March 2026

CURRICULUM VITAE

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Associate Professor (Tenured)
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I. Education and Training

Education

PhD, Zoology, Banaras Hindu University, India (2001-2006)
Thesis: Evolutionary Studies in Drosophila: Interspecific hybridization among four species of the *Drosophila bipectinata* complex
Mentor: B. N. Singh, PhD, DSc

MS, Zoology, Banaras Hindu University (1999-2001)

BS, Zoology (Honors), Lalit Narayan Mithila University, India (1995-99)

Postdoctoral Training

Research Associate, University of Louisville, KY (2008-10)

Postdoctoral Fellow, Emory University, GA (2007-08)

II. Faculty Appointments

Associate Professor (Tenured), Department of Cellular and Integrative Physiology, University of Nebraska Medical Center (2016 - Present)

Associate Professor (Courtesy), Department of Anesthesiology, UNMC (2015 - 2018)

Assistant Professor (Tenure Track), Department of Cellular and Integrative Physiology UNMC (2013 – 2015)

Assistant Professor (Term Track), Department of Physiology and Biophysics, University of Louisville (2010 – 2013)

III. Honors and Awards

2026: Fellow of American Physiological Society (FAPS)

2024: Innovation Award, UneMed

2021: Best Review Article Award, *AJP – Heart and Circulatory Physiology*

2017: Fellow, American Heart Association (FAHA)

2017: Excellence in Mentoring Award, University of Nebraska Medical Center

2014: Fellow, American Physiological Society Cardiovascular Section (FCVS)

2014: New Investigator Award, University of Nebraska Medical Center

2011: Satu Somani Award in Physiology, Association of Scientists of Indian Origin in America

2010: Finalist, Harry Goldblatt New Investigator Award, American Heart Association

2010: Best Poster Award, International Conference on Hydrogen Sulfide Biology and Medicine

2005: National Travel Award, Department of Science and Technology, Government of India

2005: Travel Award, Indian National Science Academy

IV. Research Program Overview

Research Focus

- Diabetic cardiomyopathy and cardiometabolic heart failure
- Ferroptosis and regulated cell death mechanisms
- Mitochondrial quality control mechanisms
- Regulation of metabolic, structural, and functional cardiac remodeling

Overview

My research program focuses on defining the **conceptual and molecular mechanisms that drive cardiometabolic remodeling in diabetic heart failure**, with the goal of identifying pathways that can be therapeutically targeted to prevent myocardial dysfunction. Our work has contributed to the growing recognition that *ferroptosis - an iron-dependent, lipid peroxidation-driven form of regulated cell death - plays a major role in cellular injury in human diabetic heart failure,* highlighting the importance of non-apoptotic cell death pathways in disease progression. We further identified *matrix metalloproteinase-9 (MMP9)* as a regulator of ferroptotic signaling, revealing a *novel role for MMP9 in the regulation of ferroptosis*. More recently, *integrated multi-omics analyses of human diabetic failing hearts uncovered a mechanism we termed "electrostatic lipidopathy",* in which alterations in membrane lipid composition and electrostatic properties disrupt mitochondrial function and metabolic signaling.

Our group also developed *widely cited guidelines for evaluating myocardial cell death mechanisms,* contributing to improved rigor and reproducibility in cardiovascular research. In addition, we established *optimized, low-toxicity transfection strategies for cardiomyocyte cell lines,* enabling more reliable mechanistic studies in cardiac biology. Collectively, these efforts advance understanding of regulated cell death, mitochondrial dysfunction, and cardiometabolic remodeling while informing potential therapeutic strategies for diabetic cardiomyopathy.

V. Major Scientific Contributions and Selected Publications

My work has advanced the understanding of cardiometabolic remodeling in diabetic heart failure by identifying previously underrecognized mechanisms linking metabolic dysregulation to myocardial injury. These contributions include establishing the importance of *ferroptotic cell death in human diabetic heart failure*, introducing the concept of *electrostatic lipidopathy as a new paradigm in cardiometabolic remodeling,* and uncovering *novel regulatory mechanisms of ferroptosis involving matrix metalloproteinase-9 (MMP9)*. In addition, this research has provided new perspectives on *metabolic energy inefficiency in the diabetic heart*, including disease-specific and sex-dependent differences in cardiac substrate utilization. These efforts also led to the development of *widely cited methodological guidelines for evaluating myocardial cell death*, improving rigor and reproducibility in cardiovascular research.

Selected publications illustrating these contributions are listed below.

1. Electrostatic lipid remodeling as a mechanism of diabetic heart failure

Gawargi FI, Mishra PK*. Electrostatic lipidopathy drives human diabetic heart failure. *Cardiovascular Diabetology – Endocrinology Reports.* Accepted March 11, 2026.

Identifies electrostatic lipid remodeling ("electrostatic lipidopathy") as a previously unrecognized mechanism in human diabetic heart failure, linking alterations in membrane lipid charge to membrane hyperpolarization, metabolic inflexibility, mitochondrial dysfunction, increased susceptibility to ferroptosis, and impaired cardiac contractility.

2. Ferroptosis as a major contributor to cardiomyocyte loss in human diabetic heart failure

Gawargi FI, Mishra PK*. Regulation of cardiac ferroptosis in diabetic human heart failure: uncovering molecular pathways and key targets. *Cell Death Discovery.* 10:268, 2024.

Demonstrates that ferroptosis represents a major pathway of cardiomyocyte death in human diabetic heart failure, exceeding the contribution of apoptosis, pyroptosis, and necroptosis and highlighting the importance of iron-dependent lipid peroxidation in disease progression.

3. Identification of MMP9 as a regulator of ferroptotic signaling

Gawargi FI, Mishra PK*. MMP9 drives ferroptosis by regulating GPX4 and iron signaling. *iScience.* 27(9):110622, 2024.

Reveals a novel regulatory role for matrix metalloproteinase-9 (MMP9) in ferroptosis, linking protease signaling to GPX4 regulation and iron-dependent lipid peroxidation pathways.

4. Mechanisms of metabolic inflexibility in the diabetic heart

Mishra PK*. Why the diabetic heart is energy inefficient: ketogenesis and ketolysis perspective. *American Journal of Physiology – Heart and Circulatory Physiology.* 321:H751–H755, 2021.

Introduces a conceptual framework explaining metabolic energy inefficiency in the diabetic heart, highlighting impaired substrate flexibility and dysregulated ketone metabolism as key contributors to cardiac dysfunction. The work also delineates distinct metabolic adaptations between diabetic and non-diabetic hearts and discusses sex-specific and disease-specific differences in cardiac substrate utilization, including divergent metabolic mechanisms between male and female hearts and between type 1 and type 2 diabetes, providing insight into the heterogeneity of cardiometabolic remodeling.

5. Establishing best-practice guidelines for evaluating myocardial cell death

Mishra PK*, et al. Guidelines for evaluating myocardial cell death. *American Journal of Physiology, Heart and Circulatory Physiology,* 317 (5): H891-922, 2019.

Developed widely cited best-practice guidelines for evaluating cardiomyocyte death mechanisms, improving rigor and reproducibility in studies of myocardial injury and heart failure.

VI. Research Impact

Google scholar profile:
https://scholar.google.com/citations?hl=en&user=c40osEkAAAAJ&view_op=list_works&sortby=pubdate

H-index: 40
Total Citations 18982
i10-index: 69

NIH iCite Profile: https://icite.od.nih.gov/analysis

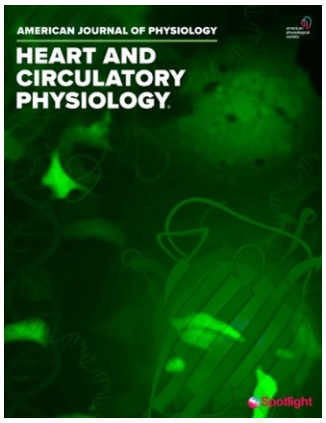
Scopus overview: https://www.scopus.com/authid/detail.uri?authorId=14066618900

VII. Publications

RESEARCH ARTICLE (* corresponding author)

1. Gawargi FI, **Mishra PK*.** Electrostatic lipidopathy drives human diabetic heart failure. *Cardiovascular Diabetology – Endocrinology Reports.* Accepted on March 11, 2026.
2. Go S, Lim RR, Thomas A, Connor TB, Subramanian A, **Mishra PK**, Chaurasia SS. Metabolic Syndrome Predisposes Ossabaw Minipig Retina to an Early Neurodegenerative Milieu. *Cells* 15(4):358. 2026. PMID: 41744801.
3. Freel CI, Mohammed IA, Lynch A, Murali G, Subrayan U, Tripthi S, Xu F, Benjamin DK, Greenberg RG, Campbell MM, Rapoza RA, Hanson CK, **Mishra PK**, Anderson-Berry AL. Subclinical changes in cardiovascular function during the neonatal period in infants born to mothers with diabetes. *The Journal of Pediatric Pharmacology and Therapeutics* 31(1):138-149. 2026. PMID: 41675477.
4. Freel CI, Baveri AE, Mauch TJ, Hanson CK, **Mishra PK**, Anderson-Berry AL. Elevated blood pressure in newborns from hypertensive disorders of pregnancy during the immediate postnatal period. *The Journal of Clinical Hypertension* 28(1): e70204. 2026. PMID: 41543275.
5. Freel CI, Scheffler J, Drakowski RA, Lyden E, VanOmer M, Thoene MS, **Mishra PK**, Hanson CK, Anderson-Berry AL. Differential Plasma Carotenoids Profiles in Hypertensive Disorders of Pregnancy. *Nutrients* 17(19), 3104. 2025. PMID: 41097178.
6. Gawargi FI, **Mishra PK*.** Regulation of cardiac ferroptosis in diabetic human heart failure: uncovering molecular pathways and key targets. *Cell Death Discov* 10(1):268. 2024. PMID: 38824159.
7. Gawargi FI, **Mishra PK*.** MMP9 drives ferroptosis by regulating GPX4 and iron signaling. *iScience* 27(9):110622. 2024. PMID: 39252956.
8. Gawargi FI, **Mishra PK*.** Deciphering MMP9's dual role in regulating SOD3 via protein-protein interaction. *Canadian Journal of Physiology and Pharmacology* 102(3):196-205. 2024. PMID: 37992301.
9. Ai W, Casey CA, **Mishra PK**, Alnouti Y, Daria S, Saraswathi V. Blockade of thromboxane A2 signaling attenuates ethanol-induced myocardial inflammatory response in mice. *Alcohol Clin Exp Res* 48(8):1529. 2024. PMID: 39030742.
10. Gawargi FI, **Mishra PK*.** Tailoring transfection for cardiomyocyte cell lines: balancing efficiency and toxicity in lipid versus polymer-based transfection methods in H9c2 and HL-1 cells. *Am J Physiol- Heart Circ Physiol.* 326(6):H1406-H1419. 2024. PMID: 38607343.
    Spotlight Cover for *American Journal of Physiology – Heart and Circulatory Physiology*

We introduce meticulously crafted protocols to enhance the culture and transfection of H9c2 and HL-1 cells, emphasizing the reduction of cytotoxic effects while improving transfection efficiency. Through the examination of polymer-based and lipid-based transfection methods, we offer a comparative analysis that underscores the heightened efficiency and reduced toxicity of these approaches. Our research provides an extensive array of step-by-step procedures designed to foster robust cell cultures and outlines troubleshooting practices to rectify issues of low transfection rates. We discuss the merits and drawbacks of both transfection techniques, equipping researchers with the knowledge to choose the most fitting method for their experimental goals. By offering a definitive guide to these cell lines' culturing and transfection, our work seeks to set a new standard in procedural consistency, ensuring that the cardiovascular research community can achieve more dependable and reproducible results, thereby pushing the boundaries of current methodologies toward impactful clinical applications.



