



**T**he Division of Rheumatology and Immunology at the Medical University of South Carolina (MUSC) has a long and illustrious track record in the study and treatment of rheumatic diseases and in the mentoring and training of leaders in the field of rheumatology. Under the leadership of **Jim Oates, M.D.**, the division enjoyed another productive year marked with accomplishments in education, research, and patient care.

The division maintains outstanding disease-focused clinical programs that drive its reputation for excellence in the treatment of rheumatic diseases. In 2020, MUSC Health's rheumatology program was ranked 14th best in the country by U.S. News & World Report and has consistently placed in the top 20 annual rankings for the past 12 years.

The division is internationally recognized for its care and research relating to systemic lupus erythematosus (SLE) and systemic sclerosis (scleroderma). Most recently, the division was approved for the creation of the MUSC Inflammation and

Fibrosis Research Center of Economic Excellence through the SmartState® SC Centers of Economic Excellence Program which focuses on clinical and translational research related to both scleroderma and lupus.

The division maintains a robust research program and had another successful year securing support from a variety of external sources, including the NIH, NIAMS, and Lupus Foundation of America. In FY20, Division faculty were successfully awarded \$7.5 million in research funding.

Within the MUSC Rheumatology Fellowship Program, the division continues to recruit top candidates to the program with over 160 applicants in FY20 from across the country.

The publications, honors, and grant funding received by division faculty this year highlight the quality and ingenuity of work being done in the division to advance our knowledge and treatment of rheumatic diseases through scientific discoveries, cutting-edge treatments, and the training of clinician-scientists.



**#14**  
IN THE NATION  
MUSC  
RHEUMATOLOGY

**6,998**  
FY20  
OUTPATIENT  
OFFICE VISITS

**\$7.5M**  
FY20  
RESEARCH  
FUNDING



Division of Rheumatology  
& Immunology  
Department of Medicine

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On the Cover, L-R: *Katherine  
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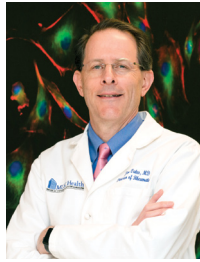
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## MESSAGE FROM THE DIRECTOR



As I write this letter we are in the midst of unprecedented times, a global pandemic due to COVID-19. Over the past 10 months, I have been inspired daily by my team's ingenuity, creativity, and commitment to excellence in the face of this pandemic, as they continue to find innovative solutions to care for our patients, conduct research, and educate our residents.

During this crisis, the Division of Rheumatology and Immunology has continued to flourish over the past year. In fact, in spite of the many challenges COVID-19 has presented in academic medicine, we have continued to provide health care services using best-practices to protect the health of our patients and care teams. Our world-class faculty have made outstanding contributions in research and scholarship, education, and clinical care.

In FY20, the division's aggressive pursuit of external funding was rewarded: 4 new grants were secured and 26 non-competing grants were renewed. The division continues to have a robust clinical presence, and in 2020, MUSC Health's rheumatology program was ranked 14th best in the country by U.S. News & World Report.

Seamless integration of education has been the hallmark of the division's activities, as we mentor and train the next generation of academic leaders in rheumatology. Our competitive fellowship program offered three first-year positions and attracted over 160 applicants this year.

The current times stretch us, but the achievements presented in this report underscore our strength and commitment to meet the challenges of the pandemic in our mission to provide exceptional care for all.

**Jim Oates, M.D.**  
Professor and Director,  
Division of Rheumatology & Immunology  
Vice Chair for Research, Department of Medicine  
Medical University of South Carolina

### Four Convenient Locations:

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Charleston, SC 29425

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1600 Midtown Avenue - 2nd Floor  
Mount Pleasant, SC 29464

**West Ashley Medical Pavilion**  
2060 Sam Rittenberg Boulevard  
Charleston, SC 29407

**MUSC Health - Nexton**  
5500 Front Street, Suite 320  
Summerville, SC 29486

**Call for Appointments:**  
MUSC Rheumatology Clinics:  
843-876-0615

**Schedule a Virtual Visit:**  
[muschealth.org/virtual-visits](http://muschealth.org/virtual-visits)

# DEANNA BAKER FROST, M.D., PH.D.

## Expanding Expertise at the MUSC Scleroderma Center of Excellence

DeAnna Baker Frost, M.D., Ph.D., is an associate professor in the Division of Rheumatology & Immunology with a clinical interest in autoimmune diseases and fibrosis. Along with her colleagues, Baker Frost recently published findings from her NIH-funded study on the link between estradiol levels and severe disease in scleroderma in "Arthritis Research & Therapy". As a member of the MUSC Scleroderma Research Team, Baker Frost is continuing her efforts to improve patient lives through compassionate patient care and innovative research.

