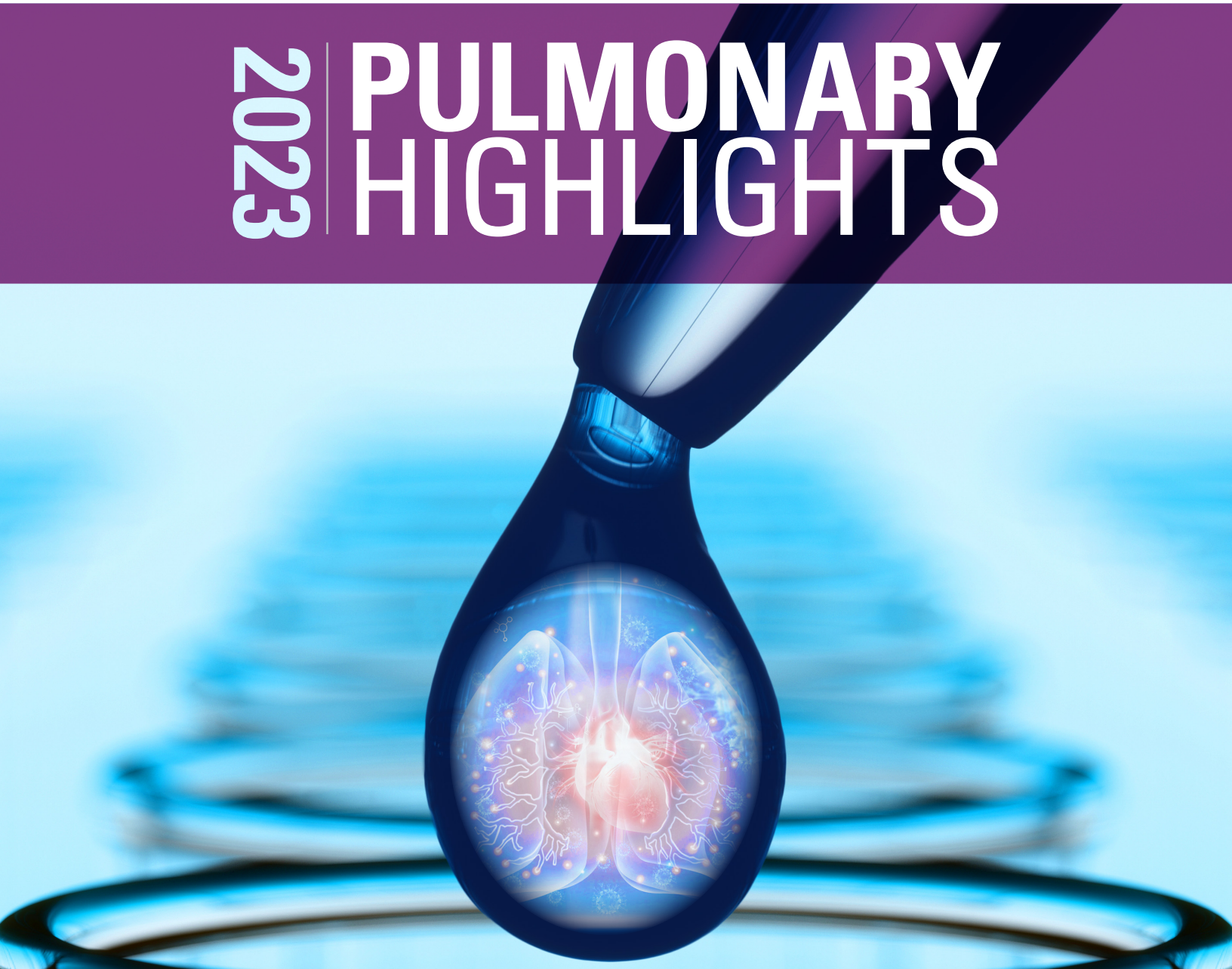
Clinical Expertise, Research and Education

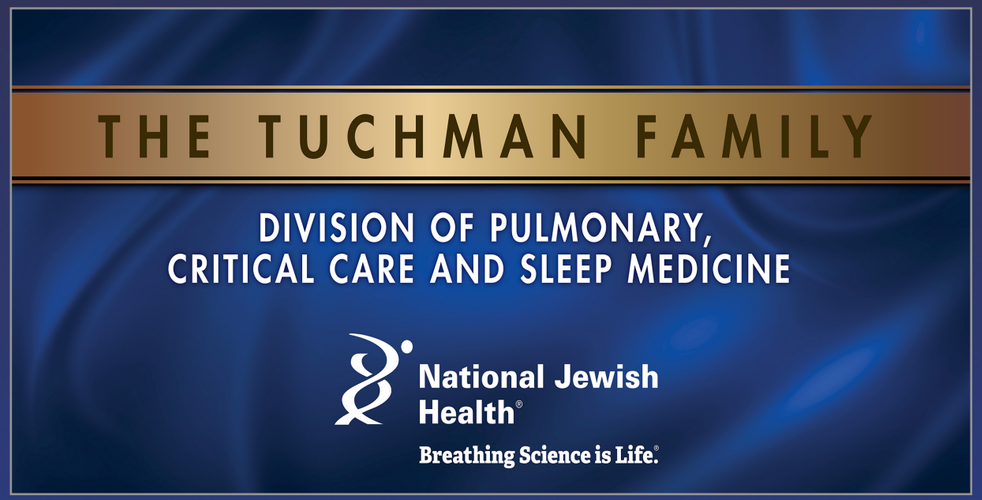
2023 PULMONARY HIGHLIGHTS



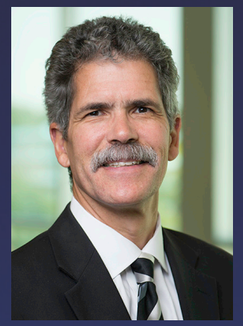
BEST HOSPITALS U.S.News & WORLD REPORT PULMONOLOGY & LUNG SURGERY 2022–23

National Jewish Health®

Breathing Science is Life.®



National Jewish Health acknowledges The Tuchman Family Foundation and Debra and Ken Tuchman for their generous gift to establish The Tuchman Family Division of Pulmonary, Critical Care and Sleep Medicine. For more than 20 years, Debra and Ken Tuchman and the Tuchman Family have been committed to National Jewish Health through board service and as outstanding advocates for the institution.



Dear Colleague,

Although COVID-19 continued to dominate much of the health care conversation in 2022, we are encouraged by signs that the pandemic is waning. At the same time, we continue to see large numbers of patients with persistent COVID symptoms and functional impairment after they recover from the acute disease. Teamwork and collaboration with clinicians and researchers in our Center for Post-COVID Care and Recovery, along with colleagues across the country, continue to advance our understanding and treatment of long COVID.

At National Jewish Health, we are focused on the full range of respiratory and related illnesses. Asthma to COPD, cystic fibrosis to interstitial lung disease, we practice a multidisciplinary model of care that provides patients with comprehensive evaluations by pulmonologists and other specialists, all under one roof. We have internationally recognized clinicians across our specialties, including pulmonology, cardiology, gastroenterology, oncology, occupational lung disease, immunology, and others, that are experienced in the evaluation and treatment of multisystem illnesses. We bring basic and translational researchers together to work side by side with our clinicians to advance our understanding and management of respiratory disease. In the past year, National Jewish Health scientists have published more than 450 articles in peer-reviewed scientific and medical journals, growing our experience and knowledge.

Physicians, researchers and staff at National Jewish Health are working tirelessly to seek the insight and answers necessary to make a difference in the lives of all patients. This approach is one of the reasons that, for 26 consecutive years, we have been named #1 or #2 on the *U.S. News & World Report* list for best hospitals in pulmonology.

Thank you for taking a few moments to read about National Jewish Health and how we are advancing pulmonary medicine. We look forward to serving as a resource for you and your patients.

Kevin K. Brown, MD
Chair, Department of Medicine
National Jewish Health

Irina Petrache, MD
Chief, Division of Pulmonary,
Critical Care and Sleep Medicine
National Jewish Health

Emerging from the Pandemic: Insights on Long COVID Causes and Care

As the COVID-19 pandemic stretched into its third year, scores of patients continued to struggle with lingering symptoms, including shortness of breath, fatigue, brain fog and gastrointestinal problems. More than 6,000 of those patients came to the National Jewish Health Center for Post-COVID Care and Recovery.

