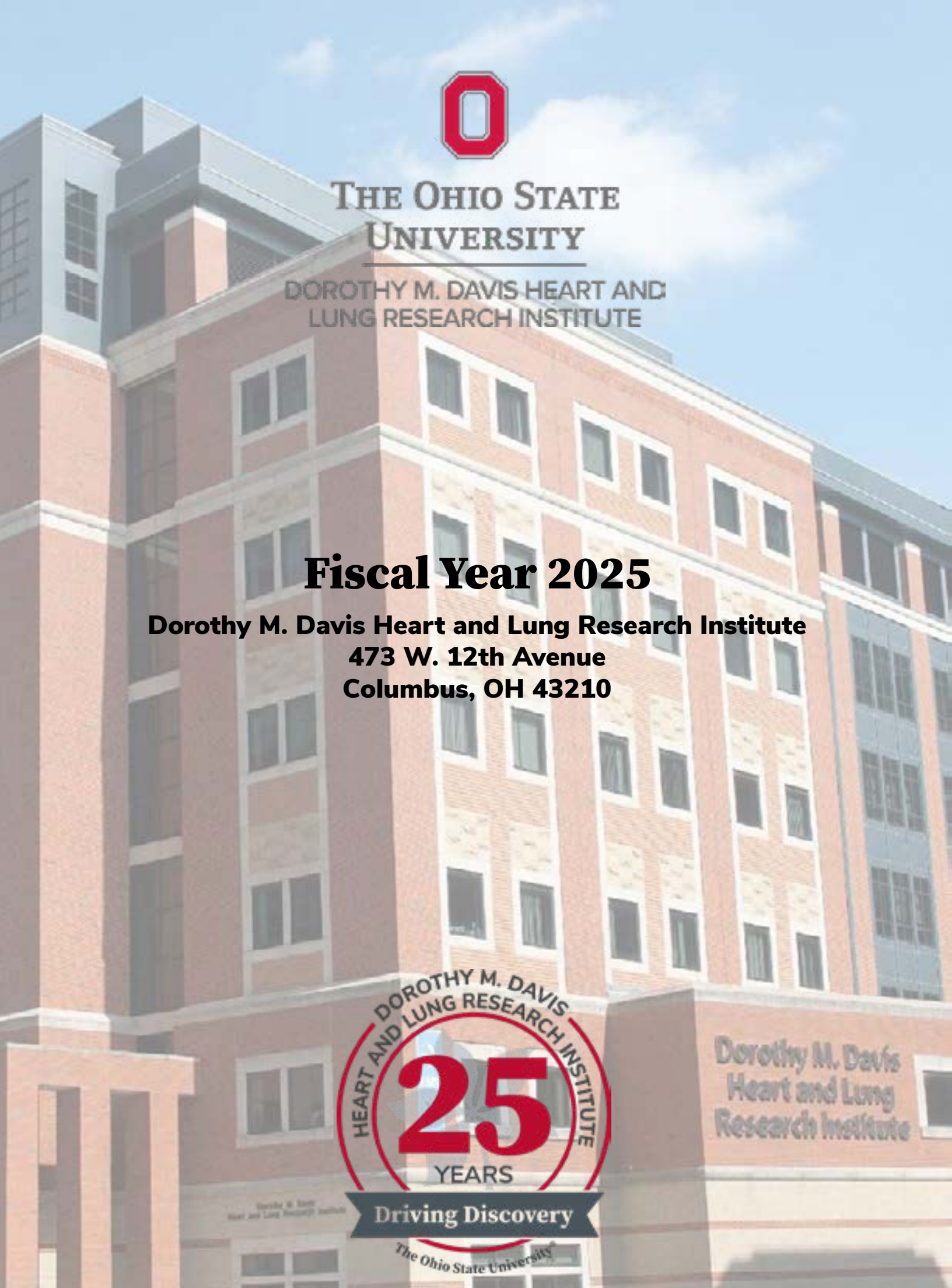


Fiscal Year 2025

Dorothy M. Davis Heart and Lung Research Institute
473 W. 12th Avenue
Columbus, OH 43210

Table of Contents

Welcome from the Director 4
Executive Committee 5
Administrative Team 6
Associate Directors 7
FY25 DHLRI Strategic Plan 8
DHLRI Administrative Structure 9
DHLRI Committees 10
New Members 11
Core Labs 12
Funding & Publications 14
Equipment 15
Clinical Trials 15
Development 16
DHLRI 25th Anniversary 17
Cardiovascular Research 18
Pulmonary Research 19
Metabolism Research 20
Advanced Therapeutics and Engineering 21
Education and Outreach 22
Research Day 22
JB Fellowship 24
American Heart Association 23
Working Wednesdays 26
AHA Heart Walk 25
R01-101 / R01-201 27
Featured Stories 28
Impact 2035 30
FY26 DHLRI Strategic Plan 31
C.I.T.E-ing the Future 32
Membership List 34
Timeline 36

VISIT US AT

go.osu.edu/DHLRI

twitter/x: @OhioStateDHLRI

Welcome

Thomas Hund, PhD - DHLRI Director

It is with great pride that the Dorothy M. Davis Heart and Lung Research Institute (DHLRI) Leadership Team shares our Fiscal Year 2025 Annual Report. This year carries extra significance as it marks the 25th anniversary of the DHLRI! As we take a moment to celebrate the many achievements of our members over the past year, the occasion calls for reflection on how far we've come over the past quarter century.

Opened in October 2000, the DHLRI was initially a 96,000-square-foot free-standing building, one of the largest of its kind in the United States made possible by a gift from the William H. Davis, Dorothy M. Davis, and William C. Davis Foundation. The institute from the outset was designed to foster collaboration, bringing together faculty from various colleges and departments to tackle complex diseases of the heart and lungs.

Growth and Expansion

In the years since its founding, the DHLRI has experienced exponential growth and now occupies over 230,000 square feet across six different locations on campus housing more than 80 research labs, state-of-the-art core labs, and dedicated administrative staff. Our members come from over 3 dozen divisions/departments. Our expansion over the past 25 years has solidified the DHLRI as a hub for team-based approaches to research, covering a broad range of topics from imaging and genetics to regenerative medicine and metabolism. The institute's success is also reflected in its research funding, which has grown to over $80 million annually.

Key Research Milestones

Since the opening of DHLRI, there has been significant progress in heart and lung health, driven by a greater emphasis on collaborative and translational research with improvements in patient diagnostics, therapy, and patient outcomes. Throughout this time, DHLRI has been driving discovery with important contributions to heart and lung health, including:

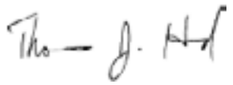
- **Genetic basis of cardiopulmonary disease:** Genetic risk factors have been identified for a myriad of debilitating conditions, including cardiomyopathy, inherited arrhythmia, idiopathic pulmonary fibrosis, and alpha-1 antitrypsin deficiency paving the way for personalized medicine.
- **Molecular mechanisms of complex disease:** The institute's work has been instrumental in understanding molecular mechanisms underlying chronic conditions like heart failure, atherosclerosis, atrial fibrillation, chronic obstructive pulmonary disease (COPD), and lung cancer.
- **Advanced imaging:** New methods have been developed for cardiac and lung imaging, allowing for more detailed and accurate diagnoses.
- **Regenerative medicine and advanced therapy:** A host of novel therapeutic approaches have been explored including stem cell technologies, non-viral methods for gene delivery, and new pharmacological agents to repair damaged heart and lung tissues.
- **Devices:** New technology has been advanced from wireless monitoring of pulmonary artery hemodynamics to advanced stent-based applications.

FY25: A year of progress

As outlined in the subsequent pages of this report, our faculty, staff and trainees have carried forward the tradition of excellence in DHLRI in FY25. Our investigators submitted a record number of large, collaborative grants. We have invested in shared resources, including expansion of core labs and replacement of aging shared equipment, to bolster the infrastructure for interdisciplinary collaborative science. The R01-201 mentoring program was launched to support investigators with their second R01 or first renewal, while the R01-101 program continued to assist those working on their first R01. The JB Undergraduate Summer Research Fellowship was expanded, selecting 19 fellows from 250 applicants. Resource stewardship was demonstrated through securing impactful estate gifts and other donations. The institute actively participated in outreach and communication efforts, including the AHA Go Red for STEM event and the establishment of a Wellness Committee. Tech transfer and IP development initiatives included data collection on IP development, the establishment of the Innovator of the Year Award, and the development of a new training program in collaboration with Nationwide Children's Hospital and other partners. Lastly, the institute enhanced its workplace of choice and talent acquisition efforts by recruiting new members, promoting existing staff, and adding new team members.

We are grateful to our Internal Advisory Committee, **Dean Carol Bradford, MD**, OSU Wexner Medical Center CEO **John Warner, MD**, and our many community partners for their generous support that has propelled us to this milestone and onto many more!

Sincerely,



Thomas Hund, PhD
Director
Dorothy M. Davis Heart and Lung Research Institute

A PDF VERSION OF THIS REPORT WITH LINKS IS AVAILABLE AT:
https://medicine.osu.edu/departments/davis-heart-lung-research-institute/our-people/message-from-the-director

DHLRI Internal Advisory Committee

Administrative Team

Thomas Hund, PhD
Professor, Departments of Internal Medicine and Biomedical Engineering
Director, Dorothy M. Davis Heart and Lung Research Institute

Kristin Stanford, PhD
Professor, Department of Surgery, General
Associate Director, Dorothy M. Davis Heart and Lung Research Institute
Associate Director, Diabetes and Metabolism Research Center

Penny Jones
Administrative Director, Davis Heart and Lung Research Institute

Izabelle Colvin
Research Programs Manager

Alan Bakaletz
COM-RTS Liaison, Davis Heart and Lung Research Institute

Internal Advisory Committee

Matthew Corriere, MD
Professor and Director,
Division of Vascular Surgery

Isabelle Deschenes, PhD
Professor and Chair,
Department of Physiology and Cell Biology

Dana Glenn
Director, College of Medicine Grants Management Office

Deanna Golden-Kreutz, PhD
Senior Director, Center for Clinical Research Management

Richard Gumina, MD, PhD
Professor and Director,
Division of Cardiovascular Medicine
Associate Dean for Convergent Research,
College of Medicine

Jennifer Hargett
Director, Marketing Communications
Cancer, Heart, Surgery, & Networks
Comprehensive Cancer Center
Wexner Medical Center

Natalia Higuita-Castro, PhD
Associate Professor, Department of Biomedical Engineering
Director of Advanced Therapeutics and Engineering, DHLRI

Jeffrey Horowitz, MD
Professor and Director,
Division of Pulmonary, Critical Care, and Sleep Medicine

Sara Koenig, PhD
Senior Director, Business Operations
College of Medicine

E. Douglas Lewandowski, PhD
Professor, Division of Endocrinology
Director of Translational Research, DHLRI

Dana Mack
Senior Director of Development
Heart and Vascular Center

Rama Mallampalli, MD
Professor, Division of Pulmonary,
Critical Care, and Sleep Medicine
Chair, Department of Internal Medicine

Michael Martin
Associate Executive Director,
Richard M. Ross Heart Hospital

Ernest Mazzaferri, MD
Professor, Division of Cardiovascular Medicine
Medical Director, Richard M. Ross Heart Hospital
Interim Co-Director, Heart and Vascular Center

