BluePrint

Duke Anesthesiology

HEROES

Anesthesiologists on the Front Lines of a Pandemic

VOLUME 11 | 2020/2021

What We Do Changes The World

Duke Anesthesiology

Duke University School of Medicine

MISSION: Extraordinary care through a unique culture of innovation, education, research, and professional growth.

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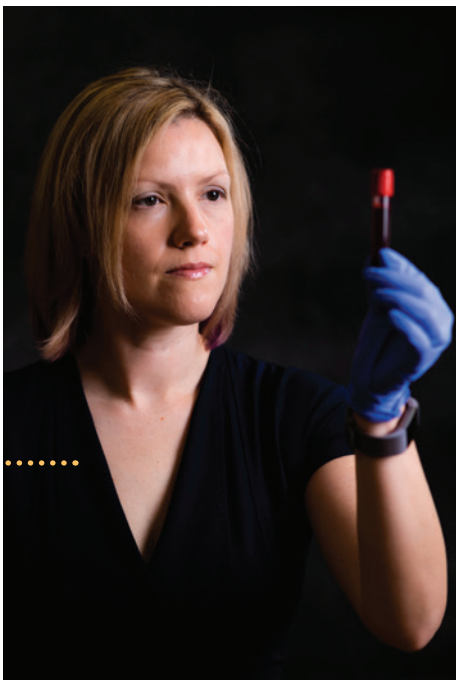
On the Cover



Duke Anesthesiology
Duke University School of Medicine

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FOR MOST OF US, 2020 has been a year of change like none other. The COVID pandemic challenged us in ways we could never have imagined but the reality is that we are likely to see more change in the next couple of years than in the past decade. While we all have a natural tendency to fear these changes, we must also recognize that with change comes great opportunity. As one example, virtual health (and education) is here to stay but we should also be asking the associated question to such a change, "How can we make it better?" We would be wise to heed Pauline Kezer's words, "Continuity gives us roots; change gives us branches, letting us stretch and grow and reach new heights."

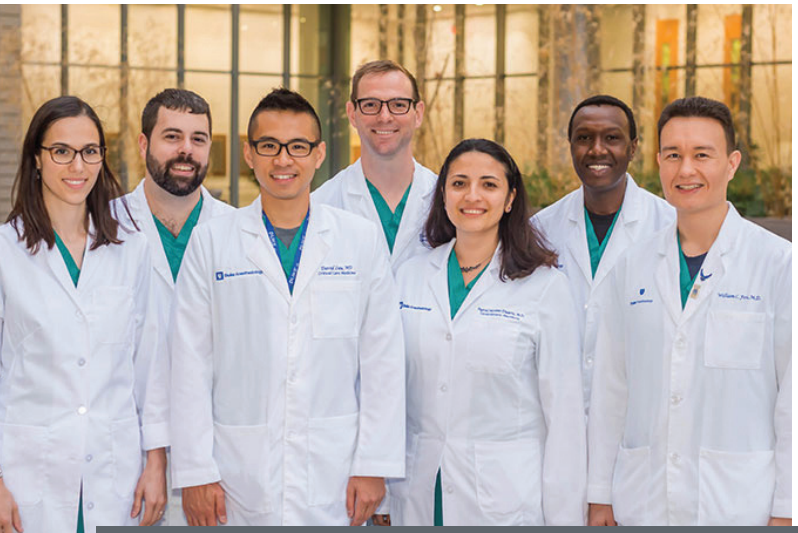
This has also been a remarkable year for the department starting with the incredible effort put forth by all our faculty, trainees, nurses, and staff in providing excellent care for our patients through a season of challenges that were more often than not, volatile, uncertain, complex, and ambiguous. We owe our clinicians, in particular, our deepest gratitude for working the front-lines and leading through the crisis. In a similar vein, our educators creatively adapted to the distancing restrictions and maintained the high standards of Duke Anesthesiology. Finally, our researchers achieved new heights with the receipt of the first Program Project Grant awarded to the department in 40 years and a #5 NIH ranking, marking the first time that our department has ranked among the top five. This national ranking is a tribute to our late vice chair for research, William "Bill" Maixner, whose vision and tireless efforts were key to our success.

"Continuity gives us roots; change gives us branches, letting us stretch and grow and reach new heights."

As you look forward and more so because of the fog of persistent challenges, may I encourage all of you to embrace each new day with HOPE and joy!

Sincerely,

Joseph P. Mathew
MD, MHSc, MBA



A Tradition of Excellence

DUKE ANESTHESIOLOGY ALUMNI ASSOCIATION

At Duke, we believe that continued engagement with our alumni is the key to our future success. We take great pride in these talented men and women who play an integral role in strengthening our department and making it an ideal environment in which future generations of trainees can learn, work and achieve excellence.

As a graduate of Duke Anesthesiology, you are automatically enrolled as a member of the Duke Anesthesiology Alumni Association! Help us grow our department's alumni outreach by staying connected to your peers, fellow alumni and faculty.

- Register or update your profile in our Alumni Database to receive special offers, our annual BluePrint publication by mail, and invitations to exclusive department events
- Consider continuing your legacy with a donation to the Duke DREAM Campaign and have your name featured on our website's Donor Honor Roll

Duke Anesthesiology Alumni Association

DUKE ANESTHESIOLOGY ALUMNI ASSOCIATION

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RUN THE BULL CITY

The Duke Anesthesiology racing team proved victorious at the 2019 ASA-sponsored Run For The Warriors race in Orlando, securing first place for fundraising ($8,100) for the ninth consecutive year and earning the Give Hope Award for our contributions and selfless service. Dr. Richard Moon also received a Give Hope Award in recognition of being the event's top fundraiser. Proceeds benefit wounded warriors and their families through the many Hope For The Warriors® programs.


RUN THE
BULL CITY
1313

A Comprehensive Approach to Pain

By Jennifer Bringle and Dr. Padma Gulur

ACROSS THE UNITED STATES, opioid addiction has reached a crisis level. In 2019, more than 70 percent of drug overdose deaths—nearly 50,000 people—were due to opioids, according to the Centers for Disease Control and Prevention. And among those deaths, 73 percent involved synthetic opioids.

Many of those cases are connected to chronic pain, often stemming from an injury or a surgical procedure.

"If you've heard about the prescription opioid epidemic, you've become aware of the extent of chronic pain in our population," says Dr. Padma Gulur, director of pain management strategy and opioid surveillance for the Duke University Health System. "It's a unique debility in that unlike other health conditions, it's not visible."

Gulur knows that well. As a pain medicine specialist at the Duke Integrated Pain and Wellness Clinic, as well as at the Duke Perioperative Pain Care Clinic, and principal investigator at Duke Anesthesiology's Pain Relief and Opioid Mitigation Innovation Science (PROMIS) Lab, she works closely with patients dealing with acute and chronic pain. Gulur is focused on helping those patients manage that pain, improving their quality of life through a balanced multimodal approach without becoming addicted to opioid medication.

She says to effectively treat pain, it's important to understand how it affects the patient. "Pain is a biological, psychological and social beast. There is no way to separate those components because your experience of pain is very personal and variable," says Gulur.

