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U.S.News & WORLD REPORT
NATIONAL
PULMONOLOGY & LUNG SURGERY
2020-21

National Jewish Health®

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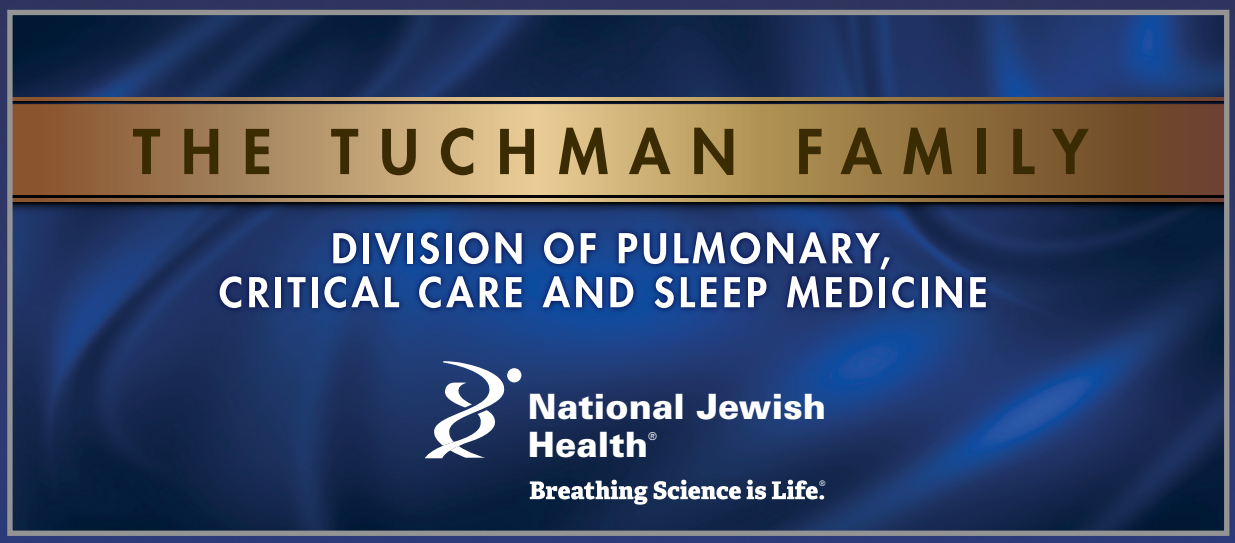
2020 PULMONARY HIGHLIGHTS

Clinical Expertise, Research and Education



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,

We have been here before. In 1899, National Jewish Health opened its doors to treat an infectious, deadly respiratory pandemic for which there were no effective treatments — tuberculosis. Our experts followed the existing science, worked as a team to advance care, and nimbly adapted to changing conditions. In 2020, we have followed the same principles — teamwork, evidence and responsiveness — to mount a massive, continuously adaptive and effective response to SARS-CoV-2 and COVID-19. Every institution in the country has stepped up to meet the challenges of the pandemic, and we are proud to be part of the ongoing, extraordinary efforts to help as many people as possible.

Teamwork in the intensive care units we manage in five states, in our acute COVID-19 clinics, the Center for Post-COVID Care and Recovery, and our diagnostic and research laboratories have all combined varied strengths into a powerful, unified effort. While COVID-19 seemed so new and different at first, we found that existing scientific and clinical evidence served as our best guide for protecting our patients and staff, managing those with the most severe disease and helping people recover.

As a hospital system focused on respiratory and related diseases and with our Respiratory Institute® partners, we offer unique perspectives and can quickly implement strategic and operational changes in response to rapidly evolving conditions. In a matter of weeks, we created new clinical programs, new tests, novel research initiatives, clinical trials, telehealth options and changes to our physical plant and infection-control practices. We expanded our inpatient and critical care capacity and collaboratively worked with our clinical partners, community organizations, schools and public health institutions to lend our expertise, our doctors and caregivers where they were needed most.

With new vaccines and effective public health measures, we believe there is light at the end of the tunnel. There will continue to be enormous challenges with COVID-19 and an ongoing need to increase understanding and to treat the wide range of respiratory diseases that plague millions across the globe. With teamwork, our continued partnerships across the country, evidence and responsiveness, we will continue to find solutions for our patients and yours.

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

COVID-19 "Long Haulers" Pose Ongoing Challenge

When the COVID-19 pandemic hit Colorado, National Jewish Health increased inpatient and critical care capacity, developed multiple platforms for COVID-19 molecular and antibody tests, and opened the Acute Respiratory Clinics for children and adults with suspected COVID-19 or acute exacerbations of other respiratory illnesses. In December 2020, National Jewish Health joined other health care providers in vaccinating those deemed in most urgent need.

As new vaccines roll out, there is great hope that the crushing surges of COVID-19 cases will ease. However, patients with lingering symptoms, variously known as "long haulers" or patients with long COVID, will need ongoing care for weeks, months or even longer. National Jewish Health has assembled a multidisciplinary team to serve these patients in the **Center for Post-COVID Care and Recovery**. Working closely with researchers across the institution and with Respiratory Institute® partners at Mount Sinai, Jefferson Health and National Jewish Health | Saint Joseph Hospital, we are investigating the mysteries of long COVID.

In March, as emergency rooms were becoming overwhelmed with frightened people seeking care for suspected COVID-19, we launched our Acute Respiratory Clinics for children and adults. Patients suffering acute respiratory symptoms could be evaluated for COVID-19 or exacerbations of other respiratory diseases that we treat. We offered COVID-19 testing and comprehensive medical evaluations by specially trained providers in safe, negative-pressure rooms. When needed, we transferred patients directly to our major inpatient hospital, National Jewish Health | Saint Joseph Hospital.

By April, people who had overcome the initial SARS-CoV-2 infection were seeking care for lingering symptoms, including extreme fatigue, shortness of breath, cough, heart palpitations, gastrointestinal distress, and problems with memory, attention and cognition. We created the Center for Post-COVID Care and Recovery, with a team of pulmonologists, cardiologists, neurologists, gastroenterologists, social workers and pulmonary rehabilitation therapists dedicated to post-COVID-19 care and helping patients continue their recovery. We have coordinated with our Respiratory Institute® partners at Mount Sinai and Jefferson Health to have common post-COVID-19 clinical programs and are collaborating on the collection and use of COVID-19 clinical samples for research.

Our clinicians are working closely with clinical, translational and basic researchers to address urgent questions about long COVID. What causes postural orthostatic tachycardia syndrome (POTS) and how should it be addressed? Are the sequelae typical post-viral symptoms or does SARS-CoV-2 trigger some sort of autoimmune reaction? Will lung scarring and cognitive deficits resolve over time or plague patients for years to come? Collection of blood and bronchoalveolar lavage (BAL) from COVID-19 and post-COVID-19 patients linked anonymously to electronic medical records in our research database provides a valuable resource to answer these questions.

As patients from Colorado and around the nation continue coming to the Center, our clinicians and researchers will find answers to many of these mysteries and help those patients recover in a post-pandemic world.

New Expert Guidance in 2020 on Diagnosis and Management of Patients with Respiratory Disease

National Jewish Health physicians are frequently consulted for their expertise to provide guidance on the latest evidence regarding the diagnosis and care of patients with respiratory disease. Below are several clinical guidelines co-authored by National Jewish Health faculty in 2020, with brief highlights of new guidance.

Treatment of Nontuberculous Mycobacterial Pulmonary Disease: An Official ATS/ERS/ESCMID/IDSA Clinical Practice Guideline

Charles Daley, MD; Gwen Huitt, MD; and colleagues. *Clin Infect Dis*. 2020 Aug 14;71(4):905-913.

