NYU Langone Health

CENTER FOR THE PREVENTION OF CARDIOVASCULAR DISEASE

2021 RESEARCH INNOVATIONS AND CLINICAL EXCELLENCE REPORT

Setting New Standards for Patient Care, Research, and Education in Cardiovascular Disease Prevention

At the NYU Langone Health Center for the Prevention of Cardiovascular Disease, we take a multidisciplinary approach to preventing and treating the single greatest threat to human health: heart disease. Our program intertwines three missions: clinical care, research, and education. None takes precedence over the others.

These missions are oriented around an ultimate goal of bringing about the very best care and quality of life for patients. To every patient encounter we bring an in-depth knowledge of current treatment modalities as well as an appreciation for and understanding of how to help patients with personal lifestyle factors that affect cardiovascular risk.

We engage in the kind of groundbreaking research that has the potential to help our patients today and to create the treatments that others will be practicing tomorrow. Our researchers are uncovering the underlying mechanisms of cardiovascular disease. We also run large, international clinical trials that will guide therapy for decades to come. Through our continuing medical education programs, we share these discoveries with others around the country, while right here in New York we're training physicians and healthcare providers for careers in cardiovascular disease prevention. We're also one of just a handful of programs in the country to offer a fellowship in cardiovascular prevention.

At the Center, we stress collaboration between scientists and clinicians. That keeps us in the forefront of cardiovascular discoveries and treatments, and in the driver's seat for figuring out how to prevent cardiovascular disease. Clinical observations lead to improved diagnosis, clinical care, and research, and the research then leads back to discovery, clinical trials, and improved population health. Ultimately, our patients reap the benefits.

A Message from the Director

I am excited to share in these pages the extraordinary accomplishments of the NYU Langone Center for the Prevention of Cardiovascular Disease, a component of the renowned Leon H. Charney Division of Cardiology.

The Prevention Center was established in 2003 to consolidate and integrate research, clinical care, and education across diverse fields, all aimed at providing care to patients at risk for heart disease and stroke. Our visionary founders (pictured on page 15) laid the groundwork for our successes today by establishing one of the country's first such centers focused on cardiovascular prevention. Over the past 18 years, we have built a state-of-the-art program, inclusive of lipid abnormalities, hypertension, metabolic health, inflammation and immunity, abnormal clotting, environmental medicine, women's heart disease, exercise, nutrition, and other lifestyle issues.

A critical component of what sets the Center apart is our relentless commitment to pushing science forward, dynamically shaping and improving the clinical care landscape, and training the future leaders in this field. This report is our way of sharing with you news about our program and the dynamic research advances and emerging treatment strategies that hold exciting promise for improving quality of life for our community—and yours.

In our research, we use state-of-the-art techniques to investigate not just how to prevent and treat the disease, but in a sense go back in time and regress it. As I look to the future, I envision continued partnership between our physician-scientists and our healthcare providers targeting areas that have the potential to forever change the way we approach cardiovascular disease. The possibilities are thrilling.

I invite you to read on to learn more about the work we do at the NYU Langone Center for the Prevention of Cardiovascular Disease.

Sincerely,

Jeffrey S. Berger, MD, MS
Associate Professor of Medicine and Surgery
Director, Center for the Prevention of Cardiovascular Disease

What Sets Us Apart: Clinical Expertise and Services

DYSLIPIDEMIA

Abnormalities in blood lipid levels are a major risk factor for cardiovascular disease. Our group has been at the forefront in understanding how various lipoproteins (LDL, HDL, VLDL) influence cardiovascular risk. The approach to treating a patient with isolated elevated LDL cholesterol is different from that of treating someone with low HDL cholesterol and elevated triglycerides. We treat lipid abnormalities according to the American Heart Association and American College of Cardiology guidelines, and individualize our care to optimize outcomes for each individual patient.

CARDIO-METABOLIC DISORDERS

Patients with metabolic disorders—including diabetes and obesity—are at greater risk for heart disease. Early targeted treatment strategies and lifestyle interventions can help prevent heart disease and lead to improved outcomes. Our researchers in the fields of cardiology and endocrinology collaborate to uncover novel mechanisms and discover new treatment strategies to reduce risk.