Because of that complexity, Gulur and her teams work to approach pain management from a population health perspective, addressing the gaps in the continuum of care that can lead to opioid abuse.

Duke Perioperative Pain Care Clinic

Dr. Padma Gulur

Dr. Brian Starr

Dr. Nathan Christie

Duke Anesthesiology first took a population health value based care approach to patients who were undergoing surgery at Duke University Hospital. The Duke Perioperative Pain Care Clinic was established in March of 2017 to identify patients scheduled for surgery who may be at risk for poor outcomes from a pain perspective. Once identified, these patients were offered optimization services prior to their surgery to ensure they were in good condition so they could have the best possible outcomes after their surgery. The clinic was the first in the nation to allow patients to see the same pain specialist team before, during and after surgery.

From decision to surgery, these patients are optimized using multiple approaches, including finding the most appropriate multimodal regimen to manage their pain - this includes the use of non-pharmacological strategies such as music therapy, all the way to their nutritional status, which is addressed with a focus on enhancing their diet to include primarily non-inflammatory foods. They are also provided with skill building, such as relaxation techniques, to help them better cope with pain.

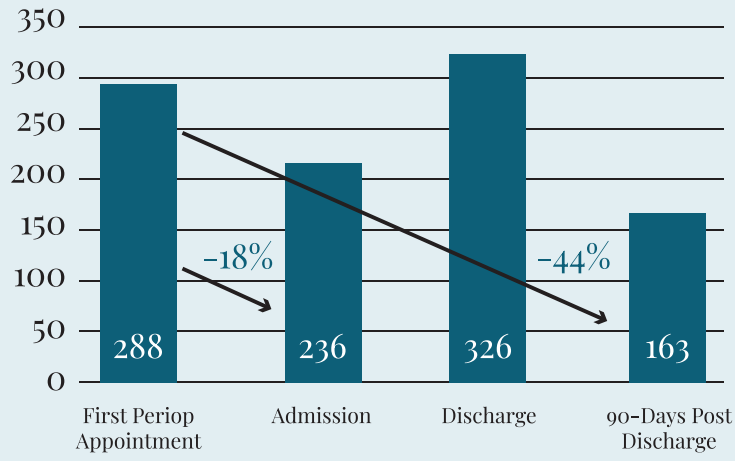
"A lot of our patients, when they come to us, their house is on fire, and I'm teaching them preventative strategies," Gulur says of the traditional approach of offering pain management after a patient is already experiencing problems. "It's extremely apparent we're a little late in that game." By addressing this prior to surgery (as it is anticipated their pain will be higher afterward), we ensure they are best equipped to manage their postsurgical pain without relying solely on opioid medications.

Setting appropriate goals and expectations is also important. "It's not all or none," says Gulur. "With prehabilitation, it's about moving and getting your body ready for surgery—if you've not been moving, it's going to hurt more. We work with your pain, using coping techniques, like music therapy. Even if you walk just five more minutes each day, your outcomes are better."

Doing the work before surgery is only one part of Duke Anesthesiology's comprehensive approach to pain management. Continuing that care during and after procedures is critical to preventing patients from becoming dependent on opioid medications.

"With chronic pain, if you talk to patients, you'll often find it started with an injury or surgery," Gulur says. "So we thought the surgical episode is a wonderful time to address pain. We need to do something better for them before they go into surgery. Then, there are other patients who will not do well and the surgery will be the tipping point, so we give them the skill sets now - not when they are hurting. And the third group is when the surgery tends to be painful – this is where anyone borderline for addiction risk can get into trouble."

Gulur says that once a patient is discharged, they are in the subacute phase for pain, a time when patients are vulnerable to becoming dependent on pain medication. With this phase lasting



Long term gains as seen by a 44 percent reduction in chronic opioid use, from the intentional teaching model and multimodal care plans used at the Perioperative Pain Care Clinic.

90 days before a patient is considered to have chronic pain, many of these patients fall into a limbo between treatment for acute postsurgery/injury pain and care for chronic pain.

"We identified this as a gap in health care," says Gulur. "So we introduced the perioperative clinic—when they have subacute pain, these patients have a home now."

"One of the areas where opioid addiction springs from is accidental development of overuse in the time around surgery, and that's one of the common places where people develop access to pain medication," says Dr. Brian Starr, interventional spine specialist and pain medicine specialist at the Duke Perioperative Pain Care Clinic. "So by having a much more regimented approach to coming down on those medications, we're able to reduce the situation of someone saying, 'I had some pills leftover from a surgery, and I've been taking those.' It's a snowball effect when that happens."

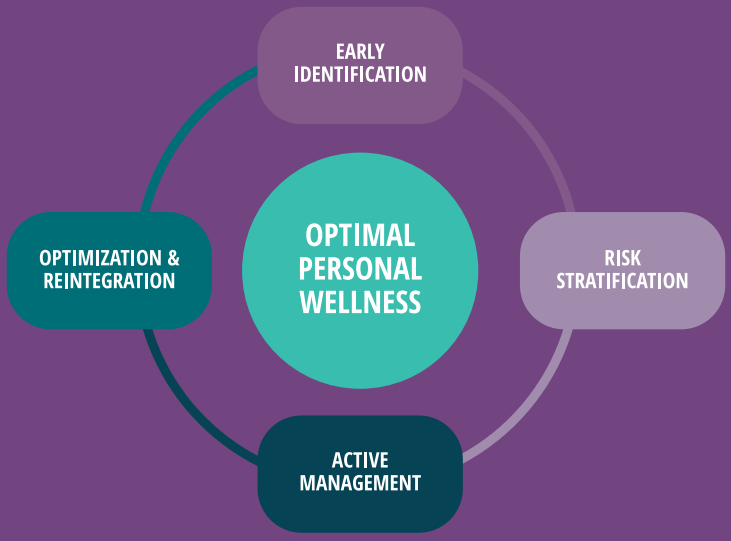
Through the perioperative clinic, pain medicine specialists can better monitor patients, offering continuous care rather than simply writing a prescription and letting them go. And that care includes treatments outside the use of pain medication.

"We see patients at very short intervals with frequent small prescriptions with the goal of tapering every time, meeting them where they're at with the goal of bringing them down," says Starr. "And then we incorporate interventional treatments such as physical therapy, and our social worker provides some of the psychosocial support."

"A lot of times people may take the pain medicine not necessarily just because they're hurting, but because they're panicked by their hurting—that mental state can cause them to use medicine more than prescribed."

Because of those different aspects of pain—the biological, psychological and social—it's important to provide patients a personalized plan that draws on multiple treatments throughout the process to address their specific needs. It's that mix of approaches to treating pain, coupled with the scope of care before, during and after surgery, that gives patients the best possible chance to find relief without dependency on opioids. For Gulur, that's the goal—not only reducing opioid dependency, but also helping her patients find long-term relief for their pain.

"The key element is because it's a multimodal multidimensional approach, it doesn't rely on opioids as the primary means of pain treatment," she says. "That allows for safe opioid prescribing, but at the same time, we're not just reducing opioid prescribing—we're addressing the pain."



Population Based Approach to Integrated Pain Management and Wellness

Our goal is to identify new patients presenting to Duke Health who may be at risk of developing poor pain outcomes that impact their overall health and wellbeing.