New guidance includes a recommendation to treat most patients with NTM pulmonary disease, particularly those with more extensive disease, instead of watchful waiting; obtaining drug-susceptibility test results for macrolides and amikacin; and a strong recommendation to add amikacin liposome inhalation suspension for the treatment of refractory *Mycobacterium avium* complex pulmonary disease.

Diagnosis and Detection of Sarcoidosis. An Official American Thoracic Society Clinical Practice Guideline

Lisa Maier, MD; Shu-Yi Liao, MD; Shandra Knight, MS; and colleagues. *Am J Respir Crit Care Med.* 2020 Apr 15;201(8):e26-e51.

The diagnosis of sarcoidosis is based on three major criteria: a compatible clinical presentation, finding non-necrotizing granulomatous inflammation in one or more tissue samples, and the exclusion of alternative causes of granulomatous disease. If tissue sampling is needed, the recommendation is to obtain EBUS-guided lymph node sampling. Additionally, the expert committee made one strong recommendation for baseline serum calcium testing.

Silicosis: An Update and Guide for Clinicians

Krefft S, Wolff J, Rose C. *Clin Chest Med*. 2020 Dec;41(4):709-722.

Physicians who care for patients with silicosis should be on the lookout for well-known complications of the disease, which include emphysema, mycobacterial lung infection, autoimmunity and inflammatory kidney disease. Silicosis and its associated diseases are occurring in younger stone fabrication workers who cut, grind and install engineered/artificial stone countertops. Chest CT scans in these workers often show findings of inflammation such as ground glass opacities along with the more typical silicosis findings of nodules and enlarged mediastinal lymph nodes.

Interstitial Lung Abnormalities Detected Incidentally on CT: A Position Paper from the Fleischner Society

Kevin K. Brown, MD; David A. Lynch, MD; and colleagues. *Lancet Respir Med*. 2020 Jul;8(7):726-737.

Management of interstitial lung abnormalities on CT scans requires distinguishing interstitial lung abnormalities that represent clinically significant interstitial lung disease from those that are subclinical. In particular, it is important to identify the subpleural fibrotic subtype, which is more likely to progress and to be associated with mortality.

Consensus Guidelines for Evaluation and Management of Pulmonary Disease in Sjögren's

Richard Meehan, MD, and colleagues *Chest*. 2020 Oct 16:S0012-3692(20)34902-3.

It is important for pulmonologists to consider Sjogren's syndrome as an alternative diagnosis for fibrotic lung disease, since Sjogren's syndrome patients with interstitial lung disease are more likely to respond to immunomodulatory drugs than to recently approved anti-fibrotic medications.

Behavioral and Psychological Treatments for Chronic Insomnia Disorder in Adults: an American Academy of Sleep Medicine Clinical Practice Guideline

Jack Edinger, PhD, and colleagues. J Clin *Sleep Med*. 2020 Nov 9.

The multicomponent treatment, cognitive behavioral therapy for insomnia is the most supported insomnia therapy. Although sleep hygiene practices are often suggested and well understood by patients, sleep hygiene recommendations do not constitute an effective stand-alone therapy.

Collaboration Fuels COVID-19 Testing Innovation

Before SARS-CoV-2 had even been identified in the United States, National Jewish Health began developing laboratory tests to detect both SARS-CoV-2 and antibodies to the virus in patients. A unique collaboration between academic and commercial sides of our institution helped us become one of the first non-governmental institutions to offer these tests at scale.

Scientists in our Advanced Diagnostic Laboratories and Center for Genes, Environment & Health used different skill sets to overcome endless hurdles in broken supply chains and regulatory requirements to launch IgM and IgG antibody tests and three high-throughput molecular testing platforms for SARS-CoV-2 with capacity for more than 5,000 tests per day and the ability to report results in 24 hours. We provide mass COVID-19 testing for our patients, the public at large, local hospitals, departments of health in five states and several educational institutions and businesses.

"In the Infectious Disease Laboratory, we are good operationally at providing consistent, reportable results," said Reeti Khare, PhD, director of the Infectious Disease Laboratory. "Every time there is a change in our procedures, machines or reagents, we have to run a validation for the FDA to prove we can still provide reliable results. In the two years before the pandemic, we ran one validation. In the nine months since the pandemic began, we have run almost 20 validations to bring up three different testing platforms and adapt to changing conditions."

"The researchers in the Center for Genes, Environment & Health were able to solve problems and find alternatives to the endless breaks in the supply chain," said Dr. Khare. "They made viral test media for us when shortages threatened to disrupt our testing just as we were bringing new platforms online."

"It was a great pairing," said Tasha Fingerlin, PhD, director of the Center for Genes, Environment & Health. "We were able to provide the technical expertise to set up the assay while working with them to make sure it hit all the quality and compliance benchmarks."

In addition, facilities staff built an entire new lab space and constructed drive-through testing tents and trailers. Human Resources hired 80 new technicians and other laboratory personnel to accommodate the dramatically expanded operations.

"We have gone from being a small, specialized reference laboratory running tests from 8 to 5, to a 24-hour-a-day operation running on a scale comparable to commercial laboratories," said Dr. Khare. "It has been an extraordinary effort on the part of so many people and groups across the institution who have come together to help us provide a such a crucial service to our patients and community."

Experience and Teamwork Save Critically Ill Patients

National Jewish Health physicians cared for critically ill COVID-19 patients across the nation in hospitals pushed to their limits by the pandemic.

As the pandemic surged on the West and East coasts, the National Jewish Health critical care team prepared for the arrival of more virus in Colorado by doubling intensive care beds, tripling staff, stockpiling personal protective equipment, both at our campus and working collaboratively at the three Denver hospitals where we provide care.

At the initial peak, all beds were full with "incredibly sick" patients, and supplies and staff were stretched thin, according to William Janssen, MD, head of Critical Care for National Jewish Health. "It was tough," said Dr. Janssen. "But everybody pulled together. We were stretched to the breaking point, but we didn't snap."

In March and April, mortality in the National Jewish Health managed intensive care units was less than 20 percent, compared to an average of about 50 percent in most ICUs and up to 75 percent in some units overwhelmed by the pandemic. Dr. Janssen credits attention to detail and adherence to evidence-based practices developed over 50 years of caring for patients with severe, life-threatening lung disease.

"This may be a new disease, but these patients are similar to those we have spent decades caring for — very sick, in shock and on ventilators," said Dr. Janssen.

At the height of the early COVID-19 surge in New York, 15 National Jewish Health critical care and specialty physicians flew to New York over the course of six weeks to join their colleagues at the Mount Sinai – National Jewish Health Respiratory Institute® on the front lines of care. Over the next several weeks, they provided expertise and support to medical teams stretched thin by the pandemic. In return, National Jewish Health intensivists, cardiologists and pulmonologists gained invaluable experience and firsthand knowledge that translated into better care for severely ill patients in five Colorado hospitals.

In addition, National Jewish Health critical care physicians provided tele-ICU care to thousands of patients in intensive care units at 25 Banner Health hospitals in five western states.

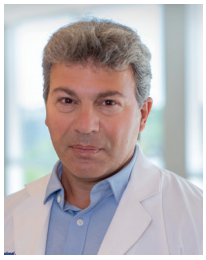
"Telehealth offered a very good model for providing critical care in coronavirus hotspots," said Dr. Janssen. "In Arizona for instance, when cases there surged, we were able to bring more physicians onto telehealth and help the hospitals expand their critical care capacity."