11. Yadav SK, Gawargi FI, Hasan MH, Tandon R, Upton JW, **Mishra PK*.** Differential effects of CMV infection on the viability of cardiac cells. *Cell Death Discovery*. 9(1):111, 2023. PMID: 37012234.
12. Park SY, Pekas E, Anderson C, Kambis TN, **Mishra PK,** Schieber MN, Wooden TK, Thompson J, Kim KS, Pipinos I I. Impaired microcirculatory function, mitochondrial respiration, and oxygen utilization in skeletal muscle of claudicating patients with peripheral artery disease. *Am J Physiology - Heart Circ Physiol.* 322 (5): H867-H879, 2022. PMID: 35333113.
13. Kambis TN, Shahshahan HR, **Mishra PK*.** Metabolites and genes behind cardiac metabolic remodeling in mice with type 1 diabetes mellitus. *International Journal of Molecular Science*. 23 (3), 1392, 2022. PMID: 35163316.
14. Yadav SK, **Mishra PK*.** Intracellular matrix metalloproteinase-9 mediates epigenetic modifications and autophagy to regulate differentiation in human cardiac stem cells. *Stem Cells*. 39; 497-506, 2021. PMID: 33438302. The Best Papers from 2022 STEM CELLS® Young Investigators.
15. Park SY, Pekas E, Headid RJ, Son WM, Wooden TK, Song J, Layec G, Yadav SK, **Mishra PK,** Pipinos I I. Acute mitochondrial antioxidant intake improves endothelial function, antioxidant enzyme activity, and exercise tolerance in peripheral artery disease patients. *Heart, and Circulatory Physiology.* 319(2): H456-H467, 2020. PMID: 32706261.
16. Yadav SK, Kambis TN, Kar S, Park SY, **Mishra PK*.** MMP9 mediates acute hyperglycemia-induced human cardiac stem cell death by upregulating apoptosis and pyroptosis in vitro. *Cell Death and Disease*. 13; 11(3):186, 2020. PMID: 32170070.
17. Kar. S, Shahshahan HR, Hackfort BT, Yadav SK, Yadav R, Kambis TN, Lefer DJ, **Mishra PK*.** Exercise training promotes cardiac hydrogen sulfide biosynthesis and mitigates pyroptosis to prevent high-fat diet-induced diabetic cardiomyopathy. *Antioxidants,* 11; 8 (12), pii: E638, 2019. PMID: 30925069.
18. Kar. S, Shahshahan HR, Kambis TN, Yadav SK, Zhen Li, Lefer DJ, **Mishra PK*.** Hydrogen sulfide ameliorates homocysteine-induced cardiac remodeling and dysfunction. *Frontiers in Integrative Physiology*, 10:598, 2019. PMID: 31178749.
19. Kambis TN, Shahshahan HR, Kar S, Yadav SK, **Mishra PK*.** Transgenic expression of miR-133a in the diabetic Akita heart prevents cardiac remodeling and cardiomyopathy. *Frontiers in Cardiovascular Medicine,* 6:45, 2019. PMID: 31069235.
20. Yadav SK and **Mishra PK***. Isolation, characterization, and differentiation of cardiac stem cells from the adult mouse heart. *J. Vis. Exp*. (143), e58448, 2019. PMID: 30663680.

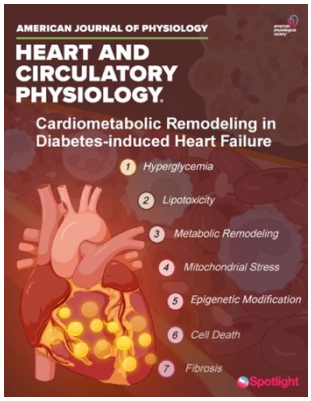
21. Nandi SS, Shahshahan HR, Shang Q, Kutty S, Boska M, **Mishra PK***. MiR-133a mimic alleviates T1DM-induced systolic dysfunction in Akita: A MRI-based study. *Frontiers in Physiology*, 9:1275, 2018. PMID: 30364155.
22. Krishnan B, Massilamany C, Basvalingappa RK, Gangaplara A, Rajasekaran RA, Afzal MZ, Sharghi VK, Zhou Y, Eiethoven J J, Nandi SS, **Mishra PK,** Sobel RA, Strande JL, Steffen D, Reddy J. Epitope mapping of SERCA2a identifies an antigenic determinant that induces mainly atrial myocarditis in A/J mice. *Journal of Immunology*. 200 (2): 523-537, 2018. PMID: 29229678.
23. Kesherwani V, Shahshahan HR, **Mishra PK***. Cardiac transcriptome profiling of diabetic Akita mice using microarray and next generation sequencing. *PLOS ONE.* 12 (8): e0182828, 2017. PMID: 28837672.
24. Nandi SS*, **Mishra PK***. H_2S and homocysteine control a novel feedback regulation of cystathionine beta synthase and cystathionine gamma lyase in cardiomyocytes. *Scientific Reports.* 7: 3639, 2017. PMID: 28623294.
25. Sharma NM, Nandi SS, Zheng H, **Mishra PK**, Patel KS. A novel role for miR-133a in centrally mediated activation of the renin-angiotensin system in congestive heart failure. *American Journal of Physiology - Heart and Circulatory Physiology.* 312 (5): H968-979, 2017. PMID: 28283551. Highlighted as an APS*select* article, a platform for the best articles in physiological research. Link: http://apsselect.physiology.org/
26. Nandi SS, Zheng H, Sharma NS, Shahshahan HR, Patel KP, **Mishra PK***. Lack of miR-133a decreases contractility in diabetic hearts: a role for novel crosstalk between tyrosine aminotransferase and tyrosine hydroxylase. *Diabetes* 65 (10): 3075-90, 2016. PMID: 27411382.
27. Prathipati P, Metreveli N, Nandi SS, Tyagi SC, **Mishra PK***. Ablation of matrix metalloproteinase-9 prevents cardiomyocytes contractile dysfunction in diabetics. *Frontiers in Physiology* 7:93, 2016. PMID: 27014091.
28. Nandi SS, Duryee MJ, Thiele GM, Anderson DR, **Mishra PK***. Induction of autophagy markers is associated with attenuation of miR-133a in diabetic heart failure patients undergoing mechanical unloading. *American Journal of Translational Research* 7(4) 683-696, 2015. PMID: 26064437.
29. Kesherwani V, Chavali V, Hackfort BT, Tyagi SC, **Mishra PK***. Exercise ameliorates high fat diet induced cardiac dysfunction by increasing interleukin 10. *Frontiers in Physiology* 6: 124, 2015. PMID: 25954207.
30. Kesherwani V, Nandi SS, Sharawat SK, Shahshahan HR, **Mishra PK***. Hydrogen sulfide mitigates homocysteine mediated pathological remodeling by inducing miR-133a in cardiomyocytes. *Molecular and Cellular Biochemistry* 404: 241-250, 2015. PMID: 25763715.
31. Zheng H, Liu X, Li Y, **Mishra PK**, Patel KP. Attenuated dopaminergic tone in the paraventricular nucleus contributing to sympatho-excitation in rats with type2 diabetes. *American Journal of Physiology, Regulatory, Integrative, and Comparative Physiology* 306: R138-148, 2014. PMID: 24305061.
32. Chavali V, Tyagi SC, **Mishra PK***. Differential expression of dicer, miRNA, and inflammatory markers in diabetic Ins2+/- Akita hearts. *Cell Biochemistry and Biophysics* 68: 25-35, 2014.
33. Chavali V, Tyagi SC, **Mishra PK***. MicroRNA-133a regulates DNA methylation in diabetic cardiomyocytes. *Biochemical and Biophysical Research Communication* 425:668-672, 2012.
34. **Mishra PK***, Chavali V, Metreveli N, Tyagi SC. Ablation of MMP9 induces survival and differentiation of cardiac stem cell into cardiomyocytes in the diabetic heart, a role of extracellular matrix. *Canadian Journal of Physiology and Pharmacology* 90: 353-360, 2012.
35. Sen U, Sathur PB, Kundu S, Givvimani S, Coley D, **Mishra PK**, Qipshidze N, Tyagi N, Metreveli N, Tyagi SC. Increased endogenous H_2S generation by CBS, CSE, and 3MST gene therapy improves ex vivo renovascular relaxation in hyperhomocysteinemia. *American Journal of Physiology, Cell Physiology* 303: C41-51, 2012.
36. **Mishra PK***, Awe O, Metreveli N, Qipshidze N, Joshua IG, Tyagi SC. Exercise mitigates the homocysteine- beta2 adrenergic receptor interactions to ameliorate contractile dysfunction in

diabetes. *International Journal of Physiology, Pathophysiology and Pharmacology* 3:97-106, 2011.

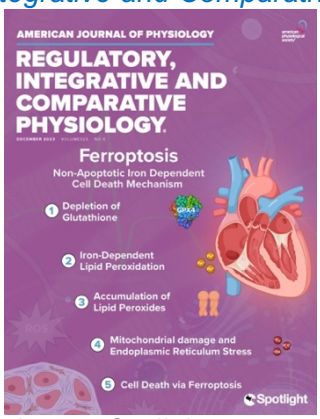
37. Basu P, Qipshidze N, Sen U, Givvimani S, Munjal C, **Mishra PK,** Tyagi SC. Chronic hyperhomocysteinemia causes vascular remodeling by instigating vein phenotype in artery. *Archives of Physiology and Biochemistry* 117: 270-282, 2011.
38. Givvimani S, Qipshidze N, Tyagi N, **Mishra PK**, Sen U, Tyagi SC. Synergism between arrhythmia and hyperhomocysteinemia in structural heart disease. *International Journal of Physiology, Pathophysiology and Pharmacology* 3: 107-119, 2011.
39. **Mishra PK***, Givvimani S, Metreveli N, Tyagi SC. Attenuation of beta2-adrenergic receptors and homocysteine metabolic enzymes cause diabetic cardiomyopathy. *Biochemical and Biophysical Research Communication* 15: 175-181, 2010.
40. Qipshidze N, Metreveli N, **Mishra PK**, Lominadze D, Tyagi SC. Hydrogen sulfide mitigates cardiac remodeling during myocardial infarction via improvement of angiogenesis. *International Journal of Biology* 8: 430-441, 2010.
41. **Mishra PK**, Metreveli N, Tyagi SC. MMP9 gene ablation and TIMP4 mitigates PAR1 mediated cardiomyocytes dysfunction: a plausible role of dicer and miRNA. *Cell Biochemistry and Biophysics* 57: 67-76, 2010.
42. Givvimani S, Tyagi N, Sen U, **Mishra PK**, Qipshidze N, Munjal C, Vacek JC, Abe OA, Tyagi SC. MMP2/TIMP2/TIMP4 Versus MMP9/TIMP3 in transition from compensatory hypertrophy and angiogenesis to decompensatory heart failure. *Archives of Physiology and Biochemistry* 116: 63-72, 2010.
43. **Mishra PK**, Tyagi N, Sen U, Givvimani S, Tyagi SC. H_2S ameliorates oxidative and proteolytic stresses and protects the heart against adverse remodeling in chronic heart failure. *American Journal of Physiology, Heart, and Circulatory Physiology* 298: H451-456, 2010.
44. Moshal KS, Kumar M, Tyagi N, **Mishra PK**, Metreveli N, Rodriguez WE, Tyagi SC. Restoration of contractility in hyperhomocysteinemia by cardiac–specific deletion of NMDA-R1. *American Journal of Physiology, Heart and Circulatory Physiology* 296: H887-892, 2009.
45. Kundu S, Kumar M, Sen U, **Mishra PK**, Tyagi N, Metreveli N, Lominadze D, Rodriguez W, Tyagi SC. Nitrotyrosylation, remodeling and endothelial myocyte uncoupling in iNOS, cystathionine beta synthase (CBS) knockouts and iNOS/CSB double knockout mice. *Journal of Cell Biochemistry* 106: 119-126, 2009.
46. Tyagi N, **Mishra PK**, Tyagi SC, Homocysteine, hydrogen sulfide, and NMDA receptor in heart failure. *Indian Journal of Biochemistry and Biophysics* 46: 441-446, 2009.
47. **Mishra PK**, Tyagi N, Kundu S, Tyagi SC. MicroRNAs are involved in homocysteine induced cardiac remodeling. *Cell Biochemistry and Biophysics* 55: 153-162, 2009.
48. Kumar M, Tyagi N, Moshal KS, Sen U, Kundu S, **Mishra PK**, Givvimani S, Tyagi SC. Homocysteine decreases blood flow to the brain due to vascular resistance in carotid artery. *Neurochemical International* 53:214-219, 2008.
49. **Mishra PK**, Singh BN. Assessing the putative roles of X-autosome and X-Y interactions in hybrid male sterility of the Drosophila bipectinata species complex. *Genome* 50: 653-659, 2007.
50. **Mishra PK**, Singh BN. Drosophila bipectinata species complex: study of phylogenetic relationship among four members through the analyses of morphology of testes and seminal vesicles. *Journal of Zoological Systematics and Evolutionary Research* 44: 175-179, 2006.
51. **Mishra PK**, Singh BN. Unique phenotypes, and variation in the sex comb patterns and their evolutionary implications in the Drosophila bipectinata species complex (Diptera: Drosophilidae). *European Journal of Entomology* 103: 805-815, 2006.
52. **Mishra PK**, Singh BN. Genetic interactions underlying hybrid male sterility in the Drosophila bipectinata species complex. *Genes and Genetic Systems* 81: 193-200, 2006.
53. **Mishra PK**, Singh BN. Genetic basis of hybrid male sterility among three closely related species of Drosophila. *Indian Journal of Experimental Biology* 43:455-461, 2005.

REVIEW ARTICLE (* corresponding author)

1. Salomon JD, Karl AC, Ahmad R, Bastola D, Singh AB, **Mishra PK***. Metabolic Syndrome and a Broken Heart: Trust Your Gut or Risk Your Heart. *Am J Physiol Heart Circ Physiol*. 2026. In Press. PMID: 41605465
2. Staller DW, Gawargi FI, Panigrahi SS, **Mishra PK**, Mahato RI. Pharmaceutical Perspectives on Oligonucleotide Therapeutics and Delivery Systems. *Pharmacological Reviews.* 14;77(4):100065, 2025. PMID: 40513184.
3. Sharma G, Chaurasia S S, Carlson M A, **Mishra PK***. Recent advances associated with cardiometabolic remodeling in diabetes-induced heart failure. *Am J Physiol Heart Circ Physiol*.327(6):H1327-H1342, 2024. PMID: 39453429.
   Spotlight Cover for *American Journal of Physiology – Heart and Circulatory Physiology.*
   Decoding cardiometabolic remodeling in diabetes-induced heart failure: novel mechanistic insights, innovative techniques, and emerging therapeutic strategies. Diabetes-induced heart failure (DHF) presents unique metabolic challenges due to altered cardiac substrate metabolism, including increased fatty acid oxidation and impaired glucose utilization. These changes drive lipotoxicity and metabolic remodeling, leading to mitochondrial dysfunction and energy deficits, which worsen heart failure. Emerging mechanisms in diabetic heart remodeling include autophagy dysregulation, epigenetic changes, polyamine imbalance, and disrupted branched-chain amino acid metabolism, providing opportunities for targeted therapies aimed at restoring metabolic balance. Advanced techniques reveal novel strategies, such as adjusting fatty acid metabolism and optimizing ketone body use, offering hope for better cardiac outcomes. This review highlights the latest research, methodologies, and therapeutic approaches to address metabolic disturbances in DHF.