THROMBOSIS

Thrombosis (or blood clots) are responsible for many heart attacks and strokes. Our National Institutes of Health (NIH)-funded laboratory is investigating the role of platelets and clotting proteins across diseases. The lab's discoveries are finding novel mechanisms and helping to guide personalized therapies that may help prevent a first heart attack or stroke.

CARDIO-ONCOLOGY

Together with oncologists at the NYU Perlmutter Cancer Center, our team assesses and provides specialized prevention-focused management for patients with cancer whose treatment regimens may put them at higher cardiovascular risk.

CARDIO-RHEUMATOLOGY

The Cardio-Rheumatology program is one of the country's first to focus on cardiovascular prevention in patients with autoimmune and inflammatory conditions, which can double or triple their risk of heart disease and stroke.

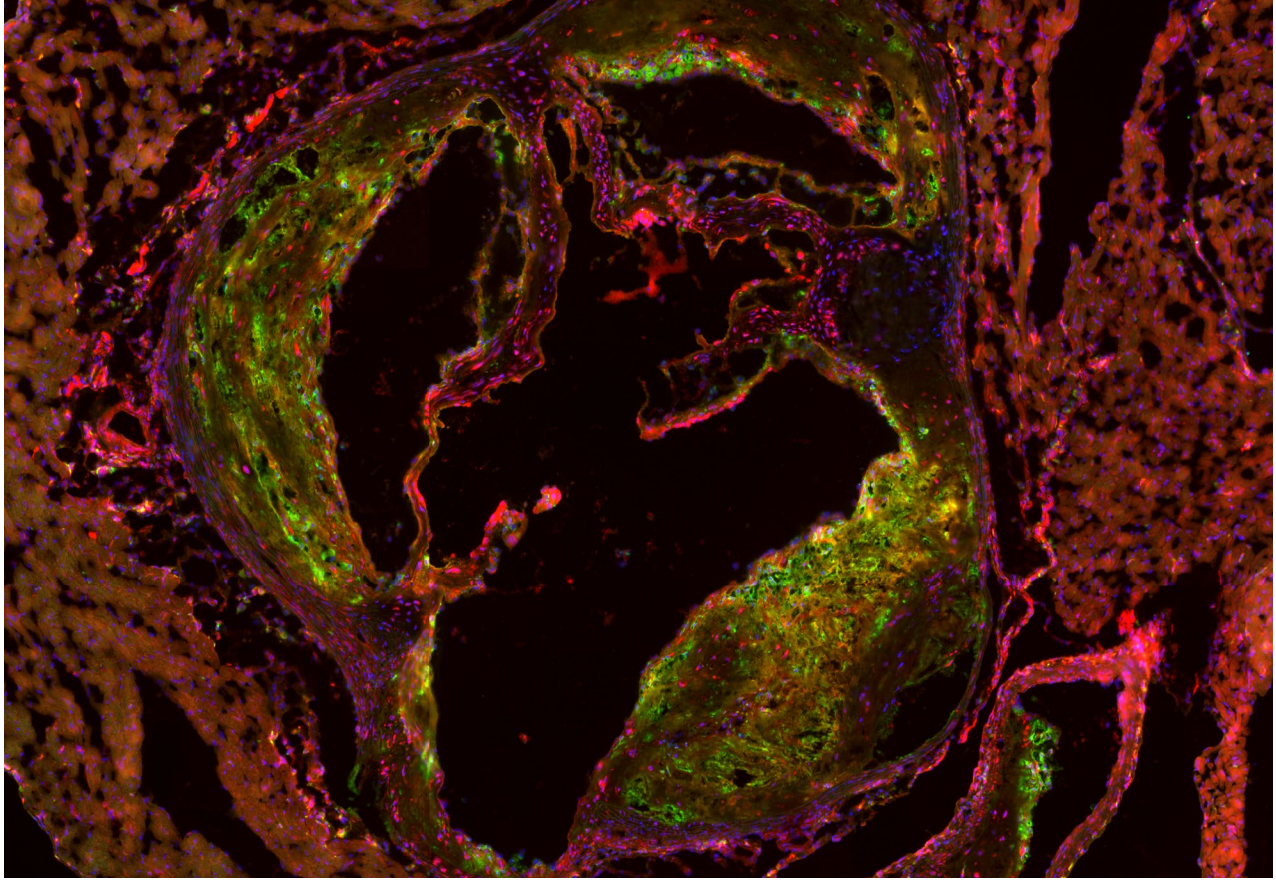
INPATIENT CONSULT SERVICE