This will allow for comprehensive management of these patients with a multidisciplinary specialist team that will help modify risk factors to promote wellness and optimal pain care.

Duke Integrated Pain and Wellness Clinic

With the evident success in improved outcomes in Duke's surgical population, utilizing a population health approach that focused on identifying patients at risk early on and providing them with the support to prevent poor outcomes, Duke Anesthesiology led a Private Diagnostic Clinic and Duke Health initiative with a goal to apply this to all patients who presented for care at Duke Health.

A pilot clinic was established, which is linked to some of the primary care and specialty care clinics at Duke Health where a large number of patients with pain-related comorbidities receive care.

That's where the PROMIS Lab's work comes in. Gulur and her team developed a set of questions that can be easily integrated into any clinical setting to assess whether the patient needs further screening to identify the risk of poor pain-related outcomes.

"Does everyone who has an ankle injury end up with chronic pain? No, so what is the difference?" she says. "They may have had biological, social or cultural influences that have changed their threshold and made them more prone to developing chronic pain."

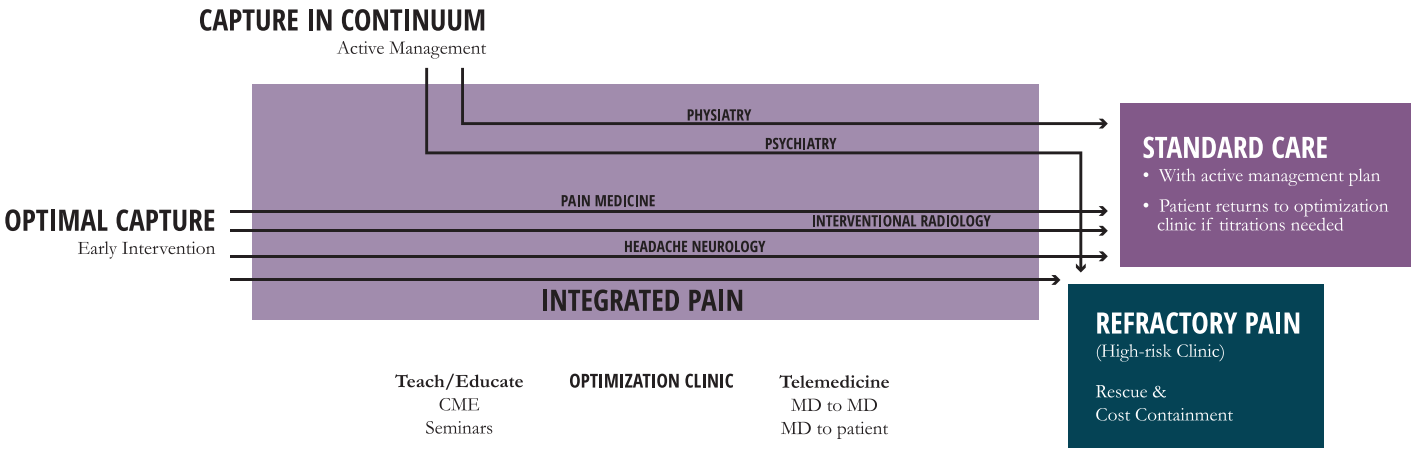
Once a patient is identified as at-risk, they are referred to the Duke Integrated Pain and Wellness Clinic for further screening.

"They meet with us and undergo a risk stratification, which is a comprehensive set of questions that are assessable," says Dr. Nathan Christie, anesthesiologist, interventional spine specialist and pain medicine specialist at the Duke Integrated Pain and Wellness Clinic. "They meet with a social worker to do a risk assessment, then they meet with us and a nurse practitioner."

That comprehensive assessment allows the clinic to determine a formula of pain management based on risk, with options that include traditional pain medication, epidurals, physical therapy, and cognitive behavioral therapy.

This clinic offers a range of services to address pain from physical therapy and nutrition, to medications and injections, to the latest advanced procedures. "We are most excited about procedures involving neurostimulation," says Christie. "There are certain types of pain that are very difficult to treat with medicine, such as abdominal or pelvic pain, and there aren't great procedures as far as single-shot injections. But dorsal root ganglion stimulation, which actually targets it, tries to short circuit the pain before it can reach the spinal cord and be transmitted to the brain."

Early outcomes from this approach are very promising – an approach that Gulur and her team are looking forward to implementing not only across Duke Health, but at large institutions across the country; some of which have already expressed significant interest and where Gulur and her team are consulting to assist those health care systems in launching perioperative pain clinics and soon, integrated pain and wellness centers – ultimately achieving population health.



Current State

- Currently, pain in our population is managed in various outpatient settings such as family medicine, primary care, surgical clinics, etc.
- Often, supportive resources for optimal multimodal pain management are scarce in these locations resulting in a small population utilizing significant resources in each clinic or using acute care in the hospital.

Proposed State

- Predictive analytics and biogenetics can be utilized to identify patients at risk for early optimization/intervention.
- Provide optimization pathway through integrated pain for all outpatients and for all post discharge high resource utilizers.
- An active management plan will be set in place before they are returned to standard care.

> We are working to bend the curve here at Duke – trying to reach patients before they are exposed to opioids and other substances in order to prevent them from going down a pathway that leads to poorer outcomes and is nearly impossible to change.
>
> *Dr. Nathan Christie*

AMBULATORY ANESTHESIOLOGY

Duke Health Opens Duke Ambulatory Surgery Center Arringdon

As part of Duke Health's strategy to expand ambulatory surgical services while maintaining safe, convenient and value-based care, the first of several planned new surgery centers, Duke Ambulatory Surgery Center Arringdon, opened in May 2021. The Ambulatory Anesthesiology Division, along with partners from surgery, nursing and throughout the health system, collaborated to build the first new independent center in more than 25 years. **Located between Durham and Wake counties, the new 35,000 square-foot center** has eight state-of-the-art surgical suites that provide patients with the latest surgical technology and anesthetic techniques, in a center with abundant spaces filled with natural light. The large operating rooms are designed to facilitate the growth of ambulatory surgery and implement new and innovative programs, such as same-day total knee and hip replacement. The lead anesthesiologist at Arringdon is Dr. Steve Melton.

To prepare for Arringdon and the growth of ambulatory surgery, the division has been working diligently to organize efficient workflows, incorporate its expertise in regional anesthesia, and collaborate with health system partners to look for novel ways to improve patient outcome and experience. To help support this new endeavor, the Ambulatory Anesthesiology Division is pleased to welcome its newest members; Drs. Alex Cravanas and Michael Doden, who were specifically recruited for their experience in ambulatory anesthesia.

"The growth of ambulatory surgery continues to present exciting opportunities for our division. It has been extremely rewarding for me to be a part of the amazing Arringdon surgery center team working to ensure patients, in this new setting, receive the outstanding care they expect and deserve from Duke."