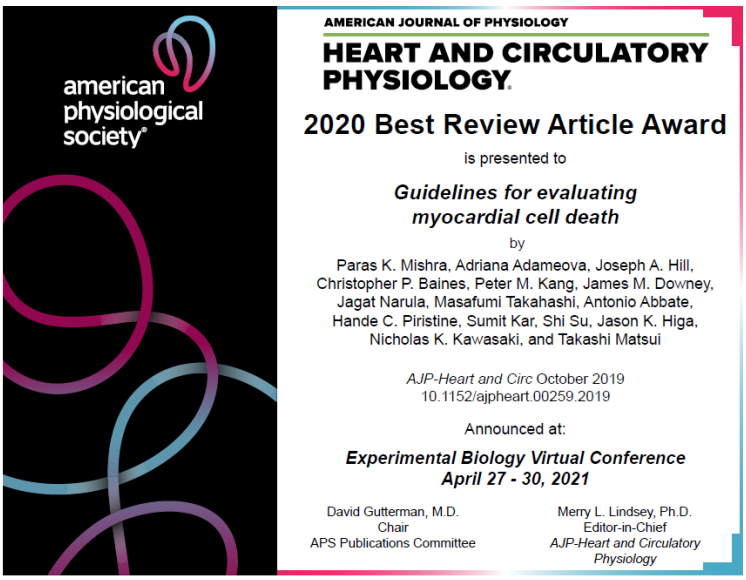


4. Gawargi FI, **Mishra PK*.** Ironing out the details: Ferroptosis and its relevance to diabetic cardiomyopathy. *American Journal of Physiology – Regulatory, Integrative and Comparative Physiology.* 325(6): R665-681, 2023.
   Spotlight Cover for *American Journal of Physiology – Regulatory, Integrative and Comparative Physiology.*
   Mechanisms of myocardial ferroptosis. Ferroptosis is a non-apoptotic, regulated form of cell death mechanism driven by iron-dependent lipid peroxidation and progresses through a series of distinct events. It begins with the depletion of glutathione, which disrupts the activity of glutathione peroxidase-4 (GPX4), an enzyme that reduces lipid peroxide into alcohol (1). Reduced GPX4 activity is a key marker of myocardial ferroptosis. Downregulation of GPX4 sets the stage for iron-dependent lipid peroxidation (2). This results in accumulation of lipid peroxides (3), which triggers a sequence of events, including mitochondrial damage and endoplasmic reticulum stress (4). Ultimately, these events lead to cell death via ferroptosis (5), which is characterized by the disruption of the cell membrane and release of cellular contents.



5. Heather LC, Hafstad AD, Halade GV, Harmancey R, Mellor KM, **Mishra PK**, Mulvihill EE, Nabben M, Nakamura M, Rider OJ, Ruiz M, Wende AR, Ussher JR. Guidelines on models of diabetic heart disease. *American Journal of Physiology - Heart, and Circulatory Physiology*, 323 (1): H176-H200, 2022.
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6. Agic MB, Chalise U, Daseke MJ, Konfrst SR, Salomon JD, **Mishra PK,** Lindsey ML. Infarct in the heart: what's MMP-9 got to do with it? *Biomolecules*. 11: 491, 2021.
7. Klionsky DJ, ----**Mishra PK**--- et al. Guidelines for the use and interpretation of assays for monitoring autophagy (4th edition). *Autophagy*, 17 (1): 1-382, 2021. PMID: 33634751.
8. **Mishra PK***, Tandon R, Byrareddy SN. Diabetes and COVID-19 risk: an miRNA perspective. *American Journal of Physiology - Heart and Circulatory Physiology,* 319 (3): H604-H609, 2020. PMID: 32762561.
   https://pubmed.ncbi.nlm.nih.gov/32762561/
9. **Mishra PK***, Adameová A, Hill JA, Baines CP, Kang PM, Downey JM, Narula J, Takahashi M, Abbate A, Piristine HC, Su S, Higa JK, Kawasaki NK, Matsui T. Guidelines for evaluating myocardial cell death. *American Journal of Physiology, Heart and Circulatory Physiology,* 317 (5): H891-922, 2019.
   Winner of the *AJP- Heart and Circulatory Physiology* Best Review Article Award
   Cell death is a fundamental process in cardiac pathologies. Recent studies have revealed multiple forms of cell death, and several of them have been demonstrated to underlie adverse cardiac remodeling and heart failure. With the expansion in the area of myocardial cell death and increasing concerns over rigor and reproducibility, it is important and timely to set a guideline for the best practices of evaluating myocardial cell death. There are six major forms of regulated cell death observed in cardiac pathologies, namely apoptosis, necroptosis, mitochondrial-mediated necrosis, pyroptosis, ferroptosis, and autophagic cell death. In this article, we describe the best methods to identify, measure, and evaluate these modes of myocardial cell death. In addition, we discuss the limitations of currently practiced myocardial cell death mechanisms.



10. Kar S, Kambis TN, **Mishra PK*.** Hydrogen sulfide-mediated cell death signaling in diabetic cardiomyopathy. *American Journal of Physiology - Heart and Circulatory Physiology.* 316:H1237-H1252, 2019.
11. **Mishra PK***, Ying W, Nandi SS, Bandyopadhyay GK, Patel KS, Mahata SK*. Diabetic cardiomyopathy: an immunometabolic perspective. *Frontiers in Endocrinology, section Cellular Endocrinology*. 8: 72, 2017.
12. Prathipati P, Nandi SS, **Mishra PK***. Stem cell-derived exosomes, autophagy, extracellular matrix turnover, and miRNAs in cardiac regeneration during stem cell therapy. *Stem Cell Reviews and Reports 13* (1): 79-91, 2017.
13. Hackfort BT, **Mishra PK***. Emerging role of hydrogen sulfide-microRNA crosstalk in cardiovascular disease. *American Journal of Physiology - Heart and Circulatory Physiology* 310: H802-H812, 2016.
14. Nandi SS, **Mishra PK***. Harnessing fetal and adult genetic reprogramming for therapy of heart disease. *Journal of Nature and Science* 1 (4): e71, 2015.
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INVITED REVIEW ARTICLE

23. Kambis TN, Tofilau HMN, Gawargi FI, Chandra S, **Mishra PK***. Regulating polyamine metabolism by miRNAs in diabetic cardiomyopathy. *Current Diabetes Reports*. 21 (12):52, 2021. PMID: 34902085.

EDITORIAL/PERSPECTIVE (* corresponding author)

1. Martelli F, **Mishra PK**, Caporali A. Editorial: Nucleic acid-based therapies for cardiovascular diseases. *Front Cardiovasc. Med.* 11: 1392073, 2024. PMID: 38586169.
2. Chen Y, Zhao Y, **Mishra PK**. Autophagy-mediated cell survival and death in disease progression and treatment. *Front Cell Dev. Biol.* 10:916347, 2022.
3. **Mishra PK**. Why the diabetic heart is energy inefficient: ketogenesis and ketolysis perspective. *American Journal of Physiology - Heart, and Circulatory Physiology*. 321(4):H751-H755, 2021. PMID: 34533402. https://journals.physiology.org/doi/full/10.1152/ajpheart.00260.2021
4. **Mishra PK*** and Nemer G. The non-coding genome and cardiovascular disease. *Frontiers in Cardiovascular Medicine*. 6:98, 2019. PMID: 31380396.
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6. **Mishra PK**. Is miR-133a a promising therapeutic target for heart failure? *Journal of Diabetes and Metabolism* 5: 8: e118, 2014.

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1. **Mishra PK***. Cardiac regenerative therapy in diabetes: challenges and potential therapeutics. In Haider KH (Editor): Stem Cells: Latest Advances. Springer, 2021. ISBN 978-3-030-77051-8.
2. Tyler N. Kambis, **Mishra PK***. Genome editing and diabetic cardiomyopathy. In Junjie Xiao (Editor): Genome editing in cardiovascular and metabolic diseases. Springer. Adv Exp Med Biol. 2023; 1396: 103-114. PMID 36454462.
3. Shahshahan HR, Kambis TN, Kar S, **Mishra PK*.** Generating Ins2+/-/miR-133aTg mice to model miRNA-driven cardioprotection of diabetic hearts in humans. In Singh SR (Editor): Mouse Genetics: Methods and Protocols. Second Edition. Springer. 2224:113-121, 2021. PMID: 33606210
4. Yadav SK, Kambis TN, **Mishra PK*.** Regulating inflammatory cytokines in diabetic hearts. In Chakraborti S, Dhalla NS, Ganguli NK and Dikshit M (Editors): Oxidative Stress in Heart Diseases. Springer, 2019.

5. Yadav SK, **Mishra PK*.** Isolation, characterization, and differentiation of mouse cardiac progenitor cells. In Singh SR and Pranela Rameshwar (Editors): Somatic Stem Cells: Methods and Protocols", Second Edition. Springer, 978-1-4939-8696-5. Methods Mol Biol. 1842: 183-191, 2018. PMID: 30196409.
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OTHER BOOK CHAPTER

9. **Mishra PK*,** Tyagi SC. MicroRNOmics of diabetic cardiomyopathy. In Turan B and Dhalla NS (Eds): Diabetic cardiomyopathy, Springer 9: 179-188, 2014.
10. **Mishra PK*,** Singh SR, Sharma R, Tyagi SC. Stem cell for myocardial regeneration. In Singh SR et al (Eds); Stem Cells: organogenesis and cancer. Transword Research Network, 119-126, 2010.
11. Moshal KS, Kumar M, Tyagi N, **Mishra PK,** Kundu S, Tyagi SC. Oxidative and proteolytic stress in homocysteine associated cardiovascular diseases. In H. Sauer et al (Eds); Studies on cardiovascular disorders. Springer Science+ Business Media, LLC, 139-148, 2010.

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1. Singh SR, **Mishra PK**, Hou SX. Editors, Stem Cells: Organogenesis and Cancer, Transword Research Network, ISBN: 978-81-7895-487-5; 2010.

PUBLISHED ABSTRACTS AND CONFERENCE PROCEEDINGS

1. Sharma G, Shahshahan HR, Powel L, Wen X, Peltz M, Jessen ME, **Mishra PK** (2025). Metabolic inflexibility and altered substrate utilization drive cardiac remodeling in metabolic syndrome. *Physiology.* Vol 40, Issue S1. https://journals.physiology.org/doi/abs/10.1152/physiol.2025.40.S1.0039
2. Gawargi FI, **Mishra PK** (2024). A novel target for attenuating T1DM-induced myocardial ferroptosis. *Physiology* 2024. https://journals.physiology.org/doi/abs/10.1152/physiol.2024.39.S1.1222.
3. Kambis TN, Kar S, **Mishra PK** (2022). miR-133a mitigates ferroptosis by attenuating fatty acid metabolism in the diabetic heart. *The FASEB Journal,* 2022. Vol 36, Issue Suppl_1. https://faseb.onlinelibrary.wiley.com/doi/10.1096/fasebj.2022.36.S1.R5755
4. Shahshahan HR, **Mishra PK**. Cardiomyocyte-specific transgenic MMP9 overexpression induces cardiac remodeling. *The FASEB Journal,* 2021. Vol 35, Issue Suppl_1. DOI: 10.1096/fasebj.2021.35. S1.04281.
5. Kambis TN, **Mishra PK**. Diabetes mellitus-induced metabolic remodeling is alleviated by transgenic overexpression of miR-133a in the heart. *Circulation Research,* 2020. Vol 127, Issue Suppl_1. DOI: 10.1161/res.127.suppl_1.501.
6. Kar S, Shahshahan HR, **Mishra PK**. Hydrogen sulfide protects the heart against ferroptotic cell death in diabetic cardiomyopathy. *Circulation Research,* 2020. Vol 127, Issue Suppl_1. DOI: 10.1161/res.127.suppl_1.501.