She shares her insights into the diagnosis, treatment, and future of scleroderma - a rare autoimmune connective tissue disease that disproportionately affects women and underserved minorities, often profoundly affecting quality of life and survival.

### **Scleroderma is a rare and often misdiagnosed condition, why do patients slip under the radar?**

Because there are smaller numbers of patients that have this disease, many physicians, including rheumatologists, have not cared for patients with scleroderma. Therefore, they may not be as familiar with the criteria for diagnosis.

Fortunately, there are several centers throughout the country, deemed Scleroderma Centers of Excellence, that specialize in research surrounding and caring for scleroderma patients. MUSC is one of those centers. If there is a concern that a patient may have scleroderma, they can be referred to one of these centers for evaluation.

Time to diagnosis is improving, but there are still patients that go undiagnosed for several years. Once diagnosed, symptom management can begin. This area of treatment is improving as well, but more treatment options are needed.

### **What role does estradiol play in the etiology of scleroderma?**

Estradiol is one of the forms of estrogen that naturally occurs in our body. Males

and post-menopausal females typically have lower levels of estradiol. However, we found that in scleroderma patients, men and post-menopausal females have higher levels of estradiol compared to those without scleroderma.

Estradiol can also promote fibrosis, which is one of the hallmarks of scleroderma. Therefore, we are concerned that these high levels of estradiol are contributing to fibrosis. We are completing other experiments to better understand how these high levels influence the severity of scleroderma in patients. But it is possible that using medications that prevent high levels of estradiol may be a treatment option for patients.

### **Where do you see the diagnosis and treatment of scleroderma heading in the future?**

This is an exciting time for scleroderma research. There are researchers around the world who are studying and applying sophisticated techniques to better understand this disease. There are also more collaborations with other specialists so that expertise in multiple areas can combine to bring a unique perspective to studying scleroderma.



DeAnna Baker Frost, M.D., Ph.D.

The current thought is that genetics does play a role in the development- and possibly the severity- in several autoimmune diseases, including scleroderma, but we need more research in this area. I believe this will become more of a research focus. With increased resources and collaborations dedicated to scleroderma research, the hope is that one day this disease can be cured.

### **What should referring physicians know about the comprehensive care provided at the Scleroderma Center of Excellence at MUSC?**

Because scleroderma can affect multiple organs, many specialists are needed to address the specific needs of these patients. We are fortunate at MUSC to have a team of specialists to care for our scleroderma patients. They are familiar with the complications that occur with this rare disease and are well-versed with the current research and treatment options.

MUSC also has world-renowned researchers and clinicians that have dedicated the majority of their training to understand the specifics of scleroderma. We often work together with referring physicians so that all team members remain informed of the patient's needs and progress. Therefore, we are confident that we can provide quality and comprehensive care for scleroderma patients.

*To refer a patient, contact the navigation team coordinators at 843-876-2808 or 843-876-1219.*



## RESEARCH NEWS: RAISING THE PROFILE OF LUPUS

The MUSC Improving Minority Health in Rheumatic Diseases (IMHRD) Core Center for Clinical Research (CCCR) provides research resources to enable and enhance clinical and translational research on two autoimmune connective tissue diseases, scleroderma and lupus, that have a disparate impact on women and African Americans.

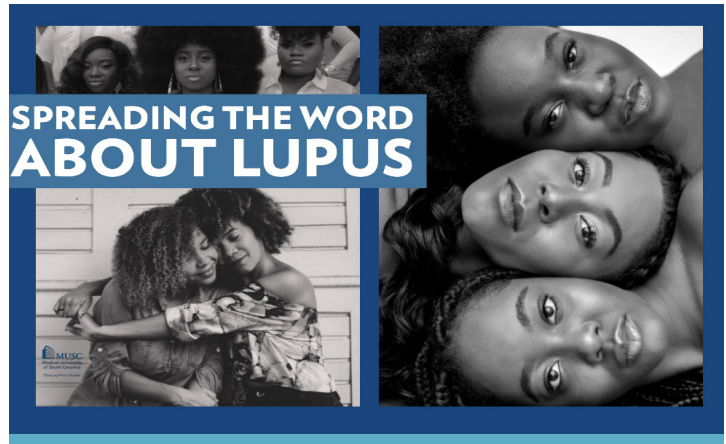
**T**he center, led by **Gary Gilkeson, M.D.**, was established in 2017 through a P30 center grant from the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) of the National Institutes of Health. With the core purpose of improving minority health, IMHRD researchers place a major emphasis on communicating and collaborating with minority patient groups and communities to encourage input and participation in clinical research and health promotion activities.

