D. Brian Foster, Ph.D., M.Sc.

Titles & Department

Associate Professor of Medicine; Director, Laboratory of Cardiovascular Biochemistry

Specialization Area

Protein biochemistry and network modeling to identify breakpoints in heart failure and cardiac ischemic preconditioning.

Unmet Need

Post-translational proteomic approaches to elucidate networks in heart disease and function.

Summary of Research & Work

The Foster lab takes a much-needed networked and proteomic approach to understanding heart disease progression and discovering new therapies. Using a combination of proteomics, metabolomics, biochemistry, and molecular cardiology, researchers in this group investigate heart failure and cardiac ischemic preconditioning in a manner that encompasses post-translational modifications and regulation for the true function of cardiac tissue. Recent work has pinpointed retinoid metabolism as a key modulator of heart failure, as levels of all-trans retinoic acid decline in human heart failure and prevention of heart failure in animal models has been achieved by administering this nutrient. The Foster lab continues to use critical methods to understand this process and other pathways and networks key to understanding the progression of other cardiac diseases.

Value Proposition

- Proteomic approach more directly tied to function (as opposed to transcriptome).
- Capability to assess post-translational modifications of protein activity.
- Networked approach better identifies key inflection pathways in diseased state.

Recent Publications

- Papanicolaou KN, Jung J, Ashok D, Zhang W, Modaressanavi A, Avila E, Foster DB, Zachara NE, O'Rourke B. Inhibiting O-GlcNAcylation impacts p38 and Erk1/2 signaling and perturbs cardiomyocyte hypertrophy, J Biol Chem, January 2023.
- Xu M, Bermea KC, Ayati M, Kim HB, Yang X, Medina A, Fu Z, Heravi A, Zhang X, Na CH, Everett AD, Gabrielson K, Foster DB, Paolocci N, Murphy AM, Ramirez-Correa GA. Alteration in tyrosine phosphorylation of cardiac proteome and EGFR pathway contribute to hypertrophic cardiomyopathy, Commun Biol, November 2022.
- Foster DB, Gu JM, Kim EH, Wolfson DW, O'Meally R, Cole RN, Cho HC. Tbx18 Orchestrates Cytostructural Transdifferentiation of Cardiomyocytes to Pacemaker Cells by Recruiting the Epithelial-Mesenchymal Transition Program, J Proteom Res, October 2022.

- Yang N, Parker LE, Yu J, Jones, JW, Liu T, Papanicolaou KN, Talbot CC Jr, Margulies KB, O'Rourke B, Kane MA, Foster DB. Cardiac retinoic acid levels decline in heart failure, JCI Insight, April 2021.

Awards & Honors

- 2022 Saving Tiny Hearts Society Award
- 2018 American Heart Association Grant
- 2017 Catalyst Award