7. Kar S, Yadav SK, Goyal R, Lefer DJ, **Mishra PK**. Hydrogen sulfide protects the heart against homocysteine-induced remodeling by regulating autophagy and pyroptosis. *Circulation Research,* 2019. Vol 125, Issue Suppl_1. DOI: 10.1161/res.125.suppl_1.433.
8. Kambis TN, Yadav SK, **Mishra PK**. Cardiac-specific overexpression of miR-133a decreases pyroptosis in $Ins2^{+/-}$ T1DM mice heart. *FASEB J,* 2018; 32, 838.12.
9. Yadav SK, **Mishra PK**. Ablation of MMP9 prevents cardiac pyroptosis of $Ins2^{+/-}$ T1DM mice heart. *FASEB J*, 2018; 32, 838.5.
10. Nandi SS, **Mishra PK**. Cardiac-specific overexpression of miR-133a in the diabetic heart mitigates mitochondrial abnormality by targeting TIM17a. *FASEB J*, 2018; 32, 752.5.
11. Yadav SK, **Mishra PK**. Ablation of MMP9 mitigates high glucose-induced cardiac stem cell death. *Circulation*, 2017, 136: A20116.
12. Nandi SS, **Mishra PK**. Hydrogen sulfide controls CBS-CTH feedback regulation by inducing miR-133a and suppressing SP1 in a dose dependent manner in cardiomyocytes. *FASEB J,* 2017; 31, 1079.7.
13. Nandi SS, **Mishra PK**. Ablation of MMP9 upregulates autophagic flux in the diabetic heart. *FASEB J,* 2017; 31, 1013.6.
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15. Hackfort BT, Prathipati P, **Mishra PK**. Role of hydrogen sulfide in the regulation of DNA methyl transferases in cardiomyocytes. *Current Research Cardiology*, 2:140, 2015.
16. Sharma NM, Nandi SS, Liu X, Zheng H, **Mishra PK**, Patel KP. Upregulation of angiotensinogen in the paraventricular nucleus of the hypothalamus during chronic heart failure: Role of miR-133a. *Current Research Cardiology*, 2:122, 2015.
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18. **Mishra PK**. Novel cardioprotective role of miR-133a. Current Research Cardiology, 2:125, 2015.
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35. **Mishra PK,** Chavali V, Sathnur P, Qipshidze N, Tyagi SC. H_2S ameliorates homocysteine mediated attenuation of miR-133 and β2-AR in diabetic hearts. *Nitric Oxide*, 27: S38, 2012.
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SELECTED POSTER/ORAL PRESENTATION

1. Freel CI, Hanson CK, Anderson-Berry AL, **Mishra PK** (2026). Ferroptosis as a Mediator of Hyperglycemia-Induced Hypertension During Diabetes. American Physiological Society Summit, April 23-26, Minneapolis, Minnesota. (Also, Selected for Oral presentation in 57th Annual Midwest Student Biomedical Research Forum; March 7th, 2026; Omaha, Nebraska)
2. Sharma G, Shahshahan HR, Powell L, Wen X, Peltz M, Jessen M E, **Mishra PK** (2025). Metabolic Inflexibility and Altered Substrate UtilizationDrive Cardiac Remodeling in Metabolic Syndrome. American Physiological Society Summit, April 23-27, Baltimore, Maryland.
3. Gawargi FI, **Mishra PK** (2024). A novel target for attenuating T1DM-induced myocardial ferroptosis. American Physiological Society Summit, April 4-7, Long Beach, California. (Received APS Research Recognition Award).
4. Gawargi FI, **Mishra PK** (2023). Molecular regulation of ferroptosis in the T1DM heart. American Heart Association Basic Cardiovascular Science conference, Boston, July 31-August 3. Travel Award from the University of Nebraska Medical Center.
5. Li S, Schieber M, Shields C, Brunette K, Zhu Z, Hakim A, Kim J, **Mishra PK**, Casale G, Pipinos II (2023). Ischemic myopathy in the leg muscles of patients with peripheral artery disease: autophagy fails to respond to the increased damage. American Association of Neuropathologists Annual meeting, Monterey, CA, June 8-11.

6. Gowrikumar S, **Mishra PK**, Dhawan P (2023). MMP9KO decelerates claudin-1-mediated colitis and impaired recovery through attenuating notch signaling cascade. Control ID 3866004). Digestive Disease Week. Chicago, IL, May 6-9.
7. Kambis TN, Kar S, **Mishra PK** (2022). miR-133a mitigates ferroptosis by attenuating fatty acid metabolism in the diabetic heart. Experimental Biology meeting. April 2-5.
8. Shahshahan HR, Hackfort BT, **Mishra PK** (2021). Cardiac-specific transgenic MMP9 overexpression induces cardiac remodeling. Experimental Biology meeting. April 27-30. Virtual.
9. Kar S, Shahshahan HR, **Mishra PK** (2020). Hydrogen sulfide protects the heart against ferroptosis in diabetic cardiomyopathy. Presented at 2020 Iowa Physiological Society and Midlands Society of Physiological Sciences Scientific Sessions. Virtual meeting. October 30-31 (Received the Outstanding Graduate Student Oral Presentation Award).
10. Yadav SK, **Mishra PK** (2019). Ablation of MMP9 prevents cardiac pyroptosis of $Ins2^{+/-}$ T1DM mice heart. Presented at "The Midlands Society of Physiological Sciences". Omaha, NE, October 26 (Received 1st Prize in Poster Presentation in Postdoctoral category).
11. Kar S, Yadav SK, Goyal R, Lefer DJ, **Mishra PK** (2019). Hydrogen sulfide protects the heart against homocysteine-induced remodeling by regulating autophagy and pyroptosis. Presented at "The Midlands Society of Physiological Sciences". Omaha, NE, October 26 (Received 1st Prize Poster Presentation in Predoctoral category).
12. Kar S, Yadav SK, Goyal R, Lefer DJ, **Mishra PK** (2019). Hydrogen sulfide protects the heart against homocysteine-induced remodeling by regulating autophagy and pyroptosis. AHA BCVS meeting, Boston, July 20- August 1.
13. Shahshahan HR, Kar S, **Mishra PK** (2018). Hydrogen sulfide protects against homocysteine-induced cardiac remodeling and dysfunction. Presented in Nebraska Physiological Society meeting, Omaha, NE, October 2018. (Received Poster Award in the Graduate category).
14. Yadav SK, **Mishra PK** (2018). Ablation of MMP9 prevents cardiac pyroptosis of $Ins2^{+/-}$ T1DM mice heart. Presented in Nebraska Physiological Society meeting, Omaha, NE, 2018. (Received Poster Award in the Postdoctoral category).
15. Nandi SS, **Mishra PK** (2018). Cardiac-specific overexpression of miR-133a in the diabetic heart mitigates mitochondrial abnormality by targeting TIM17a. Experimental Biology meeting, San Diego, CA. (Selected for the Caroline tum Suden/Frances Hellebrandt Professional Opportunity Award).
16. Yadav SK, **Mishra PK** (2018). Ablation of MMP9 prevents cardiac pyroptosis of $Ins2^{+/-}$ T1DM mice heart. Experimental Biology meeting, San Diego, CA.
17. Kambis TN, Yadav SK, **Mishra PK** (2018). Cardiac-specific overexpression of miR-133a decreases pyroptosis in $Ins2^{+/-}$ T1DM mice heart. Experimental Biology meeting, San Diego, CA.
18. Marta P, Yadav R, Nandi SS, Shahshahan HR, **Mishra PK** (2017). Role of homocysteine and hydrogen sulfide donors on cell death signaling in HL1 cardiomyocytes. Presented in Nebraska Physiological Society meeting 2017, Omaha, NE. (Received Poster Award in the Undergraduate category).
19. Nandi SS, **Mishra PK** (2017). MiR-133a improves beta-adrenergic receptors sensitivity in hyperglycemic cardiomyocytes. American Diabetes Association Scientific Session meeting, San Diego, CA, June 9-13.
20. Nandi SS, **Mishra PK** (2017). Ablation of MMP9 upregulates autophagic flux in the diabetic heart. Experimental Biology meeting, Chicago, IL, April 25. (Received the Research Recognition Award of APS. Also, Winner of the 2017 Caroline tum Suden/Frances Hellebrandt Professional Opportunity Award).
21. Nandi SS, **Mishra PK** (2017). Hydrogen sulfide controls CTH-CBS feedback regulation by inducing miR-133a and suppressing SP1 in a dose-dependent manner in cardiomyocytes. Experimental Biology meeting, Chicago, IL, April 26.

22. Zucker IH, Rozanski GJ, **Mishra PK**, Wang H (2017). Cardiac spinal sensory endings mediate remodeling in the post MI state. U-CARS Utah Cardiac Recovery Symposium, University of Utah School of Medicine, UT, January 12-13.
23. Nandi SS, **Mishra PK** (2016). Hydrogen sulfide controls CTH-CBS feedback regulation by inducing miR-133a and suppressing SP1 in a dose-dependent manner in cardiomyocytes. Nebraska Physiological Society meeting, Omaha, NE, October 15.
24. Nandi SS, **Mishra PK** (2015). MiR-133a regulates cardiac autophagy in diabetics. Annual meeting of the international academy of cardiovascular sciences (IACS): North American Section" held in Omaha, NE, September 10-12 (Received the Morris Karmazyn Award for the Best Poster in Translational Medicine).
25. Sharma NM, Nandi SS, Liu X, Zheng H, **Mishra PK**, Patel KP (2015). Upregulation of angiotensinogen in the paraventricular nucleus of the hypothalamus during chronic heart failure: Role of miR-133a. Annual meeting of the international academy of cardiovascular sciences (IACS): North American Section" held in Omaha, NE, September 10-12 (Received the Eric Olson Young Faculty Award).
26. Hackfort BT, Prathipati P, **Mishra PK** (2015). Role of hydrogen sulfide in the regulation of DNA methyl transferases in cardiomyocytes. Nebraska Physiological Society meeting, held in University of South Dakota, SD, October 10 (Received the Best Poster Presentation Award).
27. Prathipati P, Hackfort BT, Nandi SS, Shahshahan HR, **Mishra PK**. Ablation of MMP9 alleviates mitophagy and mitigates cardiac dysfunction in diabetics. Nebraska Physiological Society meeting, held in University of South Dakota, SD, October 10 (Received the Oral Presentation Award).
28. Nandi SS, **Mishra PK** (2015). MiR-133a mitigates mitophagy in Ins2+/- diabetic heart. Experimental Biology, March 28- April1, Boston, MA (Selected for the Oral Presentation).
29. Wang Hanjun, **Mishra PK**, Nandi SS, Cornish KG, Zucker IH (2014). Cardiac sympathetic denervation improves cardiac inflammation and ameliorates cardiac remodeling in post-MI rats. AHA, High Blood Pressure Research, San Francisco, CA, September 9-12
30. Nandi SS, Chavali V, **Mishra PK** (2014). MiR-133a alleviates cardiac autophagy by targeting AMPK in Ins2+/- diabetic mice. Experimental Biology, April 26-30, San Diego, CA (Selected for the Oral Presentation).
31. Nandi SS, Liu X, Zheng H, Sharma H, Chavali V, Patel KS, **Mishra PK** (2014). MiR-133a ameliorates cardiac dysfunction in diabetes: possibly by restoring β-adrenergic receptor function and expression. Experimental Biology, April 26-30, San Diego, CA (Selected for the Oral Presentation).
32. **Mishra PK**, Nandi SS, Chavali V (2014). Mdivi-1 mitigates cardiac dysfunction by attenuating mitophagy in diabetes. Experimental Biology, April 26-30, San Diego, CA
33. Chavali V, Nandi SS, **Mishra PK** (2013). Mitochondrial division inhibitor (Mdivi-1) ameliorates diabetic cardiomyopathy by attenuating mitophagy and DNA methylation. Nebraska Physiological Society Meeting, October 4, University of Nebraska, Omaha, NE
34. Nandi SS, Chavali V, **Mishra PK** (2013). MiR-133a mitigates autophagy by regulating AMPK/mTOR signaling and ameliorates diabetic cardiomyopathy. Nebraska Physiological Society Meeting, University of Nebraska, Omaha, NE, October 4,
35. Chavali V, Metreveli N, Tyagi S, **Mishra PK** (2013). Mitochondrial division inhibitor (Mdivi-1) mitigates autophagy and DNA methylation and ameliorates diabetic cardiomyopathy. The cardiovascular Forum for Promoting Centers of Excellence and Young Investigators, Louisville, KY, August 15-17 (Selected for the James Willerson Clinical Award Lecture).
36. **Mishra PK**, Chavali V, Metreveli N, Tyagi SC (2013). Ablation of MMP9 ameliorates epigenetic modifications and mitigates diabetic cardiomyopathy. Experimental Biology, April 20-24, Boston, USA.