Ana Mora, MD
Professor, Division of Pulmonary,
Critical Care, and Sleep Medicine
Director of Lung Research, DHLRI

Matthew Ringel, MD
Professor and Chair,
Department of Molecular Medicine and Therapeutics

John Stafford, MD, PhD
Professor and Director,
Division of Endocrinology, Diabetes, and Metabolism

Bryan Whitson, MD, PhD
Professor and Director, Division of Cardiac Surgery
Interim Co-Director, Heart and Vascular Center

Loren E. Wold, PhD
Sr. Associate Vice President,
Enterprise for Research, Innovation and Knowledge
Professor, Division of Cardiac Surgery

DHLRI Administrative Team

Thomas Hund, PhD
Director

Penny Jones
Administrative Director

Latisha Roland
Assistant to the Director

Jenifer Bennett
Senior Business Analyst

Izabelle Colvin
Research Programs Manager

Joshua Jackson
Building Coordinator

DeeAnn Willis-Berry
Fiscal Officer

Tori Bram
Office Coordinator

Alan Bakaletz
COMRTS -
DHLRI IT Service Liaison

Ella Olberding
Student Assistant

Sophia Stibitz
Student Assistant

Associate Directors

Kristin Stanford, PhD
Associate Director
Metabolism Lead

The general focus of Dr. Stanford's research is to investigate how various stressors, including exercise, cause adaptations to adipose tissue which effect overall metabolic health and glucose homeostasis. Her lab uses various omics analyses (metabolomics, structural lipidomics, and signaling lipidomics) to determine how adipose tissue adaptations contribute to whole-body metabolic and cardiac health. Current projects include investigating 1) the role of signaling lipids released from brown and white adipose tissue to mediate whole-body metabolic health and cardiac function; 2) the role of exercise-induced adaptations to adipose tissue and how these changes alter whole-body, skeletal muscle, and cardiac health; and 3) determining the effects of parental exercise on the metabolic and cardiovascular health of the offspring. Ultimately, she hopes the combined knowledge from these projects will allow us to integrate cellular and molecular aspects of adipocyte biology with energy metabolism and provide new therapeutic targets to aid in the fight against cardiovascular disease, obesity, metabolic disease, cancer and aging.

E. Douglas Lewandowski, PhD
Director of Translational Research
Cardiovascular Lead

Dr. Lewandowski pioneered quantifying metabolic flux, enzyme activity, and metabolite transport within cardiomyocytes of beating hearts with novel methodologies for NMR spectroscopy and mass spectrometry detection of stable isotope kinetics. Research focuses on genomic, transcriptional, and proteomic/post-translational regulation of metabolic flux and explores the metabolic basis and consequences of heart failure. He has elucidated numerous adaptive and maladaptive metabolic mechanisms in the pathogenesis of heart failure, and implemented novel, cardiac-specific gene therapies in models of heart disease. A recipient of the NIH R37 MERIT Award, he has received continuous NIH funding for over 30 years. He has been recognized with Distinguished Investigator Awards from the International Society for Heart Research and the British Society for Cardiovascular Research, named a University Scholar by the University of Illinois, and is an elected Fellow of the AAAS, ISHR, APS Cardiovascular Section, and AHA.

Ana Mora, MD
Director of Lung Research
Pulmonary Lead

Dr. Mora received her MD degree from Universidad Nacional de Colombia. She did postdoctoral training at Vanderbilt University and moved in 2002 as independent investigator to Emory University. In 2010, she joined the Division of Pulmonary at the University of Pittsburgh, where she was member of the Vascular Medicine Institute and Director of Education of the Aging Institute. Dr. Mora is one of the pioneers of the study of the molecular aspects of the aging lung and the pathogenesis of age-related lung diseases, such as IPF. Her studies have elucidated a critical role of mitochondrial homeostasis in the vulnerability to lung injury and activation of fibrotic responses and senescence. She received in 2023 the ATS Recognition Award for Scientific Accomplishments. She served as chair of the 2024 ATS RCMB Assembly Program Committee, and until June 2025 she was a permanent member of the Lung Injury Repair and Remodeling (LIRR) NIH study section. Currently, she is a member of the ATS Publication and Award Committees. Dr. Mora has received support for her research from ALA, AHA, and the NIH. Her work has been published in more than 100 peer reviewed publications, several book chapters, and editorial comments.

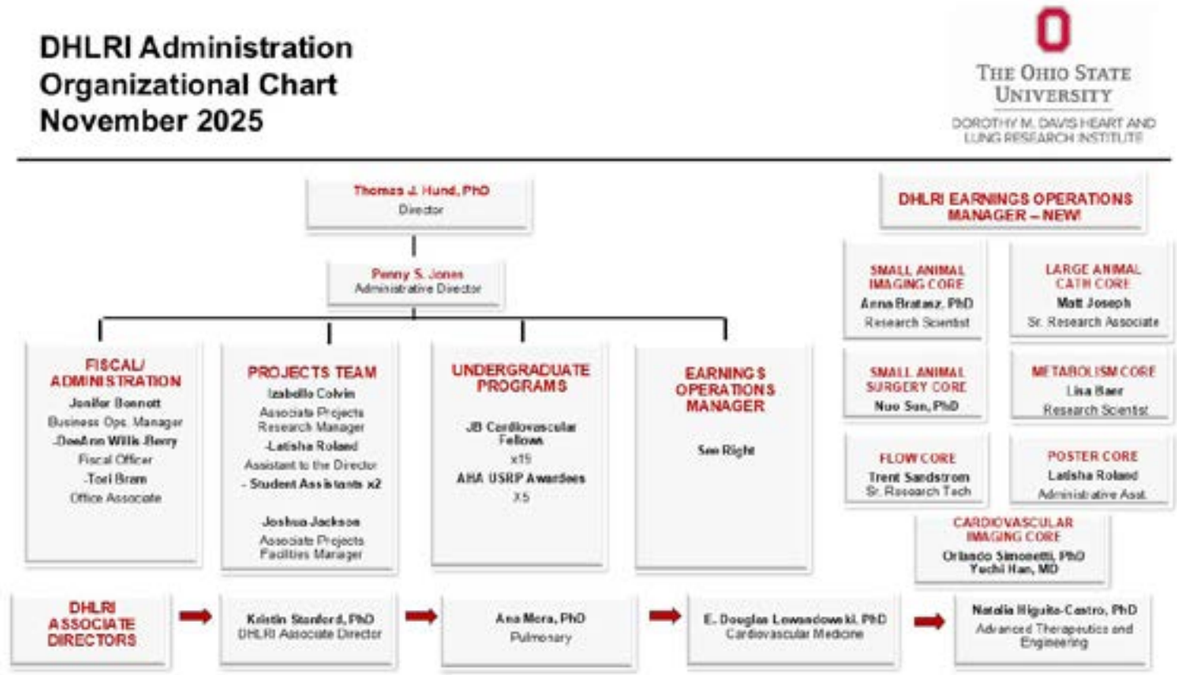
Natalia Higuita-Castro, PhD
Director of Advanced Therapeutics & Engineering

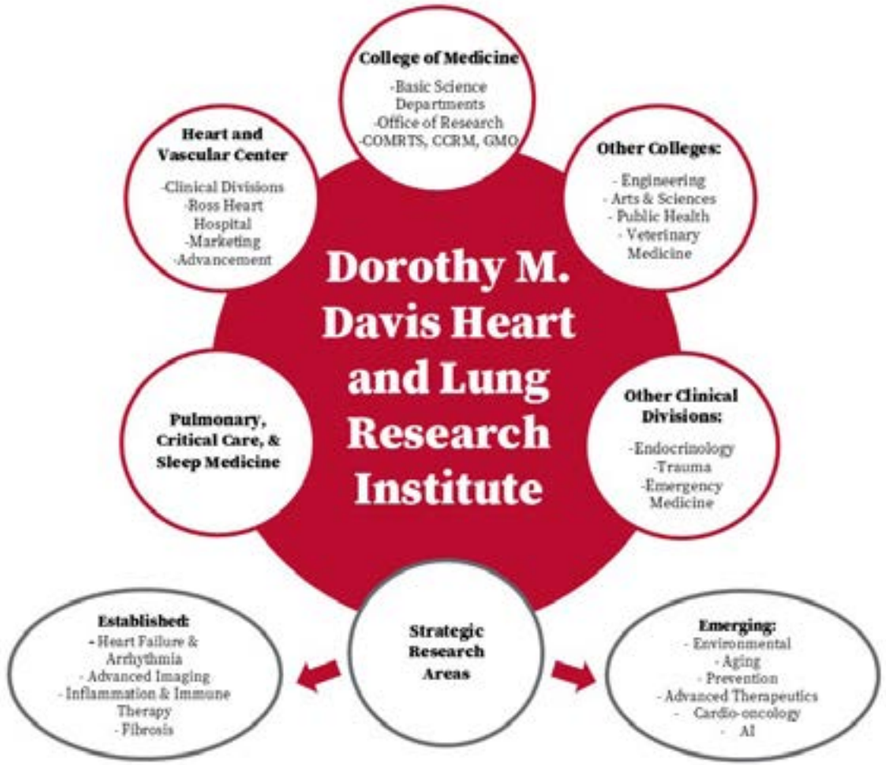
Dr. Higuita-Castro is an Associate Professor in the Departments of Biomedical Engineering and Neurosurgery at The Ohio State University (OSU). Dr. Higuita-Castro's research is at the forefront of several unique niches linking extracellular vesicles (EVs), gene and cell therapies, and nanomedicine fields, where she is pioneering the development of novel nanocarriers based on engineered EVs for far-reaching therapeutic applications, including neurofibromatosis type 1 (NF1), chronic low back pain, and acute respiratory distress syndrome (ARDS). This work has led to publications in high-ranking journals and over 15 patent filings, 11 of which were licensed to industry. She was recently recognized with the Cellular and Molecular Bioengineering (CMBE) Young Innovator Award (2023), and was named an OSU College of Engineering Innovation Scholar. The contributions of Dr. Higuita-Castro have been instrumental to advance the field of EV-based nanocarriers for non-viral gene and cell therapy applications.

DHLRI Strategic Plan - FY25

Basic Research and Clinical Excellence and Discovery	• Support submission of large programmatic research and training grants • Bridge basic science and clinical researchers through targeted investment(s).
Operational Excellence	• Expand sustainable core services and shared resources
Education	• Expand the reach of DHLRI educational programs. • Disseminate information and support collaboration in emerging fields • Bridge basic scientists and clinical researchers through educational programming. • Support grant development and mentorship for students, fellows, and faculty.
Diversity, Equity, and Inclusion	• Identify and target barriers for professional development for all members. • Promote diverse representation across spectrum of institute activities. • Advance education on disparities in healthcare and research. • Grow outreach for underrepresented students.
Resource Stewardship	• Partner with Advancement to match philanthropic support to strategic research areas. • Pursue synergistic industry partnerships to advance research. • Work with Advancement to expand the Schott Prize impact.
Outreach & Communication	• Partner with local schools promoting STEM. • Grow community partnerships / Central Ohio AHA • Promote wellness programming for internal faculty, staff and students as well as in community events.
Tech Transfer & IP Development	• Grow partnerships with other centers / institutes at OSU. • Promote entrepreneurship programs and IP development for faculty, staff and trainees. • Advance industry internship opportunities and preparedness training.
Workplace of Choice and Talent Acquisition	• Partner with TIUs / Divisions to recruit funded scientists in strategic research areas. • Advance career development opportunities for faculty, staff and trainees within the Institute.