Clinicians and researchers at National Jewish Health led or participated in more than 80 COVID-related research projects aimed at increasing our understanding of COVID and long COVID — identifying the impact on body systems and overall health and developing effective treatments for acute and post-acute disease.

"There is no common characteristic among patients experiencing post-COVID syndrome," said **Irina Petrache, MD,** chief of Adult Pulmonary, Critical Care and Sleep Medicine, reinforcing the need for individualized care.

The team of experts in pulmonology, neurology, gastroenterology, infectious disease, cardiology, rheumatology, allergy and immunology work together to understand the unique symptoms each patient faces.

National Jewish Health research on COVID published in the *American Journal of Respiratory and Critical Care Medicine* summarized much of what physicians treating post-acute COVID-19 have learned. A lost sense of smell was the greatest single predictor of developing long COVID. Conversely, preexisting lung disease did not predispose patients to lingering symptoms. Researchers also learned that recovery from long COVID is likely to last nine to 12 months, at which point lung scarring will stabilize or improve.

A National Jewish Health research team of clinicians and basic researchers described four different phenotypes of COVID patients in the journal *Southwest Respiratory and Critical Care Chronicles*. Three of the phenotypes, accounting for about half of patients, had previously recognized syndromes resulting from acute infection, intensive care unit and hospital stays, and the worsening of preexisting lung disease. The fourth category is the mysterious long COVID, which commonly affects previously healthy, younger patients, who often suffered mild disease. They can experience extreme fatigue, exercise intolerance and wildly fluctuating heart rates, among other symptoms.

"The ongoing pandemic will no doubt increase the numbers of those who suffer long COVID symptoms, making it even more important that we continue the focus on this illness," said Dr. Petrache.

Respiratory therapist Valerie Keever (right) conducts tests on a long COVID patient.

Caring for Patients with Long COVID Leads to Published Studies with Significant Findings

Vamsi P. Guntur, MD

Looking to Plasma for Long COVID Answers

Exercise intolerance has been shown to be a significant symptom of long COVID. In these patients, exercise intolerance is associated with higher arterial blood lactate accumulation and lower fatty acid oxidation rates during graded exercise tests to volitional exertion, suggesting altered metabolism and mitochondrial dysfunction.

Pulmonologist **Vamsi P. Guntur, MD**, and colleagues analyzed plasma samples from patients recovered from COVID, those suffering long COVID symptoms and healthy controls. They found that plasma from individuals who fully recovered from COVID exhibited an intermediary metabolic phenotype, with milder disturbances in fatty acid metabolism and higher levels of spermine and taurine. They also noted depletion of tryptophan, a hallmark of disease severity in COVID, is not normalized in long COVID patients, despite normalization of kynurenine levels.

They concluded that long COVID plasma metabolites are indicative of altered fatty acid metabolism and dysfunctional mitochondria-dependent lipid catabolism. These metabolic profiles obtained at rest are consistent with previously reported mitochondrial dysfunction during exercise and may pave the way for treatment focused on restoring mitochondrial fat-burning capacity.

Signatures of Mitochondrial Dysfunction and Impaired Fatty Acid Metabolism in Plasma of Patients with Post-Acute Sequelae of COVID-19 (PASC)
Metabolites. 2022 Oct 26;12(11):1026.

Nathan Rabinovitch, MD

Addressing COVID Symptoms in Children

A study led by National Jewish Health found that the majority of children with post-COVID respiratory symptoms exhibited reversible peripheral airway obstruction and lung hyperinflation despite normal spirometry.

"Children can experience lingering symptoms, including chronic cough, chest pain and shortness of breath, which is an underappreciated problem," said **Nathan Rabinovitch, MD,** director of the Pediatric Day Program and a pediatric allergist and immunologist.

Many of these previously active and healthy children reported multisystem complaints, including chronic fatigue and exercise intolerance, along with behavioral, neurological, GI, chronic pain or respiratory symptoms, necessitating a comprehensive whole-body assessment. These children improved with daily inhaled corticosteroid and bronchodilator therapy, along with the initiation of a specialized physical therapy program.

Reversible Peripheral Airway Obstruction and Lung Hyperinflation in Children Presenting with Dyspnea and Exercise Intolerance After COVID-19 Infection
American Journal of Allergy and Clinical Immunology: In Practice, 2022-10-01, Volume 10, Issue 10, Pages 2748-2749.e1.

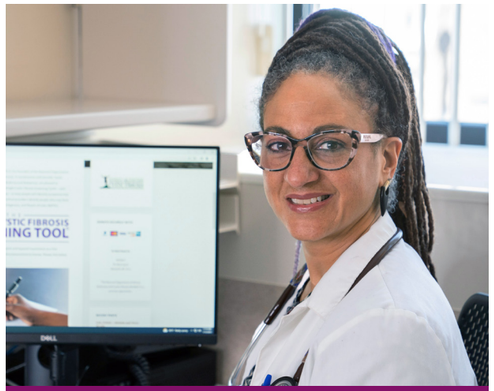
Special Programs Advance Disease Understanding

National Jewish Health physicians bring their expertise to research and projects that impact the understanding of various diseases, treatments and care.

Cystic Fibrosis Screening for All

Though more prevalent in white populations, cystic fibrosis (CF) can affect anyone. However, for years people of color presenting with CF symptoms have been misdiagnosed. So when National Jewish Health pulmonologist **Jennifer Taylor-Cousar, MD**, met Terry Wright, a CF patient who was previously told he couldn't have the disease because of his skin color, she decided to take action.

Working with Wright, Dr. Taylor-Cousar developed a tool that would make CF screening more accessible to a broader population. Now known as The Wright Cystic Fibrosis Screening Tool©, this instrument was approved by the Cystic Fibrosis Foundation's education committee and is available online in Spanish and English. "The sooner we get the word out about this tool, the better – it could literally save or change someone's life," said Dr. Taylor-Cousar.



Jennifer Taylor-Cousar, MD, helped create an inclusive CF screening tool.

Center for ILD Combines Top Minds with Top Care

The Center for Interstitial Lung Disease (ILD) at National Jewish Health is one of the largest and most prestigious programs of its kind in the U.S. Building on that historic leadership in research, innovation and patient care is an ever present goal. **Joshua Solomon, MD**, director of the Center for Interstitial Lung Disease, is constantly looking for new technologies and treatments.

Joshua Solomon, MD
Director, Center for Interstitial Lung Disease

In recent years, specialists at the Center have worked toward a more data-driven approach. Because the hospital draws such a diverse group of ILD patients, pulmonologists have the unique opportunity to parlay vast sets of CT scans and fibrotic scores toward more accurate diagnoses. Quantitative experts like **Stephen Humphries, PhD**, apply the latest analyses to convert raw data into clinical care, ensuring patient trajectories are easier to predict based on models of scarring progression.

"So much goes into the diagnosis of ILD," said Dr. Solomon. "Our use of quantitative CT is making us more confident about how we diagnose and what our next steps should be."

While this new approach improves current patient outcomes, Dr. Solomon and his team are working at the forefront of ILD research, reviewing the latest pharmaceuticals in the pipeline and publishing high-impact papers.

Among the research are breakthrough studies led by **Kevin Brown, MD**, on the use of nintedanib in progressive fibrosing ILD in the *New England Journal of Medicine* and by **Evans Fernández, MD**, on the use of pirfenidone in hypersensitivity pneumonitis in *ERJ Open Research*. Additionally, Dr. Solomon recently published a study highlighted by several media outlets on the use of pirfenidone for rheumatoid arthritis-associated ILD in *The Lancet Respiratory Medicine*.

As the Center for ILD grows, Dr. Solomon and others remain focused on what makes their practice worthwhile. "Patients come first for us," explained Dr. Solomon. "That's really it. Patients come first, and that's who we are."

Immunology Takes Center Stage

Recent advances in laboratory diagnostic capabilities are quickly making immunology a mainstay of patient care. The availability of genomic sequencing, for example, allows specialists like **Rohit Katial, MD**, to dissect the defects that previously puzzled doctors and patients. Dr. Katial serves as director of the National Jewish Health Center for Clinical Immunology.