37. Qipshidze N, **Mishra PK**, Tyagi SC (2013). Mitochondrial division inhibitor (Mdivi-1) ameliorates post-myocardial infarction via stimulating stem cell by elevating levels of miR-499 in diabetes. Experimental Biology, April 20-24, Boston, MA
38. Chavali V, Diaz NL, Tyagi SC, **Mishra PK** (2013). MiR-133a ameliorates cardiac stem cell survival and differentiation in Insulin 2 mutant diabetic mice. Experimental Biology, April 20-24, Boston, MA
39. Chavali V, Harris J M, Givvimani S, Qipshidze N, Murphy LA, Tyagi G, Metreveli N, Tyagi SC, **Mishra PK** (2013). Exercise ameliorates high fat diet mediated inflammation, DNA methylation and heart failure in female mice. Experimental Biology, April 20-24, Boston, MA
40. **Mishra PK**, Chavali V, Metreveli N, Tyagi SC (2012). Targeted deletion of MMP9 mitigates autophagy mediated contractile dysfunction in Insulin 2 mutant diabetic mice. AHA, Scientific Session, November 3-7, Los Angeles, CA.
41. **Mishra PK**, Metreveli N, Chavali V, Tyagi N, Qipshidze N, Sen U, Joshua IG, Tyagi SC. (2012). Role of MMP9 in cardiac stem cell differentiation and autophagy. Experimental Biology, April 21-25, San Diego, CA
42. Chavali V, Tyagi N, Tyagi SC, **Mishra PK**. (2012). MiR-133 as an epigenetic regulator of diabetic heart failure. Experimental Biology, April 21-25, San Diego, CA
43. **Mishra PK**, Chavali V, Sathur P, Qipshidze N, Tyagi SC (2012). H_2S ameliorates homocysteine mediated attenuation of miR-133 and β2-AR in diabetic hearts. 2nd International Conference on H_2S Biology and Medicine, September 20-22, Atlanta, GA. (Received the Best Poster Award).
44. Qipshidze N, **Mishra PK,** Givvimani S, Sen U, Tyagi SC (2012). Hydrogen sulfide protects coronary vasospasm after myocardial infarction and eliminates myocardial infarction zone by promoting to grow new vessels. 2nd International Conference on H_2S Biology and Medicine, September 20-22, Atlanta, GA
45. **Mishra PK**, Chavali V, Metreveli N, Tyagi SC (2012). Targeted deletion of MMP9 mitigates autophagy mediated contractile dysfunction in Insulin2 mutant diabetic mice. Scientific Session, American heart Association, November 3-7, Los Angel, CA
46. Tyagi N, Narayanan N, **Mishra PK**, Qipshidze N, Givvimani S, Tyagi SC (2012). Epigenetic reprogramming of mitochondrial dysfunction in hyperhomocysteinemia. Experimental Biology, April 21-25, San Diego, CA
47. **Mishra PK**, Joshua IG, Tyagi SC. (2012). Exercise mitigates beta2-adrenergic receptor dysfunction by decreasing homocysteine in diabetes. Experimental Biology, April 21-25, San Diego, CA
48. Tyagi N, Qipshidze N, Munjal C, Metreveli N, Dankowski A, **Mishra PK**, Sen U, Lominadze D, Givvimani S, Tyagi SC (2011). Hydrogen sulfide ameliorates mitochondrial MMP-9 mediated mitochondrial remodeling in cerebral ischemia. Experimental Biology, April 9-13, Washington, DC
49. **Mishra PK**, Awe O, Metreveli N, Qipshidze N, Munjal C, Tyagi N, Tyagi SC. (2011). Exercise ameliorates diabetic cardiomyopathy by inducing beta2-adrenergic receptors and miR-133a, and attenuating MMP-9. Experimental Biology, April 9-13, Washington, DC
50. Munjal C, Tyagi N, Qipshidze N, **Mishra PK**, Givvimani S, Sen U, Lominadze D, Tyagi SC (2011). The siRNA targeting MMP-9 mitigates homocysteine- induced disruption of barrier integrity in human intestinal microvascular cells. Experimental Biology, April 9-13, Washington, DC
51. Sen U, Qipshidze N, Givvimani S, **Mishra PK**, Munjal C, Tyagi N, Tyagi SC (2011). Hydrogen sulfide mitigates homocysteine- mediated mitophagy. Experimental Biology, April 9-13, Washington DC
52. Qipshidze N, **Mishra PK**, Metreveli N, Lominadze D, Tyagi SC (2011). Hydrogen sulfide improves angiogenesis and regulates cardiac function and structure during myocardial infarction in mice. Experimental Biology, April 9-13, Washington, DC
53. **Mishra PK**, Metreveli N, Givvimani S, Panguluri SK, Sen U, Tyagi N, Basu P, Munjal C, Joshua IG, Tyagi SC. (2010). Ablation of MMP-9 ameliorates miR-1 and -133 mediated cardiac dysfunction in insulin2 mutant diabetic mice. (Presented at the Harry Goldblatt New Investigator

Award Lecture 2010 AHA High Blood Pressure Research). Received the *Best of HBPR* 2010. Invited Presentation in the Best of AHA specialty conference at the Scientific Session of AHA, Chicago, IL.

54. Kandel M, Tyagi N, Qipshidze N, Munjal C, Basu P, Givvimani S, Abe O, **Mishra PK,** Sen U, Tyagi SC (2010). Folic acid mitigated homocysteine-mediated decrease in bone blood flow and bone remodeling. Experimental Biology, April 24-28, Anaheim, CA
55. Givvimani S, Jala R, **Mishra PK**, Sen U, Tyagi N, Qipshidze N, Munjal C, Tyagi SC. (2010). Functional heterogeneity in vascular remodeling (MMP-9-/- and PAR-1-/+) in hyperhomocysteinemic (CBS-/+) and diabetic (Akita, Ins2-/+) mice. Experimental Biology, April 24-28, Anaheim, CA
56. **Mishra PK**, Givvimani S, Sen U, Abe OA, Tyagi N, Basu P, Munjal C, Tyagi SC. (2010). Role of dicer in diabetic cardiomyopathy through dysregulation of MMP-9 and TIMP-4. Experimental Biology, Anaheim, CA, April 24-28
57. Tyagi N, Qipshidze N, Givvimani S, Kandel M, **Mishra PK**, Sen U, Johar A, Tyagi SC (2010). Tetrahydrocurcumin ameliorates mtMMP-9 mediated mitophagy and mitochondria remodeling in Stroke. Experimental Biology, April 24-28, Anaheim, CA
58. Munjal C, Falcon JF, Qipshidze N, **Mishra PK**, Tyagi SC (2010). DDAH-2 & eNOS in Mesenteric Vascular Remodeling: Role of Fenugreek. Experimental Biology, April 24-28, Anaheim, CA
59. Basu P, Qipshidze N, Sen U, **Mishra PK**, Tyagi SC (2010). Blood flow regulates vasculature by maintaining elastin /collagen and MMP/ TIMP ratio. Experimental Biology, April 24-28, Anaheim, CA
60. **Mishra PK,** Metreveli N, Givvimani S, Kundu S, Tyagi N, Qipshidze N, Sen U, Basu P, Abe OA, Gillespie WM, Munjal C, Vacek J, Tyagi SC (2009). Downregulation of dicer involved in MMP-9 mediated cardiomyocytes dysfunction. 63rd High Blood Pressure Research Conference, September 23-26, Chicago, IL
61. Tyagi N, S Kundu, N. Qipshidze, **Mishra PK**, S. Givvimani, S. Tyagi (2009). Cardiac- specific deletion of N-methyl-D-aspartate R1 ameliorates mitochondrial connexin-43 translocation and mitochondrial MMP-9 activity in hyperhomocysteinemia. Basic cardiovascular Sciences Conference. July 20-23, Las Vegas, NV
62. Kumar M, Givvimani S, Sathnur PB, **Mishra PK**, Kundu S, Rodriguez-Alvarez WE, Tyagi N, Sen U, Tyagi SC (2009). Cerebro-protective role of tetra-hydro-curcumin in hyperhomocysteinemic ischemic mine by regulating NF-kB. Experimental Biology, April 18-22, New Orleans, LA
63. Tyagi N, Givvimani S, Kumar M, Kundu S, Gillespie W M, **Mishra PK**, Sathnur P, Lominadze D, Sen U, Tyagi SC (2009). Curcumin reduces matrix metalloproteinase-9 expression and ameliorates blood brain barrier dysfunction in stroke. Brain & Brain PET 09 conference Chicago, IL
64. **Mishra PK** Tyagi N, Kumar M, Kumar M, Kundu S, Givvimani S, Sen U, Tyagi SC (2009). Role of microRNAs in homocysteine-induced oxidative stress. Experimental Biology, April 18-22, New Orleans, LA

VIII. Grant Support

A. Active Grants

1. P50AA030407 (PI, Casey CA)
Role: Co-Investigator
01/01/2022 - 12/31/2027

2. R01 HL155618 (PI, Bagher P)
   Role: Co-Investigator
   06/01/2022 - 07/31/2026
3. University of Nebraska Collaborative Initiation Grant
   Role: Principal Investigator
   07/01/2025 - 06/30/2026
4. Child Health Research Institute, UNMC
   Role: Principal Investigator
   07/01/2025 - 06/30/2026

B. Pending Funding

1. R01HL188070
   Role: Principal Investigator
   07/01/2026 - 06/30/2031
2. R01 GM168928
   Role: Principal Investigator
   12/01/2026 - 11/30/2031

C. Prior Funding

1. R56HL156806
   Role: Principal Investigator
   09/22/2022 - 08/31/2025
2. University of Nebraska Collaborative Initiation Grant
   Role: Principal Investigator
   07/01/2024 - 06/30/2025
3. University of Nebraska Collaborative Initiation Grant
   Role: Principal Investigator
   07/01/2023 - 06/30/2024
4. P20GM104320 (PI: Zempleni J)
   Nebraska Center for the Prevention of Obesity Pilot grant
   Role: Principal Investigator
   01/01/2021 - 06/30/2022
5. R01 HL113281
   Role: Principal Investigator
   09/01/2013 - 07/31/2020
6. R01 HL126796 (PI, Zucker IH/Wang HJ)
   Role: Co-Investigator
   12/01/2015 - 11/30/2019
7. R01 HL116205
   Role: Principal Investigator
   07/01/2014 - 12/31/2019
8. 11BGIA 9690055
   Role: Principal Investigator
   01/01/2011 - 06/30/2013

Mentee Research Fellowships:

1. *Cardiac iron regulation to prevent myocardial cell death in T1DM*
American Heart Association Predoctoral Award (24PRE1181407)
01/01/2024 - 12/31/2025 (relinquished in December 2024 due to completion of PhD)
Direct cost: Year/Total: 2/$67,388
PI: Flobater I. Gawargi

2. *Iron homeostasis and cell death in the T1DM heart*
University of Nebraska Medical Center Presidential Graduate Fellowship
06/01/2023 - 06/30/2024 (relinquished in January 2024 due to F31 fellowship)
Direct cost: Year/Total: 2/$54,400
PI: Flobater I. Gawargi

3. *Targeting metabolic remodeling and mitochondrial dysfunction in the diabetic heart*
National Institutes of Health F31 Fellowship
01/01/2021 - 01/01/2023 (relinquished in May 2022 due to completion of PhD)
Direct cost: Year/Total: 2/$67,576
PI: Tyler N. Kambis

4. *Targeting ferroptotic death in diabetic cardiomyopathy with H_2S*
UNMC Program of Excellent Assistantship for Graduate Students
01/01/2020 - 06/01/2022 (relinquished in December 2020 due to completion of PhD)
Direct cost: Year/Total: 2/$51,000
PI: Sumit Kar

5. *Ameliorating mitochondrial damage by miR-133a in the T1DM heart*
UNMC Program of Excellent Assistantship for Graduate Students
06/01/2019 - 06/3/2021 (relinquished in January 2021 due to F31 fellowship)
Direct cost: Year/Total: 2/$51,000
PI: Tyler N Kambis

6. *Mitochondrial abnormalities and its regulation by miRNA in diabetic hearts*
American Heart Association Postdoctoral Fellowship (16POST27260104)
07/01/2016 – 06/30/2018
Direct cost: Year/Total: 2/$82,000
PI: Shyam Sundar Nandi

IX. Invited Lectures:

International Invited Lectures

Keynote Speaker:

1. 2021: *Role of miRNA in prevention of diabetes-induced heart failure*. International e-Conference on Recent Advances in Life Sciences with Reference to Disease, Disorder and Adaptations. Lalit Narayan Mithila University, India.

Invited Speaker:

1. 2021: *MicroRNA at the Heart of Diabetes.* International Webinar organized by the South Asian University, Faculty of Life Sciences and Biotechnology, New Delhi, India.
2. 2021: *miRNA at the Heart of diabetes and COVID-19*. Diabetes Conclave 2021, VIRTUAL. https://diabetesconference.mindauthors.com/speakers/

3. 2018: *Pyroptosis in diabetic cardiomyopathy.* International conference on Emerging Research in Bioscience, Guru Ghasidas Vishwavidyalaya, India.
4. 2018: *MICRO-managing cardiac autophagy to ameliorate diabetic cardiomyopathy*. Trends in Biochemical and Biomedical Research: Advances and Challenges, Banaras Hindu University, Varanasi, India.
5. 2014: *Cardioprotective role of miR-133 in diabetic hearts*. 2nd Cardiovascular Forum for Promoting Centers of Excellence and Young Investigators, Winnipeg, Manitoba, Canada.
6. 2012: *Genetic deletion of MMP9 induces miRNA and ameliorates heart failure in diabetics*. International symposium on "Population genetics and chromatin dynamics, Banaras Hindu University, India.

National Invited Lectures:

Institutes:

1. 2012: *MicroRNA and MMP9 in the diabetic heart*. Department of Physiology, Wayne State University, Detroit, Michigan.
2. 2013: *MicroRNA and MMP9 in the diabetic hear*t. Department seminar at the Cellular and Integrative Physiology, UNMC.
3. 2013: *MicroRNA and MMP9 in the diabetic heart.* Learner Research Institute, Cleveland Clinic, Cleveland, Ohio.
4. 2016: *Regulating autophagy in diabetic hearts*. School of Medicine Basic Biomedical Sciences, University of South Dakota.
5. 2018: *MicroRNOmics of diabetic cardiomyopathy: From regulatory RNA to therapeutic candidate*. Department of Functional Tissue Engineering, North Carolina University, North Carolina.
6. 2019: *Micromanaging cardiac remodeling to develop treatment for diabetic cardiomyopathy*. Vascular Biology Center Research Seminar series at the Medical College of Georgia. Augusta.
7. 2022: *Micro-managing complex pathogenesis of the diabetic heart*. Animal & Comparative Biomedical Sciences, University of Arizona, Arizona.
8. 2023: *Protecting the "sweet" heart: Targeting diabetes-induced heart failure*. Department of Cell and Molecular Biology, University of Mississippi Medical Center, Nebraska.