Faculty Share COVID-19 Insights

Almost a year into the pandemic, faculty and staff at National Jewish Health have gained tremendous experience and insight on everything from supply chains to COVID-19 testing and care of acutely ill COVID-19 patients. Below is a sampling of their observations, insights and advice.

"At first, with COVID-19 overwhelming hospitals, many clinicians were desperate and ready to try anything they thought might help. But as it turned out, the established standards generally provided the best guidance, and some experimental therapies may have hurt patients. You never really want to try something experimental except in context of a research clinical trial."

– Tony Gerber, MD, pulmonologist, Director, COVID-19 Research Committee



"Don't forget the psychosocial aspects of the disease, especially among post-COVID-19 patients still suffering lingering symptoms. Chronic fear, anxiety and frustration are serious problems for many. We have incorporated a social worker into our care team, but online support groups also seem to provide valuable benefits."

– Nir Goldstein, Director, Center for Post-COVID Care and Recovery

"The pandemic reinforced the importance of a multidisciplinary team to provide care in the ICU. If you have a multidisciplinary team (respiratory therapist, physical therapist, pharmacist, nursing, social worker and others) that provides well established, evidence-based standards of care, mortality from ARDS will go way down. High mortality occurred in many ICUs early in the pandemic because those hospitals were overrun and could not provide the multidisciplinary care that has been shown to work."

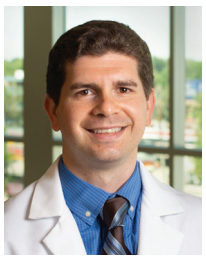
– Ken Lyn-Kew, MD, critical care pulmonologist

"Many 'long haulers' may have lasting problems, which may be non-pulmonary or systemic or multi-system. Consult with your colleagues in cardiology, neurology and infectious disease for ongoing care of recovering COVID-19 patients."

– Lisa Maier, MD, Chief, Environmental and Occupational Health Sciences

"One of the biggest frustrations was to see up close and in person just how serious COVID-19 could be, then hear people in the community so skeptical of it all. Why couldn't I convince people to take it seriously? I learned to just take the 12-step approach: accept what I cannot change and keep working hard in the areas where I can make a difference. By making a difference there, maybe we can open the eyes of skeptics down the road."

– Carrie Horn, MD, Chief Medical Officer



"I hope this experience sets us up for the next challenge with better surveillance for emerging infections; a new centralized response system at the federal level; building capacity into the system from contact tracers to surpluses of equipment and less reliance on international supply chains."

– Jared Eddy, MD, Medical Director, Infection Control

"This pandemic allowed people who were previously in their own silos to come together to work in teams. Communication across disciplines is vital to good research."

– Vamsi P. Guntur, MD, MSc, pulmonologist

Center for Outpatient Health Supports Growth

Responding to tremendous growth in demand for our multidisciplinary services, National Jewish Health officially broke ground on the five-story, 230,000-square-foot Center for Outpatient Health in December 2019. The stunning brick and glass building will contain more than 100 clinical examination and procedure rooms, as well as space for ancillary services. It will include more than 250 parking spaces. Working with partners at SCL Health and Saint Joseph Hospital, we will be better equipped to meet the needs of patients from around Colorado and the nation. The addition to our main Denver campus will enable ongoing growth, leadership and excellence for years to come. Construction continued steadily throughout the coronavirus pandemic. The Center for Outpatient Health is expected to open in the fall of 2021.

Physicians (left to right) Patricia George, MD; Mehrnaz Maleki, MD; and Lisa Maier, MD; lead programs recognized in 2020 for their excellence.

Pulmonary Hypertension, Scleroderma and Sarcoidosis Programs Recognized

National Jewish Health programs in pulmonary hypertension, scleroderma and sarcoidosis were all recognized in 2020 for their clinical and research excellence.

The Pulmonary Hypertension Association designated our Pulmonary Hypertension Program as a Center of Comprehensive Care. The designation recognizes both the outpatient care at National Jewish Health and the inpatient care that our pulmonary hypertension (PH) patients receive at National Jewish Health | Saint Joseph Hospital. To be recognized, our team demonstrated that it uses evidence-based guidelines to evaluate PH patients, provides expert treatment and makes important contributions to research and education.

The Scleroderma Foundation designated the National Jewish Health Scleroderma Program as a Scleroderma Foundation Research and Treatment Center in recognition of our clinical care for patients with scleroderma, robust research program, ancillary services and educational offerings.

Our Sarcoidosis Program was named a Center of Excellence by the Foundation for Sarcoidosis Research. To receive this prestigious designation, our faculty and staff demonstrated that they provide leadership, follow best practices, conduct research, and support and educate sarcoidosis patients and professionals.

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 our unique, comprehensive approach to care. Our clinical expertise includes the areas noted below.

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. In 2020, we launched tests for active COVID-19 infection and IgG and IgM antibodies to SARS-CoV-2.

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. Plus, 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 understand and manage behavioral health issues that often accompany chronic respiratory diseases is an integral part of our whole-patient approach. In addition, our prevention and wellness programs offer help with tobacco cessation and vaping cessation for adults and young people.

Cardiology

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

Ellen Volker, MD, MSPH, Director, Interventional Pulmonology

Interventional Pulmonology

The National Jewish Health Interventional Pulmonology Program offers a wide spectrum of minimally invasive diagnostic, therapeutic and palliative airway procedures with formally trained specialists. In 2020, program director Ellen Volker, MD, was joined by Kristen Glisinski, MD, who recently completed a fellowship in interventional pulmonology at Duke University Medical School. In January 2021, Drs. Volker and Glisinski began conducting robot-assisted lung biopsies to obtain tissue samples from deep within the lung, assuring definitive diagnoses for difficult cases.

Our Interventional Pulmonology Program provides minimally invasive diagnostic, therapeutic and palliative procedures for pulmonary nodules, lung cancer, airway obstruction, tracheomalacia and pleural effusions. We also insert airway stents and perform bronchial thermoplasty for severe asthma. Our interventional pulmonologists work closely with thoracic surgeons to individualize therapeutic options for those with severe emphysema, including bronchoscopic lung volume reduction and intra-bronchial valve placement.

CLINICAL EXPERTISE

Alpha-1 Antitrypsin Deficiency

The Alpha-1 Antitrypsin Deficiency Program at National Jewish Health is one of the best places in the world to be treated for the adult lung and liver disease caused by Alpha-1. In 2021, the program begins a new era as program founder **Robert Sandhaus**, MD, retires from clinical practice and hands the reins to his successor **Karina Serban**, MD. Dr. Serban earned her medical degree from the Carol Davila University of Medicine in Bucharest, Romania, and trained with Dr. Sandhaus for five years. In addition to her clinical work, Dr. Serban conducts basic and translational research focused on inflammation and immune responses in emphysema and alpha-1 antitrypsin deficiency.

Karina Serban, MD, leads the Alpha-1 Antitrypsin Deficiency Program at National Jewish Health.

Dr. Serban leads a multidisciplinary team that has every necessary tool at its fingertips to diagnose and treat this condition, with extensive experience gained in caring for one of the largest groups of Alpha-1 patients in the world since 1981. Our doctors and researchers are always looking for new ways to manage and treat Alpha-1 and other chronic lung diseases. They have been involved in virtually every new drug evaluated for Alpha-1. Currently trials are underway or planned to evaluate inhaled therapies and gene therapy for the condition.

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 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 those with this condition.

