**DEPARTMENT OF INTERNAL MEDICINE, DIVISION OF CARDIOVASCULAR DISEASES AND HEALTH AND BIOMEDICAL ENGINEERING**

**COLLEGE OF MEDICINE AND COLLEGE OF ENGINEERING AND APPLIED SCIENCES**

**SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE WOMEN**

**APPLICATION DEADLINE: 03/01/2019**

**PROJECT TITLE: Ultrasound-mediated drug delivery to treat cardiovascular disease**

Christy K. Holland  
Department of Internal Medicine, Division of Cardiovascular Health and Disease, and Biomedical Engineering  
CVC 3935  
231 Albert Sabin Way  
Cincinnati, OH 45267-0586  
Phone: 513 558 5675  
Fax: 513 558 6102

Kevin J. Haworth  
Department of Internal Medicine, Division of Cardiovascular Health and Disease, and Biomedical Engineering  
Cardiovascular Center 3939  
231 Albert Sabin Way  
Cincinnati, OH 45267-0586  
Phone: 513 558 3536  
Fax: 513 558 6102

---

**Project Description**

A collaborative research partnership with BTG/EKOS Corporation has been established with University of Cincinnati and University of Texas Health Science Center-Houston. An FDA-approved EKOS Endosonic® Endovascular System designed for clinical use in the peripheral vasculature will be evaluated and a pulsing scheme will be determined to induce sustained bubble activity from drug-loaded liposomes in a flow phantom in the Image-guided Ultrasound Therapeutics Laboratories at the University of Cincinnati using B-mode and passive cavitation imaging. Imaging will be developed on a research ultrasound imaging platform (Vantage, Verasonics, Kirkland, WA, USA) using a Philips P4-1 transducer. EKOS will design and build a prototype ultrasound catheter for use in human and porcine coronaries, which will also be evaluated at UC. Image guidance with B-mode ultrasound and passive cavitation imaging (PCI) will be used for quantitative assessment of bubble cloud activity produced by the EKOS catheters. The development of an image-guided coronary ultrasound exposure system will serve to translate our ultrasound-mediated therapeutic delivery strategies into a clinically applicable methodology. Training will include familiarity with databases for scientific literature review, general lab safety training, wet lab skills, Matlab control of dedicated data acquisition, instrumentation, and analysis, and nanoparticle characterization techniques.