OMB No. 0925-0001 and 0925-0002 (Rev. 10/2021 Approved Through 01/31/2026)

BIOGRAPHICAL SKETCH

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NAME: Sandrine Pierre

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

POSITION TITLE: Associate Professor and Interim Director

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 DateMM/YYYY | FIELD OF STUDY |
| --- | --- | --- | --- |
| Aix-Marseille II University, France | M.Sc | 06/1996 | Cell. Mol. Immunol. |
| Aix-Marseille II University, France | Ph.D. | 07/2000 | Cell. Mol. Endocrinol |
| Texas Tech University HSC, Lubbock, TX | Postdoctoral fellowship | 03/2002 | Physiology |

**A. Personal Statement**

Unanticipated at the time of Nobel laureate Jens Skou’s breakthrough discovery of Na/K-ATPase (NKA) as the first ion transporting P-type ATPase in the mid-1950s, the fundamental issue of NKA’s signaling function was first brought to the attention of the scientific community by the work of Zijian Xie in the late 1990s.

A large part of my research has focused on cardiac NKA signaling and its therapeutic applications. From 2003 to 2013, I have worked closely with Dr Xie and others as part of a NHLBl PPG program centered at the University of Toledo (Ohio), serving as a Project leader and Animal Core Leader. I have subsequently served as a PI of several Research-, Training-, or Equipment grants related to cardiac Na/K-ATPase signaling studies funded by NIH and AHA, building a unique experience **with overall administration of equipment and personnel in studies of Na/K-ATPase physiology.**

At Marshall, I oversaw the successful development of novel mouse models and protocols suitable to test the central hypothesis that NKA signaling can be favorably targeted to normalize NKA enzymatic function and other fundamental cellular properties in a tissue-specific manner. My experience with overall administration and direction of studies to explore the role of Na/K-ATPase signaling pathways has helped lay the foundation for bold new research programs at Marshall, as envisioned by the regretted Dr. Zijian Xie himself, with a large focus on chronic diseases that disproportionately affect West Virginians and translational applications.

**NIH - R01DK129937-01**

**08/24/21 - 06/30/26**

**PI: Pierre, SV**

**ATP1A1-dependent regulation of sodium handling by the renal proximal tubule: mechanism and implications in salt-sensitivity**

**American Physiological Society (APS) - Porter Physiology Development Fellowship**

**09/01/2025 - 08/31/2026**

**PI: Strause, S**

**Role: Pierre Mentor/sponsor of PhD student S. Strause**

**AHA - 25TPA1477521**

**7/1/2025 - 6/30/2028**

**PI: Pierre, SV**

**Biased Signaling at the Cardiac Na/K-ATPase Receptor: A New Approach in Uremic Cardiomyopathy**

**AHA - 25IAUST1377724**

**01/01/2025 - 12/31/2027**

**PI: Santanam, N**

**AHA Undergraduate Student Research Program at Marshall University.**

**Role: Pierre Mentor/sponsor**

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

2002-2003 Research Instructor, Dept. of Physiology, Texas Tech University HSC, Lubbock, TX

2004-2011 Assistant Professor. Dept. of Physiology & Pharmacology, UT HSC, Toledo, OH

2012-2013 Associate Professor. Dept. of Biochemistry, UT HSC

2014-2017 Assoc. Invest. & Ed. Coordinator. Marshall Inst. for Interdisciplinary Research, Huntington, WV

2018- Associate Scientific Director, Marshall Institute for Interdisciplinary Research

2018- Cell Biol. Res. Cluster Coordinator, Marshall University J. C. Edwards School of Medicine

2020- 2025 Assoc. Professor of Biomed. Sciences, Marshall University J.C. Edwards School of Medicine

2020- Interim Director, Marshall Institute for Interdisciplinary Research

2025- Professor of Biomed. Sciences, Marshall University J.C. Edwards School of Medicine

***Other Experience and Professional Memberships***

2002- Member, American Physiological Society (APS)

2010- Member, American Heart Association (AHA)

2012- 2015 APS - Award Chair, Cellular and Molecular Physiology Section

2019- APS - Committee on Committees Rep - Cellular and Molecular Physiology Section

2022- 2025 APS - Chair - Cellular and Molecular Physiology Section

2025- APS - Sage - Cellular and Molecular Physiology Section

**2023- Physiological Reports Editorial Board - Member**

**2023-** **AJP - Cell Physiology** **Editorial Board - Member**

2024- **AJP** *-*Heart and Circulatory Physiology **Editorial Board - Member**

**2025-** Comprehensive Physiology: Interorgan communication in Health and Disease. **Editorial Board -Member**

***Service on Grant Review Committees*:** AHA Basic Cell Membrane & Subcellular Organelles 1 (2010-2014), The British Diabetic Association (mail reviewer, 2010), UK Biotechnology and Biological Sciences Research Council (mail reviewer, 2010, 2013), NIH Kidney and Urological Systems Function and Dysfunction Study Section (2021-22), Israel Science Foundation (2021), NIH KUH Innovative Science Accelerator Program (2021-present), NIH/ZRG ZRG1 KUDS (2025).