Cystic Fibrosis

We have the largest and most experienced adult cystic fibrosis program in the nation. Our team of pulmonary specialists, nurse coordinators, respiratory therapists, registered dietitians, psychologists and social workers provides treatment for more than 400 adults annually. We have more than two dozen ongoing clinical trials to evaluate new cystic fibrosis therapies.

Environmental Health

We define, diagnose and treat patients with a broad range of occupational, environmental and granulomatous lung diseases, including chronic beryllium disease, bronchiolitis obliterans and respiratory disease among warfighters returning from deployment in the Middle East.

Gastroenterology

We have special expertise in GI motility disorders, pulmonary-related GI conditions, GI cancer screening and 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.

CLINICAL EXPERTISE

Interstitial Lung Disease

We have vast experience with interstitial lung disease (ILD). Through detailed evaluations, we diagnose the wide range of ILDs of idiopathic, exposure and autoimmune origins. Care plans are based on the most current information, much of which has been discovered at National Jewish Health. We have several ongoing clinical trials of approved and experimental ILD therapies.

Mycobacterial Infections: TB and NTM

National Jewish Health began as a hospital for destitute tuberculosis (TB) patients more than 122 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.

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 screen and monitor patients at high risk for lung cancer.

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 Severe Asthma Clinic and Pediatric Day Program offer multiday evaluations, education and management plans for children with pulmonary and atopic diseases.

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 offers many unique tests, including cardiopulmonary exercise tests with full metabolic testing, arterial line, lactate levels and cardiac data; and continuous laryngoscopy with exercise tolerance to evaluate exercise-induced respiratory distress.

Radiology

National Jewish Health is recognized around the world for our expertise in thoracic imaging. Our highly experienced team of radiologists and technicians performs imaging studies on more lungs than any other facility. Our experts provide interpretations of imaging test results and consultations to help doctors nationwide make accurate and timely diagnoses.

Rare Lung Diseases

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

Rheumatology

Our rheumatologists work to diagnose, manage and research

CLINICAL EXPERTISE

a variety of rheumatologic disorders, with special expertise in interstitial lung diseases caused by systemic autoimmune diseases. In 2020, the Rheumatology Division was designated as a 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. In 2020, our Sarcoidosis Program was named a Center of Excellence by the Foundation for Sarcoidosis Research.

Scleroderma

In 2020, the Scleroderma Program at National Jewish Health was 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. Services include advanced diagnostic and treatment options, access to scleroderma clinical trials, nutritional counseling and specialized pulmonary and physical rehabilitation programs.

Sleep

Our comprehensive Sleep Center has a full complement of pulmonologists, sleep medicine specialists, psychologists, respiratory therapists and polysomnographic technologists.

Pulmonary Hypertension

In 2020, the Pulmonary Hypertension Program continued its explosive growth in both the volume of patients and complexity of cases. The program, launched in 2016, was named an accredited Center of Comprehensive Care by the Pulmonary Hypertension Association. Program Director **Patricia George**, MD, published the proceedings of the prestigious Aspen Lung Conference on Pulmonary Hypertension, which she chaired in 2019.

Our pulmonary hypertension specialists in pulmonology, cardiology and rheumatology 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 hypertension patients have access to the latest treatments and a variety of clinical trials.

CLINICAL RESEARCH — SELECTED RESULTS

National Jewish Health has a robust clinical research program with more than 300 active clinical trials. We collaborate on clinical research with the National Institutes of Health (NIH), industry leaders and research institutions across the country through numerous research networks and consortiums. Highlights of our clinical research results from 2020 are provided below.

Influenza and Severe COVID-19

Kelly Schweitzer, PhD; **Irina Petrache**, MD; and their National Jewish Health colleagues report influenza A infection may increase the risk of severe COVID-19. Healthy human small airway cells infected with influenza A increase by eight-fold their expression of ACE2, a protein crucial to SARS-CoV-2 entry into cells, and induce posttranslational changes to ACE2 that may increase vulnerability to lung injury. *Eur Respir J 2021 Jan 8;2003988.*

Preventing Transmission of SARS-CoV-2 During Aerosol-Generating Procedures

Jane E. Gross, MD, PhD, and her colleagues identify specific aerosol-generating procedures commonly used to treat respiratory disease and the personal protective equipment, environmental conditions and other measures that can inhibit transmission of SARS-CoV-2. *Am J Respir Crit Care Med 2020 Aug 15;202(4):P13-P14.*

Inhaled Steroids Not a Risk Factor for COVID-19

Lisa Maier, MD; **Shu-Yi Liao**, MD; **Irina Petrache**, MD; and **Tasha Fingerlin**, PhD; found no significant association between inhaled steroid use and a positive COVID-19 test among 928 patients tested for the disease at National Jewish Health, leading to the recommendation that patients with chronic pulmonary diseases, including asthma and COPD, who require treatment with either inhaled or systemic corticosteroids, should continue their use during the COVID-19 pandemic. *Respir Med. 2020 Nov 28;176:106275.*

Asthma in COVID-19 Hospitalizations

Michael Wechsler, MD, and his colleagues reported that asthma appears not to be a risk factor for severe COVID-19. A review of 15 studies and data from the University of Colorado Hospital indicate that hospitalizations and intubations of asthma patients are comparable to population prevalence of asthma. *Ann Am Thorac Soc. 2020 Dec;17(12):1645-1648.*

Vitamin D to Reduce Asthma Exacerbations

Low levels of vitamin D have been associated with severe asthma exacerbations. In this placebo-controlled, double-blind study of 192 pediatric asthma patients with low vitamin D levels, **Ronina Covar**, MD, and her colleagues reported that daily supplementation with 4,000 IU of vitamin D failed to extend the time to a severe exacerbation. *JAMA. 2020 Aug 25;324(8):752-760.*

Alternative to Antibiotics for Bronchiectasis Exacerbations

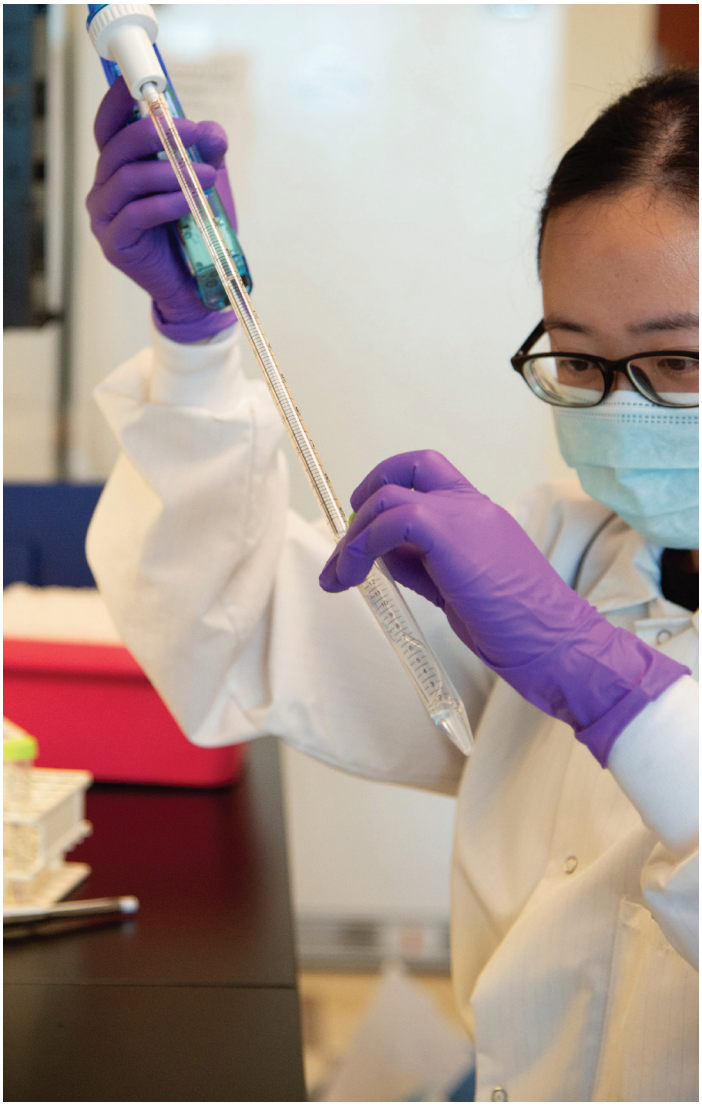
The only existing medications to reduce exacerbations of bronchiectasis are inhaled antibiotics, which are time consuming to administer and eventually lead to resistant organisms. **Charles Daley**, MD, and his colleagues reported an alternative; the experimental medication brensocatib reduced exacerbations of bronchiectasis by approximately 40 percent in a phase 2 trial. *N Engl J Med. 2020 Nov 26;383(22):2127-2137.*