DHLRI Administrative Structure





DHLRI Committee Structure

Space Committee

Mission: To ensure the assignment of space in a transparent, just, and efficient manner that fosters collaborative research.

Kristin Stanford, PhD - Chair
(Surgery)

MEMBERS
Xun Ai, MD (PCB)
Kymberly Gowdy, PhD (PCCS)
Judy Opalek, PhD (Surgery)
Loren Wold, PhD (Cardiac Surgery)
Yutong Zhao, MD, PhD (PCB)
Student Liaison

Tom Hund, PhD - Ex-Officio (DHLRI)
Penny Jones - Ex-Officio (DHLRI)
Kristin Stanford, PhD - Ex-Officio (Surgery)

Education Committee

Mission: To coordinate educational and training programs fostering collaboration, innovation, and translation across career stages.

Seth Weinberg, PhD - Chair
(Biomedical Engineering)
Mona El Refaey, PhD - Vice Chair
(Surgery)

MEMBERS
Izabelle Colvin (DHLRI)
Laszlo Farkas, MD (PCCS)
Matt Gorr, PhD (Surgery)
Tatiana Cuellar-Gaviria, PhD (BME)
Onur Kanisicak, PhD (EM)
Richard Nho, PhD (PCCS)
Latisha Roland (DHLRI)
Lorena Rosas, PhD (PCCS)
Rebecca Shaheen, PhD (Graduate Fellow)
Wandi Zhu, PhD (MMT)
Student Liaison
Tom Hund, PhD - Ex-Officio (DHLRI)
Penny Jones - Ex-Officio (DHLRI)
Kristin Stanford, PhD - Ex-Officio (Surgery)

Pathways to Progress Committee

Mission: To promote a fair and effective research and training environment for faculty, staff, and trainees.

Rebecca Vanderpool, PhD - Chair
(Cardiovascular Medicine)

MEMBERS
Lisa Baer (Surgery)
Jenifer Bennett (DHLRI)
Brandon Biesiadecki, PhD (PCB)
Ashely Greenlee, PhD (CVM)
Natalia Higuita-Castro, PhD (BME)
Yohannes Mebratu, PhD (PCCS)
Mike Tranter, PhD (MMT)
DeeAnn Willis-Berry (DHLRI)
Student Representative(s)

Tom Hund, PhD - Ex-Officio (DHLRI)
Penny Jones - Ex-Officio (DHLRI)
Kristin Stanford, PhD - Ex-Officio (Surgery)

Shared Resources Committee (NEW!)

Mission: To identify equipment investment and ensure state-of-the-art equipment is maintained and operated by trained individuals, thereby improving the quality of research.

Nuo Sun, PhD - Chair
(Physiology & Cell Biology)

MEMBERS
Joshua Jackson (DHLRI)

Tom Hund, PhD - Ex-Officio (DHLRI)
Penny Jones - Ex-Officio (DHLRI)
Kristin Stanford, PhD - Ex-Officio (Surgery)

New Members (FY25)

Paula Agudelo Garcia, PhD
Assistant Professor, BME

Ian Bentley, MD
Physician, PCCS

Allison Bigeh, DO
Assistant Professor, CVM

Sarah Cohen, MD
Assistant Professor, PCCS

Tatiana Cuellar Gaviria, PhD
Assistant Professor, BME

Wa Du, MD, PhD
Assistant Professor, VS

Yanbo Fan, MD, PhD
Associate Professor, VS

Josh Gordon, MD
Physician, PCCS

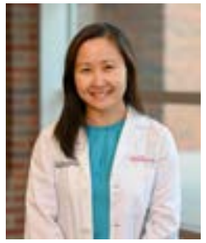
Akash Goyal, MD
Assistant Professor, CVM

Shrinivas Hebsur, MD
Assistant Professor, CVM

Chad Hyer, MD
Assistant Professor, CVM

Peter Kneuertz, MD
Associate Professor, TS

Laura Leuenberger, MD
Physician, PCCS

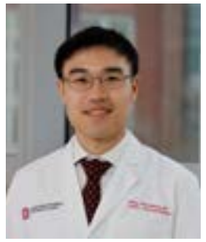


Ellen Liu, MD
Assistant Professor, CVM

Alexandria Miller, MD
Assistant Professor, CVM

Dustin (Drew) Peth, DO
Assistant Professor, PCCS

Leah Pyter, PhD
Professor, Psychiatry



Natee Sirinvaravong, MD
Assistant Professor, CVM

John Stafford, MD, PhD
Professor, EDM

Department Abbreviation Key

CVM - Cardiovascular Medicine
EDM - Endocrinology, Diabetes & Metabolism
EM - Emergency Medicine
PCCS - Pulmonary, Critical Care, & Sleep Medicine
PCB - Physiology & Cell Biology
MMT - Molecular Medicine & Therapeutics
TS - Thoracic Surgery
VS - Vascular Surgery

Core Labs

LEARN MORE ABOUT OUR CORES
https://medicine.osu.edu/departments/davis-heart-lung-research-institute/core-labs-and-research-centers

Cardiovascular Imaging Research Center (CIRC)

The Cardiovascular Imaging Research Center (CIRC) provides high quality human and large animal cardiovascular imaging and image analysis services. The CIRC team helps to identify the optimal imaging modality, and to design appropriate imaging experiments and data analysis strategies through whole-body magnetic resonance imaging (MRI) scanners, whole-body X-ray computed tomography (CT) scanners, image post-processing hardware and software. CIRC has access to CT and MRI (1.5T) equipment located in the Ross Heart Hospital, and to MRI (0.55T and 3T) equipment located at the Martha Morehouse Outpatient Center.
Managers: Yuchi Han, MD and Orlando Simonetti, PhD

Yuchi Han, MD

Orlando Simonetti, PhD

Flow Core

This state-of-the-art Flow Cytometry Core is capable of cell analysis and sorting at the single cell level. It includes a spectral high-resolution cell analysis flow sorter (Cytek® Northern Lights) equipped with 3-lasers (BVR), a flow nanoanalyzer from NanoFCM capable of measuring fluorescence in small particles (such as exosomes) and organelles (such as mitochondria), and a flow cell sorter (Cytek® Aurora) equipped with 3-lasers (BVR) and technical support personnel expert in using these machines for various scientific applications. The Nano is housed in the PaRC with other equipment in DHLRI.
Manager: Trent Sandstrom

Trent Sandstrom

Metabolism Core

The Metabolism Core has the ability to measure both live animal and cellular metabolic outcomes. The Columbus Instrument's Comprehensive Lab Animal Monitoring System (CLAMS) has the ability to offer continuous, non-invasive collection of live animal physiological and behavioral measurements, which incorporates sub-systems for open circuit calorimetry and activity in an environmental chamber. The Oxymax/CLAMS is the one-test solution for simultaneous multi parameter assessment of one to nine mice. This equipment is scheduled and operated by the Core Manager. The CLAMS is located in BRT076B.
The Agilent Seahorse XFe Analyzers (24-well and 96-well plates) measure and reports the oxygen consumption rate (OCR), proton efflux rate (PER) or extracellular acidification rate (ECAR), as well as ATP production rates of live cells, which are critical measurements of energy metabolism and vital indicators of mitochondrial health. Technical training and support is provided by the Core Manager. Following training, this equipment is calendar reserved for self-service use. The Agilent Seahorse Analyzers are located in BRT340F.
Manager: Lisa Baer

Lisa Baer

Interventional Cardiology Cath Core Lab

The Cath Core is a fully equipped interventional Cath/EP suite with an OEC 9800 Plus fluoroscopic C-arm. This imaging system has cine, digital spot, and digital subtraction angiography (DSA) capabilities as well as a dedicated cardiac review station for post imaging processing. In addition to the equipment, the Cath Core also provides the experienced interventional and surgical support personnel needed to complete your large animal preclinical experiments. The Cath Core is located in Wiseman Hall.
Manager: Matthew Joseph

Matthew Joseph

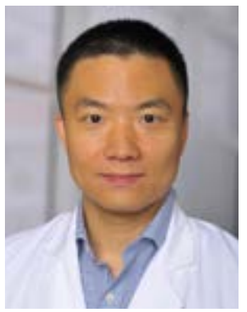
Small Animal Imaging Core

The Small Animal Imaging Core (SAIC) is a comprehensive small animal imaging facility. This facility includes high resolution imaging equipment (MRI, ultrasound, microCT and optical), X-ray irradiators (SARRP, RS-2000, GammaCell), body composition analyzer, and personnel trained in the operation of each imaging modality and small animal handling procedures, as well as analytical software support for quantitative image analysis. In addition to providing interim animal housing for serial imaging studies, the SAIC also offers on-site suites for surgical procedures, and animal care provided by the University Laboratory Animal Resources. Image reconstruction, multi-modality fusion, quantitative image analysis. The SAIC is housed in both the BRT and PaRC.
Manager: Anna Bratasz, PhD

Anna Bratasz, PhD

Comprehensive Small Animal Surgery Core

The DHLRI CSASC is a state-of-the-art small animal surgical core facility capable of cardiovascular small animal surgery for research purposes. There are 2 locations (Pelotonia Research Center 0010 and Graves 5060) each housing a fully equipped surgical station for services inclusive of TAC, LAD Ligation, AV Fistula, Intracardiac Injection, Telemetry Implantation, Minipump Implantation, Intracardiac Pacing, PV Loops and Vevo. CSASC is available as a resource to all investigators at The Ohio State University (OSU), as well as at other academic institutions and commercial organizations. The CSASC is located in both Graves Hall and the PaRC.
Manager: Nuo Sun, PhD