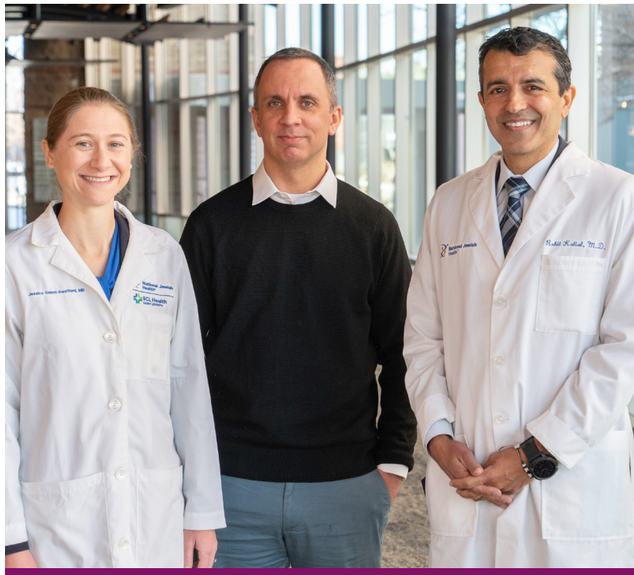
"It's all cutting-edge," explained Dr. Katial. "Higher level immune testing, including genomics analysis, is not always available to all providers. Leveraging new innovative diagnostics allows us to assess for immune defects in a manner that was not possible in the past."

Supported by innovative research and technology, the Center for Clinical Immunology provides thorough evaluations for complex patients to determine if they have underlying immune deficiency, auto-inflammation or other immunologic disorders.

In the past, auto-inflammatory diseases like vasculitis were seemingly incurable. However, according to Dr. Katial, the development of new biologic agents and antibody-based therapeutics promises better targeting and understanding of these conditions.

These immunologic-based treatments also dovetail with the respiratory care already present at National Jewish Health. Patients dealing with lung conditions will sometimes present with auto-inflammatory issues that require a different skill set.

"The impetus for the Center was to highlight our core strengths," said Dr. Katial. "It plays to the knowledge of our faculty and their expertise with complex diseases. We take a multidisciplinary approach to caring for these patients, with multispecialty involvement and case discussion."



From left: Jessica Galant-Swafford, MD; Jason Catanzaro, MD; and Rohit Katial, MD

Assisting Dr. Katial at the Center are **Jessica Galant-Swafford, MD,** and **Jason Catanzaro, MD**, who both have extensive experience with primary immune deficiencies. Together they're collaborating to structure the growing center and generate clinical excellence, science and communication.

Cognitive Therapy Gets Lupus Patients Back in the Game

Elizabeth Kozora, PhD

As physicians work to develop solutions for the physical symptoms of lupus, the swell of cognitive problems associated with the condition often go ignored. Setting out to address this gap, **Elizabeth Kozora, PhD**, led a study published in *Lupus* that illustrates how video game-based cognitive therapy can improve attention and executive functioning in patients with systemic lupus erythematosus (SLE).

"We believe that SLE patients would benefit from participation in digital interventions designed to interact with the prefrontal networks of the brain," said Dr. Kozora.

The study and subsequent therapy options represent the innovative solutions National Jewish Health professionals are developing every day.

CLINICAL EXPERTISE

National Jewish Health provides comprehensive evaluations, diagnoses and treatment plans for people from around the nation and the world. Our pulmonary specialists and their colleagues in cardiology, gastroenterology, oncology, immunology, rheumatology and radiology lead the way in providing this unique, comprehensive approach to care.

Advanced Diagnostic Laboratories

We provide unparalleled expertise in immune and respiratory disease to our clinical, biotech, pharmaceutical, public health and diagnostic partners. Our CLIA and CAP15189[SM]-certified laboratories have decades of experience developing immunology, complement, infectious disease and molecular genomic tests.

Allergy and Immunology

Our nationally recognized experts use the latest testing and treatments to diagnose and manage allergies and other immune disorders, which can impact respiratory health. Our patients have access to the latest allergy and immunology clinical trials.

Asthma

Thorough upper and lower airway evaluations in our multiday adult and pediatric asthma programs help us phenotype patients and understand complicating factors, from aspiration to allergies, vocal cord dysfunction and inhaler technique. Our faculty members lead numerous National Institutes of Health (NIH) studies and industry-sponsored clinical trials.

Behavioral Health

Teaching patients to manage behavioral health issues that often accompany chronic respiratory diseases is an integral part of our whole-patient approach. Additional prevention and wellness programs offer help with tobacco and vaping cessation for adults and young people.

Cardiology

Our cardiologists are experts in the heart-lung interface. They work closely with pulmonologists to treat the cardiac causes and consequences of lung disease, including cardiac sarcoidosis and other rare conditions.

Teamwork and Innovation Elevate Bronchiectasis Treatment

Steven Lommatzsch , MD

The team-based approach at National Jewish Health is taking bronchiectasis treatment to new heights, according to pulmonologist **Steven Lommatzsch, MD**. While pursuing cutting-edge research, Dr. Lommatzsch has become keenly aware of how a connected campus can empower doctors who want the best for their patients.

“We’re under one roof,” said Dr. Lommatzsch. “We all work cross-departmentally, and with that comes a lot of shared knowledge and collaboration. So, when patients present bronchiectasis symptoms to nurses and respiratory therapists, they’re recognized quickly and sent to me.”

While this network of care ensures more bronchiectasis cases are caught early, Dr. Lommatzsch explained that the pursuit of innovative treatments is always a top priority, as promising anti-inflammatory agents make their way into the pipeline.

“There also are a number of treatments that have a lot of potential when it comes to reducing inflammation and improving patient outcomes,” Dr. Lommatzsch said. “There are a lot of medications we’re investigating right now that could be the next big thing in bronchiectasis treatment.”

Chronic Beryllium Disease

National Jewish Health has more experience with the diagnosis and treatment of chronic beryllium disease than any other health care organization in the world. We developed the first diagnostic blood test for beryllium sensitization, which continues to be the gold standard diagnostic tool, and emphasize early detection and intervention.

Chronic Obstructive Pulmonary Disease (COPD)

We are advancing pulmonary medicine with COPDGene® and other studies to diagnose and phenotype COPD, striving to individualize therapies for chronic bronchitis, bronchiolitis, emphysema and bronchiectasis. In addition, we are a leading center for the diagnosis and management of alpha-1 antitrypsin deficiency and offer clinical trials for this condition.

Cystic Fibrosis

The largest and most experienced adult cystic fibrosis program in the nation is housed at National Jewish Health. Our team of pulmonary specialists, nurse coordinators, respiratory therapists, registered dietitians, psychologists and social workers provides treatment for more than 400 adults annually. We offer ongoing clinical trials to evaluate new cystic fibrosis therapies.

Exercise and Breathing Performance

We evaluate exercise intolerance and treat exercise-related respiratory problems in a state-of-the-art exercise physiology lab. Innovative, on-site therapists aid in treating specific problems and guide using exercise as a medicine.

Gastroenterology

We have special expertise in GI motility disorders, pulmonary-related GI conditions, GI cancer screening and the treatment of GI malignancies. We diagnose and treat the entire range of GI illnesses, including liver disease, biliary disorders, inflammatory bowel disease, GERD and esophageal disorders, pancreatic disease and functional disorders of the gut.

Imaging

The National Jewish Health Institute for Advanced Biomedical Imaging is recognized around the world for thoracic imaging expertise. Our highly experienced team of radiologists and technicians performs imaging studies on more lungs than any other facility. Patients have access to state-of-the-art imaging equipment, including new photon counting CT technology. Our experts provide interpretations of imaging test results and consultations to help doctors nationwide make accurate and timely diagnoses.

Interventional Pulmonology

Our interventional pulmonologists offer a wide spectrum of minimally invasive diagnostic, therapeutic and palliative airway procedures for pulmonary nodules, lung cancer, airway obstruction and more. We also insert airway stents and perform bronchial thermoplasty for severe asthma. Our specialists work closely with thoracic surgeons to individualize therapeutic options for those with severe emphysema, employing bronchoscopic lung-volume reduction and intra-bronchial valve placement.