Black Lung Disease Progresses After Leaving the Mines

Cecile Rose, MD, and her colleagues report that coal workers' pneumoconiosis can develop and progress in the absence of further exposure to coal dust, even among miners who originally had no radiographic evidence of pneumoconiosis. Former miners should undergo regular medical surveillance because of the risk for disease progression. *Occup Environ Med. 2020 Nov;77(11):748-751.*

Mortality Risk Factors for COPD

Risk of mortality among COPD patients is impacted most by six-minute walk distance, forced expiratory volume in one second and age, according to a risk-prediction model developed by **Matthew Strand**, PhD; **James Crapo**, MD; and their colleagues using extensive clinical characterization, genetic data and



10 years of follow-up for almost 10,000 smokers in the COPDGene® study. Risk factor identification is a proven strategy in advancing treatments and preventive therapy for many chronic conditions. *Chronic Obstr Pulm Dis. 2020 Oct;7(4):346-361.*

Methotrexate and Interstitial Lung Disease in RA Patients

Fibrotic interstitial lung disease (ILD) is a common complication of rheumatoid arthritis (RA). Does treatment with methotrexate, a key anchor drug for RA management, increase the risk of ILD in patients with RA? **Joshua Solomon**, MD, and his colleagues reported results suggesting not. In fact, they found that ILD was generally detected later in RA patients treated with methotrexate. *Eur Respir J. 2020 Jul 9.*

CLINICAL RESEARCH — OPEN CLINICAL TRIALS

National Jewish Health has a robust clinical trials program with more than 300 active clinical trials in progress. Below are brief descriptions of some of our active clinical trials.

Alpha-1 Antitrypsin Deficiency

Potential New Treatment for Alpha-1 Antitrypsin Deficiency

Principal Investigator:
Robert Sandhaus, MD

Researchers want to see if a new drug, alvelestat, improves the symptoms of COPD caused by alpha-1 antitrypsin deficiency (AATD), as well as other symptoms of the AATD.

Asthma

PrecISE Severe Asthma Interventions

Principal Investigator:
Michael Wechsler, MD

The purpose of this study is to understand how to treat different types of severe asthma using precision medicine, which targets treatments to defined subgroups of patients who share similar characteristics such as a specific genetic variation or high levels of eosinophils. Study participants will receive various treatments based on their type of severe asthma.

Cancer

Skin Reactions to Cancer Immunotherapy

Principal Investigators:
Donald Leung, MD, PhD, and Jeffrey Kern, MD

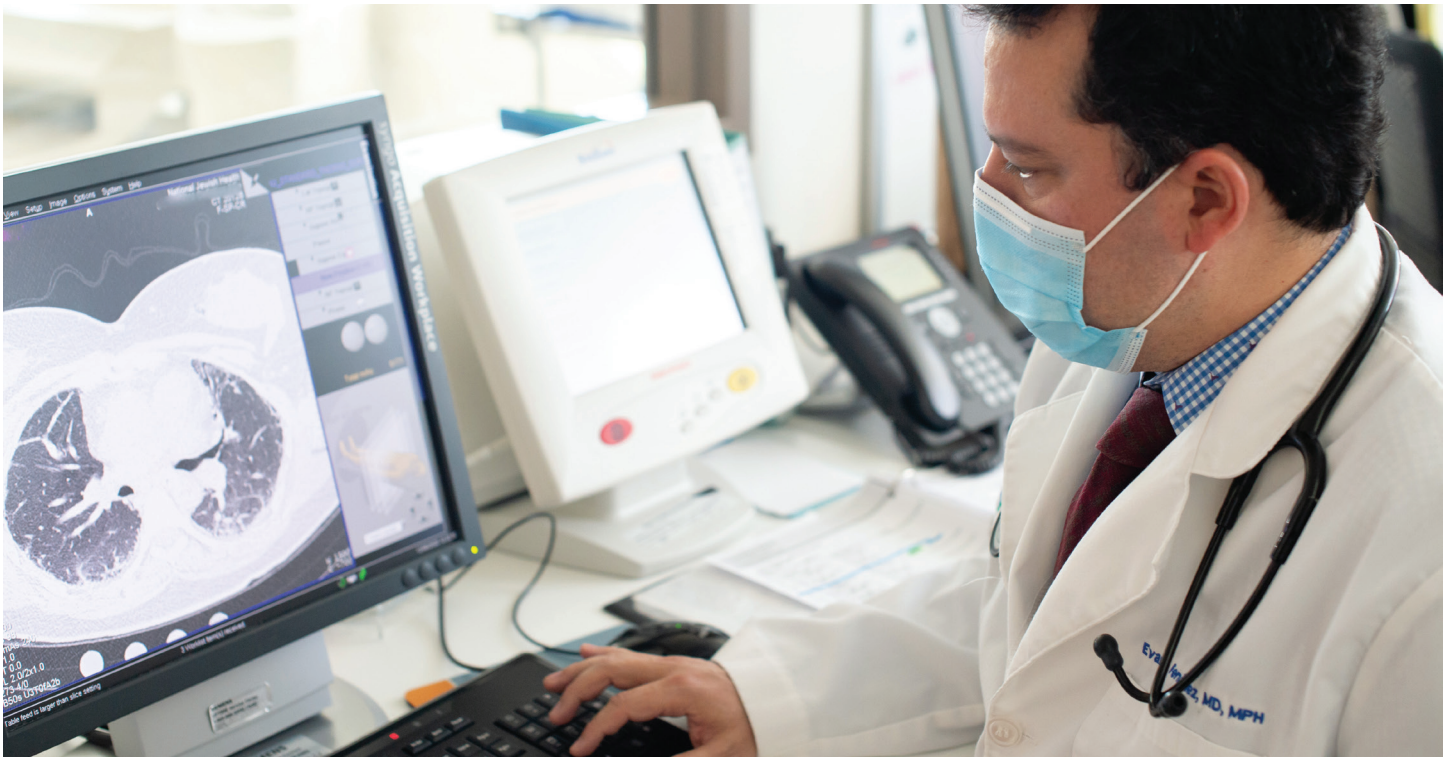
This study focuses on side effects caused by cancer immunotherapy, specifically skin reactions. The purpose of this study is to understand what changes occur in the immune system and how these changes lead to skin reactions as a side effect. By understanding these changes, our goal is to define the best treatment for the skin reactions, or possibly prevent the reactions.