Nuo Sun, PhD

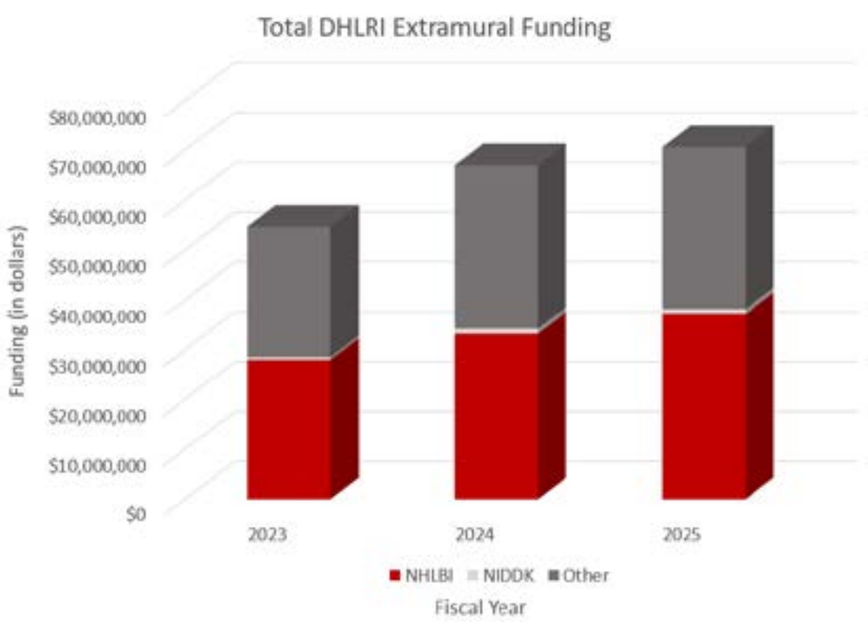
Poster Printing Core

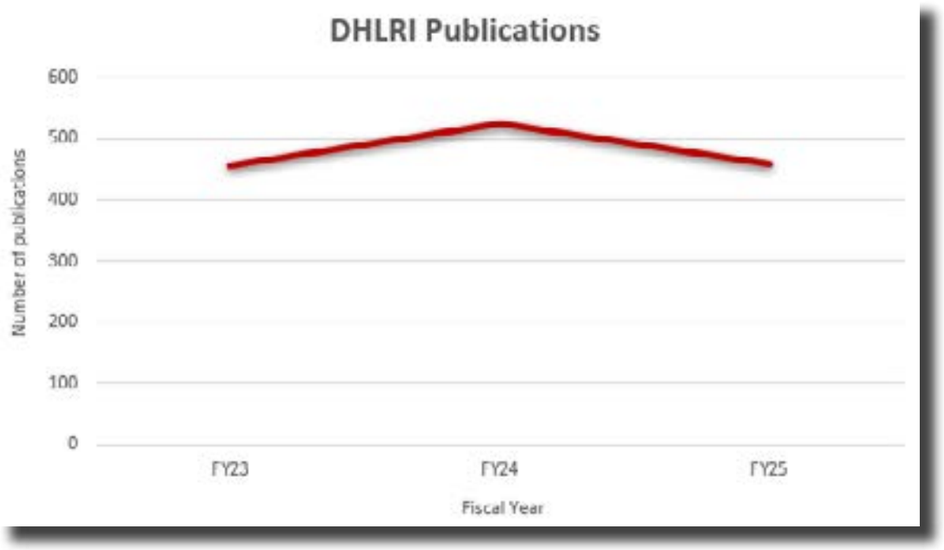
DHLRI offers large scale poster printing and easel rentals for OSU faculty, staff, and students. Posters are priced by size and requested processing time. Posters can be specified as paper or fabric are requested through Workday. Easel rental for OSU events, is available which includes metals display frames, foam core poster boards and moving cart. Set-up and delivery is not offered by DHLRI. The Poster Printer is located in DHLRI.
Manager: Tori Bram

Tori Bram

Funding & Publications

DHLRI members had a fantastic FY25, with remarkable productivity and impact that's detailed in the Research Area sections. We're particularly proud of the many large, collaborative grants submitted this past year. Overall, FY25 was a record-breaking year for the organization, with new highs in high-impact publications, large grants submitted, clinical trials, and total annual funding, which exceeded $80 million. Another significant achievement is that thanks to the hard work of DHLRI investigators, Ohio State ranked fifth nationally for American Heart Association funding in FY25. While these numbers don't tell the whole story, they clearly show DHLRI's expanding influence. Congratulations to all the faculty, trainees, and staff whose efforts propelled research to a new level in FY25!





Equipment

DHLRI actively purchased research equipment, enhancing its portfolio. Continuing the equipment program initiated the previous year, the replacement of aging equipment concluded with the purchase of biosafety cabinets, -80°s and -20°s freezers, centrifuges, incubators, and cryostats. Additionally, significant investments were made in the Cores, including the replacement of the CLAMS in the Metabolic Core and a newly purchased echoMRI in the Small Animal Imaging Core, housed in the PaRC. Two new shared equipment rooms were established in Graves Hall and the BRT. Future investments include the C-Arm in the Large Animal Cath Core. The equipment refresh amounted to an investment of more than $1M. Creative work continued with vendor partners, purchasing nearly new sample equipment at discounted rates. Additionally, DHLRI collaborated with the Ross Heart Hospital, when appropriate, on transfers of hospital-grade equipment in lieu of their trade-in.

Clinical Trials

The College of Medicine's Center for Clinical Research Management (CCRM) provides essential administrative infrastructure to support the conduct of non-cancer clinical and translational research. In close collaboration with investigators, staff, and institutional leadership, CCRM aims to:

- Strategically align research resources and personnel
- Enhance compliance and risk management
- Drive process improvement initiatives
- Identify and address barriers to study feasibility, startup, and enrollment
- Oversee and optimize revenue recovery
- Deliver comprehensive tracking and reporting of research activities

In FY25, CCRM supported the management of over **1,800** active studies across **49** clinical divisions, partnering with **479** principal investigators and **389** clinical research staff.

Clinical Trials in DHLRI

Within the Dorothy M. Davis Heart and Lung Research Institute (DHLRI), clinical research spans Cardiovascular Medicine, Pulmonary, Critical Care & Sleep Medicine, Cardiothoracic Surgery, and Vascular Surgery.

10,000 Participants

114 Principal Investigators

40 Research Support Staff

Notably, OSU is among top US enrollers in multiple clinical research studies (e.g., electrophysiology/PI: **Muhammad Afzal**, LEADR LBBAP); interventional pulmonary/PI: **Jasleen Pannu**, NIGHTINGGALE and PI: **Alberto Revelo**, CBCT Robot Study); received sponsor recognition for quality work (PI: **Jasleen Pannu**, NIGHTINGGALE).

Another key highlight from FY25 is the Cardiovascular Medicine division's role as a pilot group for the College of Medicine's implementation of OpenSpecimen—an open-source, configurable biobanking informatics platform and Laboratory Information Management System (LIMS). OpenSpecimen enables end-to-end tracking of biospecimens from collection through utilization, ensuring regulatory compliance and facilitating seamless data integration. Once fully implemented, OpenSpecimen will support the management and documentation of all non-cancer biospecimens across the College of Medicine.

Development

Development Team

Dana Mack
Senior Director,
Heart and Vascular Center
and Cardiovascular
Medicine Leadership,
DHLRI Leadership

Emily Swank
Director of Development

Stephenie Robertson
Senior Liaison,
Corporate Engagement

Briana Yauk
Senior Director of
Foundation Engagement

Giving to DHLRI in FY25

Total Dollars
$2,116,275

Total Number of Gifts
639

Gifts & Highlights

- Patti Webb made a significant estate gift that, when realized, will create an endowment with annual distribution focused on innovation, heart failure, and cardio-oncology.
- Rich and Jenny Housh made a gift to DHLRI to support general research.
- A faculty member made a gift for staff support.

DHLRI 25th Anniversary Event

The Dorothy M. Davis Heart and Lung Research Institute marked its 25th Anniversary with a week-long series of events. Festivities began on the official anniversary date, October 13, bringing together trainees, staff, and faculty to celebrate a quarter-century of groundbreaking discoveries. The celebration continued with an evening dedicated to expressing gratitude for the generous philanthropic support from donors.

Cardiovascular Research

Honors

Thomas Hund, PhD (Cardiovascular Medicine) was elected as a Fellow of the American Institute of Medical and Biological Engineering

Douglas Lewandowski, PhD (Endocrinology, Diabetes, and Metabolism) received the Innovative Investigator Award from the International Academy of Cardiovascular Sciences.

Featured Publications

Sanghvi S, et al. (Singh Lab) Functional large-conductance calcium and voltage-gated potassium channels in extracellular vesicles act as gatekeepers of structural and functional integrity.
Nat Commun. 2025 Jan 2;16(1):42.
https://pubmed.ncbi.nlm.nih.gov/39747826/

Biswas R, el al. (Chinthalapudi Lab) Structural basis of human Nav1.5 gating mechanisms
Proc Natl Acad Sci U S A. 2025 May 20;122(20:e2416181122.
https://pubmed.ncbi.nlm.nih.gov/40366698/

American Heart Association Conferences

In November, OSU was well represented at the 2024 American Heart Association's Scientific Sessions - the premiere global event in health and science where cardiovascular experts around the world gather to share the latest research and clinical advancements. Over 50 physicians and researchers were in attendance with 30 panelists, moderators and presenters from The Ohio State University Wexner Medical Center.

OSU Faculty, Staff, and Learners at the 2024 AHA Scientific Sessions

Major Grants

NIH NHLBI: *Impact of Adaptive Immune System on Cardiac Electrophysiology*
Isabelle Deschenes, PhD (Physiology & Cell Biology)
Dr. Isabelle Deschenes and collaborator Dr. Shyam Bansal are uncovering a novel immune-driven mechanism of heart failure, demonstrating that CD4+ T-cells activated during ischemic heart failure can directly impair heart function. Their research reveals that these T-cells infiltrate the heart, form connexin43-mediated gap junctions with cardiomyocytes, and induce arrhythmias and pathological remodeling through contact-dependent electrical disturbances. This groundbreaking work highlights a previously unrecognized link between immune cells and cardiac electrophysiology, opening new avenues for targeted therapies in heart failure and arrhythmia.

NIH NHLBI R01: *Genetic modulation of inflammation following myocardial infarction*
Richard Gumina, MD, PhD (Cardiovascular Medicine)
Dr. Richard Gumina's team is investigating how genetic differences in regulatory T cell (Treg) expression of CD39—a key anti-inflammatory enzyme—affect healing after myocardial infarction. Their research shows that reduced CD39 activity leads to impaired cardiac recovery in mice and correlates with specific human genetic variants, suggesting a genetically driven failure to resolve inflammation. By combining murine models and patient biospecimens, this project aims to uncover new biomarkers and therapeutic targets to improve post-heart attack outcomes.

NIH NHLBI R01: *Novel Roles of Protein phosphatase 2A in Cardiac Arrhythmia*
Mona El Refaey, PhD (Cardiac Surgery)
Dr. Mona El Refaey's first NIH R01 grant investigates a novel regulatory pathway that may protect against fatal cardiac arrhythmias by targeting the late sodium current (INa,L) in heart cells. Her team has developed the first inducible in vivo model to study PP2A-B56a regulation of Nav1.5 sodium channels, along with a new molecule that selectively activates PP2A in disease settings. This groundbreaking work aims to uncover therapeutic strategies for arrhythmia by modulating cardiac excitability through precise control of sodium channel activity.

Pulmonary Research

Honors

Yohannes Mebratu, PhD was one of four winners of the Rising Star in Research Award for the Department of Internal Medicine.

Joseph Bednash, MD received the Recognition of Early Academic Achievement Award (REAAch) from the American Thoracic Society Assembly on Respiratory Cell & Molecular Biology.

Featured Publications

Soni S, et al. (Mebratu Lab) BIK polymorphism andproteasome regulation unveil host risk factor for severe influenza. *Proc Natl Acad Sci USA*.
2025 Jul 15;122(28):e2424367122.
https://pubmed.ncbi.nlm.nih.gov/40627391/

Johnson BS, et al. (Mallampalli Lab) Targeted degradation of extracellular mitochondrial aspartyl-tRNA synthetase modulates immuneresponses.
Nat Commun. 2024 Jul 22;15(1):6172.
https://pubmed.ncbi.nlm.nih.gov/39039092/

Angeles-Lopez QD, et al. (Mora Lab) Regulation of lung progenitor plasticity and repair by fatty acidoxidation. *JCI Insight*. 2025 Feb 10;10(3):e165837.
https://pubmed.ncbi.nlm.nih.gov/39927460/

PCCS Annual Research Retreat

The Division of Pulmonary, Critical Care, and Sleep Medicine hosted their Annual Research Retreat, featuring Keynote Speaker Dr. Alision Morris. Dr. Morris was the former Division Director of the Division of Pulmonary, Allergy, and Critical Care Medicine at the University of Pittsburgh.