Thanks to additional grant funding awarded in 2019, MUSC doctors and researchers are now testing several ideas for improving care and outreach to people with lupus or at risk of developing the autoimmune disease.

The two-year, \$550,501 grant from the NIAMS includes three areas of concentration:

- The beginnings of an educational outreach effort on college campuses.
- Piloting the use of a patient navigator for lupus patients at MUSC Health.
- A partnership with the University of Alabama at Birmingham to increase understanding of minority health and health disparities among health care providers at both universities.

Lupus typically strikes women between the ages of 15 and 45 and is more common in black, Asian and Native American women. The body's immune system turns on itself and begins attacking healthy cells, causing joint pain, fever, rashes, fatigue, swelling and sun sensitivity.



Managing the disease is critical, because unchecked it can lead to serious complications like kidney failure. But awareness of the disease, especially in the communities it most affects, lags.

**Edith Williams, Ph.D.**, associate professor, is heading up the educational outreach component. She's focusing her efforts on historically black colleges and universities (HBCUs) to try to reach the population at highest risk. Not only are black women more at risk for developing lupus, but they're also more likely to be sicker, to be admitted to the hospital more often and to die from complications at higher rates, Williams said.

With this grant, Williams is working with focus groups at Claflin University, Voorhees College and South Carolina State University—as well as non-students ages 18 to 25—to understand what young people already know about lupus and myths that are circulating about the disease. Long term, she intends to use the insights gathered through the focus groups to develop educational outreach initiatives that could be used at all HBCUs in South Carolina and throughout the Southeast.

Once diagnosed, managing lupus is a logistical challenge for many of the patients who Gilkeson and his colleagues see. About 2,000 people from across the state come to MUSC Health for lupus care, said Gilkeson. Many are from rural areas and have transportation problems.

To help these patients, the grant provided funding to hire a patient navigator, **Gary Link**, in hopes that having such a person would reduce disease flares and hospital readmission rates. Link serves as the point-of-contact for at-risk patients and helps them decide if their health concerns warrant a trip to the local emergency room or if they should see an MUSC rheumatologist.

Finally, MUSC and UAB are working together to increase knowledge among providers from all clinical areas, not just rheumatology, about health disparities. Both universities will host outside experts in minority health and health disparities in forums that will be available live or via webcast on both campuses.



Edith Williams, Ph.D.



Gary Gilkeson, M.D.

*Adapted from original article by Leslie Cantu.*

# CCCR PILOT PROJECT

Each year, MUSC's Core Center for Clinical Research (CCCR) awards pilot project grants to faculty and postdoctoral scholars to support new research studies that will lead to innovative and sustainable projects to impact patients with lupus, scleroderma and other rheumatic diseases.



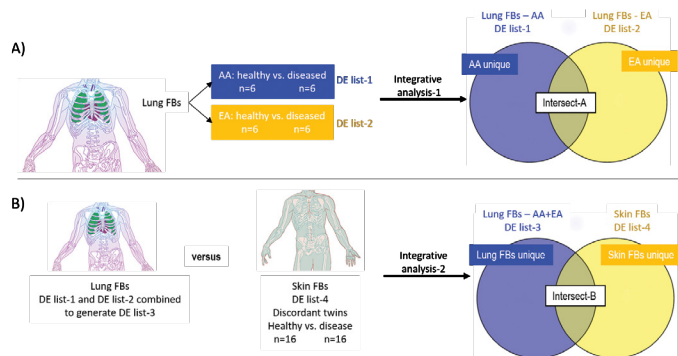
In 2020, postdoctoral scholar **Ludivine Renaud, Ph.D.**, was awarded a pilot project grant from the CCCR to study potential genes that could become a target for treating scleroderma.

Scleroderma, or systemic sclerosis, is an autoimmune disease that disproportionately affects women and underserved minorities, often leading to lung fibrosis as well as thickening and tightening of the skin. There are currently no FDA-approved drugs that can either stop disease progression or reverse it in these patients.