COPD

COPD Patient Knowledge

Principal Investigator:
Barry Make, MD

The objective of this study is to find out what COPD patients know and don't know about their disease so they can regain some control over their health, and to help physicians better educate their patients, with a goal of providing better care and increasing patient satisfaction.



COVID-19

Safety and Efficacy of Dapansutrile for Treatment of Moderate COVID-19

Principal Investigator:
Michael Wechsler, MD

The purpose of this study is to find out if an investigational drug, called dapansutrile, safely and effectively improves symptoms of moderate COVID-19 and shortens the time that a patient is sick with COVID-19. To qualify, participants must have tested positive for COVID-19 and have experienced their first symptoms of the virus within five days of becoming part of the study.

Cystic Fibrosis

Impact of Triple Combination Therapy for People with CF with Sinusitis

Principal Investigator:
Jennifer Taylor-Cousar, MD

This observational study will assess the impact of a new triple-combination CFTR modulator therapy (ivacaftor/tezacaftor/elexacaftor) on chronic sinusitis in adults with cystic fibrosis. In previous studies this therapy has been shown to improve lung function and sweat chloride. Researchers are trying to determine if this triple-combination therapy can also improve computed tomography sinus CT scan findings, sense of smell and quality of life for people with CF with chronic sinusitis.

Hypersensitivity Pneumonitis

Investigational Medication for Fibrotic Hypersensitivity Pneumonitis

Principal Investigator:
Evans Fernandez, MD

The purpose of this clinical trial is to study the safety and potential benefits of treating fibrotic hypersensitivity pneumonitis with an investigational medication.

Rheumatoid Arthritis

ILD & Early Rheumatoid Arthritis

Principal Investigator:
Joshua Solomon, MD

There is evidence that rheumatoid arthritis starts in the lungs in a subset of patients. The purpose of this study is to learn how interstitial lung disease (ILD) develops and progresses over time in people with early rheumatoid arthritis (RA).

Interstitial Lung Disease

Improving Treatment for IPF

Principal Investigator:
Gregory Downey, MD

Researchers want to know if the Src kinase inhibitor saracatinib is a safer and more effective treatment for idiopathic pulmonary fibrosis (IPF) when compared to currently available treatments.

Pulmonary Hypertension

Ralinepag for Pulmonary Arterial Hypertension

Principal Investigator:
Marjorie Patricia George, MD

The ADVANCE OUTCOMES study is evaluating the effects of adding the investigational drug ralinepag to patients' current therapies for pulmonary arterial hypertension. Ralinepag is designed to help the body receive prostacyclin, which is known to widen blood vessels and relax artery walls, potentially improving blood flow in adults with pulmonary arterial hypertension.

Sarcoidosis

Silicosis Registry

Principal Investigator:
Cecile Rose, MD

This observational study is collecting information on adults who have been exposed to silica dust at their workplace in hopes of better understanding how silica-related diseases progress. Researchers hope to improve treatments and prevention strategies by discovering the individual and workplace risk factors for these diseases.

Tuberculosis

Tuberculosis Testing for NTM Patients

Principal Investigator:
Charles Daley, MD

The purpose of this study is to determine if a new blood test known as the VIDAS Interferon Gamma Release Assay (VIDAS TB-IGRA) is effective at diagnosing tuberculosis (TB) in people with nontuberculous mycobacteria (NTM) infections. The study will evaluate whether nontuberculous mycobacteria interfere with the positive *Mycobacterium tuberculosis* diagnosis. Researchers are comparing VIDAS TB-IGRA with other diagnostic tests known to accurately detect latent tuberculosis in NTM patients. It is important to rule out a TB infection when treating NTM.

To learn more about clinical trials, visit www.njhealth.org/clinicaltrials.

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.

SELECTED 2020 RESEARCH REPORTS

ABCs of Granulomatous Disease

A subset of B cells, known as Age-associated B cells (ABCs), contribute to inflammation but are also associated with persistent viral infections and autoimmunity. **Phillippa Marrack**, PhD, whose lab has been a leader in identifying and characterizing ABCs, reports that ABCs are also increased in blood and bronchoalveolar lavage of patients with the granulomatous diseases sarcoidosis, chronic beryllium disease and hypersensitivity pneumonitis. The findings suggest that depletion of these cells may be a valuable therapeutic strategy. *Am J Respir Crit Care Med. 2020 Oct 1;202(7):1013-1023.*

Diesel Exhaust and Asthma

Mothers living near high-traffic roads before or during pregnancy are more likely to have children with asthma. **Magdalena Gorska**, MD, PhD, in studies has shown that maternal mice exposed to diesel exhaust particles have offspring predisposed to allergic asthma. Most recently she showed in a mouse model that natural killer cells play a vital role in the process through expression of GATA2 and secretion of IL-13 and granzyme B. *J Clin Invest 2020 Aug 3;130(8):4133-4151.*

Allergic Asthma Transforms Cells of the Airway

Max Seibold, PhD, and his colleagues showed that allergic asthma fundamentally transforms the human airway, reducing cells' ability to remove pollutants and fight infections. When they added IL-13, which drives allergic asthma, to cells extracted from human airways, it weakened the cells' innate immune defense, increased production of 'pathologic' mucus and reduced the ability of cilia to remove pollutants and microorganisms. *Cell Rep. 2020 Jul 7;32(1):107872.*

Iron-Rich Soil May Drive High NTM Prevalence in Hawaii

Epidemiologic studies have shown the Hawaiian Islands have the highest prevalence of NTM lung infections in the United States. **Jennifer Honda**, PhD, and her colleagues found that iron, which is especially prevalent in the basaltic rock and soil of Hawaii, was associated with higher NTM counts and could be a factor in high prevalence of NTM in Hawaii and other locations around the world. *Appl Environ Microbiol 2020 Oct 15;86(21):e00121-20.*

Antiviral Lipids

Mari Numata-Nakamura, MD, PhD, and **Dennis Voelker**, PhD, reported that two naturally occurring lipids in the lungs, POPG and PI, effectively reduce and prevent infection by the H1N1 influenza virus, which caused a worldwide pandemic in 2009 and 2010. In recent months, they showed that the lipids also are effective against the SARS-CoV-2 virus that causes COVID-19. The researchers are currently seeking support to move the lipids into clinical trials. *J Biol Chem. 2020 Feb 7;295(6):1704-1715.*

Cholesterol 25-hydroxylase Promotes Resolution of Lung Inflammation

Jerry Nick, MD, and **William Janssen**, MD, report that cholesterol 25-hydroxylase (25HC), is expressed at high levels by macrophages in the inflamed lungs of mice and humans, and promotes the resolution of inflammation in the lungs through clearance of apoptotic cells. 25HC could be either an informative biomarker or an intervenable target in human lung disease. *JCI Insight. 2020 Jun 4;5(11):e137189.*

NOTEWORTHY ONGOING RESEARCH

Incidence and Transmission of COVID-19 Among Children

Max Seibold, PhD, and his team will serve as the experimental and computational analysis center for the Human Epidemiology and Response to SARS-CoV-2 Study (HEROS) to determine the role of children in the pandemic. His lab is analyzing thousands of COVID-19 tests taken sequentially over several months from 2,000 children and their family members to learn how many children become infected and if they spread the disease to others.

Understanding the Cytokine Storm

William Janssen, MD, head of our critical care section, has secured NIH funding to better understand the 'cytokine storm' that makes some COVID-19 patients develop severe disease. He is identifying various cell types active in the lungs of acutely ill patients and seeking to understand their contribution to the inflammatory cascade.