Drs. Rojas, Mallampalli, Mora, and Horowitz with the PCCS Annual Research Retreat Keynote Speaker, Dr. Alison Morris.

Major Grants

NIH NHLBI R01: *Hypoxia-induced aberrant lactate generation and shuttling serves as a direct signal to promote pro-fibrotic fibroblast phenotypes*
Jeffrey Horowitz, MD (Internal Medicine) &
Richard Nho, PhD (Pulmonary, Critical Care and Sleep Medicine)
These novel studies will enhance our understanding of how hypoxia-mediated aberrant lactate production, shuttling and signaling directly contributes to lung fibrosis while interrogating the potential to target lactate-mediated signaling as a therapeutic approach to fibrotic lung diseases including IPF.

NIH NHLBI R01: *Regulation and Function of RAB7 in the pulmonary endothelium*
Laszlo Farkas, MD (Pulmonary, Critical Care, and Sleep Medicine)
This research will establish a new molecular model connecting RAB7 transcriptional regulation via the HIF-2a→miR-199a→MEIS2 axis to EC dysfunction and PAH. This approach will further elucidate for the first time the molecular link between RAB7 deficiency, mRNA stability, PASMC and PAAF growth, and PA remodeling by studying CSDE1 as a key regulator of the endothelial secretome. These results will fundamentally enhance the understanding of EC dysfunction in PAH and provide novel therapeutic opportunities.

NIH NIAID R01: *The Role of Ariadne RBR E3 ubiquitin protein ligase 2 (ARIH2) in influenza A virus replication and pathogenesis in the airway epithelial cells*
Yohannes Mebratu, PhD (Pulmonary, Critical Care, and Sleep Medicine)
The proposed studies may uncover ARIH2 as a universal and novel target for treating influenza infections, offering therapeutic promise due to its enzymatic nature and potential selectivity towards BIK. These studies will have profound translational implications and hold the potential to enhance prevention and treatment strategies for emerging and reemerging influenza strains.

Metabolism Research

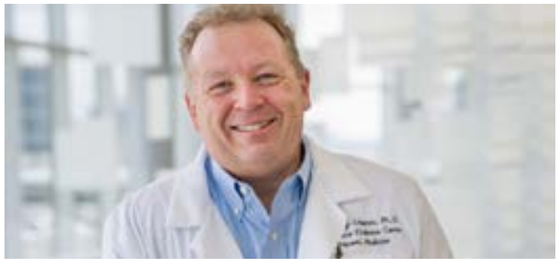
Leadership

John Stafford, MD, PhD, joined The Ohio State University Wexner Medical Center as the Director of the Division of Endocrinology, Diabetes and Metabolism. He brings a distinguished record of leadership, research, and clinical expertise in the fields of diabetes, obesity, and metabolism.

Major Grants

American Heart Association Strategically Focused Research Network (SFRN) on Cardiovascular Kidney Metabolic Syndrome: Heterogenetity in Women
Joshua Joseph, MD (Endocrinology, Diabetes, and Metabolism)
Through the center's Beyond One Size Fits All (B-FIT) initiative, the teams will undertake three different projects as a multi-dimensional approach to CKM health in women. The first project - DASH-CKMH – will look at how different medicines work for men and women to improve heart health, using real-life data. The second project - Food and Fitness WITH Medicine - is a study that combines healthy eating, exercise and medicine to help older women stay on their health treatments and improve their heart health. The third project - Inspire HER – is a community program that supports women in making healthy lifestyle changes to improve heart health.

PHAT / Big 10 Lipids Symposia



Philipp Scherer, PhD

Publications

Shantaram D, et al. (Hsueh Lab) The GLP-1 Receptor Agonist Dulaglutide Attenuates Hepatic Steatosis in Obesity via a Weight-Independent Mechanism. *Diabetes*. 2025;74(9):1512-1524. https://pubmed.ncbi.nlm.nih.gov/40663700/

Serrano J, et al. (Kyriazis Lab) A partial loss-of-function variant (Ile191Val) of the TAS1R2 glucose receptor is associated with enhanced responses to exercise training in older adults with obesity: A translational study. *Metabolism*. 2025 Jan;162:156045. https://pubmed.ncbi.nlm.nih.gov/39393515/

Nirengi S, et al. (Stanford Lab) 12,13-diHOME protects against the age-related decline in cardiovascular function via attenuation of CaMKII. *Nat Commun*. 2025 Aug 2;16(1):7088. https://pubmed.ncbi.nlm.nih.gov/40751044/

Blaszkiewica M, et al. (Townsend Lab) Transdermal electrophysiological recordings of diet-induced small fiber peripheral neuropathy using a needle electrode array in mice and man. *Front Bioeng Biotechnol*. 2025 Jan 10;12:1511383. https://pubmed.ncbi.nlm.nih.gov/39867474/

The 4th annual Preventative Health of Adipose Tissue (PHAT) symposium in parallel with the Big Ten Lipids Symposium in February 2025 at the DHLRI. A keynote talk was given by **Dr. Philipp Scherer, PhD**, from UT Southwestern Medical Center. The Big Ten Lipids Symposium featured attendees and speakers from 12 different Big Ten Universities. These interdisciplinary international events were open to researchers whose work intersects with the study of adipose tissue or lipids, with the goal of bringing together new research teams and collaborations and stimulating discussions around the future of adipose tissue research across the basic, translational, and clinical spectrum.

Advanced Therapeutics & Engineering

Honors

Ana Salazar-Puerta, PhD (Postdoctoral Researcher, Biomedical Engineering) was recognized as a **2024 Rising Star in Engineering Health**, a distinction that highlights her exceptional promise as an emerging leader in the field. This honor is awarded to early-career scientists and engineers whose research, innovation, and impact demonstrate outstanding potential to advance human health through engineering. Dr. Salazar-Puerta's recognition reflects not only her scientific excellence and creativity, but also her growing influence in shaping the future of health-focused engineering and translational science.

Publications

Cuellar-Gaviria TZ, et al.
Tissue nano-transfection of antimicrobial genes drives bacterial biofilm killing in wounds and is potentially mediated by extracellular vesicles. *J Control Release*. 2024 Dec;376:1300-1315. https://pubmed.ncbi.nlm.nih.gov/39491627/

Gabela-Zuniga B, et al. (Ghadiali Lab)
A micro-scale humanized ventilator-on-a-chip to examine the injurious effects of mechanical ventilation. *Lab Chip*. 2024 Sep 10;24(18):4390-4402. https://pubmed.ncbi.nlm.nih.gov/39161999/

ICBME 2024

There was a strong representation of DHLRI at the 18th International Conference on Biomedical Engineering (ICBME 2024) in Singapore, a leading international forum that brings together leading experts, innovators, and emerging leaders in the field to discuss the latest advances in biomedical engineering research and translation. Dr. Natalia Higuita-Castro and Dr. Daniel Gallego-Perez were invited speakers, where they presented their work on a novel non-viral delivery platform for gene and cell therapy applications. Their contributions highlighted transformative strategies to overcome longstanding barriers in therapeutic delivery and underscored DHLRI's growing impact on the global stage of biomedical innovation.

Technology Related Grants

Natalia Higuita-Castro, PhD (Biomedical Engineering and Neurosurgery) part of a multidisciplinary team awarded a $6.2 million Department of Defense (DoD) grant to advance novel therapies for preserving vision after neurotrauma. The project led by Higuita-Castro focuses on *Developing and optimizing Translational Technologies for Therapeutic Delivery After Neurotrauma.*

DHLRI researchers were awarded two highly competitive **Phase I Small Business Technology Transfer (STTR) awards from the NIH and NSF** to advance an innovative fibroblast-derived engineered extracellular vesicle platform for targeted delivery in rare diseases. In close collaboration with the biotechnology company NeuCore Bio, this initiative will generate essential proof-of-concept data to accelerate the translation of this non-viral therapeutic delivery system.

National Conferences

DHLRI trainees also showcased their research at major national venues, including the **BMES Annual Meeting**, **LatinXinBME Symposium**, and the **Society for Biomaterials Annual Meeting**. These presentations not only demonstrated the innovative approaches being developed by the next generation of researchers but also reinforced DHLRI's leadership in driving forward translational advances at the interface of engineering and medicine.

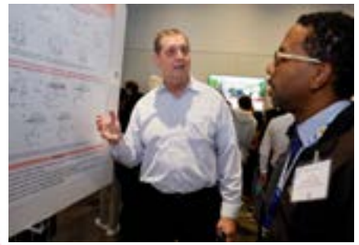
Dr. Higuita-Castro presenting at the 18th International Conference on Biomedical Engineering in Singapore

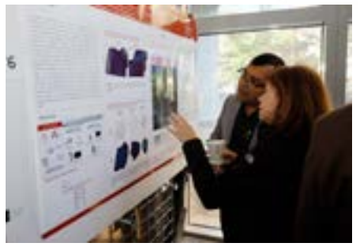
Education & Outreach

DHLRI 20th Annual Research Day

Juleen Zierath, PhD

The DHLRI concluded its week-long anniversary celebration with the annual Research Day. A standing-room-only presentation featured a panel discussion with leaders from the University ERIK office, Wexner Medical Center, College of Medicine, and DHLRI. Highlights included past advancements and future goals as the University, Wexner Medical Center, and DHLRI as we usher in the next 25 years of discovery. The event included short talks and a record number of poster presentations, followed by a keynote address from Juleen Zierath, PhD, of the Karolinska Institutet in Stockholm. Dr. Zierath, Professor in the Departments of Physiology and Pharmacology, and Molecular Medicine and Surgery, presented "Deconvoluting Signals and Metabolic Rhythmicity in Type 2 Diabetes."





Awards

Numerous posters received special recognition, and the following Distinguished Awards were presented:

Dana Mack
Director's Award

Ana L. Mora, MD
Melissa G. Piper Distinguished Mentor Award

Daniel Gallego-Perez, PhD
Chuck Webb Innovator of the Year Award

Xianyao Xu
Distinguished Basic Research Staff Award

Kelly Dunsky
Distinguished Clinical Research Staff Award

Karan Rai, MD
Distinguished Clinical Fellow Award

Anna Bratasz, PhD
Distinguished Administrative Staff Award

Xilal Y. Rima, PhD
Post-Doctoral Scholar of the Year Award

Vladimir Bogdanov
Graduate Student of the Year Award

DOROTHY M. DAVIS HEART AND LUNG RESEARCH INSTITUTE
25 YEARS
Driving Discovery
The Ohio State University®

JB Cardiovascular Undergraduate Fellowship

The JB Undergraduate Summer Fellowship in Cardiovascular Research experienced a record-breaking year with over 250 applications. This banner year realized applicants from not only OSU but also Ohio Dominican, Cornell, University of Cincinnati, Otterbein University, University of Virginia, University of Miami, Case Western, Denison University, University of Georgia, University of Kentucky, University of South Florida, Hope College, and University of Mississippi, among others. Through a rigorous selection process, 19 candidates were chosen, each paired with a mentor and assigned a project in cardiovascular research.

