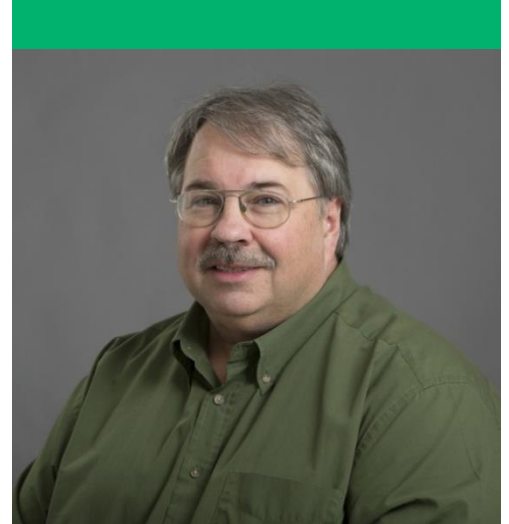


Michael Fill, PhD

The Francis N. and Catherine O. Bard
Professor of Physiology



Advancement of Medicine

Your generosity has supported basic science pre-clinical research that is defining mechanisms governing acid-base balance, various cardiac arrhythmias and skeletal muscle myopathies as potential targets for future therapeutic interventions.

The funds partially supported the salaries of nine research faculty members (not including me) in the Department of Physiology & Biophysics.

Research

The current National Institutes of Health salary cap cannot entirely cover the salary of senior investigators who receive full project funding from federal sources. Thus, the proceeds from the chair were used to supplement two full professors with a long track record of bringing millions in external funding to Rush.

Grants

We have an R01 grant from the National Institutes of Health for our project titled “Collective Ryanodine Receptor Operations at Release Sites.” In the heart (between beats), abnormal intracellular calcium release may trigger arrhythmias that can lead to sudden death. This project defines why this abnormal calcium release occurs and explores therapeutic strategies to make it less likely to occur. Thus, it aims to advance our understanding of cardiac arrhythmia prevention and treatment.

Publication Highlights – Abbreviated

- Inositol 1,4,5-Trisphosphate Receptor 1 Gain-of-Function Increases the Risk for Cardiac Arrhythmias in Mice and Humans. Sun, B., Ni, M., Fill, M., Ramos-Franco, J., and S.R.W., Chen. *Circulation*. 151(12):847-862, 2025
- Alda-1 attenuation of binge alcohol-caused atrial arrhythmias through a novel mechanism of suppressed c-Jun N-terminal Kinase-2 activity. Yan, J., Khanal, S., Cau, Y., Ricchiuti, N., Nani, A., Chen, S.R.W., Fill, M., Bare, D.J. and X. Ai. *Journal of Molecular and Cellular Cardiology*. 197:11-19, 2024
- Skeletal muscle disorders as risk factors for type 2 diabetes. Tammineni, E.R., Manno, C., Oxa, G. and Lourdes Figueroa. *Molecular and Cellular Endocrinology*. 599:112466, 2025
- Artificial intelligence approaches to the volumetric quantification of glycogen granules in EM images of human tissue. Rios, E., Samso, M., Figueroa, L., Manno, C., Tammineni, E.R., Giordano, L.R., and Sheila Riazi. *Journal of General Physiology*. 156(9);e202413595, 2024
- Blink nadir measurements of sarcoplasmic reticulum are consistent with strong local Ca^{2+} depletion. Dirk Gillespie. *Biophysical Journal*. 124(2):245-255, 2025.
- Combined effect of confinement and dielectric exclusion on ion adsorption in slits, pores, and cavities. Szarvas, J., Valisko, M., Gillespie, D. And Dezso Boda. *AIP Advances*. 14(12):125323, 2024
- Biophysical Properties of Somatic Cancer Mutations in the S4 Transmembrane Segment of the Human Voltage-Gated Proton Channel hH_v1. Jardin, C., Derst, C., Frazen, A., Mahroivska, I., DeCoursey, T.E., Musset, B. and Gustavo Chaves. *Biomolecules*. 15(2):156, 2025.
- Proton reactions: From basic science to biomedical applications. Bondar, A.N. and T.E. DeCoursey. *Biophysical Journal*. 123(24):E1-e5, 2024

The Year Ahead: 2025 and Beyond

Funds will continue to support basic pre-clinical research in the Department of Physiology & Biophysics.



With Gratitude

I want to thank the donors to the endowed Francis N. and Catherine O. Bard Professorship of Physiology. Your donation (over many years now) has supported basic research identifying the physiological mechanisms that fail in disease. This fosters the discovery of novel potential therapeutic interventions that promise to save lives.