Vaping, Influenza and COVID-19

Irina Petrache, MD, is extending preliminary research that suggests vaping and influenza infections may make COVID-19 infection more likely and more serious through a grant provided by the American Lung Association.

Biomarkers of Hypersensitivity Pneumonitis

Evans Fernandez, MD, is seeking to discover if biomarkers can predict fibrotic progression of chronic hypersensitivity pneumonitis, an allergic disease of the lungs with no known causative antigen. Identifying patients at risk of disease progression can aid in prognosis and therapy.

COPDGene® - Genetic Epidemiology of COPD

Led 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 14th year, the study has 10,000 enrolled individuals. In 2019, using 10 years of data from the study, Dr. Crapo and his colleagues proposed diagnostic criteria for COPD, which added environmental exposure, symptoms and abnormal CT scans to the existing sole measure of lung function.

Mechanisms of Non-Allergic Asthma

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

T Cells and Cancer

James Scott-Browne, PhD, is studying how the lung environment and tumor microenvironment influence T-cell transcriptional programs with an eye toward improving anti-tumor activity of T cells.

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 translation research enterprise, placing it in the top 6 percent 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 family medicine at National Jewish Health | Saint Joseph Hospital.

School of Medicine
UNIVERSITY OF COLORADO
ANSCHUTZ MEDICAL CAMPUS

EDUCATION — CONTINUING MEDICAL EDUCATION

Building on 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 National Jewish Health treats and researches.

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.

In early 2020 in-person educational events transitioned to live webinars and online grand rounds in response to the pandemic. Our virtual CME events were attended by more than 1,000 physicians and other health care providers. Most of our live webinars are enduring online CME-certified activities, making these virtual education opportunities accessible 24/7.

Annual Respiratory Disease Young Investigators' Forum

Committed to helping young scientists grow to become leaders in the research and treatment of respiratory diseases, the National Jewish Health Office of Professional Education each year hosts the Respiratory Disease Young Investigators' Forum. Twenty-five 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.

Online Courses Include:

- The Intersection of COVID-19 and Chronic Lung Disease: Treating Real World Issues with Evolving Data
- Clinical Decision Points in the Diagnosis and Treatment of Non-Eosinophilic Asthma
- Selecting the Right Treatment for Your Patients with Severe Asthma
- Challenging Cases in COPD: Early Diagnosis, Management and Exacerbation Prevention
- Empowering and Educating Patients and Caregivers: Medical Management of Cystic Fibrosis
- Diagnosis and Treatment Selection for Eosinophilic Granulomatosis with Polyangiitis
- Systemic Sclerosis Interstitial Lung Disease (SSc-ILD): The Importance of Early Diagnosis, Patient-Centered Communication and Evidence-Based Treatment
- Emerging Treatments: Diagnosis and Treatment of Chronic Fibrosing ILD with a Progressive Lung Disease Phenotype
- The Importance of Early and Accurate Diagnosis and Treatment of ILD and IPF
- Improving Outcomes in NTM-LD: Strategies for Diagnosis, Individualized Treatment Plans and Patient Adherence

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

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RESPIRATORY INSTITUTES® INCREASE REACH

Through our unique Respiratory Institute® model, National Jewish Health collaborates with Saint Joseph Hospital in Denver, Mount Sinai in New York and Jefferson Health in Philadelphia. The Respiratory Institutes combine the strengths of our collaborating institutions while bringing our multidisciplinary, team-based model of care to patients. The Institutes also provide a common platform for expanded research of complex respiratory and related diseases.

Mount Sinai — National Jewish Health Respiratory Institute

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

Physicians at National Jewish Health and Mount Sinai have jointly developed protocols for the treatment of patients with respiratory disease and have established regular conferences to discuss complex cases. National Jewish Health critical care and specialty physicians joined their Mount Sinai colleagues on the frontlines of care in New York during the height of the initial surge. The two institutions have also collaborated on protocols for care of post-COVID-19 patients. Scheduling and referral centers at both institutions have been linked to offer seamless, multidisciplinary evaluations in New York or in Denver.

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, including COVID-19, COPD, asthma, interstitial lung disease and sarcoidosis and. The Respiratory Institute also brings together investigators to advance research and care for complex respiratory diseases.

Collaboration with Saint Joseph Hospital

Our collaboration with Denver-based Saint Joseph Hospital, a part of the SCL Health system, began in 2014. It expanded in 2018 through the Respiratory Institute model, which includes a dedicated 36-bed inpatient unit and expanded research opportunities. All team members are trained to care for patients with advanced respiratory diseases, including COVID-19, cystic fibrosis, bronchiectasis, COPD, interstitial lung disease and other rare pulmonary conditions. The Respiratory Institute builds on existing collaborations in cardiology, lung cancer and intensive care.

SELECTED 2020 PUBLICATIONS

In 2020, National Jewish Health faculty published more than 450 articles in peer-reviewed scientific and medical journals. Included below is a selection of noteworthy article.

COVID-19 / SARS-COV-2

Coronavirus disease 2019: investigational therapies in the prevention and treatment of hyperinflammation.

Amigues I, Pearlman AH. Patel A, Reid P, Robinson PC, Sinha R, Kim AH, Youngstein T, Jayatilleke A, Konig MF. *Expert Rev Clin Immunol.* 2020 Nov 4.

Type 2 and interferon inflammation regulate SARS-CoV-2 entry factor expression in the airway epithelium.

Sajuthi SP, DeFord P, Li Y, Jackson ND, Montgomery MT, Everman JL, Rios CL, Pruesse E, Nolin JD, Plender EG, Wechsler ME, Mak ACY, Eng C, Salazar S, Medina V, Wohlford EM, Huntsman S, Nickerson DA, Germer S, Zody MC, Abecasis G, Kang HM, Rice KM, Kumar R, Oh S, Rodriguez-Santana J, Burchard EG, **Seibold MA**. *Nat Commun.* 2020 Oct 12;11(1):5139.

Coronavirus Disease 2019 Pandemic Measures: Reports From a National Survey of 9,120 ICU Clinicians.

Kleinpell R, **Ferraro DM,** Maves RC, Kane Gill SL, Branson R, Greenberg S, Doersam JK, Raman R, Kaplan LJ. *Crit Care Med.* 2020 Oct;48(10):e846-e855.

Asthma in COVID-19 Hospitalizations: An Overestimated Risk Factor?

Broadhurst R, Peterson R, Wisnivesky JP, Federman A, Zimmer SM, Sharma S, **Wechsler M**, Holguin F. *Ann Am Thorac Soc.* 2020 Aug 31.

Kawasaki syndrome: role of superantigens revisited.

Leung DYM, Schlievert PM. *FEBS J.* 2020 Aug 8:10.1111/febs.15512.

The Progression of SARS Coronavirus 2 (SARS-CoV2): Mutation in the Receptor Binding Domain of Spike Gene.

Kim S, Lee JH, Lee S, Shim S, Nguyen TT, Hwang J, Kim H, Choi YO, Hong J, Bae S, Jhun H, Yum H, Lee Y, **Chan ED**, Yu L, Azam T, Kim YD, Yeom SC, Yoo KH, Kang LW, Shin KC, Kim S. *Immune Netw.* 2020 Oct 26;20(5):e41.

COVID-19-related Genes in Sputum Cells in Asthma. Relationship to Demographic Features and Corticosteroids.

Peters MC, **Sajuthi S, Deford P, Christenson S, Rios CL, Montgomery MT**, Woodruff PG, Mauger DT, Erzurum SC, Johansson MW, Denlinger LC, Jarjour NN, Castro M, Hastie AT, Moore W, Ortega VE, Bleecker ER, Wenzel SE, Israel E, Levy BD, **Seibold MA**, Fahy JV. *Am J Respir Crit Care Med.* 2020 Jul 1;202(1):83-90.