We perform a comprehensive patient assessment after cardiology procedures, stroke, or other primary reasons for hospitalization, providing individualized recommendations about diet, physical activity, weight loss, sleep apnea, cardiac rehabilitation, and post-procedural medication optimization and adherence. We offer patients the option to enroll in cutting edge clinical trials.

FAMILIAL HYPERCHOLESTEROLEMIA

Familial hypercholesterolemia (FH) is an inherited disease that leads to high cholesterol levels from birth and is associated with a significantly increased risk of heart disease and stroke at an early age. We offer expert management of this condition with access to the newest treatments and clinical trials. Our programs at NYU Langone and New York City Health + Hospitals/Bellevue focus on managing and treating patients with FH. Our training programs have produced more new specialists in this field than any other program in the country.

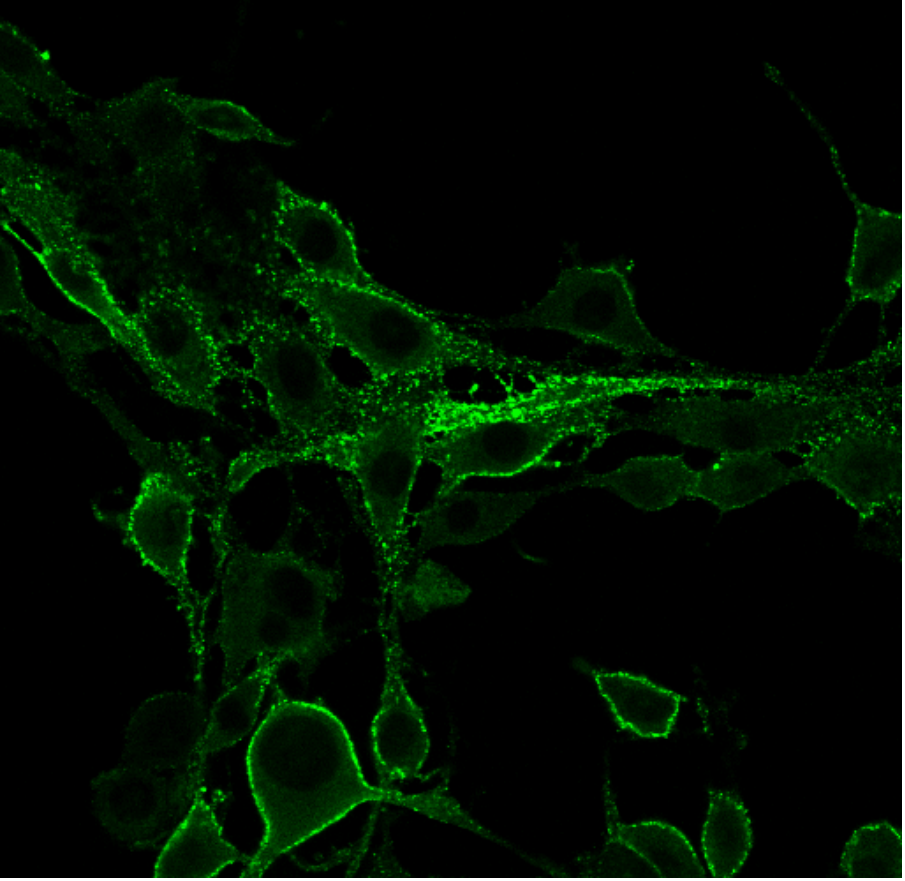
To learn more about our clinical programs, research, and educational offerings, visit us at **nyulangone.org/cvdprevention**