***Honors***

1999 Student Travel Award. International Conference on Na/K/-ATPase & Related ATPases, Sapporo, Japan.

2002 Best poster. International Conference on Na/K/-ATPase and Related Cation Pumps. Elsinore, Denmark.

2002 Symposium Award. Annual Meeting of the Society of General Physiologists. Woods Hole, MA.

2010 New Investigator Award. American Physiological Society (APS) Cell. and Molecular Physiology Section.

2020 Mentoring Faculty Award - Marshall University Biomedical Research Graduate Program.

2022 Dean’s Awards of Excellence in Research - Marshall University Joan C. Edwards School of Medicine.

**C. Contributions to Science**

**My major research interest has been on the physiological relevance of the Na/K-ATPase structural heterogeneity, and the Na/K-ATPase non-canonical (signaling) function. One of the main goals of our research has been to apply these new aspects of Na/K-ATPase structure and function to explore new ways of protecting the heart using the three cardiac Na/K-ATPase isoforms as targets for therapeutic intervention.**

**1. Na/K-ATPase isoforms in health and diseases.**

 **My graduate work was on the regulation of Na/K-ATPase isoforms’ expression and ion-pumping activity in health and diseases. Those studies encompassed a variety of tissues, including the heart. Numerous reports by us and others have shown that a fine and tissue-specific regulation of Na/K-ATPase isoforms’ expression occurs during physiological and pathological processes.**

1. **Pierre S, Jamme I, Robert K, Gerbi A, Duran M-J, Sennoune S, Droy-Lefaix M-T, Nouvelot A, and Maixent J-M. Ginkgo biloba extract (EGb 761) protects Na,K-ATPase isoenzymes during cerebral ischemia. *Cell. Mol. Biol*. 2002; 48: 671-679. PMID: 12396078**
2. **Maixent JM, Duran MJ, Pierre S, Sennoune S, Robert K, Bernard M, Levy S. Remodeling of Na,K-ATPase and membrane fluidity after atrial fibrillation in sheep. *J Recept Signal Transduct Res* 2002; 22: 203-213. PMID: 12503616**
3. **Bai Y, Morgan EE, Giovannucci DR, Pierre SV, Philipson KD, Askari A, Liu L Different roles of the cardiac Na+/Ca2+-exchanger in ouabain-induced inotropy, cell signaling, and hypertrophy.. *Am J Physiol Heart Circ Physiol*. 2013; 304:H427-35. PMID: 23203972.**
4. **Kutz LC, Cui X, Xie JX, Mukherji ST, Terrell KC, Huang M, Wang X, Wang J, Martin AJ, Pessoa MT, Cai L, Zhu H, Heiny JA, Shapiro JI, Blanco G, Xie Z, Pierre SV. The Na/K-ATPase α1/Src interaction regulates metabolic reserve and Western diet intolerance. *Acta Physiol (Oxf)*. 2021 Jul;232(3):e13652. doi: 10.1111/apha.13652. Epub 2021 Apr 4. PubMed PMID: 33752256.**

**2. Functional Significance of Na/K-ATPase structural heterogeneity.**

 **To address this question, we used a cellular system of heterologous expression of Na/K-ATPase isoform chimeras to conduct structure/function analysis. This led to the discovery of an isoform-specific structural determinant of PKC-mediated regulation of Na/K-ATPase activity and cell surface expression.**

1. **Pierre SV, Duran MJ, Carr DL, and Pressley TA. Structure/function analysis of Na+-K+-ATPase central isoform-specific region: involvement in protein kinase C regulation. *Am. J. Physiol Renal Physiol* 2002; 283: F1066-F1074. PMID: 12372782**
2. **Sottejeau Y, Belliard A, Duran MJ, Pressley TA, Pierre SV. Critical role of the Isoform-Specific Region in alpha1-Na, K-ATPase trafficking and Protein Kinase C-dependent regulation. *Biochemistry*. 2010; 49: 3602-10. PMID: 20302352**
3. **Pierre SV, Belliard A, Sottejeau Y. Modulation of Na+, K+-ATPase cell surface abundance through structural determinants on the alpha1-subunit. *Am J Physiol Cell Physiol*. 2011; 300: C42-8. PMID: 21048163**
4. **Kutz LC, Mukherji ST, Wang X, Bryant A, Larre I, Heiny JA, Lingrel JB, Pierre SV, Xie Z. Isoform-specific role of Na/K-ATPase α1 in skeletal muscle. *Am. J Physiol. Endocrinology and metabolism*. 2018; 314: E620-E629. PMCID: PMC6032065.**