- Dr. Steve Melton
Lead Arringdon Anesthesiologist

CARDIOTHORACIC ANESTHESIOLOGY

A Year of Clinical Firsts, Innovation and Leadership in Education and Research

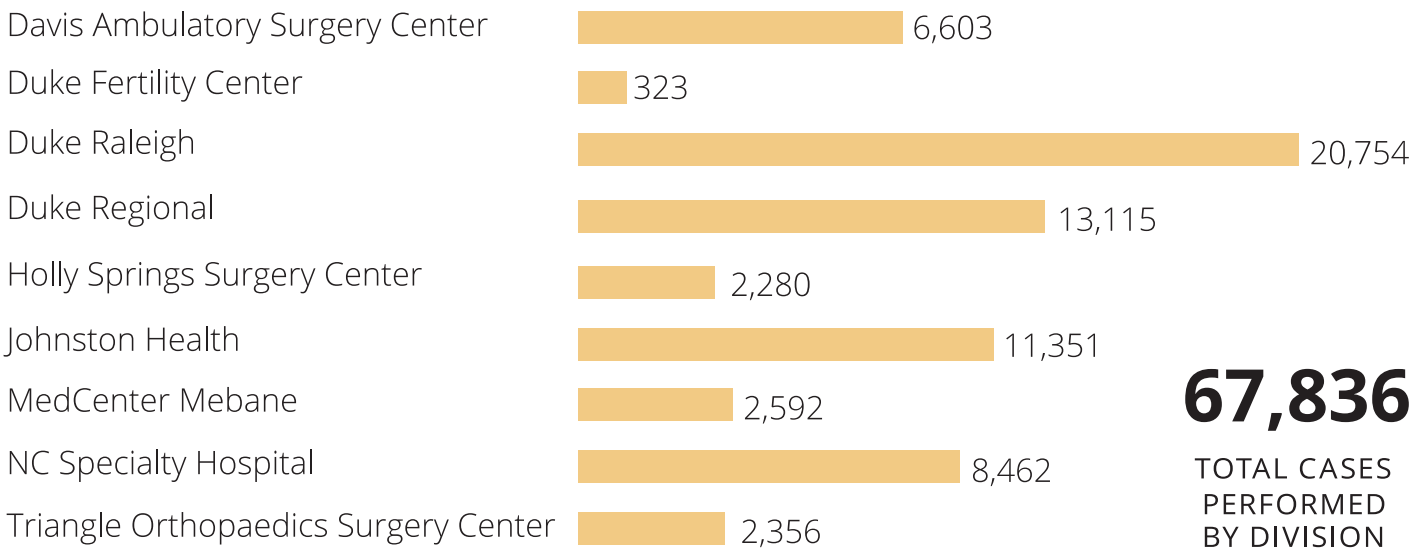
Duke's Adult Cardiac Surgery program was awarded, for the first time, **three simultaneous 3-star ratings by the Society of Thoracic Surgeons** – for patient care and outcomes in the areas of coronary artery bypass grafting, aortic valve replacement, and mitral valve replacement/repair. The 3-star rating, which denotes the highest category of quality, places our program among the top 10 percent of all centers in the United States and Canada. Furthermore, the Duke team was the first to perform a donation after circulatory death (DCD) heart transplantation in the nation and the first center in the Southeastern US to complete 1,500 heart transplants.

Dr. Sharon McCartney assumed leadership of the Duke University School of Medicine Acute Care Simulation course for medical students. And, an innovative approach to cardiothoracic (CT) anesthesia and critical care education, using the Sakai learning management system, has been spearheaded by Drs. Brandi Bottiger, Anne Cherry, Nazish Hashmi, Rebecca Klinger, Alina Nicoara, and Angela Pollak. On the national stage, Nicoara served as course director for the Society of Cardiovascular Anesthesiologists (SCA) Echo Week meeting.

Dr. Kamrouz Ghadimi

Dr. Kamrouz Ghadimi completed the landmark INSPIRE-FLO randomized controlled trial and presented the results at the annual meetings of the International Society for Heart and Lung Transplantation and the SCA. And, Project Symphony – a digital transformation initiative aimed at integrating perioperative device data, predictive analytics, team communication, and clinician workflow - is being launched as a pilot in CT surgery patients, championed by Dr. Mihai Podgoreanu.

COMMUNITY



67,836

TOTAL CASES PERFORMED BY DIVISION

CRITICAL CARE MEDICINE

Division Plays Integral Role During a Pandemic

Every intensive care unit (ICU) at Duke University Health System came together to care for critically ill patients with COVID-19, and the Critical Care Medicine Division faculty were instrumental in staffing these ICUs. **The division worked with the hospital command center to manage not only critically ill COVID patients, but also critically ill surgical and trauma patients.** Dr. Raquel Bartz worked with Duke University Hospital leadership, while Drs. Nitin Mehdiratta and Arturo Suarez worked closely with Duke Regional and Duke Raleigh Hospital leadership, training every ICU across the health system to prone hypoxemic mechanically ventilated patients - providing the highest quality of care to patients in all ICUs. Additionally, the division played a key role in education, with Dr. Kamrouz Ghadimi organizing critical care education for its non-critical care anesthesiologists and Drs. Ankeet Udani (from the GVT Division), John Whittle, and John Lemm training non-anesthesia intensivists in emergency airway management. Bartz and Dr. Vijay Krishnamoorthy helped build real-time tools to understand the COVID population and determine post-surgical ICU needs to prioritize scheduling of surgical patients. Despite COVID clinical needs, research continued to flourish in the division with more than 100 publications (from primary and secondary faculty and CAPER Unit members in fiscal year 2020) and the CAPER Unit reaching a milestone of more than $1 million in industry support. Dr. Paul Wischmeyer began studies to understand the nutritional and metabolic needs of critically ill COVID+ patients. And, Dr. Nancy Knudsen has taken on a key leadership position in the School of Medicine, with her appointment as the associate dean for learning environment and well-being.

Photo: Painting in grass by Duke University Facilities Landscape Services Athletics team. *Source: Duke Today*

GENERAL, VASCULAR & TRANSPLANT ANESTHESIOLOGY

Photo: Dr. Warwick Ames demonstrating proper PPE use for COVID airway management at the Duke Human Simulation and Patient Safety Center.

Simulation for Donning and Doffing

Drs. Ankeet Udani, John Whittle and Warwick Ames led the development of an airway management protocol for COVID patients.

The protocol was tested iteratively at the Duke Human Simulation and Patient Safety Center in collaboration with intensivists, respiratory therapists, nurses, and the Regional Biocontainment Laboratory at Duke. Once developed, the team trained more than 300 members of the airway management teams within days. The COVID airway teams received commendation from the hospital for prioritizing safety, teamwork and preparedness. The airway management protocol was shared widely to assist other hospitals in their care of COVID patients.

NEUROANESTHESIOLOGY, OTOLARYNGOLOGY & OFFSITE ANESTHESIOLOGY

Spinal Fluid of People with Alzheimer's Risk Gene Signals Inflammation

Dr. Miles Berger

People who have a gene variant associated with an increased risk of developing Alzheimer's disease also tend to have changes in the fluid around their brain and spinal cord that are detectable years before symptoms arise, according to new research from Duke Health.

The work found that in **people who carry the APOE4 gene variant, which is found in roughly 25 percent of the population,** the cerebrospinal fluid contains lower levels of certain inflammatory molecules. This raises the possibility that these inflammatory molecules may be collecting in the brain where they may be damaging synapses, rather than floating freely in the cerebrospinal fluid.