JB Fellows and their mentors at the end-of-program poster session

In addition to their lab experience, the undergraduates participated in various activities. These included a "Lunch and Learn" session where they learned best practices from leadership of the Graduate School and Medical School, a real-time visit to the Cath Lab, and a celebration of their scientific works during a Research Day, where Senior Leadership from the College of Medicine viewed their posters.

The JB fellowship program, funded by an anonymous donor, began in 2022 with 8 OSU applications. Since then, the program has attracted growing interest from applicants nationwide. Three members of the earliest cohort have gone on to medical school, two have been published, and one has received an Aspire Award.

AHA STEM Goes Red

STEM Goes Red is the American Heart Association's nationwide movement dedicated to empowering a future generation of female STEM leaders, while providing them with the tools and resources for living long, healthy lives. The program introduces young women to developing science, technology, education and math (STEM) solutions.

In May, Dr. Tom Hund, Penny Jones and Izabelle Colvin hosted breakout sessions at the PAST Foundation, sharing insight on cardiovascular research and prevention to >150 middle school girls from four Central Ohio Districts. Students were immersed in hands-on STEM activities throughout the day.

Shared by the AHA, women hold less than 25% of STEM jobs, of which there are millions becoming available. Employment in science, technology, engineering, and math (STEM) occupations is projected to grow, and women are vastly underrepresented in these fields. The demand for workers in the STEM fields is outpacing the number of college graduates with science, technology, engineering, and math degrees. DHLRI is committed to advancing STEM for future generations.

AHA Summer Research Fellowship

Continuing our partnership with the American Heart Association, the OSU Office of Undergraduate Research & Creative Inquiry (OUR&CI) and DHLRI, awarded six summer fellowships to students who demonstrated an interest in pursuing a cardiovascular and stroke research career. THE USFP undergraduate summer program carried a research award of $6,000 as well as the opportunity for a $3,000 travel award to attend a scientific meeting with their AHA mentor. The recipients of this hands-on training opportunity included:

- **Azair Ahmed**, Mentor - Mahmood Khan, PhD (EM)
- **Eleanor Mohler**, Mentor - Loren Wold, PhD (Cardiac Surgery)
- **Kareem Amro**, Mentor - Jay Zweier, MD (CVM)
- **Mudra Patel**, Mentor - Harpreet Singh, PhD (PCB)
- **Neva Schehl**, Mentor - Michael Tranter, PhD (MMT)
- **Virang Desai**, Mentor - Sakima Smith, MD (CVM)

Administered by Deb Wheeler, we thank her for her dedication over the years in managing this USFP grant.

SFRN Summer Fellowship

Croix Johnson, SFRN Summer Fellow

DHLRI members Joshua Joseph, MD (Endocrinology, Diabetes & Metabolism), Kristin Stanford, PhD (Surgery), and Loren Wold, PhD (Cardiac Surgery), hosted four summer students from Central State University as a part of the American Heart Association Strategically Focused Research Network program. The students participated in various labs and presented a poster and short presentation at the end of the summer.

Working Wednesdays

DHLRI continued its second year of Working Wednesday, a monthly learning series dedicated to the business of science. A few of the sessions included presentations by:

- Dr. Kristy Townsend, Women in Medicine and Science
- The Grants Management Office, Tips and Updates
- Dr. Sara Koenig, College of Medicine Research Strategy & Operations
- DHLRI Core Operations Team, Services Available
- Dr. Kristin Stanford, DHLRI R01-101 Grant Mentoring Program
- WMC HR Team, Buckeye Performance – The Career Roadmap Process

The series will continue in FY26 with scheduled programming to include IRB/Huron Roles and Responsibilities, Graduate School Programs and Processes, Research Innovation and Commercialization, and updates from ERIK (Enterprise for Research, Innovation and Knowledge).

American Heart Association Heart Walk

In August 2025, the 30th annual AHA Heart Walk achieved a record level of participation. Team Ohio State was once again recognized as the largest team at the event on August 16. The Ohio State University Wexner Medical Center continued its role as the Live Fierce sponsor, demonstrating ongoing commitment to this initiative.

Notably, 2025 was our most successful year to date, with a record number of teams and registered walkers.

Since 2014, TEAM OHIO STATE has participated in the American Heart Association's (AHA) annual Heart Walk to support the fight against our nation's No. 1 and No. 5 killers – heart disease and stroke. AHA is funding $14.5 million in active research at The Ohio State University.

By the Numbers

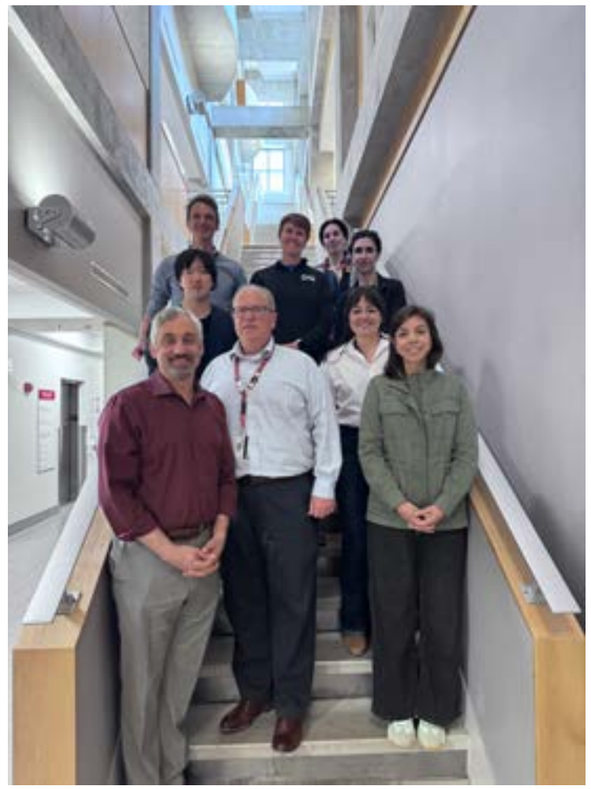
264 Teams
(25% / YOY)
Goal was 200

4,221 Walkers
(57% / YOY)
Goal was 2,500

$95,672 Funds Raised
(57% / YOY)
Goal was 2,500

R01-101

The DHLRI grant writing program, "R01-101" was highly effective in supporting junior faculty through the process of preparing and submitting their R01 grant proposals. Continuing with a new R01-101 cohort, the program paired junior faculty submitting their first R01 with an assigned mentor. Selected applicants received personalized guidance on key aspects of grant writing, including refining the aims page to ensure clarity and impact, enhancing the narratives of background and research strategies, and developing a detailed and realistic budget to support proposed research activities. Participants engaged in a mock study session, providing critical feedback and refinement of their proposals.



R01-101 Cohort

R01-101 November 2024 - May 2025

Cohort

- **Paula Agudelo Garcia, PhD** (Biomedical Engineering)
- **Tatiana Cuellar Gaviria, PhD** (Biomedical Engineering)
- **Cole Harrington, MD, PhD** (Neurology)
- **Sara Myers, MD, PhD** (Surgical Oncology)
- **Drew Nassal, PhD** (Physiology & Cell Biology)
- **Yuta Nihongaki, PhD** (Physiology & Cell Biology)
- **Ilaria Palmisano, PhD** (Neuroscience)

Stemming from the success of the R01-101 program, a second mentored series was offered, namely "R01-201", a 4-month program aimed at bridging the gap between securing the first R01 and subsequent R01 funding. A condensed learning summer series, topics included "Creating Effective Collaborations," "Selling Your Aims Page," "Developing Your Significance/Innovation/Approach Sections," and "The Role of the OSU OSP Office." This summer series also concluded with a mock study session of both internal and external reviewers. Both programs will continue due to the high volume of interest.

R01-201 June - September 2025 Cohort

- **Megan Ballinger, PhD** (Pulmonary, Critical Care, & Sleep Medicine)
- **Vincenzo Coppola, MD** (Cancer Biology & Genetics)
- **Matthew Stratton, PhD** (Physiology & Cell Biology)

Featured Stories

Cardiovascular-kidney-metabolic Syndrome in Women

Joshua Jospeh, MD

A major new $15 million research initiative led by Augusta University, Massachusetts General Hospital, and The Ohio State University will focus on understanding how risk factors for heart and kidney diseases uniquely affect women. The Ohio State University team is led by DHLRI member **Josh Joseph, MD** (Endocrinology). Funded by the American Heart Association through its Strategically Focused Research Network on Cardiovascular Kidney Metabolic (CKM) Syndrome, the project will study why women may be more vulnerable to these conditions at certain life stages, such as during pregnancy or after menopause. CKM syndrome refers to the combined impact of heart disease, kidney disease, diabetes, and obesity—conditions that significantly raise the risk of heart attack, stroke, and heart failure. With nearly one-third of U.S. adults already facing multiple CKM risk factors, researchers hope to uncover how biological differences, life experiences, and social factors contribute to women's health outcomes. The findings could lead to more personalized prevention and treatment strategies, ultimately improving health and saving lives. Projects like this helped propel Ohio State to 5th in the nation for funding awarded from the AHA in 2025.

Read more here: https://newsroom.heart.org/news/researchers-awarded-15-million-to-study-cardiovascular-kidney-metabolic-syndrome-in-women

Single Ventricle Heart Disease

Christopher Breuer, MD, Isabelle Deschenes, PhD, & Mingtao Zhao, DVM, PhD

Single ventricle heart disease is a rare and serious birth defect in which one of the heart's main pumping chambers does not fully develop, often requiring multiple surgeries from infancy onward. To advance research in this challenging area, the American Heart Association and Additional Ventures funded five scientific teams, including two led by DHLRI members. One project, led by **Christopher Breuer, MD** [Nationwide Children's Hospital (NCH)] will investigate Fontan-associated liver disease (FALD), a life-threatening complication for which the only current treatment is liver transplantation. Another project, co-led by **Isabelle Deschênes, PhD** (Physiology & Cell Biology) and **Mingtao Zhao, PhD** (NCH), will study dangerous heart rhythm problems in single ventricle patients, exploring new therapies such as cardiac radiotherapy. Since about 1 in 15,000 babies in the U.S. are born with this condition, these efforts aim to fill critical gaps in understanding and develop new strategies to improve care and quality of life for patients living with single ventricle heart disease.

Read more here: https://newsroom.heart.org/news/new-project-commits-13m-to-study-biological-mechanisms-of-rare-congenital-heart-defect

Drs. Gowdy & Black Receive Presidential Early Career Awarwds for Scientists and Engineers

Sylvester Black, MD, PhD & Kymberly Gowdy, PhD

Sylvester Black, MD, PhD (Surgery), and **Kymberly Gowdy, PhD** (Pulmonary, Critical Care and Sleep Medicine), were awarded the Presidential Early Career Award for Scientists and Engineers (PECASE)—the nation's highest honor for early-career researchers. Both were nominated by the National Institutes of Health and recognized among nearly 400 scientists and engineers nationwide for their groundbreaking and innovative contributions to science. The award highlights the importance of supporting early-career researchers, whose work bridges laboratory discoveries and real-world medical advances that improve lives.