Basic and Translational Research

REGRESSION OF ATHEROSCLEROSIS

While preventive treatment has made major strides in reducing the risk of heart attack, many people will still experience one. This "residual risk" is the inspiration for the continued clinical and basic science studies carried out by the Center's faculty. The aim is to halt the progression and, ideally, promote the regression of atherosclerotic plaques in the arteries that lead to heart attack. Edward Fisher, MD, PhD, is a pioneer and widely recognized leader in the development of pre-clinical models of human atherosclerosis and the application of cutting-edge technologies that have the potential to reduce residual risk. Research from the Fisher Lab, published in the *Journal of Clinical Investigation*, found that without also reducing the inflammation level of macrophages (plaque cells filled with cholesterol), lowering LDL cholesterol is not sufficient to regress atherosclerosis. This work presaged the results of the CANTOS trial, which showed that the most effective combination of prevention in certain high-risk individuals was both LDL cholesterol-lowering and anti-inflammatory therapy.



Opposite page: Aortic root sections from Wnt-reporter mice were stained with a macrophage marker in green. This allows us to isolate Wnt-responsive cells from atherosclerotic plaques and investigate how Wnt regulates their function. (unpublished; Fisher Lab)

This page: Cultured endothelial cells incubated with labeled chylomicrons, shown in green. This led to the cells being coated with chylomicrons on their surface. This process appears to illustrate a new pathway for movement of circulating lipids into tissues and the arterial wall. (Cabodevilla et al. JCI 2021; Goldberg Lab)

Learn more about our groundbreaking research at
nyulmc.org/cvdprevention
nyulmc.org/cvrc

UNCOVERING RESIDUAL RISK IN DIABETES

NYU Grossman School of Medicine is home to one of only four national scientific teams selected to create a new American Heart Association Strategically Focused Research Network (AHA SFRN) on cardiometabolic health and type 2 diabetes. This prestigious grant will help our teams focus on metabolic health, in an effort to better prevent and treat these conditions.

Directed by Ira Goldberg, MD, the three-part program is called "Diabetes and Vascular Repair in Women and Men" (REPAIR for short). Its focus arises from basic research performed in the laboratory of Edward Fisher, MD, PhD, which found that animal models of diabetes may not benefit from cholesterol reduction. The program is divided into the following three projects:

- Project 1, led by Edward Fisher, MD, PhD, will determine whether the ineffectiveness of statins is linked to high blood sugar or defective insulin actions.
- Project 2, led by Chiara Giannarelli, MD, PhD, and co-investigator Jonathan Newman, MD, will compare the pathology of carotid arteries and radiologic imaging to assess changes in atherosclerosis in patients with diabetes and vascular disease.
- Project 3, led by Jeffrey Berger, MD, will examine how dramatic cholesterol reduction changes the ability of blood to clot and also alters expression of genes in circulating platelets and white blood cells.

The REPAIR SFRN four-year grant promises to provide new information on how diabetes affects blood vessels, with the goal of finding correctable abnormalities. The information we obtain via REPAIR may lead to new treatment strategies and a personalized approach to prevent or alleviate heart disease in patients with diabetes, as well as others with impaired metabolic health.

Translational and Clinical Research

EXAMINING OBESITY AND CARDIOVASCULAR DISEASE

Nearly one-quarter of all cardiovascular disease is attributable to obesity. Understanding how and why obesity increases risk is critical to reducing heart disease. The translational research program, led by Sean Heffron, MD, aims to identify new risk factors for cardiovascular disease in obesity, and understand how these may be targeted to prevent adverse cardiovascular outcomes. Among other efforts, our current work focuses on understanding how best to resolve the chronic vascular inflammation associated with excess body weight. This work will improve our understanding of obesity's role in the pathophysiology of cardiovascular disease, which may provide targets for risk reduction in individuals with and without obesity.