SARS-CoV-2 Transmission and the Risk of Aerosol Generating Procedures.

Pasnick S, Carlos WG, Dela Cruz CS, **Gross JE**, Garrison G, Jamil S. *Am J Respir Crit Care Med.* 2020 Jun 30.

How I Do It: Restarting Respiratory Clinical Research in the Era of the COVID19 Pandemic.

Taylor-Cousar JL, Maier L, Downey GP, Wechsler ME. *Chest.* 2020 Nov 13:S0012-3692(20)35140-0.

Deferral and Resumption of Lung Cancer Screening After COVID-19 Surge: Patient Perspectives From Two Institutions.

Byrne SC, Jacobson FL, Hammer MM, **Dyer DS**. *J Am Coll Radiol.* 2020 Oct 22:S1546-1440(20)31150-9.

How to Leverage Collaborations Between the BME Community and Local Hospitals to Address Critical Personal Protective Equipment Shortages During the COVID-19 Pandemic.

George MP, Maier LA, Kasperbauer S, Eddy J, Mayer AS, Magin CM. *Ann Biomed Eng.* 2020 Sep;48(9):2281-2284.

COVID-19: How Do We Stay Safe?

Carlos WG, Dela Cruz CS, Cao B, **Gross JE**, Pasnick S, Jamil S. *Am J Respir Crit Care Med.* 2020 Jul 10.

Critical Care Clinician Reports on Coronavirus Disease 2019: Results From a National Survey of 4,875 ICU Providers.

Kaplan LJ, Kleinpell R, Maves RC, Doersam JK, Raman R, **Ferraro DM**. *Crit Care Explor.* 2020 May 7;2(5):e0125.

Pathogenesis of COVID-19 from a cell biology perspective.

Mason RJ. *Eur Respir J.* 2020 Apr 16;55(4):2000607.

EXPERT GUIDELINES

Silicosis: An Update and Guide for Clinicians.

Krefft S, Wolff J, Rose C. *Clin Chest Med.* 2020 Dec;41(4):709-722.

Treatment of Nontuberculous Mycobacterial Pulmonary Disease: An Official ATS/ERS/ESCMID/IDSA Clinical Practice Guideline.

Daley CL, Iaccarino JM, Lange C, Cambau E, Wallace RJ, Andrejak C, Böttger EC, Brozek J, **Griffith DE,** Guglielmetti L**, Huitt GA, Knight SL**, Leitman P, Marras TK, Olivier KN, Santin M, Stout JE, Tortoli E, van Ingen J, Wagner D, Winthrop KL. *Clin Infect Dis.* 2020 Aug 14;71(4):905-913.

Guidelines for the Evaluation of Pulmonary Nodules Detected Incidentally or by Screening: A Survey of Radiologist Awareness, Agreement, and Adherence From the Watch the Spot Trial.

Gould MK, Altman DE, Creekmur B, Qi L, de Bie E, Golden S, Kaplan CP, Kelly K, Miglioretti DL, Mularski RA, Musigdilok VV, Smith-Bindman R, Steltz JP, Wiener RS, Aberle DR, **Dyer DS,** Vachani A. *J Am Coll Radiol.* 2020 Nov 16:S1546-1440(20)31119-4.

Consensus Guidelines for Evaluation and Management of Pulmonary Disease in Sjögren's.

Lee AS, Scofield RH, Hammitt KM, Gupta N, Thomas DE, Moua T, Ussavarungsi K, St Clair EW, **Meehan R**, Dunleavy K, Makara M, Carsons SE, Carteron NL. *Chest.* 2020 Oct 16:S0012-3692(20)34902-3.

Summary for Clinicians: Clinical Practice Guideline for the Diagnosis and Detection of Sarcoidosis.

Singha A, Liao SY, Herman DD, Crouser ED, **Maier LA**, Baughman RP, Ruminjo JK, Thomson CC. *Ann Am Thorac Soc.* 2020 Sep 24.

Interstitial lung abnormalities detected incidentally on CT: A Position Paper from the Fleischner Society.

Hatabu H, Hunninghake GM, Richeldi L, **Brown KK**, Wells AU, Remy-Jardin M, Verschakelen J, Nicholson AG, Beasley MB, Christiani DC, San José Estépar R, Seo JB, Johkoh T, Sverzellati N, Ryerson CJ, Graham Barr R, Goo JM, Austin JHM, Powell CA, Lee KS, Inoue Y, **Lynch DA**. *Lancet Respir Med.* 2020 Jul;8(7):726-737.

ASTHMA

Unmet need in severe, uncontrolled asthma: can anti-TSLP therapy with tezepelumab provide a valuable new treatment option?

Menzies-Gow A, **Wechsler ME.** *Respir Res.* 2020 Oct 15;21(1):268.

Benralizumab as a steroid-sparing treatment option in eosinophilic granulomatosis with polyangiitis.

Guntur VP, Manka L, Denson JL, Dunn RM, Dollin YT, **Gill M, Kolakowski C, Strand M, Wechsler ME.** *J Allergy Clin Immunol Pract.* 2020 Oct 13:S2213-2198(20)31104-1.

SOURCE: a phase 3, multicentre, randomized, double-blind, placebo-controlled, parallel group trial to evaluate the efficacy and safety of tezepelumab in reducing oral corticosteroid use in adults with oral corticosteroid dependent asthma.

Wechsler ME, Colice G, Griffiths JM, Almqvist G, Skärby T, Piechowiak T, Kaur P, Bowen K, Hellqvist Å, Mo M, Garcia Gil E. *Respir Res.* 2020 Oct 13;21(1):264.

SELECTED 2020 PUBLICATIONS

BT or MAb: That is the question!

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Effect of Vitamin D3 Supplementation on Severe Asthma Exacerbations in Children With Asthma and Low Vitamin D Levels: The VDKA Randomized Clinical Trial.

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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 24th consecutive year, National Jewish Health was named a top respiratory hospital in the nation by *U.S. News & World Report* in its 2020-21 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 24 years that *U.S. News* has evaluated pulmonology care.

National Jewish Health has 53 doctors, nearly one-third of our faculty, named on various top doctor lists, including "America's Top Doctors" by Castle Connolly and "Top Docs" in *5280 Magazine's* 2019 rankings of Denver-area physicians.

National Jewish Health is in the top 6 percent of institutions nationally funded by the National Institutes of Health (NIH), in terms of absolute dollars. This is a tremendous achievement for a specialty hospital.

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. Our National Jewish Health physicians were among the nation's thought leaders in developing this crucial tool for fighting tuberculosis.

Mechanisms of apoptosis. Our pioneering efforts have helped doctors understand how the body effectively removes and recycles up to two billion cells a day and resolves inflammation in the lungs.

Allergies to artificial joints. National Jewish Health researchers have developed a blood test that can detect allergies to nickel used in artificial joints, a common cause of failure.

CLINICAL AND RESEARCH EXPERTISE, EXPERIENCE, COLLABORATION

With a 122-year history of transformative medicine, National Jewish Health is the only health care organization in the world dedicated exclusively to respiratory and related diseases. Today, we have unparalleled pulmonary expertise and internationally recognized physician-scientists who bring their extensive experience and knowledge to the most challenging respiratory cases from around the world.

Our pulmonologists work closely with their colleagues in cardiology, gastroenterology, allergy, immunology, oncology and radiology to understand the whole person and find solutions for our patients.

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