The findings, published online in January in the Journal of Alzheimer's Disease, provide a potential means to identify the earliest mechanisms occurring among APOE4 carriers that might contribute to Alzheimer's disease before people develop memory problems or other symptoms of dementia.

"Our work suggests a potential role for a long-studied molecule called C-reactive protein (CRP), which is typically elevated when there's inflammation, as a factor in the increased Alzheimer's disease risk seen in APOE4 carriers," says lead author Dr. Miles Berger. "Our results raise the possibility that processes like these operating over many years and even decades in APOE4 carriers could eventually result in Alzheimer's disease pathology and cognitive decline."

Source: Duke Health News

ORTHOPAEDICS, PLASTICS & REGIONAL ANESTHESIOLOGY

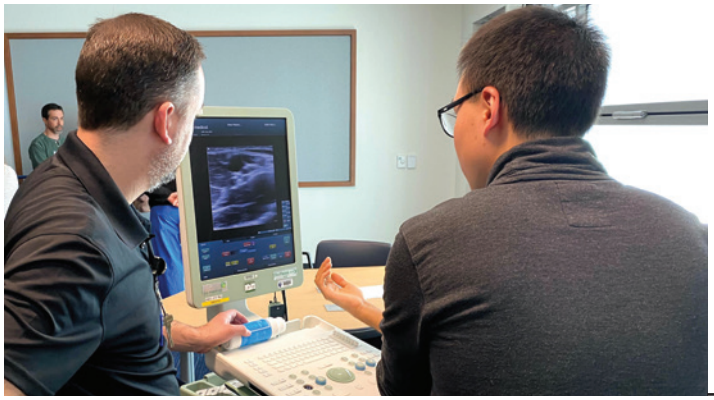


Photo: Drs. Joshua Dooley and Andrew Wong at the Resident Regional Anesthesia Workshop.

"We wanted to create a high-quality learning opportunity for trainees without the cost barrier."

- Dr. Jeff Gadsden
Division Chief

Launch of Educational Initiatives

The Orthopaedics, Plastics and Regional Anesthesiology Division continued to promote its innovative educational mission with three new activities in 2020. In February, the division co-hosted (with UNC) a **free Resident Regional Anesthesia Workshop**, which was quickly filled to capacity by residents and fellows from both institutions, as well as out-of-state trainees and international trainees from as far away as Brazil. The comprehensive workshop was taught by faculty and Regional Anesthesiology and Acute Pain Medicine fellows, and incorporated hands-on scanning of live models. "Workshops of this caliber are taught by our faculty at ASRA, NYSORA and ASA meetings, and participants pay up to $1,500 for this kind of experience," says Division Chief Jeff Gadsden, MD. "We wanted to create a high-quality learning opportunity for trainees without the cost barrier." The division also launched a new preceptorship program, which has drawn practicing anesthesiologists from around the country and Europe who want to observe state-of-the-art innovations in regional anesthesia and learn from our world-class faculty. October 2020 saw the launch of "#Blocktober," a month-long, daily educational event on social media that saw interaction from six continents and generated more than 38 million impressions from more than 5,000 participants.

PAIN MEDICINE

Pain Medicine Fellowship Expands to Wake County

Dr. Peter Yi

Duke Anesthesiology's Pain Medicine Fellowship is thriving under the leadership of the division's **Dr. Peter Yi.** In the 2021-2022 application period, the program received more than 300 applications and interviewed 35 candidates, matching all four candidates in the top 2/3 of that highly-selective group. In July 2020, the division began incorporating its fellows into clinical rotations at its Wake County practices of Raleigh Spine and Pain and Duke Raleigh Hospital Pain Clinic. In those clinics, they work directly with Drs. Scott Runyon, Jay Kumar and Kevin Vorenkamp, who provided the fellows with an even greater exposure to procedures and operative cases, including celiac plexus blocks, spinal cord stimulator implants, and vertebral augmentation cases for both chronic and cancer pain indications. **The Wake County pain practices have grown to nearly 15,000 patient visits in fiscal year 2019-2020, despite COVID-19.** New pain fellowship educational activities have also been incorporated, including a suturing workshop and simulation/cadaver courses for spinal cord stimulation, dorsal root ganglion stimulation, peripheral nerve stimulation and ablation procedures targeting knee/hip/shoulder joint articular nerves. Pain fellows continue to rotate through the Duke Pain Medicine clinic, Duke Perioperative Pain Care clinic, VA pain clinic and the Inpatient Pain Service, where they spend additional time on the Palliative Care Service and gain exposure to interpreting radiological imaging with an attending radiologist. In addition to the Duke Raleigh Hospital operating rooms, the fellows perform operative cases at Duke ASC, Davis ASC and Duke University Hospital.

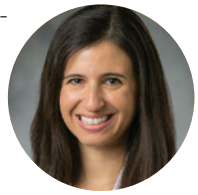
PEDIATRIC ANESTHESIOLOGY

Post-Operative Opioid Stewardship Project in Pediatric Patients

The opioid epidemic has led to research that shows that prescribing schedules can optimize pain management while reducing unused doses. **Dr. Lisa Einhorn led a multi-disciplinary team of pediatric providers in developing and implementing post-operative recommendations for children**. She was awarded a PDC Outcomes Research Team (PORT) project to create a tableau dashboard which allows medication data from more than 16,000 pediatric surgical patients to be reviewed in an ongoing basis to guide prescribing patterns. Analysis of this data shows that following the implementation of the new opioid practices, the average number of oxycodone doses prescribed to children following surgery is down between 30 and 66 percent (based on surgical service) with no increase in refill requests. This change represents an important quality and safety improvement in the perioperative care of pediatric surgery patients.

Work from this project was recognized at this year's Society for Pediatric Anesthesia national meeting when **Dr. Alison Brown** was awarded second prize in the Resident Research Award for the abstract, titled "Opioid Prescribing Patterns for Tonsillectomy in Children."

Additionally, a transition in leadership was announced in April 2021 with the appointment of **Dr. Edmund Jooste** as chief of the Pediatric Anesthesiology Division – a position that Dr. Allison Ross held for 15 years; her outstanding career will continue with new endeavors within and outside the department, focused on fostering career development in others.



Dr. Lisa Einhorn

Dr. Alison Brown

Dr. Edmund Jooste

VETERANS AFFAIRS ANESTHESIOLOGY SERVICE

Durham VA Health Care System Launches Innovative Service

Patients with chronic pain syndromes and mental health conditions who are scheduled to undergo complex surgery present a significant challenge to the anesthesia care team and the entire perioperative team. To address this issue, **Srinivas Pyati, MD,** and **Vijaya Raavi, CRNA,** assembled a multidisciplinary team of surgeons, anesthesiologists, nurse anesthetists, and psychologists to create the **Transitional Pain Service;** it aims to provide preoperative optimization in the form of education and expectation-setting, consultation with Duke Psychology to address anxiety and any pre-existing mental health conditions, medication management, and use of complementary and alternative therapies such as acupuncture, music listening and mindfulness.

Under this new paradigm, care around the time of surgery is highly protocolized and evidence-based, with daily visits following surgery and implementation of a host of pharmacological and non-pharmacological interventions to alleviate pain and anxiety. The Transitional Pain Service team follows each patient for up to 12 months following hospital discharge and ensures a smooth transition to primary care.