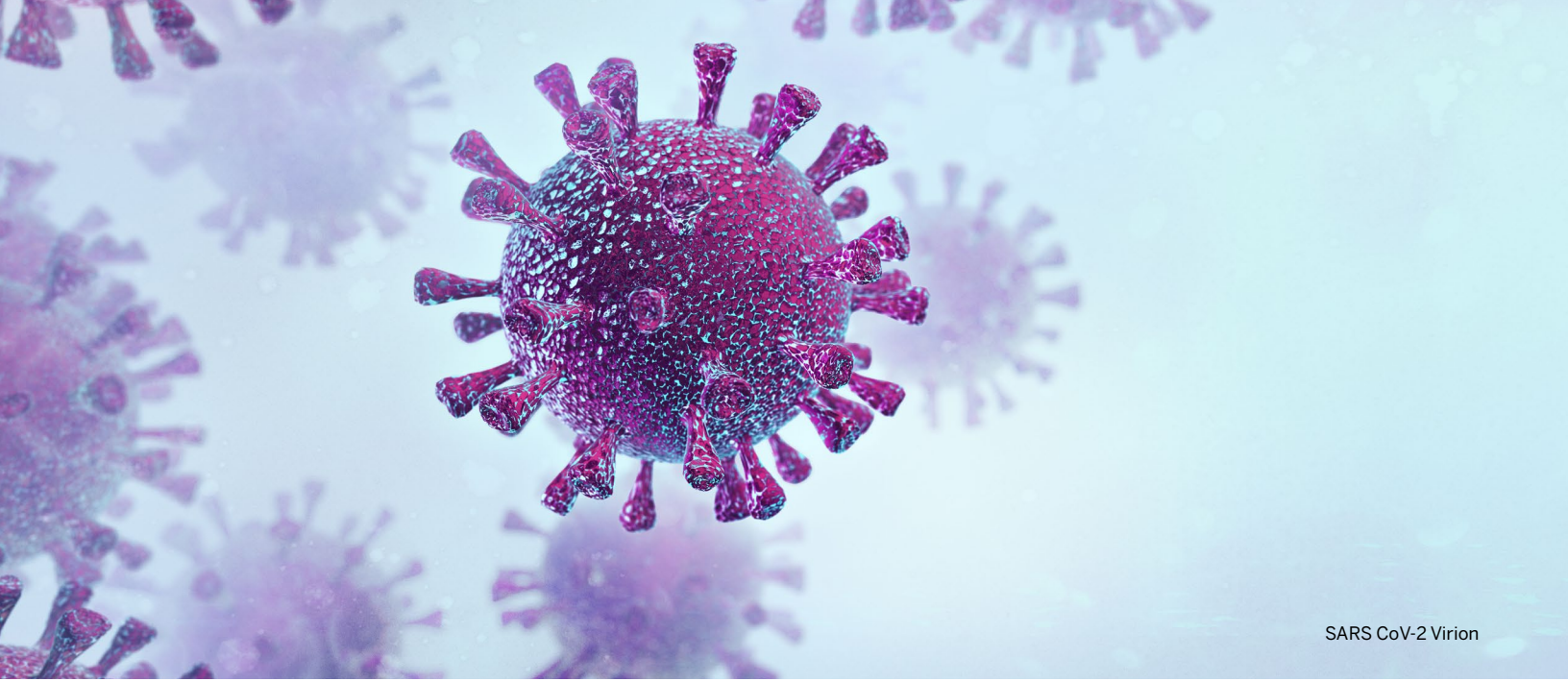
ENVIRONMENTAL EXPOSURES AND CARDIOMETABOLIC RISK

Jonathan Newman, MD, and his team are conducting innovative research into the adverse health effects of ubiquitous environmental exposures. The aim is to better understand these effects, as well as to pioneer the development of strategies to reduce them. To date, the team has led important studies to understand the vascular effects of air pollution on the risk of carotid artery stenosis, a significant driver of stroke. Their analyses show that daily exposure to air pollution can lead to clinically meaningful increases in blood pressure. Dr. Newman and his team are also involved with a number of NIH-funded clinical trials testing novel strategies to reduce the effects of environmental exposures such as lead and cadmium, under-recognized vascular risk factors. Their work also includes exploring the ways common cardiovascular risk factors such as diabetes interact with environmental exposures like air pollution to promote the development of cardiovascular disease.