Conferences:

9. 2010: *Ablation of MMP9 ameliorates miR-1, and miR-133 mediated cardiac dysfunction in Insulin2 mutant diabetic mice*. Harry Goldblatt Award Lecture, AHA Hypertension Council.
10. 2011: *Exercise ameliorates diabetic cardiomyopathy by inducing beta-2 adrenergic receptors and miR-133a, and attenuating MMP9*. Featured topic "Fibroblast-cardiomyocyte signaling", Experimental Biology meeting.
11. 2012: *Exercise mitigates beta2-adrenergc receptor dysfunction by decreasing homocysteine in diabetes*. Featured topic "Effect of exercise and nutritional perturbations on cumulative muscle protein synthesis", Experimental Biology meeting.
12. 2013: *Ablation of MMP9 ameliorates epigenetic modifications and mitigates diabetic cardiomyopathy*. Featured topic "MicroRNA and stem cell in muscle pathophysiology", Experimental Biology meeting.

13. 2013: *Cardioprotective role of miR-133a in diabetic hearts*. The Cardiovascular Forum for Promoting Centers of Excellence and Young Investigators, Louisville, Kentucky.
14. 2015: *Novel cardioprotective role of miR-133a*. Annual Meeting of the International Academy of Cardiovascular Sciences: North American section, Omaha, Nebraska.
15. 2016: *MicroRNA-autophagy axis in diabetic hearts*. 9th Global Diabetologists Annual Meeting and Medicare Expo, Dallas, Texas.
16. 2017: *A novel role for cardiac tyrosine aminotransferase in miR-133a-mediated regulation of contractility of diabetic hearts*. Annual meeting of the International Academy of Cardiovascular Sciences: North American section, 5th Annual Forum to Promote Young Investigators and Centers of Excellence in Cardiovascular Sciences, Orlando, Florida.
17. 2022: *Targeting diabetic cardiomyopathy: challenges and a potential therapy*. 13th World Congress of International Society for Adaptive Medicine, Orlando, Florida.
18. 2025: *Fueling mitochondrial efficiency and harnessing the power of ketones*. American Physiological Society Summit, Baltimore, Maryland.

Institutional Invited Seminars

1. *Role of MMP9 in diabetic cardiomyopathy*. Institute of Cellular Therapeutics, University of Louisville, Louisville, Kentucky. January 2013.
2. *Multifaceted role of miR-133 in the heart*. Department seminar in the Department of surgery at UNMC. September 2013.
3. *Novel regulatory mechanisms of diabetic cardiomyopathy*. Department of Internal Medicine, UNMC. January 2014.
4. *Role of miRNA in cardiac remodeling*. M.D. /Ph.D. Scholar Program Luncheon meeting at UNMC. April 2014.
5. *Regulating the regulators of autophagy in diabetic hearts*. The Nebraska Gateway to Nutrigenomics Seminar series, University of Nebraska-Lincoln. October 2014.
6. *Mechanism of pathological cardiac remodeling in diabetics*. Department of Pharmacology, UNMC. April 2014.
7. *Autophagy and miRNA in diabetic heart failure*. Cardiology Grand Round at UNMC. February 2015.
8. *MicroRNA: From Bench side to clinical trials*. Department of Genetics, Cell Biology and Anatomy. November 2016.
9. *A novel therapeutic strategy for diabetic cardiomyopathy*. VA Medical Center, NE. December 2016.
10. *Programming death for life: unique mechanisms for cell death*. Cellular and Integrative Physiology, UNMC. August 2017.
11. *Cell death at the heart of diabetes*. Department of surgery, UNMC. September 2019.
12. *Micromanaging the "sweet" heart to prevent heart failure*. VA Medical Center, NE. February 2022.
13. *Cardiac remodeling in metabolic syndrome: Mechanisms and therapeutic targets*. Child Health Research Institute, UNMC, February 2025.

X. Professional Service and Leadership

Professional Recognition and Service

Professional activities include participation as an *ad hoc reviewer for multiple National Institutes of Health (NIH) study sections*, as well as service on *grant review panels for the American Heart Association, NASA, the U.S. Department of Veterans Affairs, and several international funding agencies*. Editorial service includes roles as *Consulting Editor for the American Journal of Physiology – Heart and Circulatory Physiology* and *Associate Editor for Frontiers in Integrative Physiology,* in addition to prior editorial board appointments. Additional professional contributions include *committee service within the American Physiological Society (APS)* and *peer review for numerous journals in cardiovascular, metabolic, and molecular physiology research*.

1. Leadership Highlights

- President, Midlands Society of Physiological Sciences (APS Chapter) (2021)
- Chair, NIH and AHA Study Section Panels
- Consulting Editor, *American Journal of Physiology – Heart and Circulatory Physiology*
- Associate Editor, *Frontiers in Integrative Physiology*

2. Professional Society Leadership

President, Midlands Society of Physiological Sciences (APS Chapter) 2021

3. Professional Society Service

American Physiological Society (APS)

Years	Role
2015-2018	Fellowship Committee, Cardiovascular Section
2019-2022	Awards Committee, Cardiovascular Section
2022-2023	APS Chapter Advisory Committee
2025-Present	APS Awards Committee

4. Department Leadership Roles

Department of Cellular and Integrative Physiology, University of Nebraska Medical Center

Role	Committee / Program	Years
Chair	Faculty Recruitment Committee	Apr 2021 – Oct 2023
Chair	A. Ross McIntyre Cardio-Renal Seminar Review Committee	Jul 2020 – Oct 2023
Director	Department Seminar Series	Jan 2016 – Jun 2018

5. Conference and Scientific Program Leadership

- Chair, APS Summit 2025 Symposium: Alternative Metabolic Fuels and Mitochondrial Dysfunction in Heart Failure: Bridging Metabolic Insights and Cardiac Health
- Co-Chair, APS Summit 2025 Featured Topic: Unraveling the Spectrum of Cell Death: Pathways, Mechanisms, and Therapeutic Potential

- Co-Chair, ISAM 2022 Scientific Session: Diabetes and COVID-19
- Moderator, UNMC College of Medicine Retreat 2018: Gene therapy and genome editing
- Co-Chair, Experimental Biology 2015 Featured Topic: Matrix metalloproteinases in the cardiovascular system
- Chair, Experimental Biology 2015 Featured Topic: Autophagy and miRNA in diabetic heart failure
- Co-Chair, IACVS 2015 Dr. Bruce McManus Young Investigator Award
- Moderator, AHA scientific session 2015: Autophagy and cardiovascular disease
- Chair, Experimental Biology 2013 Featured Topic: MicroRNA and stem cell in muscle pathology
- Organizer, Euro Weight Loss Conference, Frankfurt, Germany (Aug 2015)
- Organizer, Annual Meeting of the International Academy of Cardiovascular Sciences – North American Section, Omaha, NE (Sep 2015)
- Organizer, Midlands Society of Physiological Sciences Scientific Session, Omaha, NE (2020, 2021, 2022)

6. Study Section Leadership

Panel Chair

- Chair, Louisiana Board of Reagents Support Fund Biological Sciences Review Panel (2023-2024)
- Chair, NIH Fellowship Study Section (2021)
- Chair, American Heart Association Basic Cell Genetics and Epigenetics Study Section (2018-2019)
- Chair, NIH Special Emphasis Panel ZRG1 CVRS-L (2018)

7. Grant Review Panels

National Funding Agencies

National Institutes of Health (NIH)

Ad-hoc reviewer for numerous NIH study sections including:

- Diabetes Complications Consortium
- Cardiac Contractility and Heart Failure
- DP5
- Program Project
- Therapeutic Development and Preclinical Studies
- Cardiovascular Fellowship Panel
- Cardiovascular SBIR/STTR Panels

Service spanning **2013-2026**.

American Heart Association (AHA)

Years	Study Section	Role
2011	Basic Cell Genetics and Epigenetics	Member
2012	Basic Cell Genetics and Epigenetics	Member
2014	Basic Cell Genetics and Epigenetics	Member
2014	Clinical and Behavioral Science	Ad-hoc Reviewer
2015	Innovative Research Grant Panel	Ad-hoc Reviewer
2016	Basic Cell Genetics and Epigenetics	Member
2023	Second Century Early Faculty Independence Award	Ad-hoc Reviewer

Department of Veterans Affairs (VA)

Year	Study Section	Role
2019	Cardiovascular Studies (ZRD1 CARA-R)	Ad-hoc Reviewer

National Aeronautics and Space Administration (NASA)

Years	Program	Role
2019	BION-M2	Ad-hoc Reviewer
2019	Musculoskeletal–Cardiovascular ROSBio	Ad-hoc Reviewer
2020	ROSBio Flight and Ground Program	Ad-hoc Reviewer
2021	ROSES Program Element E.12	Ad-hoc Reviewer

International Grant Review

Year	Agency	Country
2014	Diabetes UK Research Grants	United Kingdom
2017	Institutes Challenge Grant (IIT Kharagpur)	India
2019	International Collaboration Grant Program	Saudi Arabia
2020	INTER EUROSTARS Program	Luxembourg
2022	University of Sharjah Research Grants	United Arab Emirates

University Grant Review

- University of Nebraska Medical Center – Graduate Fellowship Programs (2016, 2017, 2018, 2026)
- Cleveland Clinic – Lerner College of Medicine Research Grants (2017)
- University of Florida – College of Pharmacy Research Grants (2017)
- Indiana University – Alzheimer Disease Center Research Grants (2017)
- California Northstate University – Faculty Seed Grant Review (2025)

8. International Academic Service

Year	Institution	Program
2020	All India Institute of Medical Sciences, New Delhi, India	PhD Examination, Department of Biophysics
2022	South Asian University, New Delhi, India	PhD Examination, Department of Life Sciences and Biotechnology
2025	South Asian University, New Delhi, India	PhD Examination, Department of Life Sciences and Biotechnology

9. Editorial Activities:

- **Consulting Editor**, *American Journal of Physiology – Heart and Circulatory Physiology* (2021-Present)
- **Associate Editor**, *Frontiers in Integrative Physiology* (2018-Present)
- **Editorial Board Member**, *American Journal of Physiology – Heart and Circulatory Physiology* (2015-2020)
- **Associate Editor**, *International Journal of Physiology, Pathophysiology and Pharmacology* (2011-2021)

Guest Editor

- *Frontiers in Cell and Developmental Biology* – Cell Death and Survival (2021)
- *Oxidative Medicine and Cellular Longevity* – mTOR Signaling in Cardiometabolic Disease (2018)
- *Frontiers in Cardiovascular Medicine* – The Non-coding Genome and Cardiovascular Disease (2017)

10. Journal Peer Review

Reviewer for **20+ journals** in cardiovascular biology and molecular medicine, including:

AJP – Heart and Circulatory Physiology, AJP – Regulatory Integrative and Comparative Physiology, Circulation, Cardiovascular Research, European Journal of Heart Failure, Diabetes, JCI Insight, Nature Communications, Cell Death and Disease, Cardiovascular Diabetology, Scientific Reports, Theranostics, BBA – Molecular Basis of Disease, Oxidative Medicine and Cellular Longevity, Journal of Molecular and Cellular Cardiology.

11. Scientific Judging and Conference Service

Poster or abstract judge for scientific meetings including:

- Nebraska Physiological Society
- Midlands Society of Physiological Sciences
- Midwest Student Biomedical Research Forum
- International Academy of Cardiovascular Sciences

- American Physician Scientists Association Midwest Meeting
- UNMC Research Symposium
- Nebraska Center for the Prevention of Obesity Research Symposium

Service spanning **2009-2024**.

12. Book Reviews

Year	Publisher	Book Title	Editor(s)
2018	Elsevier	*MicroRNA in Regenerative Medicine*	Chandan K. Sen
2021	Elsevier	*Cellular, Molecular and Environmental Contribution in Cardiac Remodeling*	Rahul Mallick & Asim K. Duttaroy

XI. Teaching and Educational Activities

1. Teaching Impact

My teaching activities span medical, graduate, and professional health programs, with emphasis on integrating molecular mechanisms with systems-level physiology and disease processes. I teach across multiple programs at the University of Nebraska Medical Center, including medical students, graduate students, physician assistant and physical therapy students, and online master's programs. My instructional approach emphasizes mechanism-based learning, interpretation of primary literature, and the application of physiological principles to clinical and translational research problems.

I have delivered more than 150 contact hours of instruction annually, including lectures, asynchronous graduate modules, and discussion-based sessions. Student evaluations consistently range between 4.0-5.0 on a 5-point (excellent) scale, across classes ranging from small graduate seminars to large professional cohorts exceeding 120 students. Through these courses, I aim to train students to analyze physiological mechanisms critically and apply them to biomedical research and clinical medicine.