Mycobacterial Infections: TB and NTM

National Jewish Health began as a hospital for destitute tuberculosis (TB) patients more than 124 years ago, and we continue to provide consultations and manage nontuberculous mycobacterial (NTM) infections today. Our unprecedented experience with thousands of complex mycobacterial infections gives us a deep knowledge of personalized antibiotic regimens and surgical options.

Neurology

With a focused and integrated approach, we diagnose and treat complex neuromuscular diseases and related metabolic and respiratory disorders, as well as neuropsychological disorders. We see patients with conditions such as amyotrophic lateral sclerosis, myasthenia gravis, neuropathy and sarcoidosis. Our team also has focused on caring for patients suffering from post-COVID conditions. We test for abnormalities that might otherwise be dismissed and work with specialists in cardiology, speech and cognitive therapy as needed to address symptoms.

Oncology

Our expert pulmonologists, thoracic radiologists, gastroenterologists and surgeons help us diagnose and treat cancers of the lungs, head and neck, and digestive system. Lung cancer screening and our tumor registry help us assess and monitor patients at high risk for lung cancer. Our cardio-oncologist helps prevent and improve cardiovascular issues related to oncology treatments.

Pediatrics

National Jewish Health *for Kids* physicians are nationally recognized leaders in the diagnosis and treatment of asthma, vocal cord dysfunction and other pediatric pulmonary diseases. Our COVID Assessment Program and Pediatric Day Program offer multiday evaluations, education and management plans for children with pulmonary, atopic and immune diseases.

Pulmonary Hypertension

Cardiologists, pulmonologists, rheumatologists, physical therapists and other specialists on our pulmonary hypertension team collaborate to provide comprehensive and sophisticated outpatient and inpatient services. Detailed diagnostic procedures, such as right-heart catheterization with cardiopulmonary exercise testing, allow precise phenotyping and treatment of complex patients.

Pulmonary Palliative Care

We improve the quality of life for individuals suffering from diverse respiratory conditions and help manage symptoms by integrating interventions with existing clinical care plans.

Pulmonary Pathology

Our vast pathology experience examining lung tissue and recognizing respiratory diseases contributes to our unparalleled diagnostic capabilities, which generate consultation requests from around the country.

Pulmonary Physiological Services

Our state-of-the-art pulmonary physiology laboratory is one of the largest in the country. We offer many unique tests, including cardiopulmonary exercise tests with full metabolic testing, arterial line, lactate levels and cardiac data. Our lab is able to perform continuous laryngoscopy with exercise tolerance tests to evaluate exercise-induced respiratory distress.

Pulmonary Vascular Biology

From basic to clinical research, our team provides key information for many of the diseases we treat. Primary areas of research include investigation of pulmonary vascular and right heart function in chronic lung disease, nutritional and exercise interventions in pulmonary hypertension, and gender differences in lung disease. We perform deep phenotyping by collecting lung, heart and skeletal muscle tissues and using new, cutting-edge approaches, such as genomics and proteomics, to study pulmonary, vascular and right heart function in great detail.

Rare Lung Disease

As a national pulmonary referral center, we have extensive experience diagnosing and managing a variety of rare lung diseases, including pulmonary alveolar proteinosis, lymphangioleiomyomatosis and eosinophilic syndromes that most pulmonologists rarely see.

Rheumatology

Our rheumatologists work to diagnose, manage and research a variety of rheumatologic disorders, with special expertise in interstitial lung diseases caused by systemic autoimmune diseases. The Rheumatology Division is a designated Scleroderma Foundation Research and Treatment Center.

Sarcoidosis

Our experience with thousands of sarcoidosis patients has helped us better define and address the multi-organ nature of the disease. We are one of 15 centers named by the Foundation for Sarcoidosis Research and World Association for Sarcoidosis and other Granulomatous Diseases as a Sarcoidosis Center of Excellence.

Scleroderma

The Scleroderma Program at National Jewish Health is designated a Scleroderma Foundation Research Treatment Center. Our multidisciplinary team of specialists in rheumatology, interstitial lung disease, pulmonary hypertension, cardiology, gastroenterology and nephrology ensures that our patients receive comprehensive care, advanced diagnostic and treatment options, and access to scleroderma clinical trials, nutritional counseling, and specialized pulmonary and physical rehabilitation programs.

Sleep Medicine

Our comprehensive Sleep Center is one of the oldest in Colorado and is accredited by the American Academy of Sleep Medicine. A multidisciplinary team of pulmonologists, psychologists, respiratory therapists and polysomnographic technologists collaborates to address clinical, educational and research activities for a wide spectrum of sleep disorders.

Seth J. Kligerman, MD, MS, to Lead Department of Radiology

Seth J. Kligerman, MD, MS
Chair, Department of Radiology

In January, nationally recognized radiologist **Seth J. Kligerman, MD, MS**, was named chair of the Department of Radiology at National Jewish Health. In addition to possessing clinical expertise in the interpretation of imaging studies of patients with a variety of thoracic and cardiac diseases, Dr. Kligerman is a noted researcher. His areas of interest include the pathogenesis of fibrotic lung diseases, chronic thromboembolic disease, vaping-induced lung injury and the integration of artificial intelligence into clinical workflows.

"I am thrilled to have the opportunity to take on this leadership role at the preeminent respiratory hospital in the nation," said Dr. Kligerman. "I look forward to continuing my passion for research and care, and to leading growth in this key area."

Dr. Kligerman joined National Jewish Health from the University of California San Diego where he was chief of cardiothoracic imaging. Dr. Kligerman completed his fellowship training in thoracic imaging at Massachusetts General Hospital, Harvard Medical School, and his residency training in radiology at the University of Colorado School of Medicine. He earned his medical degree from Chicago Medical School.

Debra S. Dyer, MD, FACP

Dr. Kligerman succeeds **Debra S. Dyer, MD, FACR**, who is retiring after leading the department for 10 years and serving nearly 30 years on the faculty at National Jewish Health. Nationally, Dr. Dyer served as a member of the Council Steering Committee of the American College of Radiology, as well as the Scientific Leadership Board of the GO_2 Foundation for Lung Cancer. She was also the co-chair of the Lung Cancer Task Force of the Colorado Cancer Coalition. She has been a national driving force to develop and implement national lung cancer screening guidelines.

Occupational Health

National Jewish Health occupational health physicians provide comprehensive diagnosis and evaluation for work-related diseases, as well as delivering nationally renowned programs for beryllium workers and miners. Our Beryllium Program has more experience (30+ years) diagnosing and treating beryllium sensitization and chronic beryllium disease than any other hospital in the world. We developed the beryllium lymphocyte proliferation test (BeLPT), considered the gold standard for diagnostic testing. We work regularly with employers, unions, industry, government and others to provide occupational health and safety programs that reduce and prevent work-related lung diseases. The National Jewish Health Miners Clinic was established 25 years ago to provide free comprehensive evaluations, education and benefits counseling to current and retired miners in Colorado, Wyoming and Arizona.

SPECTRUM OF SUPPORT

Effective care is a team effort, which is why National Jewish Health employs highly focused groups of specialists, along with hundreds of support staff, to ensure our patients' needs are met across the spectrum.

Swords for Cancers, Shields for Hearts

Physicians have known about the potential adverse effects of cancer treatments for more than 50 years. Chemotherapy, radiation and immunotherapy can cause severe damage to the heart if left unchecked. On the other hand, if these treatments are halted, the cancer has an opportunity to gain the upper hand. In recent years, the discipline of cardio-oncology has emerged to help address this conundrum with treatments that enable specialists like cardiologist **Christopher Fine, MD**, at National Jewish Health to strike a delicate balance between eradicating cancer and maintaining heart health.

"We've started gaining a lot more insight from a medical community standpoint with early detection of subclinical cardiotoxicity and what we could do about it early on. Our goal is to minimize the likelihood of cancer treatment interruption," said Dr. Fine. "We work to monitor closely, identify subclinical changes early and intervene quickly. If everything goes as planned, patients universally do better, both from an oncology standpoint and from a cardiology standpoint."