LIPOPROTEIN(A) RESEARCH

Elevated levels of the LDL variant LP(a) are found in roughly 20% of the world's population. As levels rise, research has found a clear increase in atherothrombotic risk, which causes heart attack and stroke, as well as aortic stenosis. Lowering LDL with statins may reduce the risk in general, but statins don't lower LP(a)—and may actually raise levels slightly. Howard Weintraub, MD, and colleagues have been instrumental in the development of two new agents that have been shown to lower LP(a) up to 80%. A phase 2 study of an interfering RNA to LP(a) is underway, led by Howard Weintraub, MD, and his team. Additionally, we're proud to be one of four national lead centers in the HORIZON trial, which examines the cardiac outcomes for an antisense oligonucleotide to LP(a). This will be the first study to offer definitive evidence about the impact of significant reduction in LP(a) levels in patients at high cardiovascular risk with elevated LP(a) levels.

Clinical research and administrative staff of the Prevention Center.



SARS CoV-2 Virion

Leading a Major COVID-19 Clinical Trial in Operation Warp Speed

In the spring of 2020, as the COVID-19 pandemic overwhelmed New York-area hospitals, physicians at our Center noted and then published several studies demonstrating the frequency and severity of clotting complications among patients hospitalized with SARS-CoV-2. In many of those cases, clotting led to critical illness, the need for mechanical ventilation, and death. Even as we were trying to understand why these clotting events were happening, we also began to study how they might be prevented. Those clinical observations led to the Center spearheading one of the federal government's Operation Warp Speed trials in the Accelerating COVID-19 Therapeutic Interventions and Vaccines (ACTIV) program.

Launched in late April 2020, ACTIV-4 is a large, international trial evaluating the safety and effectiveness of antithrombotics to treat adults hospitalized with COVID-19. The goal is to prevent, treat, and target COVID-19-associated coagulopathy (CAC). By targeting CAC, we sought to improve mortality and the severity of illness. The ACTIV-4a trial in collaboration with other platforms has already shaped the way antithrombotic therapy is being used in all hospitalized patients. Under the leadership of Jeffrey Berger, MD, principal investigator of ACTIV-4a, they are investigating the effect of antiplatelet therapy with a P2Y12 inhibitor on the need for organ support in hospitalized patients with COVID-19. The Center remains at the forefront of this work, which started with many of our clinical observations.

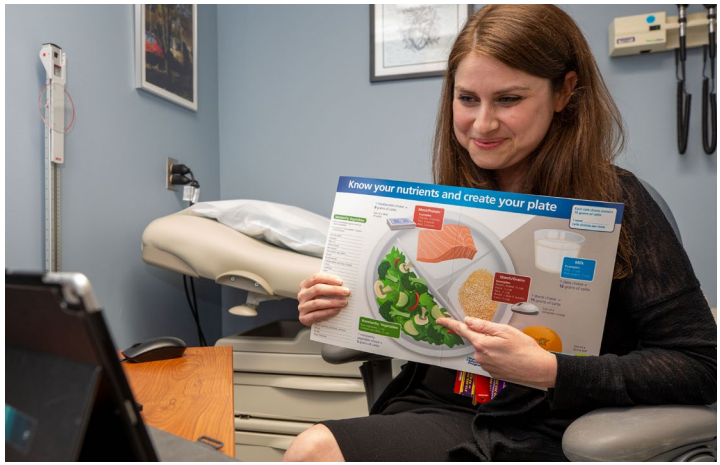
Lifestyle Approaches to Cardiovascular Disease

EXERCISE PHYSIOLOGY

Despite the well described benefit of physical activity, less than half of U.S. adults (and even fewer patients with heart disease) achieve recommended levels of exercise. Our group works with patients to determine their suitability and barriers to exercise and adequate physical activity. In collaboration with partners with New York City's 14th Street Y, we provide exercise prescriptions and personalized instruction in order to improve cardiovascular fitness and heart health.