2. Course Leadership

Course Director
Molecular Mechanisms of Cardiovascular Pathophysiology (MEP 916)
Master of Science in Physiology Program, UNMC | 2023 - Present

Responsibilities:

- Developed course syllabus and instructional schedule
- Coordinated instructors and course materials
- Designed examinations and weekly quizzes
- Facilitated weekly discussion board sessions and literature analysis

Contact hours: 68/year

Evaluation trend (1-5 scale; 5 excellent):
2023: 4.0 / 5 (5 students)
2024: 4.6 / 5 (10 students)
2025: 4.6 / 5 (14 students)

Former Course Director/Co-Director

Director, Cardiopulmonary Function in Health and Disease (2020-2023)

Co-Director, Cardiopulmonary Function in Health and Disease (2017-2019)

3. Course Instruction

Medical Physiology – Circulatory Block
UNMC College of Medicine
Topics: Cardiac electrophysiology, cardiac mechanics, cardiac cycle, ECG, hemodynamics

Contact hours: 5 (2025) and 7 (2026)

Evaluation trend (1-5 scale; 5 excellent):
2025: 4.0 / 5 (120 students)
2026: 3.8 / 5 (109 students)

Graduate Physiology I (IPMM 801)
Instructor – Neuroscience, Muscle, and Circulatory Physiology

Contact hours: 2

Evaluation: 4.6 / 5 (9 students)

Graduate Physiology II (IPMM 802)
Instructor – Sensory Physiology

Contact hours: 1 per year

Evaluation trend:
2024: 4.7 / 5 (9 students)
2025: 4.8 / 5 (8 students)

Intermediate / Graduate Physiology (CIP 606/806)
Physician Assistant / Physical Therapy Programs
Topic: Sensory Systems Physiology

Contact hours: 11 (2014-23) and 9 (2024 -Present)

Evaluation trend (1-5 scale; 5 excellent):
2014: 3.7 (89 students)
2015: 4.2 (85 students)
2016: 4.4 (122 students)
2017: 4.3 (124 students)
2018: 4.2 (128 students)
2019: 4.4 (133 students)
2020: 4.7 (123 students)
2021: 4.4 (124 students)
2022: 4.8 (125 students)
2023: 4.8 (124 students)

2024: 4.9 (124 students)
2025: 4.8 (128 students)

Medical Physiology (MEP 806)
Instructor – Neurophysiology, Muscle Physiology, Sensory Physiology
Online Master's Program

Evaluation trend:
2022: 4.8 (8 students)
2023: 4.8 (8 students)
2024: 4.8 (12 students)

Advanced Topics in Physiology (MEP 901)
Instructor – Primary Literature Analysis
Online Master's Program

4. Teaching Modules / Course Content

A. Flow cytometry Principles and Applications (Graduate Student Teaching): Methods in Physiology Research, Total Contact hours: 36; University of Louisville (2010-12)

- Lectures on the principles of flow cytometry and its applications in basic research and the pharmaceutical industry.
- Instruction combining theoretical concepts and practical demonstrations through interactive sessions.
- Training in sample preparation, experimental controls, instrument operation, data acquisition, and analysis.
- Guidance on data interpretation, including distinguishing high-quality results from artifacts.
- Instruction on troubleshooting common experimental and technical challenges in flow cytometry workflows.

B. Mechanisms of Cardiac Hypertrophy (Graduate Student Teaching): CIP 916, Total Contact hours: 2 x 7 = 14; University of Nebraska Medical Center (2013, 2015, 2017-2020, 2022)

- Distinction between cardiac hypertrophy and hyperplasia, including cellular and physiological differences in myocardial growth.
- Structural and functional features of physiological and pathological cardiac hypertrophy.
- Molecular signaling pathways involved in the development and regulation of cardiac hypertrophy.
- Key regulators of cardiac hypertrophic growth, including transcriptional and post-transcriptional mechanisms.
- Role of microRNAs and other regulators in controlling cardiac hypertrophy and myocardial remodeling.

C. Sensory Systems Physiology (PA/PT Teaching): Graduate Physiology CIP 606 / CIP806, Total Contact hours: 11 x 10 + 9 x 2 = 128; University of Nebraska Medical Center (2014 – 2023 and 2024 - present)

- Functional organization and basic components of sensory systems, including principles of sensory processing and signal transduction.
- Somatosensory physiology, including primary afferent pathways, mechanoreceptors of the skin, receptive fields, two-point discrimination, thermoreception, nociception, and

mechanisms of pain perception including the gate control theory.
- Chemical senses of taste and smell, including taste receptor types, papillae structure and innervation, taste transduction mechanisms, gustatory pathways, olfactory epithelium structure, odor coding, and olfactory signal transduction.
- Visual system physiology, including anatomical structures of the eye, photoreceptor function, visual transduction, rod and cone systems, visual pathways, color vision, receptive fields, and cortical processing of visual information.
- Auditory physiology, including sound properties, outer, middle, and inner ear function, cochlear mechanics, hair cell transduction, auditory pathways, tonotopic organization, and mechanisms of sound localization.
- Vestibular system physiology, including receptor organs, hair cell mechanotransduction, semicircular canal and otolith function, vestibular reflexes, and clinical aspects such as Ménière's disease.
- Sensory integration and sensory deficits, including mechanisms of sensory encoding, examples of sensory dysfunction, and principles underlying sensory disorders and their correction.

D. Advanced Techniques on miRNA assay and Autophagy (Graduate Student Teaching): CIP 916, Total contact hours: 2 x 6= 12; University of Nebraska Medical Center

- Overview of microRNA biology and autophagy, including their roles in cellular regulation and disease.
- Principles and methodologies for measuring microRNA expression using molecular techniques.
- Experimental approaches to evaluate autophagy and autophagic flux in cellular systems.
- Application of molecular and imaging techniques to study microRNA regulation and autophagy pathways.
- Hands-on training in experimental design and laboratory techniques for assessing microRNA levels and autophagic activity.

E. Molecular Mechanisms of Cardiovascular Pathophysiology (Asynchronous Format) **(Master and Graduate Student Teaching):** MEP 916, Total Contact hours: 4 x19 =76 (4h per week), University of Nebraska Medical Center (2023-present)

- Developed and organized the course syllabus, including structure, learning objectives, and instructional schedule.
- Coordinated course delivery by assigning instructors and preparing course materials.
- Designed and administered course assessments, including three major exams and weekly quizzes.
- Facilitated weekly discussion board activities to promote student engagement and conceptual understanding.
- Oversaw course implementation and monitored student participation throughout the term.

F. Autophagy and Mitophagy (Asynchronous Format) **(Master and Graduate Student Teaching):** Molecular Mechanisms of Cardiovascular Pathophysiology (MEP 916), Total Contact hours: 2 x 4 = 8; University of Nebraska Medical Center (2023-present)

- Definition and types of autophagy and the sequential steps involved in the autophagy process and their molecular regulators.
- Experimental methods used to evaluate autophagy and autophagic flux.
- Physiological and pathological significance of autophagy, including autosis and autophagy-dependent cell death.
- Definition and biological role of mitophagy and the sequential steps involved in the

mitophagy process.
- Experimental approaches to measure mitophagy, including reporter systems such as mito-Keima mouse models.
- Molecular regulation and signaling pathways controlling autophagy and mitophagy.

G. MicroRNA-Omics of Heart Failure and Mechanisms of Cardiac Hypertrophy (Asynchronous Format) **(Master and Graduate Student Teaching):** Molecular Mechanisms of Cardiovascular Pathophysiology (MEP 916), Total Contact hours: 2 x 4 = 8; University of Nebraska Medical Center (2023-present)

- Background on microRNA biology, including discovery, classification into families and isoforms, and distinctions between microRNA and siRNA.
- Biogenesis and functional mechanisms of microRNAs in gene regulation.
- Experimental approaches to measure microRNA expression and validate target genes.
- Regulatory roles of microRNAs in cellular function and their translational significance in disease.
- Fundamental concepts of cardiac hypertrophy, including distinctions between hypertrophy and hyperplasia and different forms of cardiac hypertrophy.
- Molecular signaling mechanisms underlying the development and regulation of cardiac hypertrophy.

H. MicroRNA Regulation (Asynchronous Course) **(Master Student Teaching):** Advanced Topics in Physiology (MEP 901), Total contact hours: 4 x 4 = 16; University of Nebraska Medical Center (2023-present)

- Participated as one of the instructors for a weekly session focused on the critical evaluation of a research manuscript in physiology and pathophysiology.
- Led discussion on the article *MicroRNA-133 controls cardiac hypertrophy*, guiding students in assessing the study's scientific significance, experimental design, and interpretation of results.
- Contributed to course activities by preparing quiz and examination questions and assisting with grading.

I. Neurophysiology, Muscle, and Sensory Systems Physiology (Asynchronous Course) **(Master Student Teaching):** Medical Physiology (MEP 806), Total contact hours: 2 x 2 = 2); University of Nebraska Medical Center (2024 - present)

- Instructor for modules in Neurophysiology, Muscle Physiology, and Sensory Systems Physiology in an online master's course covering fundamental principles of human physiology.
- Developed examination questions and participated in grading student assessments based on lecture material.

J. Neuroscience, Muscle, and Circulatory Physiology (Graduate Student Teaching): Graduate Physiology-I (IPMM 801): Total contact hours: 1+2+2 = 5; University of Nebraska Medical Center (2023-present)

- Instructor for the Neuroscience and Muscle physiology block and the Circulatory physiology block in a graduate-level course covering major human physiological systems.
- Conducted one-hour review sessions for each block to reinforce core physiological concepts and clarify material from recorded lectures delivered to PA/PT and medical students.
- Contributed to course assessment by developing examination materials and participating in grading student performance.

K. Sensory Physiology (Graduate Student Teaching): Graduate Physiology II (IPMM 802): Total contact hours: 1x 4 = 4; University of Nebraska Medical Center (2023-present)

- Instructor for the Sensory Physiology module in a graduate-level course covering sensory physiology.
- Conducted a one-hour review session to reinforce core sensory physiology concepts and support student preparation for examinations.
- Contributed to course assessment by developing examination questions and participating in grading student performance.

L. Muscle and Cardiovascular Physiology (PA/PT Teaching): Graduate Physiology CIP 606 /CIP806, Total Contact hours: 9 x 2 = 18; University of Nebraska Medical Center (2024 - present)

- Lectures on skeletal muscle physiology, including sarcomere structure, thick and thin filament organization, cross-bridge cycling, twitch and tetanus responses, and determinants of passive, active, and total muscle force.
- Mechanisms of neuromuscular transmission and excitation-contraction coupling, including neuromuscular junction anatomy, acetylcholine signaling, end-plate potentials, and Ca^{2+}-mediated initiation of muscle contraction.
- Principles of motor control and spinal reflexes, including sensory and motor neuronal pathways, muscle spindle and Golgi tendon organ function, and major reflexes such as stretch, inverse stretch, and flexor reflexes.
- Cardiac electrophysiology, including mechanisms of automatic action potential generation, electrical conduction pathways in the heart, ion channel contributions to cardiac action potentials, pacemaker hierarchy, and autonomic regulation of cardiac excitability.
- Principles of electrocardiography, including generation of ECG waveforms (P, QRS, T, U), interpretation of standard limb leads, electrophysiological basis of ECG intervals and segments, and recognition of common rhythm disturbances such as bradycardia, tachycardia, and atrioventricular block.
- Cardiac muscle mechanics and regulation of cardiac function, including differences between skeletal and cardiac muscle, heterometric (Frank-Starling) and homeometric autoregulation, and determinants of cardiac contractility.
- Cardiac pump function and the cardiac cycle, including stroke volume, cardiac output, interpretation of the Wiggers diagram, and analysis of pressure-volume loops under varying preload, afterload, and contractility conditions.
- Conducted review lectures and question-and-answer sessions to reinforce physiological concepts and support student preparation for course assessments.

M. Cell and Neurophysiology (PA/PT Teaching): Graduate Physiology CIP 606 /CIP806, Total Contact hours: 4 x 2 = 8; University of Nebraska Medical Center (2024 - present)

- Lectures on membrane physiology and action potentials in nerve and muscle, including determinants of resting membrane potential, voltage-gated Na^+ channel gating mechanisms, and the role of K^+ channels in membrane repolarization.
- Mechanisms of rapid action potential propagation along neurons and the physiological basis of ion channel-related disorders such as hyperkalemic periodic paralysis.
- Principles of cellular communication, including receptor recognition of chemical signals, receptor-effector coupling, G protein-mediated second messenger signaling, and steroid hormone-induced gene regulation.
- Structure and physiology of smooth muscle, including cytoskeletal organization, differences between multi-unit and single-unit smooth muscle, mechanisms of smooth muscle innervation, and Ca^{2+}-dependent regulation of contraction.

- Synaptic transmission in the central nervous system, including mechanisms of excitatory and inhibitory postsynaptic potentials, roles of presynaptic Ca^{2+} signaling in neurotransmitter release, and neurophysiological mechanisms underlying tetanus caused by tetanospasmin.
- Organization and function of the autonomic nervous system, including sympathetic and parasympathetic divisions, neurotransmitters and receptors at ganglionic and effector synapses, and mechanisms regulating neurotransmitter concentrations within synaptic clefts.