Dr. Fine is among the few cardiologists in the country with the specialized training needed to address cardiotoxicity concerns in cancer patients. Coordinating with pulmonologists and other specialists at National Jewish Health, he is focused on developing well-rounded care and improving cancer patient outcomes across the board.

Christopher Fine, MD

From left: Jenna Milliron, NP; Darlene Kim, MD, FACC; Patricia George, MD; and Dthia Kalkwarf, RN

New Program Promotes Evidence-Based Metabolic Treatments

Dieting and fitness culture has so many competing theories it can bewilder anyone genuinely searching for answers. Pulmonologist **Patricia George, MD**, set out to untangle this knot by getting at the core science behind the problem, so that her team could deliver practical and effective plans for patients.

The Metabolic Program at National Jewish Health is focused on reversing the damage of obesity-related illnesses like diabetes.

"I think a lot of our patients have been chronically ill for a long time, and that starts to feel normal. They feel powerless," said **Jenna Milliron, NP,** who works alongside Dr. George and others within the program. "What I hear consistently from patients is that they feel more empowered to make changes in their life because they better understand the problem."

Obesity, diabetes, hypertension and elevated blood sugar are often associated with the respiratory conditions National Jewish Health specializes in treating. As patients make their way through the Metabolic Program, their successes resound throughout the hospital's departments.

Breakthrough Cardiac Imaging Merges Heart and Lung Care

When cardiologist **Christopher Dyke, MD**, joined National Jewish Health in 2020, he brought an expertise in cardiac imaging that would become an integral part of how specialists work across departments to examine the heart and lungs.

In the field of advanced cardiac imaging, cutting-edge technology is critical, and the recently upgraded scanners at National Jewish Health will help Dr. Dyke leverage state-of-the-art methods to produce lifesaving data. "MRI and CT offer complementary information in the management of cardiac patients," explained Dr. Dyke. "Cardiac MRI has the unique ability to characterize tissue and is important in the diagnosis of various types of heart muscle injury, while cardiac CT can noninvasively diagnose coronary atherosclerosis. The new CT scanner at National Jewish Health is a game changer. It is a next generation photon-counting CT that allows unparalleled resolution, and it's only available at a few select institutions across the country."

Dr. Dyke's cardiac imaging expertise with MRI ensures that patients with pulmonary conditions that have cardiac elements, like sarcoidosis, receive the care they deserve. Using CT, Dr. Dyke can examine coronary arteries for blockages in an exam that assists pulmonologists by ruling out heart-related reasons for things like shortness of breath.

"It's a totally different construct for the future of how we're going to be looking at diagnosing and preventing heart disease, especially in our pulmonary patients," said Dr. Dyke.

Christopher Dyke, MD

Center for Deployment-Related Lung Disease

Cecile S. Rose, MD, MPH

Richard Meehan, MD, FACP

Since 2001, more than 3 million United States military personnel and contractors have deployed to Iraq, Afghanistan and other sites in Southwest Asia, and nearly 70% experienced respiratory symptoms during their service. On-site exposure to open-air burn pits, sandstorms, combat dust, diesel exhaust, and other workplace hazards may place deployers at risk for disabling respiratory symptoms and lung diseases. For many, lung disease continues to impact their ability to serve and live their daily lives as civilians.

Led by **Cecile S. Rose, MD, MPH**, and **Richard Meehan, MD, FACP**, the Center for Deployment-Related Lung Disease is focused on the diagnosis and treatment of active military personnel, veterans and contractors with lung conditions related to their mission. The Center also conducts research to understand the causes of this lung disease, identify new and better diagnostic tools, develop better treatments, and investigate ways to prevent these disabling diseases.

Ongoing research at the Center is being shared with pulmonologists and Veterans Affairs medical centers across the country to help veterans find the specialized respiratory care they need. National Jewish Health is also leading several clinical trials, including one beginning this year, that will examine a supplement they hope will help control deployment-related asthma.

PUBLIC HEALTH — TOBACCO AND SMOKING

The tobacco epidemic continues to be one of the largest public health threats in the United States, accounting for nearly 500,000 deaths every year. National Jewish Health is at the forefront of combating the impacts of smoking through personalized cessation programs, earlier detection of lung cancer, researching the biological and behavioral impacts of smoking and national advocacy.

Personalized Tobacco Quitlines Help Millions

More than 20 years ago National Jewish Health launched a behavioral change model for smoking cessation that has since assisted more than two million people with their quit attempts. QuitLogix® is the largest non-profit quitline service in the country. The evidence-based phone and online coaching program has a 40% success rate for participants who receive coaching and medications.

National Jewish Health operates quitlines for 21 states with personalized protocols for especially impacted populations, including American Indians and LGBTQ communities. In 2019, *My Life, My Quit*®, a quitline tailored for teens who want to quit e-cigarettes, launched and has shown early success in this population.

Lung Nodule Registry Catches Cancer Early

Almost 80% of people who have a small cell lung cancer (1 cm in size, about ½ inch) surgically removed will live at least five years after the diagnosis and are considered cured. Clinicians and researchers are actively working on ways to improve the detection of lung cancer earlier. The Lung Nodule Registry Program at National Jewish Health was the first of its kind in the country to create a database of patients with identified lung nodules and a way to communicate with them and their physicians when follow-up CT scans are needed. This infrastructure keeps a watchful eye on lung nodules for early cancer detection.

Understanding the Impacts of Smoking

Researchers are working to expand knowledge on how smoking and vaping impact the body. More than 40 research papers have been published in the past year by National Jewish Health researchers. For example, **Irina Petrache, MD**, and colleagues demonstrated the impact of augmenting sphingosine-1 phosphate (S1P) signaling via S1P receptor (S1P1) in cigarette smoke-induced emphysema. Their findings suggest that increasing the signaling and abundance of that receptor may be beneficial to counteract the effects of chronic cigarette smoking exposure.

American Journal of Physiology Lung Cellular and Molecular Physiology. 2022 Jun 1.

In recognizing the urgent need to study the health hazards of vaping, **Hong Wei Chu, MD**, and others described methods to collect, expand and culture human airway epithelial cells from endobronchial brushings. They exposed those cells to cigarette smoke or electronic cigarette vapor in order to understand the effects of each.

Methods in Molecular Biology. 2022 July 1.

Providing National Level Leadership

National Jewish Health physicians are driving clinical change by serving on various advisory committees. **Glenn Hirsch, MD, MHS, FACC**, chair of Cardiology, is part of the American Heart Association research team for the Cardiovascular Injury Due to Tobacco Use. **Thomas Ylioja, MSW, PhD**, clinical director of Health Initiatives, was named to the Board of Directors for the North American Quitline Consortium earlier this year. **Evan Stepp, MD**, pulmonologist, serves on the American Thoracic Society Tobacco Action Committee.

NOTEWORTHY ONGOING RESEARCH

Paving the Way for AI-Enhanced COPD Diagnosis

The human element will always be an essential part of health care. However, in cases where precision matters most, clinical researchers are examining how artificial intelligence (AI) can be leveraged to provide more objective assessments of complex illnesses like chronic obstructive pulmonary disorder (COPD). For instance, while already using quantitative analysis tools to assess CT scans at National Jewish Health, **Stephen Humphries, PhD**, is contributing to research into training AI programs to recognize patterns of COPD progression among large patient cohorts. So far, the results have been extremely promising.

"We found that the statistical correlations between AI-generated emphysema severity scores and things like lung function, survival or other kinds of clinically important characteristics were stronger when we used the AI scores compared to when we used human visual scores," explained Dr. Humphries, whose findings have been published in *Radiology,* among other journals.

According to Dr. Humphries, by removing subjectivity from the equation (along with human factors like mood and fatigue), AI has the potential to be an indispensable asset in the fight against COPD. As part of the NIH-funded COPDGene® study, the ultimate goal of his research is to develop ways to incorporate these tools into regular clinical practice, enabling care that combines the compassion and experience of providers with the data-driven accuracy of AI.

Maternal and Fetal Outcomes for Women with Cystic Fibrosis

Funded by the Cystic Fibrosis foundation, **Jennifer Taylor-Cousar, MD**, is co-leading a study following 300 women with cystic fibrosis (CF) through their pregnancies and two years afterward. Outcomes from this study should help researchers understand how mothers' lung function or overall health, along with that of their babies, is impacted by CF and by the use of new CF medications during pregnancy.