HEART HEALTH NUTRITION

Lifestyle modification is at the foundation of our recommendations for the prevention of cardiovascular disease. It can be hard to make time for an in-depth conversation about nutrition and diet during a medical visit. Having a registered dietitian (RD) on staff means we can go beyond the basics and work closely with patients and their families in a team-based approach. Our RD helps patients select the best eating pattern for them, one that considers their preferences as well as their medical history. We then create a customized plan to make heart-healthy eating a daily habit.



Patients can meet with their nutritionist or cardiologist either in person or via telehealth on their tablet or smartphone according to their preference and convenience.

Training Tomorrow's Leaders in Cardiovascular Prevention

PREVENTIVE CARDIOLOGY FELLOWSHIP

NYU Grossman School of Medicine is one of just 10 programs around the country that offer a comprehensive fellowship in cardiovascular prevention. Each year one fellow undergoes intensive training in all subjects related to cardiovascular prevention, including diabetes, lipid disorders, hypertension, and thrombotic disorders. This training allows doctors to gain expertise in the growing field of cardiovascular prevention and to prepare them for careers in clinical practice and academic medicine.

PREVENTIVE CARDIOLOGY ELECTIVE

The Center offers an elective focused on cardiovascular prevention and metabolic health to medical students, residents, and fellows in Cardiology and Endocrinology. It provides a deeper knowledge and understanding of cardiac risk assessment and risk factor reduction through medical therapy and lifestyle approaches, as well as exposure to cutting edge developments in clinical and translational research.

Continuing Medical Education

In our Continuing Medical Education (CME) series, we share state-of-the-art approaches to key aspects of cardiovascular prevention. CME conferences occurred virtually in 2021, though we look forward to a return to in-person sessions in 2022.

Dietary and Lifestyle Strategies for Cardiovascular Risk Reduction: Reviews risk-prevention strategies and ways to foster behavior change and help patients use technology to improve adherence to improved lifestyle.
nyulmc.org/hearthealthcme

The Irwin D. Mandel Advances in Cardiovascular Risk Reduction: Improving Treatment for Patients with Diabetes: Covers scientific and clinical advances in diabetes management, and strategies to achieve cardiovascular risk reduction in patients with impaired metabolic health.
nyulmc.org/cvriskcme

Management of Cardiometabolic Risk in Inflammatory Conditions: Improving Treatment in Psoriasis, Inflammatory Arthritis, Systemic Lupus Erythematosus, and HIV: Underlying mechanisms and clinical management of patients at elevated risk of cardiometabolic disease due to pro-inflammatory conditions.
nyulmc.org/cvinflammationcme

"It is courses like this that re-inspire me to the promise and possibilities of being a physician and trying to help my patients not just by ordering tests and pushing medications, but by starting with the basics of teaching them how to live a healthier life and avoid all the diseases we have learned how to treat but fail woefully in trying to prevent."

– Attendee Evaluation Response to the 2020 Dietary and Lifestyle Strategies CME Course

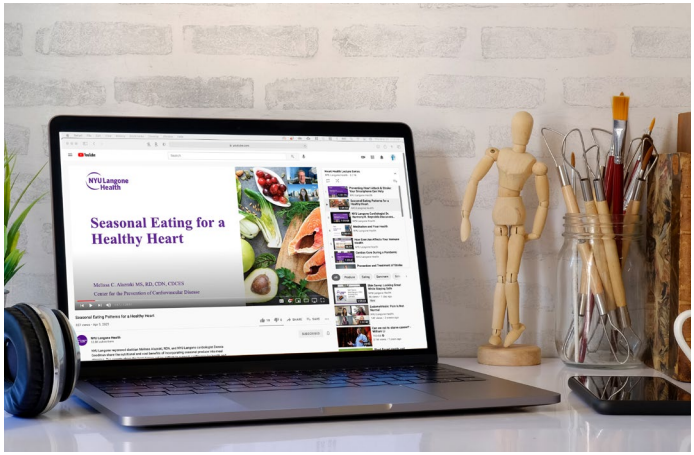
"My experience as the Preventive Cardiology fellow has positively altered my career trajectory. It is a privilege to work alongside such a dedicated group of physician-scientists who are not only at the forefront of important basic and clinical research questions, but also take the time on an individual patient level to optimize cardiovascular risk through lifestyle and pharmacologic approaches. What I have learned this year will inform everything I do as a cardiologist."