The service launched in December 2020 and has been well received by patients, colleagues and the Durham VA Health Care System.

Photo: The Transitional Pain Service team sees their first patient. Pictured left to right: CRNA Vijaya Raavi, Dr. Natasha DePesa (Duke Psychology, via telehealth platform), patient, Dr. Srinivas Pyati. Not pictured: CRNA Lisa Gioia, Dr. Harika Nagavelli (Duke Anesthesiology), Dr. Meryl Severson (Duke Neurosurgery).

WOMEN'S ANESTHESIOLOGY

Division Grows Team and Leadership

Dr. Marie-Louise Meng

Dr. Melissa Bauer

The Women's Anesthesiology Division has expanded its faculty with two recruits who bring new expertise and a unique skill set. **Dr. Marie-Louise Meng** is dual fellowship trained in obstetric and cardiothoracic anesthesia. This unique combination culminated in her clinical and research interest in the management of cardiac disease in pregnancy and investigating cardiovascular complications of pre-eclampsia. **Dr. Melissa Bauer** is dual fellowship trained in obstetric anesthesia and critical care. Bauer has an interest in maternal sepsis and is a recognized leader in this area. She was also the lead author of the recently published guidelines by the Society of Obstetric Anesthesia and Perinatology for the management of neuraxial procedures in parturients with thrombocytopenia.

The Obstetric Anesthesiology Fellowship program, led by Dr. Jennifer Dominguez, gained further momentum in 2020 with the addition of a second position, expanding the educational and research opportunities of the program. Divisional faculty also continue to support departmental focus in promoting diversity and inclusion with the recent appointment of **Drs. Dominguez and Adeyemi Olufolabi** as the department Diversity and Inclusion Program leaders. Additionally, members of the division stepped up their efforts throughout the pandemic, establishing protocols for the safe management of pregnant women with COVID and making themselves available for an extra call pool to take care of more than 130 women delivering with COVID, some of whom were critically ill.

CENTERS AND PROGRAMS

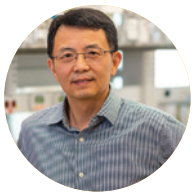
CENTER FOR TRANSLATIONAL PAIN MEDICINE

Duke Anesthesiology Awarded Program Project Grant

Dr. William Maixner

The NIH awarded the department an $8.5 million Center of Excellence award that is supported via its PPG mechanism, which marks the funding of a new national center and represents the first PPG to the department in 40 years. The designation as a Center of Excellence within the CTPM by the NCCIH brings the department both national and international recognition; there are only 1-3 Centers of Excellence funded as PPGs by NCCIH in the country. The new center represents a nidus that not only advances Duke Anesthesiology's mission in translational pain research, but brings it increased visibility in the pain field, further expanding international collaboration and increasing its value and recognition as a leader in translational pain medicine. The PPG, "Resolution of Neuroinflammation and Persistent Pain by Complementary Approaches," aims to identify novel complimentary approaches to the treatment of pain conditions. This award and designation is the culmination of a nearly three-year effort by the CTPM, initiated by the late Dr. William Maixner, who worked closely to develop the proposal with the center's members and affiliates.

CTPM Director and Postdoctoral Fellow Earn Awards



Dr. Ru-Rong Ji

Dr. Ru-Rong Ji received the prestigious American Society of Anesthesiologists Excellence in Research Award and American Academy of Pain Medicine Founder's Award, recognizing his achievements and impact in the fields of anesthesiology and pain medicine. **Dr. Christopher Donnelly** won first place in the highly-competitive AADR Hatton Awards and the IADR Unilever Hatton Awards competitions for his study, "STING Agonism as a Therapeutic Strategy to Treat Chronic Pain," in which he discovered a new role for the STING protein.

Dr. Christopher Donnelly

CENTER FOR PERIOPERATIVE ORGAN PROTECTION

Blood Platelets Trigger Events that Cause Organ Damage After Heart Surgery

Systemic inflammatory responses after cardiac surgery are directly linked to complications such as acute kidney or lung injury and neuro-cognitive decline; how these responses develop and how they might be avoided is described in a study, published online March 18 in Science Advances, led by **Dr. Jörn Karhausen**. Investigators discovered that activated platelets attach to the vessel wall and come into close contact with mast cells. Because mast cells can launch extremely powerful inflammatory responses, including life-threatening allergic reactions such as anaphylactic shock, the group further investigated the communication between these two cell types. "Evidence from our rat cardiac surgery model showed that the platelet antagonist clopidogrel stopped microvascular platelet deposition, prevented the associated drop in platelet count, and reduced mast cell-mediated inflammatory and tissue injuries," Karhausen says, which "suggests an important mechanism that could be controlled with known drugs."
Source: Duke Health News

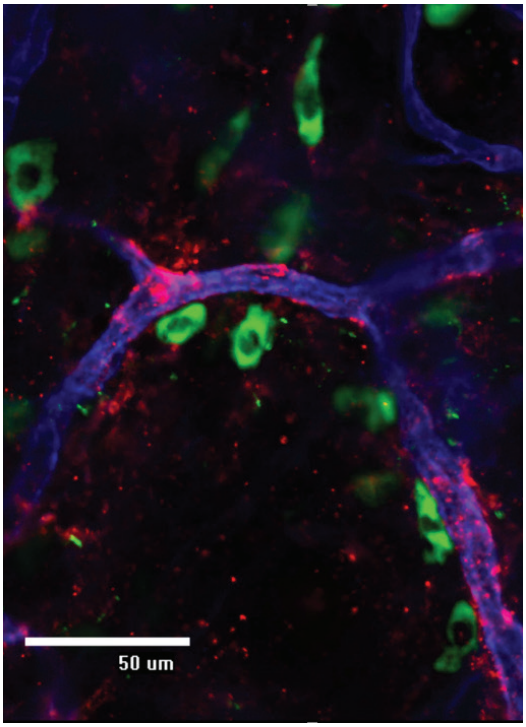
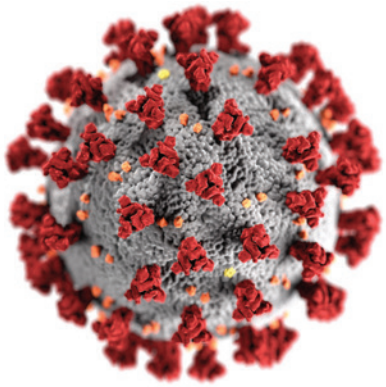


Figure: Immunostaining of a mouse skin whole mount after injection of a specific platelet antibody causing platelet activation. After activation, platelets (red stain) aggregate inside blood vessels (blue stain) and thus come into close contact to perivascular mast cells (green stain).



Delirium Superimposed on Dementia Intersects with COVID-19

Dr. Niccolò Terrando

The National Institutes of Health awarded Niccolò Terrando, PhD, a $322,620 supplement grant to his R01-funded project. He aims to develop a model of COVID-19 lung injury that activates the immune system to damage the brain, affecting areas that serve attention, memory, and thinking, and reverse these changes with an experimental drug in development. Findings from this research will provide fundamental knowledge on the pathogenesis of delirium following COVID-19-like infection. Such work has the potential to reduce the health care burden of COVID-19 associated with delirium and related neurologic complications, such as Alzheimer's disease and other dementias.