Dr. Black, a leader in abdominal transplantation, has pioneered innovative approaches to improve the quality and function of donor organs before surgery. As professor of Surgery and Surgical Director of the Liver Transplant Program at Ohio State, he co-directs the COPPER Laboratory, where his team has developed advanced organ perfusion techniques and novel therapeutics that repair tissue damage and reduce organ injury during transplantation. His work not only improves outcomes for transplant recipients but also increases the number of organs available for use, addressing a critical shortage in the field.

Dr. Kymberly Gowdy focuses her research on understanding how air pollution worsens lung disease. Leading the Gowdy Environmental Lung Lab in the DHLRI, she investigates how pollutants alter lung proteins and lipids, increasing susceptibility to infections and cardiovascular complications. Her research has expanded to study how nutrition may influence the body's response to polluted air, offering new avenues for prevention and treatment. With air quality challenges on the rise, Dr. Gowdy's work is paving the way for interventions that could significantly improve respiratory health and reduce the burden of chronic lung disease.

Read more here: https://wexnermedical.osu.edu/mediaroom/pressreleaselisting/presidential-honor

Sex Differences in Heart Rhythm

Vadim Fedorov, PhD

Research from DHRLI Investigator **Vadim Fedorov, PhD** (PCB) has uncovered why women and men experience differences in heart rhythm, shedding light on potential new treatment approaches. Researchers found that the heart's natural pacemaker, the sinoatrial node (SAN), is influenced by sex-specific genetic activity. Women's hearts showed higher levels of genes that drive faster rhythms, helping explain why women typically have quicker heartbeats and are more prone to rapid rhythm disorders, while men's hearts showed more activity in genes linked to inflammation and tissue changes, which can lead to atrial fibrillation and conduction block. By identifying these genetic drivers, scientists hope to pave the way for more personalized therapies to prevent and treat dangerous heart rhythm problems.

Read more here: https://wexnermedical.osu.edu/mediaroom/pressreleaselisting/fedorov-san-research

Impact 2035

The Ohio State University Wexner Medical Center

Strategic Plan

Impact 2035 | **The health system for Ohio. The model for the nation.**

The Ohio State University
Wexner Medical Center

Our shared purpose:

World-class care for every person, every time

Exceptional Care:
Provide all patients with the very best care, experience and outcomes, as well as equitable, convenient access to the services they need.

Purposeful Growth:
Expand our services through strategic partnerships and new facilities, extending our reach and influence across Ohio and the nation.

Best-in-Class Operating Model:
Set the standard for sustainable excellence in care, research and education, driving continuous improvement and strategic alignment in the way we work.

Relentless innovation to improve lives

High-Impact Discovery:
Integrate scientific and clinical efforts to grow as a national leader in lifesaving and life-enhancing medical research and clinical trials.

A Healthier Ohio:
Together with community partners, lead the transformation of health care by removing barriers to health and expanding equitable access, care and resources for all Ohioans.

Accelerated Health Care Transformation:
Embrace digital-first innovation and new delivery models across our research, education and patient care missions by leveraging AI and other technologies that support our teams for the future of health.

The best place to work and learn

Reimagined Learning and Development:
Influence the future of health care by elevating team-based, lifelong learning – retaining, attracting and developing the best and brightest in every profession and at every level.

Workplace of Choice:
Foster a welcoming environment of inclusivity, teamwork and personal career development that empowers every Buckeye to achieve their full potential.

Davis Heart and Lung Research Institute
FY26 Strategic Plan
In alignment with
Wexner Medical Center Impact 2035

Strategy	Goal
High-Impact Discovery **Growth as a national leader in research and funding**	• Support submission of large programmatic research and training grants • Foster innovation and technology development • Support new grant development
Best In Class Operating Model **Standard of Excellence in Research and Education**	• Bolster shared resources with emphasis on sustainability, efficiency, and impact • Maintain best in class physical plant
Reimagined Learning & Development **Elevated team-based learning, retaining through programming**	• Support for early career training and awards to increase the number of pre- and postdoctoral fellowships, K, and career development awards • Establish DHLRI Undergraduate Summer Research Fellowship Program (Umbrella for several existing and new programs) • Continue to grow impact of RIP • Expand formal training programs and learning opportunities for pre- and post-docs • Build on success of T32 training grant in Biology of Lung Disease and Aging
Workplace of Choice **Inclusivity, teamwork and personal career development**	• Targeted Faculty Recruiting • Expand mentoring and career development support • Hold listening sessions for faculty, staff, and trainees • Pursue opportunities to expand visibility of DHLRI/ OSU on national stage.
Resource Stewardship	• Continue to work with advancement to steward existing partners and establish new relationships. • Participate in Behind the Breakthroughs, Inside the Innovations. • Work with Advancement and Marketing on DHLRI 25th Anniversary Celebration
Healthier Ohio **Community Partners & Outreach**	• Grow local AHA partnership – Go Red Women, Go Red for STEM • Expand outreach to area schools to promote STEM careers • Participate in OSUWMC outreach events (e.g. Dublin Farmer's Market). • Identify new opportunities with community partners (e.g. Healthy New Albany). • Plan for Symposium Spring 2026 – AI in Cardiovascular/Pulmonary Health

C.I.T.E - ing the Future

The Next 25 Years

As we celebrate our success to date, it is also important to reflect on the path forward, which will surely hold many more discoveries. The next 25 years hold immense potential for groundbreaking advances in heart and lung patient care. Our specific goals for FY26 include efforts to bolster large programmatic grants, foster innovation, expand support for early career training and new grant development, and bolster support for current members while actively growing our ranks of exceptional scientists, engineers, and clinicians. Some emerging areas that the DHLRI is poised to generate impact include:

Artificial intelligence (AI) promises to revolutionize diagnostics and treatment plans by providing personalized and precise medical insights, leading to improved patient outcomes. The DHLRI aims to drive advances in AI for cardiopulmonary health in alignment with ongoing initiatives at the medical center, university and national level. Progress in this area will require collaboration with the OSU Wexner Medical Center and College of Medicine to access large multimodal datasets (e.g. images, waveforms, medical record data) from specific patient populations that may be used to develop AI-based tools.

Ohio Supercomputer Center

In **women's health**, a deeper understanding of gender-specific differences in heart and lung diseases will enable tailored treatments and preventive measures. DHLRI hopes to expand partnerships with The Sarah Ross Soter Women's Health Research Program in the OSU College of Medicine represents to drive discovery in this space. This interdisciplinary approach recognizes that inflammation, autonomic regulation, and neuroimmune signaling are deeply intertwined in the pathogenesis of heart and lung diseases—from arrhythmias and heart failure to pulmonary hypertension and long COVID. By forging strategic partnerships with the Institute for Brain, Behavior, and Immunology (IBBI) and the Neurological Institute at Ohio State, DHLRI researchers can leverage cutting-edge expertise in neuroinflammation, behavioral neuroscience, and immune modulation to identify novel therapeutic targets and biomarkers.

Sarah Kay and Sally Ross Soter with John J. Warner, MD

The interplay between the **immune and nervous systems** and their impact on cardiopulmonary health will uncover novel therapeutic targets, enhancing our ability to manage complex conditions. This interdisciplinary approach recognizes that inflammation, autonomic regulation, and neuroimmune signaling are deeply intertwined in the pathogenesis of heart and lung diseases—from arrhythmias and heart failure to pulmonary hypertension and long COVID. By forging strategic partnerships with the Institute for Brain, Behavior, and Immunology (IBBI) and the Neurological Institute at Ohio State, DHLRI researchers can leverage cutting-edge expertise in neuroinflammation, behavioral neuroscience, and immune modulation to identify novel therapeutic targets and biomarkers.

Sakima Smith, MD

Cardio-oncology will see significant strides in mitigating the cardiopulmonary side effects of cancer treatments, ensuring better overall health for cancer survivors. Opportunities for translational impact in this area are vast and will be supported by new collaborations between scientists and physicians at the DHLRI and James Comprehensive Cancer Center.

A major future direction is the expansion of **computational modeling** to transform how we understand, predict, and treat cardiopulmonary diseases. Advanced simulations—powered by high-resolution data and sophisticated algorithms—can replicate complex biological systems, enabling researchers to forecast disease progression, test virtual interventions, and personalize treatment strategies with unprecedented precision. These models are especially valuable in conditions like heart failure, arrhythmias, and pulmonary hypertension, where dynamic interactions between cells, tissues, and organs are difficult to capture through traditional methods alone. Increased collaborations between engineers, biomedical scientists, bioinformaticians, and clinicians will allow for the integration of patient-derived data, imaging, and physiological measurements into multi-scale models—from molecular signaling to whole-organ function. By bridging medicine and engineering, DHLRI is positioning itself at the forefront of precision cardiovascular and pulmonary care, where computational insights drive real-world impact.

In-Closing...

These advancements collectively promise a future where heart and lung care is more precise, personalized, and effective. We extend our heartfelt gratitude to our dedicated members, the leadership at OSU, our community partners, and our invaluable philanthropic supporters for their unwavering support and collaboration in realizing this vision over the next 25 years and beyond.

DHLRI Membership List

Biological Chemistry & Pharmacology
Arthur Burghes, PhD
George Kyriazis, PhD
Kamal Mehta, PhD
Kirk Mykytyn, PhD

Biomedical Engineering
Rizwan Ahmad, PhD
Daniel Conway, PhD
Daniel Gallego-Perez, PhD
Samir Ghadiali, PhD
Keith Gooch, PhD
Natalia Higuita-Castro, PhD
Mark Ruegsegger, PhD
Rengasayee Veeraragahavan, PhD
Seth Weinberg, PhD

Biomedical Informatics
Qin Ma, PhD
Xia Ning, PhD
Yuan Xue, PhD
Ping Zhang, PhD

Center for Biostatistics
Stanley Lemeshow, PhD

Chemical & Biomolecular Engineering
Jeffrey Chalmers, PhD
Andre Palmer, PhD

Dentistry
John Sheridan, PhD

Electrical Engineering
Asimina Kiourti, PhD
Lee Potter, PhD

Emergency Medicine
Mahmood Khan, MPharm, PhD
Jose P. Guirao Abad, PhD
Onur Kanisicak, PhD

Epidemiology
Amy Ferketich, PhD

Family & Community Medicine
TM Adesanya, MD, PhD
Randell Wexler, MD

Food Science & Technology
Ahmed Yousef, PhD

Health & Rehabilitation Services | Medical Sciences Division
Nicholas Funderburg, PhD