– Jack Bostrom, MD
2020–2021 Fellow

Patient Education and Outreach

HEART HEALTH LECTURE SERIES

Hosted and directed by Dennis Goodman, MD, clinical professor of medicine and director of Integrative Medicine, this patient education program, comprised of free events taking place throughout the year, highlights the expertise of our clinical and research staff and that of our expert colleagues across NYU Langone, while also sharing information about the world-class programs and services at the Center. A dedicated audience Q&A time gives attendees the opportunity to engage with our experts. The lectures, on topics that range from women and heart disease to the link between cardiovascular health and Alzheimer's disease, are livestreamed and recorded. Available in a YouTube playlist, the series extends the educational impact of the series to an even broader community.



Visit **nyulangone.org/hearthealthlectures** for more information about our Heart Health Lecture Series.

Center Faculty & Clinical Care Team

Jeffrey S. Berger, MD, MS
Associate Professor of Medicine and Surgery

Director, Center for the Prevention of Cardiovascular Disease

Director, Cardiovascular Thrombosis

Edward A. Fisher, MD, PhD, MPH
Leon H. Charney Professor of Cardiovascular Medicine

Director, Marc and Ruti Bell Vascular Biology Program

Director of Translational Research, Center for the Prevention of Cardiovascular Disease

Howard S. Weintraub, MD
Clinical Professor of Medicine

Clinical Director, Center for the Prevention of Cardiovascular Disease

Associate Program Director, Preventive Cardiology Fellowship Program

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Associate Professor of Medicine

Program Director, Preventive Cardiology Fellowship Program

Clinical Research Director, Center for the Prevention of Cardiovascular Disease

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Director, Division of Endocrinology, Diabetes, and Metabolism

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Clinical Professor of Medicine
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Sean P. Heffron, MD, MS, MSc
Assistant Professor of Medicine

Jonathan D. Newman, MD, MPH
Eugene Braunwald, MD
Assistant Professor of Medicine

James A. Underberg, MD, MS
Clinical Assistant Professor of Medicine
Director, Bellevue Hospital Lipid Clinic

Stephanie Hopkins, NP
Nurse Practitioner

Melissa C. Alazraki, RDN
Clinical Nutritionist

Metrics and Recognition

In 2020 our faculty published more than

100

peer-reviewed articles

Since 2004 we have published more than

1,000

peer-reviewed papers (via PubMed)

>10

clinical trials testing innovative strategies and novel therapies on cardiovascular risk

Our six physician-researchers are leading

21

federal and foundation-funded research projects with direct costs funding totaling approximately

$6 million

- 15 National Institutes of Health grants
- 4 American Heart Association grants
- 1 National Psoriasis Foundation grant
- 1 American Society of Hematology grant

Since 2015 we have conducted more than

40

seminars with

2,000

attendees

U.S. NEWS AND WORLD REPORT HAS RECOGNIZED NYU LANGONE AS:

- #8 in the Nation for Best Hospitals
- #2 for Best Medical Schools (Research)
- #5 in the nation in Cardiology & Heart Surgery
- #4 in the Nation for Diabetes & Endocrinology

The accomplishments and stature of the Center for the Prevention of Cardiovascular Disease would not be possible without the tremendous contributions of our founding members, pictured from left to right: Dr. Arthur Z. Schwartzbard, Dr. Edward A. Fisher, Dr. Howard S. Weintraub, and Dr. Michael F. Schloss (deceased).

NYU Langone Health

The Center for the Prevention of Cardiovascular Disease is a component of the renowned Leon H. Charney Division of Cardiology.

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