**3. Non ion-pumping Function of Na/K-ATPase.**

 **In addition to its ion-pumping function, Na/K-ATPase interacts with many membrane and cytosolic proteins. Some of the newly identified interactions are capable of organizing the Na/K-ATPase into various signaling complexes, which may be Na/K-ATPase isoform specific. This line of work has been in close collaboration with Drs. Zijian Xie, Jiang Tian, Joseph Shapiro and others.**

**a. Pierre SV and Xie Z. The Na,K-ATPase receptor complex: its organization and membership. *Cell Biochem Biophys*. 2006; 46:303-16. PMID: 17272855**

**b. Pierre SV, Sottejeau Y, Gourbeau JM, Sánchez G, Shidyak A, Blanco G. Isoform specificity of Na-K-ATPase-mediated ouabain signaling. *Am J Physiol Renal Physiol*. 2008; 294:F859-66.** PMID: 18094034

**c. Wang X, Cai L, Xie JX, Cui X, Zhang J, Wang J, Chen Y, Larre I, Shapiro JI, Pierre SV, Wu D, Guo-Zhang Zhu GZ, Xie Z. A caveolin binding motif in Na/K-ATPase is required for stem cell differentiation and organogenesis in mammals and C. elegans, *Science Advances*. 2020, 6:22. DOI: 10.1126/sciadv.aaw5851.**

**d. Mukherji ST, Brambilla L, Stuart KB, Mayes I, Kutz LC, Chen Y, Barbosa LA, Elmadbouh I, McDermott JP, Haller ST, Romero MF, Soleimani M, Liu J, Shapiro JI, Blanco GV, Xie Z, Pierre SV. Na/K-ATPase signaling tonically inhibits sodium reabsorption in the renal proximal tubule. FASEB J. 2023 Apr;37(4):e22835. doi: 10.1096/fj.202200785RR. PubMed PMID: 36856735; PubMed Central PMCID: PMC10028530.**

**4. Na/K-ATPase Signaling in Cardiac Structure and Function.**

 **Na/K-ATPase signaling cascade can be initiated with low concentrations of the specific ligands cardiac glycosides. A major focus of my laboratory has been the characterization of one beneficial effect, cardioprotection against cardiac ischemia/reperfusion injury, as a tool to develop novel approaches for therapeutic intervention in myocardial infarction. Our original report on this effect was published in *Cardiovascular Res*. and was the subject of an editorial. Four of our major publications on this effect and the characterization of the mechanisms involved in various models are listed below.**

1. **Pierre SV, Yang C, Yuan Z, Seminerio J, Mouas K, Dos-Santos P, and Xie Z. Ouabain triggers preconditioning through activation of the Na+,K+-ATPase signaling cascade in rat hearts. *Cardiovascular Res*. 2007; 73:488-96. PMID: 17157283**
2. **Duan Q, Madan ND, Wu J, Kalisz J, Doshi KY, Haldar SM, Liu L, Pierre SV. Role of phosphoinositide 3-kinase IA (PI3K-IA) activation in cardioprotection induced by ouabain preconditioning. *J Mol Cell Cardiol*. 2015; 80C:114-125. PMID: 25575882**
3. **Marck PV, Pessoa MT, Xu Y, Kutz LC, Collins DM, Yan Y, King C, Wang X, Duan Q, Cai L, Xie JX, Lingrel JB, Xie Z, Tian J, Pierre SV. Cardiac Oxidative Signaling and Physiological Hypertrophy in the Na/K-ATPase α1s/sα2s/s Mouse Model of High Affinity for Cardiotonic Steroids. *Int J Mol Sci*. 2021 doi: 10.3390/ijms22073462. PMID: 33801629**
4. **Cai L, Pessoa MT, Gao Y, Strause S, Banerjee M, Tian J, Xie Z, Pierre SV. The Na/K-ATPase α1/Src Signaling Axis Regulates Mitochondrial Metabolic Function and Redox Signaling in Human iPSC-Derived Cardiomyocytes. Biomedicines. 2023 Dec 2;11(12). doi: 10.3390/biomedicines11123207. PubMed PMID: 38137428; PubMed Central PMCID: PMC10740578.**

**Complete List of Published Work in MyBibliography:**

<http://www.ncbi.nlm.nih.gov/sites/myncbi/sandrine.pierre.1/bibliography/47629303/public/?sort=date&direction=ascending>