Through funding from the CCCR grant, Renaud used collagen-producing cells known as fibroblasts harvested from patients with scleroderma to explore the racial disparity that is also commonly seen in scleroderma. It has been shown that scleroderma starts earlier in African American (AA) patients, who often have a more aggressive type of scleroderma. Renaud compared fibroblasts of African Americans to European Americans (EA) to better understand the transcriptomic signature or the vulnerability in their gene expression that possibly makes African Americans more susceptible for this type of aggressive scleroderma. Renaud extracted 24 samples of RNA from the fibroblasts for RNA sequencing analysis.

In aim 2 of Renaud's pilot project, she compared fibrosis of the lung to fibrosis of the skin to find out if there are universal fibrotic pathways that are commonly activated or enriched in both skin and lung.

When comparing SSc-PF to normal lung in both AA and EA, the data revealed unique disease mechanisms in AA (AA unique) on top global ones common to both races (Intersect-A). Even when we compared normal-AA to normal-EA fibroblasts, pathways related to extracellular matrix and collagen processing were enriched. And in the comparison of SSc-PF-AA to SSc-PF-EA, again a distinct signature was observed in AA patients that could explain the racial disparity observed in this ethnic group. This pilot study was conducted using fibroblasts from female SSc-PF patients and healthy donors. Renaud is looking to expand this study to include fibroblasts from males as well. Based on the preliminary data, validation experiments will be conducted such as qRT-PCR and gain and loss of function studies.



## CURRENT CLINICAL TRIALS AND STUDIES

### Systemic Sclerosis (Scleroderma):

Collaborative, National Quality and Efficacy Registry for Tracking Disease Progression in Systemic Sclerosis (Scleroderma) Patients

Long-term Follow-Up of Participants of the Phase II study to evaluate subcutaneous abatacept v. placebo in diffuse cutaneous systemic sclerosis-a double-blind, placebo-controlled, randomized trial

Immune Tolerance Network – BRAVOS

SCLERODERMA LUNG STUDY III: Combining of anti-fibrotic effects of Pirfenidone with Mycophenolate to treat scleroderma-related interstitial lung disease

A Phase 2, Randomized, Placebo-controlled, Double-blind, Open-label Extension Multicenter Study to Evaluate the Efficacy and Safety of KD025 in Subjects with Diffuse Cutaneous Systemic Sclerosis

A Randomized, Multicenter, Double-Blind, Placebo Controlled, Phase 2 Study to Evaluate the Efficacy and Safety of IgPro10 (Intravenous Immunoglobulin, Privigen for the Treatment of Adults with Systemic Sclerosis

A Multi-Center, Randomized, Double-Blind, Placebo-Controlled, Phase 3 Trial to Evaluate Efficacy and Safety of Lenabasum in Diffuse Cutaneous Systemic Sclerosis

A Multicenter, Double-Blind, Randomized, Placebo-Controlled, Phase 3 Study Evaluating the Safety and Efficacy of Intravenous Iloprost in Subjects With Systemic Sclerosis Experiencing Symptomatic Digital Ischemic Episodes

### Lupus Nephritis:

Accelerating Medicine Partnerships; PEARL: Pathway Exploration and Analysis in Renal Lupus

A Randomized, Controlled Double-blind Study Comparing the Efficacy and Safety of Orelvo (voclosporin) (23.7mg Twice Daily) with Placebo in Achieving Renal Response in Subjects with Active Lupus Nephritis

A Phase 2, Randomized, Double-blind, Placebo-controlled Evaluation of the Safety and Efficacy of BMS-986165 with Background Treatment in Subjects with Lupus Nephritis

### Systemic Lupus Erythematosus:

Pilot Trial of Belimumab in Early Lupus

A 5-Year Prospective Observational Registry to Assess Adverse Events of Interest and Effectiveness of Adults with Active, Autoantibody-Positive Systemic Lupus Erythematosus Treated with or without BENLYSTA

A Multi-Center Study to Characterize the Long-Term Safety and Efficacy of BMS-986165 in Subjects with Systemic Lupus Erythematosus

ALE09 - A Phase 2, Double-blind, Randomized, Placebo-controlled Multicenter Study to Evaluate Efficacy, Safety, and Tolerability of JBT-101 in Systemic Lupus Erythematosus

Study of Anti-Malarials in Incomplete Lupus Erythematosus (SMILE)

A Phase II Sequential Dose-escalation Study Evaluating the Safety & Feasibility of Allogenic Umbilical Cord Derived Mesenchymal Stromal Cells for the Treatment of Adults w/ Treatment Refractory Lupus

A Phase 2 Randomized, Double-Blind, Placebo-Controlled Study to Evaluate Efficacy and Safety of BMS-986165 in Subjects with Systemic Lupus Erythematosus

## FELLOWSHIP NOTES

### Where are they now?

This map depicts locations of our graduating fellows from the past 46 years (majority in academic medical centers).