Stephen Humphries, PhD, stands in front of the imaging data fueling AI innovation in medicine.

Mechanisms and Treatment of Deployment-Related Lung Injury

Gregory P. Downey, MD, and **Cecile S. Rose, MD, MPH**, are working with a unique cohort of more than 100 previously deployed veterans with lung disease to understand why war fighters deployed to Southwest Asia suffer increased rates of respiratory disease and to test potential treatments.

COPDGene® Genetic Epidemiology of COPD

Directed by **James Crapo, MD**, the COPDGene study aims to find inherited or genetic factors that increase risk for COPD and to better classify COPD subtypes that may respond to precision medicine interventions. Now entering its 16th year in 20 clinical sites, the study has enrolled 10,000 individuals and has more than 425 publications resulting from the research.

Understanding Non-Allergic Asthma

Rafael Alam, MD, PhD, is working to identify molecular mechanisms that lead to non-allergic asthma, which constitutes about 30% of cases but is an area that has received much less attention and drug development than more common allergic asthma.

CLINICAL RESEARCH — OPEN CLINICAL TRIALS

Allergy

SUNBEAM: Studying Allergy Development in Babies

Principal Investigator:
Donald Leung, PhD, MD

This study is exploring various factors, including exposures and family history, that may influence the development of allergic conditions, such as food allergies, eczema, asthma and environmental allergies in babies. Investigators will follow pregnant moms and their babies through age 3.

Asthma

REGAIN Study to Understand Asthma

Principal Investigator:
Eileen Wang, MD

Researchers are working to develop a better understanding of asthma through evaluating data on what drives asthma in the body and how it reacts, depending on the environment and treatment. The study is comparing data between asthmatics and healthy people.

Cancer

Treatment of Patients with Inoperable Lung Cancer

Principal Investigator:
Laurie Carr, MD

Investigators are assessing the efficacy and safety of stereotactic body radiotherapy (SBRT) plus pembrolizumab (MK-3475) in the treatment of adults with medically inoperable Stage I or IIA non-small cell lung cancer (NSCLC).

COVID-19

Response to COVID-19 Vaccines in People with Chronic Conditions

Principal Investigators:
Anthony Gerber, MD, PhD; Barry Make, MD; and Michael Wechsler, MD, MMSc

The aim of this study is to better understand the antibody response to COVID-19 vaccines in people with chronic diseases. Researchers are focused on the short-term and long-term response in those with respiratory diseases as well as other chronic conditions.

Cystic Fibrosis

Investigational Gene Therapy for Adults with CF

Principal Investigator:
Jennifer Taylor-Cousar, MD

Researchers are evaluating the safety of 4D-710, an investigational gene therapy drug for adults with cystic fibrosis who are unable to use CFTR modulators. 4D-710 is an adeno-associated virus (AAV) that was changed in the laboratory to deliver a copy of the CFTR gene to the lungs. Participants are using a nebulizer to inhale 4D-710 into the lungs to see if 4D-710 is safe for use in adults and if it can help lung function.

Hypersensitivity Pneumonitis

Biomarkers & Hypersensitivity Pneumonitis Progression

Principal Investigator:
Evans Fernández, MD, MS

This study is helping researchers understand if biomarkers in the blood of patients with hypersensitivity pneumonitis are predictive. They are especially interested in learning if the biomarkers can predict the speed of disease progression.

Lung Disease

Predict and Prevent Lung Disease

Principal Investigator:
Barry Make, MD

This observational study focuses on factors affecting lung health with the goal of learning about the potential development of lung disease and factors that may protect people. Healthy adults, 25-35 years old, are being recruited for the study.

Lung Injury

Understanding Lung Disease From Military Deployment

Principal Investigator:
Gregory P. Downey, MD

The purpose of this study is to better understand lung disease found in contractors and U.S. military personnel serving in Iraq and Afghanistan after September 11, 2001. The information collected will be used to learn about respiratory diseases associated with the inhalation of very small particulate matter and other harmful substances during deployment.

Pulmonary Fibrosis

Role of Genetic Factors in Fibrosis

Principal Investigator:
Kevin Brown, MD

Investigators believe that inherited genetic factors predispose individuals to develop pulmonary fibrosis. This study is investigating genetic factors that play a role in the development of familial pulmonary fibrosis and identifying a group of genes that predispose individuals to develop pulmonary fibrosis. Finding the genes that play a role in pulmonary fibrosis is the first step toward developing better methods for early diagnosis and improved treatment for pulmonary fibrosis.

Sarcoidosis

Pulmonary Sarcoidosis Lung Function Medication

Principal Investigator:
Clara Restrepo, MD

Researchers are seeking to determine if an investigational medication called CMK389 improves lung function for people with chronic pulmonary sarcoidosis. The study also will determine if the drug is safe and tolerated in study participants.

Sleep and Asthma

Predicting Asthma Attacks During Sleep

Principal Investigator:
Michael Wechsler, MD

The goal of this clinical trial is to develop a way to predict an asthma attack in adults who have severe and difficult-to-treat asthma. Participants use a wireless bedside monitor to collect coughing and breathing sounds while they are sleeping.

Gregory P. Downey, MD, Named President of ATS

In May of 2022, National Jewish Health Executive Vice President of Academic Affairs **Gregory P. Downey, MD**, was named to serve as president of the American Thoracic Society (ATS).

Gregory P. Downey, MD
Executive Vice President of Academic Affairs

Earlier this year, Dr. Downey, along with the ATS Executive Committee, outlined a multiyear strategic plan to pursue several priorities, including expanding educational offerings throughout the year, increasing focus on early career members, promoting and supporting research, fostering diversity and examining global health disparities of respiratory disease, while working with sister respiratory societies on global health issues.

"The only way most people can succeed is by collaborating with others, not just within ATS, but around the country and around the world," said Dr. Downey. "By working together, we will change respiratory health globally."

Irina Petrache, MD, chief of Pulmonary, Critical Care and Sleep Medicine at National Jewish Health, is serving on the board for ATS as secretary. In 2024, she will serve as president of ATS.

FRONTIERS OF PULMONARY SCIENCE

National Jewish Health researchers conduct basic, translational and clinical research that advances the frontiers of science and medicine. This year alone we published more than 450 peer-reviewed scientific journal articles. Here is some of the groundbreaking basic and translational research being conducted at National Jewish Health.

Nasal Airway Transcriptome-Wide Association Study of Asthma Reveals Genetically Driven Mucus Pathobiology

Max Seibold, PhD, and colleagues demonstrated that genetic risk for asthma is likely mediated through altered gene expression within the airway epithelium. Researchers found genetic changes in a gene that forms the structure of mucus (MUC5AC) and in another gene (FOXA3) that directs the production of mucus secretory cells. The team also found that some of the key genes in the type 2 inflammatory pathway have genetic changes that increase their level of expression in the airway, increasing asthma risk.

Nature Communications. 2022 Oct 3;13(1):5806.

10-Year Follow-Up of Lung Function, Respiratory Symptoms and Functional Capacity in the COPDGene Study

Barry Make, MD; James Crapo, MD; Matthew Strand, PhD; and colleagues from across the country examined the trajectory of lung function over time in people who smoke cigarettes. Using data from the COPDGene® study, they determined that current cigarette smokers had a greater loss of lung function than former smokers. Their research suggests that many former and current cigarette smokers, even those without a COPD diagnosis, are at risk for lung function decline, development of respiratory symptoms and loss of functional capacity that may have a significant impact on quality of life and amount of function.

Annals of the American Thoracic Society. 2022 Mar;19(3):381-388.

Michael Wechsler, MD
Director, National Jewish Health
Cohen Family Asthma Institute

Reliever-Triggered Inhaled Glucocorticoid in Black and Latinx Adults with Asthma

Michael Wechsler, MD, and colleagues found Black and Latinx patients with moderate to severe asthma, who took inhaled glucocorticoids when they used reliever medications in addition to usual care, had fewer severe asthma exacerbations, improved asthma control, improved quality of life and fewer days lost from work or school. This approach decreased the risk of severe asthma exacerbations by 15% (0.13 exacerbations per patient per year) compared to the control group. It also reduced asthma symptoms and days of impairment.