N. Cardiac Electrophysiology, Cardiac Mechanics, and Hemodynamics (Medical Student Teaching): Medical Physiology - Circulatory Block, Total contact hours: 5 + 7 = 12; University of Nebraska Medical Center (2025 - present)

- Lectures on cardiac bioelectricity, including mechanisms of action potential generation in myocardial cells and distinctions between specialized pacemaker cells and working myocardial cells.
- Principles of electrical conduction in the heart, including pacemaker hierarchy, fast and slow pacemakers, and the effects of autonomic neurotransmitters on cardiac electrophysiology.
- Ionic mechanisms and phases of cardiac action potentials and factors influencing conduction velocity in cardiac tissue.
- Structural and physiological differences between cardiac and skeletal muscle and the principles of cardiac muscle mechanics.
- Mechanisms regulating cardiac contractility, including heterometric (Frank–Starling) and homeometric autoregulation.
- Cardiac pump function, including definitions of stroke volume and cardiac output and interpretation of the cardiac cycle using the Wiggers diagram.
- Analysis of the left ventricular pressure–volume loop and how changes in preload, afterload, and contractility alter cardiac performance.
- Principles of electrocardiography, including the relationship between cardiac action potentials and the dipoles that generate P, QRS, T, and U waves.
- Recording and interpretation of ECG signals using standard limb leads, including electrophysiological basis of PR interval, QRS duration, ST segment, and QT interval, and clinical concepts such as bradycardia, tachycardia, and atrioventricular heart block.
- Fundamentals of cardiovascular hemodynamics, including blood volume distribution, estimation of total blood volume, oxygen content and saturation, and pressure ranges within the cardiac chambers and vasculature.
- Relationships among pressure, flow, and resistance (Ohm's law), determinants of vascular resistance (Poiseuille's law), wall tension (Law of Laplace), and factors influencing blood viscosity including the Fahraeus–Lindqvist effect.
- Integration of cardiac output and venous return, including ventricular function curves, venous return curves, mean circulatory filling pressure, and physiological mechanisms regulating venous return such as skeletal muscle activity and respiration.
- Methods for estimating cardiac output, including application of the Fick principle and physiological coupling of cardiac function with peripheral circulation.

5. Group Teaching and Mentorship

- **Instructor,** Great Plains IDeA-CTR / CHVR Grant Writing Bootcamp (2021)
- **Chair,** CIP Graduate Student Journal Club, University of Nebraska Medical Center (2016 - 2018)

6. Teaching Evaluations

Average evaluation score: **4.5 / 5**

Evaluation range: **3.8 - 5.0**

Courses evaluated include:

- Medical Physiology (MD students)
- Graduate Physiology I and II
- Intermediate / Graduate Physiology (PA/PT programs)
- Molecular Mechanisms of Cardiovascular Pathophysiology (MS program)

Typical class size: **5 -133 students**

7. Educational Innovation

- Developed asynchronous graduate course modules in cardiovascular pathophysiology.
- Introduced specialized teaching modules on autophagy, mitophagy, microRNA biology, and cardiac hypertrophy.
- Integrated primary research literature discussions into physiology teaching to strengthen critical analysis skills.

XII. Mentorship and Trainee Development

Mentorship Summary

- PhD students supervised as dissertation chair: **3**
- Graduate thesis and dissertation committees served: **40+ students**
- Trainees receiving national fellowships or career development awards: *American Heart Association (AHA) Career Development Awards and Predoctoral Fellowship*
- Mentored *faculty, postdoctoral fellows, graduate students, and MD-PhD trainees*

Faculty and Trainee Mentorship

Years	Trainee	Role	Project / Outcome	Institution
2019-2021	Song-Young Park	Mentor	Individual Development Plan mentoring for early-career faculty	University of Nebraska Omaha
2020-2025	Arpita Chatterjee	Co-Mentor	Radiation-induced cardiotoxicity in diabetes	UNMC
2021-2023	Andrew Hamann	Co-Mentor	miRNA in cardiomyopathy; **AHA Career Development Award (2021)**	University of Nebraska–Lincoln
2021-2024	Shuai Li	Co-Mentor	Autophagy in peripheral artery disease; **AHA Career Development Award (2021)**	UNMC

Years	Trainee	Role	Project / Outcome	Institution
2022-2024	Weilun Ai	Co-Mentor	Cardiomyopathy and cardiac dysfunction; **AHA Predoctoral Fellowship (2023)**	UNMC
2023-Present	Colman Freel	Co-Mentor	miRNA in diabetes-associated fetal cardiovascular dysfunction	UNMC

Co-Mentor on Funded Trainee Grants

American Heart Association Career Development Award
Autophagy in Peripheral Artery Disease: Clinical Relation and Treatment Potential
PI: Shuai Li
2021-2024

American Heart Association Career Development Award
Engineering Cells to Produce miRNA-Loaded Cardiomyocyte-Targeting Exosomes
PI: Andrew Hamann
2021-2024

American Heart Association Predoctoral Fellowship
Role of Thromboxane-Prostanoid Receptor in Alcohol Cardiomyopathy
PI: Weilun Ai
2023-2024

Graduate Student Supervision

Dissertation Committee Chair

Years	Student	Degree	Program
2017-2022	Tyler N. Kambis	PhD	Cellular and Integrative Physiology, UNMC
2018-2020	Sumit Kar	PhD	Cellular and Integrative Physiology, UNMC
2022-2024	Flobater I. Gawargi	PhD	Cellular and Integrative Physiology, UNMC

Earlier service includes **multiple M.S. thesis committees at the University of Louisville (2011–2012).**

Dissertation Committees (Member)

Served on **doctoral dissertation committees across multiple graduate programs**, including:

- Cellular and Integrative Physiology
- Pharmacology and Experimental Neuroscience
- Genetics, Cell Biology and Anatomy
- Biochemistry and Molecular Biology
- OB/GYN
- Pharmaceutical Sciences

Representative students include:

- Derek Passer (PhD)
- Yuan Ying (PhD)
- Anyum Ma (PhD)
- Ahmed Wafi (PhD)
- Ke Liao (PhD)
- Cassandra Moshfegh (PhD)
- Sydney Greer (PhD)
- Corrine Monaco (PhD)
- Dalton W. Staller (PhD)

Comprehensive Examination Committees

Service on **doctoral comprehensive examination committees across multiple graduate programs at UNMC.**

Committee Chair

Year	Student	Program
2017	Ahmed Wafi	Cellular and Integrative Physiology
2020	Sydney Greer	Genetics, Cell Biology and Anatomy
2022	Corrine Monaco	OB/GYN
2023	Mane Mesidor	Cellular and Integrative Physiology

Oral Qualifying Examination Committees

Participated in **PhD oral qualifying examinations across several graduate programs**, including:

- Cellular and Integrative Physiology
- Pharmacology and Experimental Neuroscience
- OB/GYN
- Pharmaceutical Sciences

Trainee Honors and Awards:

Predoctoral Fellows

1. **Tyler N. Kambis, PhD (2017–2022)**
   Current position: Scientific and Medical Research Analyst, Defense Health Program S&T, Knowesis Inc.

   Honors and Awards
   - 2019 – UNMC Program of Excellence Assistantship
   - 2019 – 1st Place (Graduate Category), *Science Coalition Fund It Forward National Video Challenge*
   - 2020 – Second Place, Research! America National Flash Talks Competition
   - 2021 – NIH Ruth L. Kirschstein Predoctoral Fellowship (F31)

- 2021 – Graduate Student of Distinction, UNMC
- 2021 – 1st Place Oral Presentation, Midlands Society of Physiological Sciences Scientific Session

Leadership and Service

- President, UNMC Student Delegate (2020–2021)
- Member, APS Cardiovascular Section Trainee Committee (2020–2022)
- Member, UNMC Legislative Team for State Policy Advocacy (2020–2022)

2. Sumit Kar, PhD (2018–2020)

Current position: Associate Director of Translational Medicine, Revolution Medicines, San Francisco, CA

Honors and Awards

- 2018 – Poster Presentation Award, Nebraska Physiological Society Meeting
- 2019 – 1st Prize Poster Award, Midlands Society of Physiological Sciences Meeting
- 2019 – 1st Place (Graduate Category), *Science Coalition Fund It Forward National Video Challenge*
- 2020 – Beckman Coulter Life Sciences Outstanding Graduate Oral Presentation Award, Midlands Society of Physiological Sciences / Iowa Physiological Society Meeting
- 2020 – UNMC Program of Excellence Assistantship Award

Additional recognition: Featured in UNMC Today

3. Flobater I. Gawargi, PhD (2022–2024)

Current position: Postdoctoral Research Associate, Vice President Surgery, Acute Care Surgery, University of Nebraska Medical Center, Omaha, Nebraska

Honors and Awards

- 2022 – Best Poster Award, Nebraska Center for the Prevention of Obesity (NPOD) Research Symposium
- 2022 – 2nd Place Graduate Poster Award, Midlands Society of Physiological Sciences Scientific Session
- 2023 – UNMC Presidential Graduate Fellowship
- 2023 – Research Innovation Award, University of Nebraska Medical Center
- 2023 – Best Poster Award, NPOD Research Symposium
- 2023 – 1st Place Graduate Poster Award, Midlands Society of Physiological Sciences Scientific Session
- 2023 – American Heart Association Predoctoral Fellowship (Score: 3.68%)
- 2023 – UNMC Dean of Graduate Studies Conference Attendance Award (AHA BCVS)
- 2024 – Research Recognition Award, American Physiological Society (APS Summit)
- 2024 – Invited Oral Presentation, APS Summit

Postdoctoral Fellows

4. Vishalakshi Chavali, PhD

- 2013 – Finalist, James Willerson Clinical Award Lecture
  Cardiovascular Forum for Promoting Centers of Excellence and Young Investigators Conference

5. **Shyam Sundar Nandi, PhD**
   - 2015 – Best Poster Award in Translational Medicine, International Academy of Cardiovascular Sciences (North American Section)
   - 2017 – UNMC Postdoctoral Excellence in Research Award
   - 2017 – APS Cardiovascular Section Research Recognition Award
   - 2018 – Caroline tum Suden / Frances Hellebrandt Professional Opportunity Award, American Physiological Society
6. **Priyanka Prathipati, PhD**
   - 2015 – Oral Presentation Award, Nebraska Physiological Society Meeting
7. **Bryan T. Hackfort, PhD**
   - 2015 – Best Poster Presentation Award, Nebraska Physiological Society Meeting
8. **Santosh K. Yadav, PhD**
   - 2018 – Poster Presentation Award, Nebraska Physiological Society Meeting
   - 2019 – 1st Prize Poster Award, Midlands Society of Physiological Sciences Meeting
   - Vice President, UNMC Postdoctoral Association
   - Council Member, Midlands Society of Physiological Sciences (2020–2021)

Undergraduate / Summer Trainees

1. **Patrick Marta (High School Summer Research Trainee)**
   - 2017 – Poster Presentation Award, Nebraska Physiological Society Meeting
2. **Noah Needle, BS (Summer Research Trainee)**
   - 2023 – Oral Presentation Award, Midlands Society of Physiological Sciences Meeting

Research Staff

Hamid R. Shahshahan, Research Technologist

- 2017 – UNMC Chancellor's Council Silver U Award
- 2020 – UNMC Chancellor's Council Gold U Award

XIII. Institutional and Department Committee Service

University of Nebraska Medical Center

Years	Committee
2014-2024	Mouse Genome Engineering Core Advisory Committee
2015-2021	Research and Development Committee

Departmental Committees

Years	Committee
2014-2020	Alice Cumming Award Committee
2014-2015	Faculty Recruitment Committee
2014-2020	A. Ross McIntyre Cardio-Renal Seminar Review Committee
2020-2021	Faculty Recruitment Committee

Years	Committee
2020-2021	MGCB Graduate Program Committee
2020-2025	IPMM Graduate Program Committee

XIV. Professional Membership

American Physiological Society (2010-Present)
American Heart Association (2014- Present)
American Diabetes Association (2017)
American Society for Pharmacology and Experimental Therapeutics (2017)

XV. Community Engagement and Outreach

- **Scientific Outreach and Public Education**
  Delivered outreach lectures and educational discussions on cardiometabolic disease, diabetes, and heart failure to promote public understanding of cardiovascular health.
- **Public Science Communication**
  Contributed to science communication initiatives, including podcasts and outreach activities associated with the *American Journal of Physiology – Heart and Circulatory Physiology*.
- **Community Health Education**
  Authored an outreach article titled *"Diabetes is Linked to Heart Disease"* published in the UNMC Olson Center for Women's Health Newsletter (July 2022).
- **Professional Mentorship and Academic Support**
  Provided >25 promotion and tenure evaluation letters and >30 letters of support for faculty and trainees, including recommendation letters for academic promotion, grant applications, and immigration petitions.
- **Community Service**
  - Volunteer service at University of Louisville Hospital, Louisville, KY (2010; 4 weeks).
  - Blood donation volunteer, American Red Cross Blood Drive, Louisville, KY (2010) and Omaha, NE (2018).

Science Communication and Media Outreach

American Journal of Physiology – Heart and Circulatory Physiology Podcasts
Author:

- *Guidelines for Evaluating Myocardial Cell Death* (Oct 23, 2019)
  https://ajpheart.podbean.com/e/guidelines-for-evaluating-myocardial-cell-death/

Content Expert:

- *miR-140 and Right Heart Hypertrophy* (Jul 15, 2016)
- *MicroRNA Translocation into the Mitochondria* (Mar 23, 2018)

Host:

- *Cardiomyocyte-specific Txnip C247S mutation improves left ventricular functional reserve in streptozotocin-induced diabetic mice* (Aug 6, 2021)