Under the leadership of **Faye Hant, D.O.**, the Rheumatology Fellowship Training Program is fully accredited and comprised of six clinical and research fellows selected from a competitive pool of candidates. Fellows are supported in part by an NIH T32 Training Grant (Gary Gilkeson, M.D., PI). The program offers fellows the opportunity to see a wide array of rheumatic disease patients in a variety of clinical settings, to participate in clinical and basic research, and to obtain advanced training leading to a master's degree in clinical research.

### 2020-21 Fellows:

Sarah Compton, M.D.

Sonia Savani, M.D.

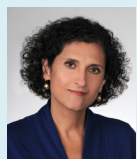
Whitney Elg-Salsman, D.O.

Jennifer Schmidt, M.D.

Samantha Minkin, M.D.

Ana Tucker, M.D.

## FACULTY NEWS & AWARDS



C. Feghali-Bostwick



J. Oates



G. Gilkeson



P. Ramos



F. Hant



R. Silver



D. Kamen



X. Zhang

**Carol Feghali-Bostwick, Ph.D.**, Professor and Kitty Trask Holt S.C. SmartState® Endowed Chair for Fibrosis Research, received the Best Mentored Paper Award (Mentor) and the Top Ten Publishers Club Award at the 2020 MUSC Department of Medicine Awards Day.

**Gary Gilkeson, M.D.**, Distinguished University Professor, gave the prestigious Paul Klemperer, M.D., Memorial Lectureship at the American College of Rheumatology annual meeting.

**Faye Hant, D.O.**, Associate Professor, received the Excellence in Patient Satisfaction Award at the 2020 MUSC Department of Medicine Awards Day.

**Diane Kamen, M.D.**, Associate Professor, received the MilliPub Club Award and the Top Ten Publishers Club Award at the 2020 MUSC Department of Medicine Awards Day.

**Jim Oates, M.D.**, Professor and Division Director, received the Southern Society for Clinical Investigation's (SSCI) Founders' Medal Award 2020, the most prestigious award of SSCI. Oates was appointed as the inaugural holder of the Richard M. Silver, M.D., Endowed Chair in Rheumatology & Immunology.

**Paula Ramos, Ph.D.**, Assistant Professor, received the Best Mentored Paper Award (Mentee) at the 2020 MUSC Department of Medicine Awards Day.

**Richard Silver, M.D.**, Distinguished University Professor, received the Professionalism Award at the 2020 MUSC Department of Medicine Awards Day.

**Xian-Kui Zhang, Ph.D.**, Associate Professor, received the MilliPub Club Award at the 2020 MUSC Department of Medicine Awards Day.



# RHEUMATOLOGY FACULTY

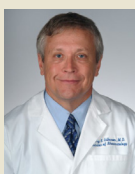
## General Rheumatology



**DeAnna Baker Frost, M.D., Ph.D.**  
Associate Professor  
**Special Interests:** Estrogen in scleroderma; autoimmune diseases



**Melissa Cunningham, M.D., Ph.D.**  
Associate Professor  
**Special Interests:** Systemic lupus erythematosus; lupus nephritis; neuropsychiatric lupus



**Gary Gilkeson, M.D.**  
Distinguished University Professor  
Associate Dean for Faculty Affairs & Faculty Development  
**Special Interests:** Lupus; retroperitoneal fibrosis; ethnic and sex disparities in lupus; use of mesenchymal stem cells as therapy in autoimmune diseases



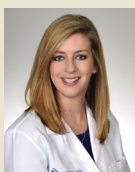
**Faye Hant, D.O., MSCR**  
Associate Professor and Director, Rheumatology Fellowship Program  
**Special Interests:** Scleroderma; CTD related interstitial lung disease; rheumatoid arthritis



**Diane Kamen, M.D., MSCR**  
Associate Professor  
**Special Interests:** Autoimmune diseases; systemic lupus erythematosus; clinical research studies



