits neointimal growth after arterial injury. J Surg Res 2013; 180(1):35-42 PubMed PMID: 23164361. PMCID: PMC3578007

3. *Targeted and local drug delivery for the vasculature.* Whereas human studies using antioxidant-based therapies have for the most part not shown differences in clinical outcomes, some studies using local delivery have shown promising results in humans. Hence, the biggest challenge for successful clinical

translation of redox therapies is the targeted delivery of the therapeutic in the right amount at the right site. In this context I have contributed to the development of peptide-based tailored nanocarriers capable of targeting specific locations. Using what we learned about redox regulation in the vascular wall, we designed targeted redox therapies to the sites of arterial injury. Specifically, I designed an S-nitrosated version of a targeted peptide that successfully inhibits arterial restenosis. The success of our targeted approach, lead us to venture into non-redox targeted therapies for the vasculature as well.

a. Morgan CE, Dombrowski AW, Rubert Pérez CM, **Bahnson ESM**, Tsihlis ND, Jiang W, Jiang Q, Vercammen JM, Prakash VS, Pritts TA, Stupp SI, Kibbe MR. Tissue-Factor Targeted Peptide Amphiphile Nanofibers as an Injectable Therapy To Control Hemorrhage. ACS Nano. 2016 Jan 26;10(1):899-909. PubMed PMID: 26700464. PMCID:N/A
b. **Bahnson ESM**, Kassam HA, Moyer TJ, Jiang W, Morgan CE, Vercammen JM, Jiang Q, Flynn ME, Stupp SI, Kibbe MR. Targeted Nitric Oxide Delivery by Supramolecular Nanofibers for the Prevention of Restenosis After Arterial Injury. Antioxid Redox Signal. 2016 Jan 21;PubMed PMID: 26593400. PMCID: N/A
c. Moyer TJ, Kassam HA, **Bahnson ESM**, Morgan CE, Tantakitti F, Chew TL, Kibbe MR, Stupp SI. Shape-Dependent Targeting of Injured Blood Vessels by Peptide Amphiphile Supramolecular Nanostructures. Small. 2015 Jun;11(23):2750-5. PubMed PMID: 25649528; PMCID: PMC4478239.
d. Patent: Kibbe MR, Stupp S, Moyer T, **Bahnson EM**, Inventors. Targeted Therapy for the Prevention of Restenosis in the Cardiovascular System. US Patent 9,517,275. 2016, December 13.

4. *Redox regulation in cardiovascular disease.* My long-term goal is to translate redox interventions to the clinic to treat cardiovascular disease. In order to successfully develop a redox-based it is important to understand the role of redox biology in cardiovascular pathophysiology. One such research effort is understanding the role of nitric oxide in regulating vascular cells. I discovered that the enzyme superoxide dismutase 1 is redox-regulated in rat arteries. Additionally, I discovered that the regulation is sex-specific. My interest in the role of redox biology goes beyond arterial disease. Recently, I contributed to finding that engulfment and cell motility protein 1 contributes to cardiomyopathy via increase in reactive species production. I measured reactive species levels in tissue and cells of mice expressing different levels of ELMO1. My findings contributed to establish that ELMO1 promote diabetic cardiomyopathy through NADPH oxidase dependent mechanisms.

a. Kakoki M, **Bahnson EM**, Hagaman JR, Siletzky RM, Grant R, Kayashima Y, Li F, Sun MT, Taylor JM, Rice JC, Almeida MF, Bahr BA, Jennette JC, Smithies O, Maeda-Smithies N. Engulfment and cell motility protein 1 potentiates diabetic cardiomyopathy via Rac-dependent and Rac-independent ROS production. JCI Insight 2019; 4(12):127660. PubMed PMID: 31219360. PMCID: Pending
b. **Bahnson ESM**, Koo N, Cantu-Medellin N, Tsui AY, Havelka GE, Vercammen JM, Jiang Q, Kelley EE, Kibbe MR. Nitric oxide inhibits neointimal hyperplasia following vascular injury via differential, cell-specific modulation of SOD-1 in the arterial wall. Nitric Oxide. 2015 Jan 30;44:8-17. PubMed PMID: 25460325; PMCID: PMC4304904.
c. Morales RC,* **Bahnson ESM**,* Havelka GE, Cantu-Medellin N, Kelley EE, Kibbe MR. Sex-based differential regulation of oxidative stress in the vasculature by nitric oxide. Redox Biol. 2015;4:226-33. PubMed PMID: 25617803. PMCID: PMC4803798 **These authors contributed equally and share first authorship*
d. Gregory EK, Vavra AK, **Moreira ES**, Havelka GE, Jiang Q, Van Lith R, Ameer GA, Kibbe MR. Antioxidants modulate the antiproliferative effects of nitric oxide on vascular smooth muscle cells and adventitial fibroblasts by regulating oxidative stress. Am J Surg. 2011; 202(5):536-40. PubMed PMID: 21944289. PMCID: PMC3216467.

A complete list of my published work can be found at:
https://www.ncbi.nlm.nih.gov/myncbi/1zoYcGwpHOCQj/bibliography/public/