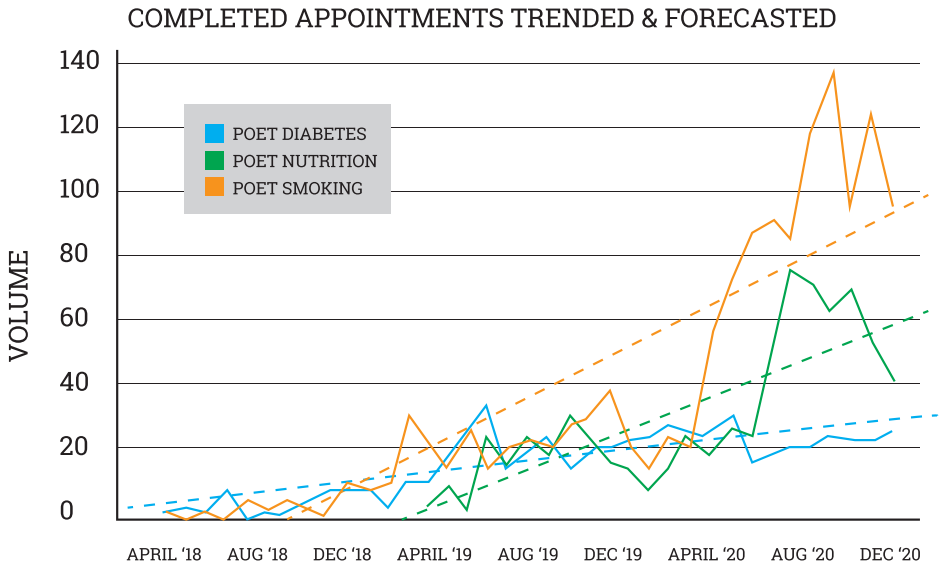
PERIOPERATIVE ENHANCEMENT TEAM (POET)

PASS and POET Clinics in the Time of COVID and Beyond

2020 marked a period of rapid evolution within medicine. The need for social distancing, the implementation of preoperative COVID testing, and a temporary mandatory pause on all but critical surgeries required seemingly overnight changes to our care delivery framework. **Our response to these COVID-related challenges has also catapulted us forward in ways that in the recent past would have been unthinkable.** Our Preoperative Anesthesia and Surgical Screening (PASS) clinic and PeriOperative Enhancement Teams (POET) did their best to capitalize on the opportunity that the pause in planned surgeries afforded to expand the timeframe and format of our preoperative optimization initiatives. The PASS clinic and POET programs now offer virtual visits. The accelerated expansion into telehealth has resulted in significant increases in patient volume for many POET programs by expanding service radius, and decreasing no-shows and cancellations. Overall, completed POET appointments increased from 1,736 in 2019 to 3,085 in 2020, with 60 percent of visits provided on the telemedicine platform. Our smoking cessation, nutrition, and diabetes programs saw the greatest increase in volume.

While COVID-related constraints have redirected some resources away from the PASS and POET core mission to re-engineer clinical care pathways for the surgically declared patient to best ensure their readiness for surgery, there have been nonetheless important impacts observed from the programs' nearly three year history of proactive preoperative optimization efforts on postoperative outcomes. Emerging data from our POET programs now demonstrates fewer days in the hospital (or none at all), less blood product utilization, and a reduction in postoperative admission to the ICU and 30 days readmission after discharge for patients treated by our POET teams. The POET anemia program, under the direction of Dr. Nicole Guinn, has demonstrated cost avoidance via a reduction in blood transfusion, length of stay and 30 day readmission. Dr. Paul Wischmeyer, Dr. David Williams, Elizabeth Villalta, RD, and the POET nutrition team have also shown success in reducing length of stay and readmission for patients at risk of malnutrition with preoperative nutritional supplementation. Despite the addition of the virtual visit format, the POET smoking team, under the directorship of Dr. James Davis, has sustained a quit rate nearly triple that of patients who attempt to quit on their own, or use a quit line. Perhaps most interesting is the impact our POET diabetes team has on patients' long-term outcomes. Dr. Tracy Setji and the POET diabetes team are noting a sustained reduction in A1c levels for up to two years after their intervention.

While this past year was fraught with challenges, the PASS and POET programs continued to demonstrate the value of patient preoperative optimization. Going forward, we are excited to explore, measure and ultimately demonstrate why preoperative optimization is a critical component to an institution's value-based care strategy.



POET
Peri-Operative Enhancement Team

Duke Anesthesiology

BY THE NUMBERS

JULY 1, 2019 - JUNE 30, 2020

CASES

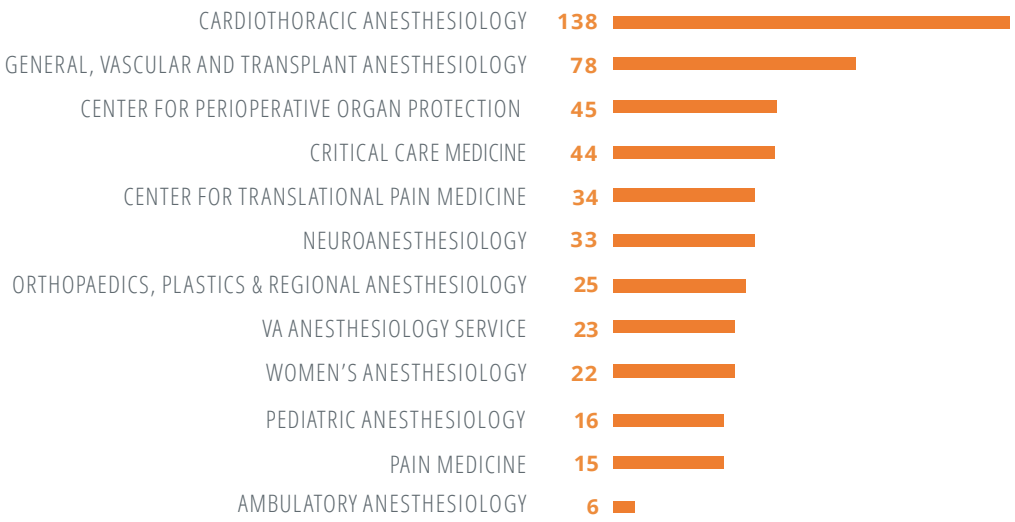
OR CASES: 136,537

5,903 AMBULATORY ANESTHESIOLOGY	**8,123** CARDIOTHORACIC ANESTHESIOLOGY	**67,836** COMMUNITY	**14,568** GENERAL, VASCULAR AND TRANSPLANT ANESTHESIOLOGY	**4,611** NEURO-ANESTHESIOLOGY
8,157 ORTHOPAEDICS, PLASTICS AND REGIONAL ANESTHESIOLOGY	**2,190** PAIN MEDICINE	**9,604** PEDIATRIC ANESTHESIOLOGY	**6,787** VETERANS AFFAIRS ANESTHESIOLOGY SERVICE	**8,758** WOMEN'S ANESTHESIOLOGY