**Jim Oates, M.D.**  
Professor and Division Director; Richard M. Silver Endowed Chair in Rheumatology & Immunology; Vice Chair for Research  
**Special Interests:** Lupus nephritis; endothelial dysfunction; biomarkers of atherosclerosis and glomerulonephritis in lupus



**Katherine Silver, M.D.**  
Assistant Professor of Medicine and Pediatrics  
**Special Interests:** Scleroderma and connective tissue diseases; juvenile scleroderma; juvenile arthritis



**Richard Silver, M.D.**  
Distinguished University Professor  
Vice Chair, Development  
**Special Interests:** Scleroderma; CTD associated ILD and PAH; childhood rheumatic diseases

## General Rheumatology



**Edwin Smith, M.D.**  
Professor  
**Special Interests:** Scleroderma; raynaud's phenomenon; rheumatology



**Grace Berlin Suppa, D.O.**  
Assistant Professor  
**Special Interests:** General rheumatology and telehealth



**Celine Ward, M.D.**  
Assistant Professor  
**Special Interests:** Systemic connective tissue diseases: lupus, myositis, scleroderma, vasculitis; inflammatory arthritis: rheumatoid arthritis, psoriatic arthritis

## Research Faculty



**Alexander Awgulewitsch, Ph.D.**  
Associate Professor  
**Special Interests:** Roles of Hox transcriptional regulators in development and disease; genetics



**Galina Bogatkevich, M.D., Ph.D.**  
Associate Professor  
**Special Interests:** The cellular and molecular mechanisms of pulmonary fibrosis in scleroderma



**Carol Feghali-Bostwick, Ph.D.**  
Professor and Kitty Task Holt Endowed Chair for Scleroderma Research  
**Special Interests:** Identifying pathogenic mechanisms in fibrosis; development of anti-fibrotic therapies; mentoring



**Stanley Hoffman, Ph.D.**  
Professor  
**Special Interests:** Cell-cell and cell-extracellular matrix (ECM) adhesion; translational research on fibrotic diseases



**Mara Lennard Richard, Ph.D.**  
Assistant Professor  
**Special Interests:** Systemic lupus erythematosus; transcriptional control/ epigenetics related to autoimmunity; sex bias in lupus

## Research Faculty



**Margaret Markiewicz, M.D.**  
Assistant Professor  
**Special Interests:** Endothelial cell dysfunction in systemic lupus erythematosus; angiogenesis



**Tamara Nowling, Ph.D.**  
Associate Professor  
**Special Interests:** Lupus nephritis; the role of glycosphingolipid metabolism in renal cell function in lupus nephritis; mechanisms of renal cell and T cell dysfunction in lupus



**Paula Ramos, Ph.D.**  
Assistant Professor  
**Special Interests:** Genetic etiology of autoimmune diseases & their ethnic disparities; systemic lupus erythematosus; systemic sclerosis



**Betty Tsao, Ph.D.**  
Professor and Richard M. Silver SmartState Endowed Chair  
**Special Interests:** Investigations in genetics, epigenetics, biomarkers and targeted treatment of systemic lupus erythematosus



**Xian-Kui (John) Zhang, Ph.D.**  
Associate Professor  
**Special Interests:** Autoimmune disease; B cell development; monoclonal antibody development and its application

## Pediatric Rheumatology



**Mileka Gilbert, M.D., Ph.D.**  
Assistant Professor, Pediatric Rheumatology  
**Special Interests:** Pediatric rheumatology; steroid joint injections; lupus research



**Natasha Ruth, M.D., MSCR**  
Associate Professor and Director, Pediatric Rheumatology  
**Special Interests:** Rheumatic diseases in children; systemic lupus erythematosus



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## THE MUSC DEPARTMENT OF MEDICINE

Founded in 1824 in Charleston, The Medical University of South Carolina is the oldest medical school in the South. Today, MUSC continues the tradition of excellence in education, research, and patient care. MUSC educates and trains more than 3,000 students and residents, and has nearly 14,000 employees, including approximately 1,500 faculty members.

As the largest Department in the MUSC College of Medicine, the Department of Medicine provides essential leadership to numerous programs across the university, MUSC Health, and South Carolina. Our Department—made up of 10 divisions engaged in care at two hospital systems and multiple ambulatory practices—is guided by our vision to provide superior patient care, to educate the next generation of physicians, and to perform seminal discovery research.

Changing What's Possible