New England Journal of Medicine. 2022 Apr 21;386(16):1505-1518.

Transient Receptor Potential Vanilloid 1 Plays a Major Role in Low Temperature-Mediated Skin Barrier Dysfunction

Byung Eui Kim, MD, PhD; Jessica Hui-Beckman, MD; Elena Goleva, PhD; Donald Leung, MD, PhD; and their colleagues demonstrated that lower temperatures inhibited the epidermal barrier proteins from functioning properly, leading to skin barrier dysfunction and allergens entering the body through the skin. In particular, TRPV1 is critical in low temperature-mediated skin barrier dysfunction.

Journal of Allergy and Clinical Immunology. 2022 Aug;150(2):362-372.e7.

Host and Pathogen Response to Bacteriophage Engineered Against Mycobacterium Abscessus Lung Infection

Jerry Nick, MD; Katherine Hisert, MD, PhD; David Lynch, MD; Charles Daley, MD; Michael Strong, PhD; Rebecca Davidson, PhD; and colleagues successfully used bacteriophages, for the first time, to treat an antibiotic-resistant mycobacterial lung infection, clearing the way for a patient with cystic fibrosis to receive a lung transplant. The phages were engineered to enhance their capacity to lyse *M. abscessus* and were selected specifically as the most effective against the subject's bacterial isolate. The research can serve as a roadmap for future use of phages to treat patients with *M. abscessus* lung infection.

Cell. 2022 May 26;185(11):1860-1874.e12.

Saracatinib Blocks Fibrotic Responses in Preclinical Models of Pulmonary Fibrosis

Gregory P. Downey, MD, and colleagues have shown that the medication saracatinib shows promise as a treatment for idiopathic pulmonary fibrosis (IPF). Saracatinib worked as well or better than two approved drugs at reducing tissue scarring in preclinical models of IPF. The researchers identified the oral therapy treatment based on a novel computational approach that analyzed several medications developed for other diseases.

American Journal of Respiratory and Critical Care Medicine. 2022 Aug 23.

Lab technician Jasmine Wilson conducts pulmonary research.

Electronic Cigarette Vapor Exposure Exaggerates the Pro-inflammatory Response During Influenza A Viral Infection in Human Distal Airway Epithelium

Hong Wei Chu, MD; Niccolette Schaunaman, MS; Brian Day, PhD; Irina Petrache, MD; and colleagues published the first evidence that e-vapor exposure significantly impacts human distal airway epithelial responses to influenza A virus (IAV) infection. After 72 hours of infection, media and cell lysates were collected to measure cytokines involved in inflammatory and antiviral responses. Pre-exposure to e-vapor with IAV infection, compared to IAV infection alone, significantly increased inflammatory and antiviral mediators, including IL-8, CXCL10, IFN-beta, and MX1.

Archives of Toxicology. 2022 Aug;96(8):2319-2328.

Blood mRNA Biomarkers Distinguish Variable Systemic and Sputum Inflammation at Treatment Initiation of Inhaled Antibiotics in Cystic Fibrosis: A Prospective Non-Randomized Trial

Milene Saavedra, MD; Tasha Fingerlin, PhD; Jennifer Taylor-Cousar, MD; Jerry Nick, MD; Matthew Strand, PhD; and colleagues found that whole blood gene leukocyte expression identifies distinct populations of responders to inhaled antibiotic therapy prior to treatment. Systemic markers of inflammation may give insight into effects of inhaled antibiotics in the cystic fibrosis airway and the heterogeneity of their effects between subjects, ideally allowing for greater personalization of treatments.

PLoS One. 2022 May 5;17(5):e0267592.

EDUCATION — ACADEMIC TRAINING

Our physicians and scientists are thought leaders in their fields who elevate the standard of patient care while teaching the next generation of health care professionals through fellowships, training and continuing medical education. National Jewish Health is an accredited teaching affiliate of the University of Colorado School of Medicine, where our physicians and scientists have faculty appointments.

Clinical Fellowships

Based at National Jewish Health:
- Adult Sleep Medicine
- Pediatric Allergy and Immunology
- Adult Allergy and Immunology
- Mycobacterial Disease

Based at University of Colorado School of Medicine with rotations at National Jewish Health:
- Adult Pulmonary and Critical Care Medicine
- Interventional Pulmonology
- Infectious Disease
- Pediatric Pulmonary Medicine
- Rheumatology
- Cardiothoracic Radiology

In collaboration with the Colorado School of Public Health, National Jewish Health also offers fellowships in:
- Occupational and Environmental Medicine
- Pediatric Sleep Medicine

Postdoctoral Fellowships

Numerous opportunities exist for postdoctoral training in laboratories in the Department of Biomedical Research, the Division of Cell Biology and the Basic Science Section of the Department of Medicine. National Jewish Health has a robust discovery and translational research enterprise, placing it in the top 6% of institutions funded by the National Institutes of Health.

Graduate Education

Students enrolled in one of the PhD programs offered by the Graduate School of the University of Colorado School of Medicine have the opportunity to perform their thesis research in the laboratories of the faculty at National Jewish Health.

Residents and Medical Students

Residents and medical students at the University of Colorado School of Medicine have rotations at National Jewish Health in a variety of specialties, including pulmonary medicine, cardiology, allergy and gastroenterology. In addition, our faculty train residents in internal medicine and family medicine at locations across our system.

National and International Visiting Fellows

National Jewish Health hosts visiting fellows from pulmonary and critical care training programs throughout the country and around the world for rotations in various subspecialty areas of pulmonary medicine and exercise physiology.

Department of Medicine Grand Rounds

The Department of Medicine (DOM) Grand Rounds at National Jewish Health offer weekly presentations covering the latest in research, clinical care and other pertinent topics. Each seminar is presented by either an expert from the institution or from around the world and has featured speakers from the National Institutes of Health (NIH).

DOM Grand Rounds is open to researchers, clinicians, advanced practice providers, nurses, alumnae, all other health care workers, non-clinical staff members at National Jewish Health and its affiliates, and interested community members. Continuing medical education credits are offered to health care professionals.

To learn more or request enrollment in DOM Grand Rounds, please email johnsona@njhealth.org.

EDUCATION — CONTINUING MEDICAL EDUCATION

Building on the expertise of the world-renowned faculty at National Jewish Health, our Office of Professional Education creates innovative educational activities for physicians, pharmacists, nurses and other health care providers to develop and enhance their knowledge and competency related to the diseases that we treat and research.

National Jewish Health is accredited by the Accreditation Council for Continuing Medical Education and recently received accreditation with commendation. Additionally, we are accredited by the Accreditation Council for Pharmacy Education and the California Board of Registered Nursing. Through robust educational offerings, with the ultimate goal of improved patient outcomes, we work to deliver on our mission to educate as a preeminent health care institution.

Annual Respiratory Disease Young Investigators' Forum

The Annual Respiratory Disease Young Investigators' Forum is committed to increasing the number of physician scientists and helping young scientists grow to become leaders in the research and treatment of respiratory diseases. Each year, the National Jewish Health Office of Professional Education hosts the Respiratory Disease Young Investigators' Forum. Thirty young investigators selected by an expert panel present their abstracts in basic science or clinical research related to respiratory disease. Junior faculty and physicians enrolled in a pediatric, pulmonary, allergy or immunology fellowship program and conducting research in disease are eligible to participate. The 19th Annual Respiratory Disease Young Investigators' Forum will be held in Denver on October 19-22, 2023, with research abstracts due June 12, 2023.