Human Nutrition
Martha Belury, PhD
Ouliana Ziouzenkova, MD

Internal Medicine | Cardiovascular Medicine
William Abraham, MD
Umair Ahmad, MD
Marios Arvanitis, MD
Talal Attar, MD
Ralph Augostini, MD
Cindy Baker, MD
Ragavendra Baliga, MD
Michelle Ballinger, MD
Philip Binkley, MD
Indra Bole, MD
Konstantinos Boudoulas, MD
Vincent Brinkman, MD
Curt Daniels, MD
Steven Dean, MD
Michael Donnally, MD
Beth Foreman, MD
Veronica Franco, MD
Katarzyna Gil, MD
Richard Gumina, MD, PhD
Sampath Gunda, MD
Garrie Haas, MD
Yuchi Han, MD
Ayesha Hasan, MD
Lauren Hassen, MD
Mahmoud Houmsse, MD
John Hummel, MD
Thomas Hund, PhD
Nkechinyere Ijioma, MD
Rami Kahwash, MD
Steven Kalbfleisch, MD
Arsad Karcic, MD
Sara Koenig, PhD
Tapan Kundu, MD
Megan Lancaster, MD
Lauren Lastinger, MD
Scott Lilly, MD, PhD
Jim Liu, MD
Doug Magorien, MD
Raymond Magorien, MD
Unni Marar, MD
William Marshall, MD
Ernest Mazzaferri, MD
Isla McClelland, MD
Laxmi Mehta, MD
Wesley Milks, MD
Paul Moodispaw, MD
David Orsinelli, MD
Vaiibhav Patel, MD
Adam Potter, MD
Ben Romer, MD
James Ryan, MD
Salvatore Savona, MD
Sakima Smith, MD
Gbemiga Sofowora, MD
Blair Suter, MD
Matthew Tong, MD
Ajay Vallakati, MD
Rebecca Vanderpool, PhD
Scott Visovatti, MD
Karolina Zareba, MD

Internal Medicine | Endocrinology, Diabetes, & Metabolism
Andrew Carley, PhD
Joshua Joseph, MD
Willa Hsueh, MD
E. Douglas Lewandowski, PhD
John Stafford, MD

Internal Medicine | Human Genetics
Jason Cowan, PhD
Ray Hershberger, MD
Elizabeth Jordan, MS, LGC
Daniel Kinnamon, PhD

Internal Medicine | Microbiology
Daniel Wozniak, PhD

Internal Medicine | Nephrology
Nicholas Ferrell, PhD
Pei-Hui Lin, PhD
Todd Pesavento, MD
Brad Rovin, MD

Internal Medicine | Pulmonary, Critical Care & Sleep Medicine
Emily Amin, MD
Megan Ballinger, PhD
Joseph Bednash, MD
Ian Bentley, MD
Maneesh Bhargava, MD, PhD
Nitin Bhatt, MD
Kelsey Black, MD
Nathan Brummel, MD
Lawrence Chan, DO
John Christman, MD
Sangwoon Chung, PhD
Megan Conroy, MD
Avraham Cooper, MD
Elliot Crouser, MD
Philip Diaz, MD
Ryan Donald, MD
Gregory Eisinger, MD
Joshua Englert, MD
Vincent Esguerra, MD
Matthew Exline, MD
Laszlo Farkas, MD
Lynn Fussner, MD
Sarah Gallucci, DO
Christian Ghattas, MBBCh
Josh Gordon, MD
Kymberly Gowdy, PhD
Derrick Herman, MD
Kevin Ho, MD
Steven Holfinger, MD
Jeffrey Horowitz, MD
Matthew Huang, MD
Jennica Johns, MD
Manjula Karpurapu, PhD
Meena Khan, MD
Sarah Knapp, MD
Laura Leuenberger, MD
James Londino, PhD
Matthew Long, PhD
Ulysses Magalang, MD
Rama Mallampalli, MD
Yohannes Mebratu, PhD
Ana Mora, MD
Naeem Ali, MD
Richard Nho, PhD
David Nunley, MD
John Odackal, MD
Stella Ogake, MBBCh
Jasleen Pannu, MBBS
Sonal Pannu, MD
Narasimham Parinandi, PhD
Jonathan Parsons, MD
Nicholas Pastis, MD
Drew Peth, DO
Verai Ramasammy, MD
Alberto Revelo, MD
Mauricio Rojas, MD
Justin Rosenheck, DO
Anasuya Sarkar, PhD
Troy Schaffernocker, MD
Arindam Singha, MD
Bronwyn Small, MD
Carleen Spitzer, MD
Jerome Stasek, MD
Kyle Stinehart, MD
Sarah Tapyrik, MD
Joanna Tsai, MD
Jing Wang, MD
Michael Wert, MD

Internal Medicine | Rheumatology and Immunology
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Microbial Infection and Immunity
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Emily Hemann, PhD
Murugesan Rajaram, PhD

Molecular Medicine & Therapeutics
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Michael Tranter, PhD
Wandi Zhu, PhD

Neurological Surgery
Amy Gleichman, PhD
Paco Herson, PhD
Kristy Townsend, PhD

Neuroscience
Phillip Popovich, PhD

Obstetrics & Gynecology
Kartik Venkatesh, MD, PhD

Pediatrics | Nationwide Children's Hospital
Benjamin Blais, MD
Christopher Breuer, MD
Vidu Garg, MD
John Gunn, PhD
Mark Hall, MD
Deqiang Li, MD, PhD
Leif Nelin, MD
Mingtao Zhao, DVM, PhD

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Terry Elton, PhD
Przemyslaw Radwanski, PharmD, PhD

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Kedryn Baskin, PhD
Brandon Biesiadecki, PhD
Krishna Chinthalapudi, PhD
Jonathan Davis, PhD
Isabelle Deschenes, PhD
Vadim Fedorov, PhD
Jidong Fu, MD, PhD
Sandor Gyorke, PhD
Sarah Heissler, PhD
Beth Lee, PhD
Christoph Lepper, PhD
Kiran Nakka, PhD
Drew Nassal, PhD
Yuta Nihongaki, PhD
Jill Rafael-Fortney, PhD
Harpreet Singh, PhD
Matthew Stratton, PhD
Nuo Sun, PhD
Dmitry Terentyev, PhD
Jing Zhao, MD, PhD
Yutong Zhao, MD, PhD
Mark Ziolo, PhD

Psychiatry and Behavioral Health
Tamar Gur, MD, PhD
Leah Pyter, PhD

Radiology
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Orlando Simonetti, PhD

Surgery | Cardiac
Mona El Refaey, PhD
Matthew Gorr, PhD
Qing Lin, MD, PhD
Bryan Whitson, MD, PhD
Loren Wold, PhD
Lufang Zhou, PhD
Hua Zhu, PhD

Surgery | General
Ramiah Jacks, PhD
Kristin Stanford, PhD

Surgery | Thoracic
Peter Kneuertz, MD

Surgery | Transplant
Ginny Bumgardner, MD, PhD

Surgery | Trauma & Critical Care
Julia Coleman, MD

Surgery | Vascular
Matthew Corriere, MD
Wa Du, PhD
Yanbo Fan, MD, PhD
Kristine Orion, MD
Bryan Tillman, MD, PhD

Veterinary Biosciences
Estelle Cormet-Boyaka, PhD

Celebrating 25 Years of Research at the DHLRI

2025
The 25th anniversary of the Dorothy M. Davis Heart & Lung Research Institute is celebrated with a series of events honoring philanthropic supporters, leadership, faculty and staff. Since opening its doors on October 13, 2000, the world-class research institute has remained at the forefront of scientific discovery, advancing science a quarter of a century later.

2024
DHLRI celebrates the 20th Anniversary of the Ross Heart Hospital, serving Ohio and beyond with decades of top-notch patient care and innovation.

2023
Kristin Stanford, PhD named Associate Director of DHLRI.

DHLRI expands its footprint as an anchor on the 5th floor of the Pelotonia Research Center with the addition of several labs.

Research funding at The Ohio State University College of Medicine experienced double-digit growth during the 2023 fiscal year, setting a new record at $421.4 million.

DHLRI hosted the Connor Senn Symposium on Sudden Cardiac Arrest in the Athlete. Attended by over 100 physicians, researchers, high school athletic directors and trainers, the symposium detailed causes and mechanisms of SCA.

2022
Thomas J. Hund, PhD is named Director of DHLRI

DHLRI received a $5.5 million gift from the Dorothy M. Davis Foundation to support a new research chair and sponsor a floor in the new Pelotonia Research Center

The Ohio State University Wexner Medical Center and College of Medicine set a new record for research awards. With many DHLRI investigators and members contributing to this increase, the year closed with a 22% increase over Fiscal Year 2021. The FY22 research portfolio included 98 new $1+ million awards and more than 3,000 active awards, a 6.2% increase over FY21.

2021
At the forefront of the global COVID-19 response, DHLRI continued to play an active role in fighting COVID-19. Repurposing lab space for COVID testing, countless numbers of samples from around the State were processed.

Personnel volunteered to create almost 400,000 virus transport media (VTM) tubes which were used throghout Ohio and nationwide.

DHLRI administration assists in the herculean effort to help process public vaccination for those 80 and older.

2020
DHLRI celebrates their 20th Anniversary, virtually. Due to the COVID-19 pandemic, the event was held through Zoom.

2019
Joe and Linda Chalpaty make a $15 million commitment to further Atrial Fibrillation research.

2018
The 35,000 square foot Bob and Corrine Frick Center for Heart Failure and Arrhythmia is opened; the first-of-its-kind center in the nation.

2017
The DHLRI expands adding 6 additional sites with a total space footprint of >200,000 square feet.

Philanthropic support grows 90% since 2013.

Thomas J. Hund, PhD named Associate Director of DHLRI.

2016
DHLRI encompasses over 700 faculty, staff, and trainees from nine different colleges of 26 departments and divisions.

500 articles on basic and translational research appear in top-tier journals, spanning subjects from molecules to humans resulting in more than 200 clinical research trials in cardiovascular and pulmonary medicine.

2013
TriFit challenge begins with event proceeds going directly to DHLRI for research into early detection of heart disease.

2012
DHLRI expands to over 600 faculty, staff, and trainees.

Connor Senn Memorial Soccer Match and Symposium on Sudden Cardiac Death; proceeds benefitting DHLRI (raised over a quater million dollars over past 2 decades).

2011
Peter J. Mohler, PhD is hired as Director

2007
Dr. Thomas Ryan joined the Ohio State Unviersity Heart Center on July 1, 2007 as director. He was also the John G. and Jeanne Bonnet McCoy Chair in Cardiovascular Medicine and held appointments as professor of internal medicine and physician-scientist leader for the Medical Center's heart signature program - which unites the Davis Heart and Lung Research Institute and the Ross Heart Hospital.

2005
For the first time, OSU heart and lung programs are ranked among "America's Best" by U.S. News and World Report's Hospitals list.

2003
An OSURF satellite office is established in the DHLRI.

2002
The OSU Department of Surgery and the Davis Heart and Lung Research Institute host the first conference in the United States to address the potential role of oxygen in wound care. This international conference focuses on oxygen sensing, oxidant signaling, oxygen therapeutics, gene therapy, angiogenesis, inflammation, and clinical care.

Jay Zweier, MD, PhD is hired as Director.

Broke ground on the Richard M. Ross Heart Hospital, clinical arm of the HVC and direct partner in DHLRI research and translational care.

2001
The OSU Heart & Lung Research Institute is renamed Dorothy M. Davis Heart and Lung Research Institute, as approved by the Board of Trustees upon receiving a $1,000,000 endowment and $10 million gift.

2000
The OSU Heart and Lung Research Institute opens its doors to a 96,000 square foot free-standing building, one of the largest and most comprehensive Institutes/Centers at The Ohio State University and dedicated institutes in the country devoted to cardiovascular, pulmonary, renal, and metabolic disease.

Notes

With cooperation by contributors, this annual report was created and edited by Izabelle Colvin, DHLRI.

THE OHIO STATE UNIVERSITY

DOROTHY M. DAVIS HEART AND LUNG RESEARCH INSTITUTE