MORE INFORMATION

Abstract submission guidelines, the agenda and program format can be found at **www.njhealth.org/YIF2023.**

Upcoming Live Courses Include:

- 59th Annual Denver TB Course – April 5-7, 2023
- Nontuberculous Mycobacteria (NTM) Lecture Series for Providers – April 27-28, 2023
- Nontuberculous Mycobacteria (NTM) Lecture Series for Patients and Families (Hybrid Event) – April 29, 2023
- Exercise and Breathing Conference: 5th International EILO/ILO Conference – June 5-6, 2023

Online Courses Include:

- Bronchiectasis Update: Evaluation, Clinical Course, Inflammation and Treatment
- Unraveling the Complexity of Severe Asthma Treatment
- Epithelial Alarmins: A New Paradigm in Severe Asthma and Emerging Treatments
- Reframing the Significance of Airway Hyperresponsiveness in Severe Asthma
- Clinical Implications of the Airway Epithelium on the Management of Patients with Severe Asthma
- E²: Evidence and Expert Insights in Advances in the Treatment of Atopic Dermatitis
- In the Know: Keeping Pace with News & Updates on COVID-19 Vaccines Series

To view all of our online courses and learn more about the National Jewish Health Office of Professional Education, visit **njhealth.org/CME** call **800.844.2305** or email **proed@njhealth.org**.

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STRONG ALLIES IN RESEARCH AND CARE

National Jewish Health continues to advance care and science through unique collaborations with medical and research partners across the nation. National Jewish Health collaborates and is an academic partner with the University of Colorado School of Medicine and UCHealth in Denver. Additionally, our unique Respiratory Institute® model brings our multidisciplinary, team-based model of care to patients, while providing a common platform for expanded research.

School of Medicine
UNIVERSITY OF COLORADO
ANSCHUTZ MEDICAL CAMPUS

Collaborations with University of Colorado School of Medicine and UCHealth

National Jewish Health has had a long-standing key relationship with the University of Colorado that encompasses opportunities for joint research, collaborative care and programs, along with training for medical students. The organizations offer regular interaction through Grand Rounds and other medical and research programs.

MOUNT SINAI - NATIONAL JEWISH HEALTH
Respiratory Institute
Icahn School of Medicine at Mount Sinai
National Jewish Health

Mount Sinai — National Jewish Health Respiratory Institute

The Mount Sinai – National Jewish Health Respiratory Institute provides state-of-the-art, multidisciplinary, outcomes-driven care in a network dedicated to elevating respiratory care and research. The Institute achieves this goal with clinical expertise, personalized medicine, patient-focused protocols and integration of the latest research advances in respiratory care.

Jointly, the two institutions have developed protocols for the treatment of patients with respiratory disease. Physicians at National Jewish Health and Mount Sinai have launched programs in bronchiectasis, adult cystic fibrosis and lung transplant health.

Jane and Leonard Korman
Respiratory Institute
Jefferson Health
National Jewish Health

Jane and Leonard Korman Respiratory Institute — Jefferson Health and National Jewish Health

Together, Jefferson Health and National Jewish Health bring extraordinary expertise to address complex illnesses. The collaboration leverages the strengths of each organization, defining best practices for treatment and research of pulmonary and related diseases. In addition, National Jewish Health and Jefferson Health are launching a respiratory therapy training program in both Philadelphia and Denver.

National Jewish Health
SCL Health
SAINT JOSEPH

National Jewish Health | Saint Joseph Hospital

Our collaboration with Denver-based Saint Joseph Hospital, now a part of Intermountain Health, includes an inpatient Respiratory Institute that contains a dedicated 36-bed unit and offers expanded research opportunities between the institutions. The partnership launched an innovative program for lung cancer screening, diagnosis and treatment, along with the expansion of the cardiac critical care program in the past year.

SELECTED 2022 PUBLICATIONS

In 2022, National Jewish Health faculty published more than 450 articles in peer-reviewed scientific and medical journals. Included below is a selection of noteworthy articles.

COVID-19/SARS-COV-2

Severe chronic cough relating to post-COVID-19 interstitial lung disease: a case report

Nguyen-Ho L, Nguyen-Nhu V, Tran-Thi TT, **Solomon JJ**. *Asia Pac Allergy.* 2022 Oct 28;12(4):e42.

Signatures of Mitochondrial Dysfunction and Impaired Fatty Acid Metabolism in Plasma of Patients with Post-Acute Sequelae of COVID-19 (PASC)

Guntur VP, Nemkov T, **de Boer E, Mohning MP, Baraghoshi D**, Cendali FI, San-Millán I, **Petrache I**, D'Alessandro A. *Metabolites.* 2022 Oct 26;12(11):1026.

The Receptor Binding Domain of SARS-CoV-2 Lambda Variant Has a Better Chance Than the Delta Variant in Evading BNT162b2 COVID-19 mRNA Vaccine-Induced Humoral Immunity

Liu H, Wei P, Aviszus K, Zhang Q, Linderberger J, **Yang J**, Liu J, Chen Z, **Waheed H, Reynoso L, Downey GP, Frankel SK, Kappler JW, Marrack P, Zhang G**. *Int J Mol Sci.* 2022 Sep 26;23(19):11325.

Autoantibodies elicited with SARS-CoV-2 infection are linked to alterations in double negative B cells

Castleman MJ, Stumpf MM, Therrien NR, Smith MJ, Lesteberg KE, Palmer BE, Maloney JP, **Janssen WJ, Mould KJ**, Beckham JD, Pelanda R, Torres RM. *Front Immunol.* 2022 Sep 5;13:988125.

SARS-CoV-2 infection produces chronic pulmonary epithelial and immune cell dysfunction with fibrosis in mice

Dinnon KH 3rd, Leist SR, Okuda K, Dang H, Fritch EJ, Gully KL, De la Cruz G, Evangelista MD, Asakura T, Gilmore RC, Hawkins P, Nakano S, West A, Schäfer A, Gralinski LE, **Everman JL, Sajuthi SP**, Zweigart MR, Dong S, McBride J, Cooley MR, Hines JB, Love MK, Groshong SD, VanSchoiack A, Phelan SJ, Liang Y, Hether T, Leon M, Zumwalt RE, Barton LM, Duval EJ, Mukhopadhyay S, Stroberg E, Borczuk A, Thorne LB, Sakthivel MK, Lee YZ, Hagood JS, Mock JR, **Seibold MA**, O'Neal WK, Montgomery SA, Boucher RC, Baric RS. *Sci Transl Med.* 2022 Sep 28;14(664):eabo5070.

Risk factors for SARS-CoV-2 infection and transmission in households with children with asthma and allergy

Seibold MA, Moore CM, Everman JL, Williams BJM, Nolin JD, Fairbanks-Mahnke A, Plender EG, Patel BB, Arbes SJ, Bacharier LB, Bendixsen CG, Calatroni A, Camargo CA Jr, Dupont WD, Furuta GT, Gebretsadik T, Gruchalla RS, Gupta RS, Khurana Hershey GK, Murrison LB, Jackson DJ, Johnson CC, Kattan M, Liu AH, Lussier SJ, O'Connor GT, Rivera-Spoljaric K, Phipatanakul W, Rothenberg ME, Seroogy CM, Teach SJ, Zoratti EM, Togias A, Fulkerson PC, Hartert TV; HEROS study team. *J Allergy Clin Immunol.* 2022 Aug;150(2):302-311.

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LUNG INJURY AND REPAIR

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RECOGNITION

National Jewish Health is the leading respiratory hospital in the nation and the only health care organization to be focused on respiratory and related illnesses.

For the 26th consecutive year, National Jewish Health was named a top respiratory hospital in the nation by *U.S. News & World Report* in its 2022-23 ranking of best hospitals in the nation. National Jewish Health has held the #1 or #2 position in the magazine's pulmonology rankings in all 26 years that *U.S. News* has evaluated pulmonology care.

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Breakthroughs in Research

National Jewish Health is responsible for many of the important scientific advances that have shaped the landscape of pulmonary science today, including:

IgE, the molecule responsible for allergic reactions. This discovery has become the basis for many new treatments for asthma and allergies.

The T cell receptor gene, which plays a crucial role in recognizing foreign invaders and orchestrating an immune response. Identifying this gene opened the door to understanding how bodies fight viruses, bacteria and cancer.

Superantigens, extremely powerful bacterial toxins associated with particularly virulent diseases such as toxic shock syndrome and Legionnaires' disease.

Combined chemotherapy for tuberculosis, a crucial tool for fighting tuberculosis. National Jewish Health physicians were among the nation's thought leaders to develop it.

Mechanisms of apoptosis, which help us understand how the body effectively removes and recycles up to two billion cells a day and resolves inflammation in the lungs, was helped by the pioneering efforts of our faculty.

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