OTHER SERVICES: 65,768

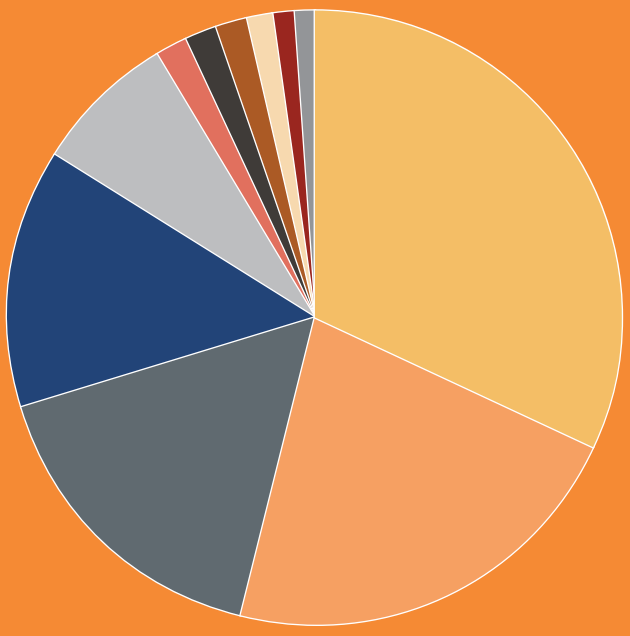
18,006 CRITICAL CARE	**32,655** PAIN VISITS	**15,107** ACUTE PAIN SERVICE VISITS

479 PUBLICATIONS



50 NEW GRANTS
totaling nearly

$11 million



BASIC SCIENCES	13	$3,469,903
ORTHOPAEDICS, PLASTICS AND REGIONAL ANESTHESIOLOGY	6	$2,401,482
CARDIOTHORACIC ANESTHESIOLOGY	4	$1,895,261
VA ANESTHESIOLOGY SERVICE	3	$1,516,074
CRITICAL CARE MEDICINE	8	$819,511
NEUROANESTHESIOLOGY	1	$200,000
PEDIATRIC ANESTHESIOLOGY	3	$187,960
PAIN MEDICINE	6	$182,942
GENERAL, VASCULAR AND TRANSPLANT ANESTHESIOLOGY	3	$139,600
HYPERBARIC MEDICINE	2	$131,675
WOMEN'S ANESTHESIOLOGY	1	$10,000

$5.2 million

TOTAL OF 20 **NON-COMPETING** CONTINUING GRANTS

157

CURRENT **ACTIVE RESEARCH** GRANTS

16 RESEARCH LABORATORIES

Chemical Sensing, Pain and Inflammation Research Laboratory
Sven-Eric Jordt, PhD

Duke Multi-Disciplinary Metabolic and Body Composition Assessment Team (MCAT) Laboratory
Paul Wischmeyer, MD

FG Hall Environmental Laboratory
Richard Moon, MD, CM, MSc, FRCP(C), FACP, FCCP

Human Affect and Pain Neuroscience Laboratory
Katherine Martucci, PhD

Human Pharmacology and Physiology Laboratory
David MacLeod, MB BS

Laboratory of Mechanistic and Clinical Pharmacology
Evan Kharasch, MD, PhD

Laboratory of Neuromodulation
Luis Ulloa, PhD, MS

Molecular Neurobiology Laboratory
Wei Yang, PhD

Molecular Pharmacology Laboratory
Madan Kwatra, PhD

Multidisciplinary Neuroprotection Laboratory
David Warner, MD

Nerve Injury and Pain Mechanism Laboratory
Thomas Van de Ven, MD, PhD

Neuroinflammation and Cognitive Outcomes Laboratory
Niccolò Terrando, PhD

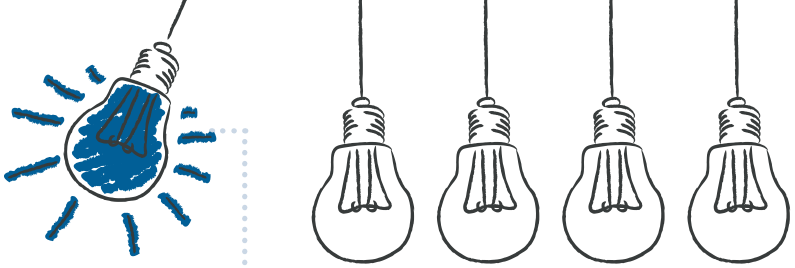
Pain Relief and Opioid Mitigation Innovation Science (PROMIS) Laboratory
Padma Gulur, MD

Peri-Operative Neurocognitive Research Team (PORT) Laboratory
Miles Berger, MD, PhD

Sensory Plasticity and Pain Research Laboratory
Ru-Rong Ji, PhD

Translational Pain Research Laboratory
Andrea Nackley, PhD

HONOR SOCIETY



DEPARTMENTAL GRANTS $100,000+

Awarded July 1, 2019—June 30, 2020

BASIC SCIENCES (CPOP/CTPM)

Satya Achanta, DVM, PhD
NATIONAL INSTITUTES OF HEALTH: $201,250
Specialized Pro-Resolving Mediators as Potential Medical Countermeasures in a Pig Model of Chlorine Gas-Induced Acute Lung Injury

Yong Chen, PhD
NATIONAL INSTITUTES OF HEALTH: $273,541
Resolution of Neuroinflammation and Persistent Pain by Complementary Approaches: Behavior Core

Venkata (Sairam) Jabba, PhD
YALE UNIVERSITY: $106,530
Cellular Toxicity of Novel Flavor-Solvent Adducts in Electronic Cigarettes

Ru-Rong Ji, PhD
BOSTON SCIENTIFIC CORPORATION: $320,889
Resolving Neuropathic Pain with High Frequency SCS via Modulation of Glial Signaling and Neuroinflammation in Small and Large Animals

Sven-Eric Jordt, PhD
NATIONAL INSTITUTES OF HEALTH: $750,625
Advanced TRPA1 Inhibitor for the Treatment of Chlorine Inhalation Injury
NATIONAL INSTITUTES OF HEALTH: $480,208
Anesthetic and Synthetic Cooling Flavors in E-Cigarettes: Chemistry and Respiratory Effects Modulating Nicotine Intake
UNIVERSITY OF COLORADO - DENVER: $105,838
Biomarkers of Lung Injury in Methyl Isocyanate Exposed Rodents and Pigs
NATIONAL INSTITUTES OF HEALTH: $312,305
Resolution of Neuroinflammation and Persistent Pain by Complementary Approaches: Molecular Core
YALE UNIVERSITY: $276,375
Project 1: Effects of Flavors on Nicotine Choice and Central Reward Me

Madan Kwatra, PhD
GENZADA PHARMACEUTICALS, LLC: $442,750
GZ17-6.02 as a Novel Therapeutic Agent for Dermatologic Disorders
GALDERMA: $475,680
Prurigo Nodularis: Disease Burden and Rationale for Novel Therapeutics

William Maixner, DDS, PhD
NATIONAL INSTITUTES OF HEALTH: $242,853
Resolution of Neuroinflammation and Persistent Pain by Complementary Approaches: Administrative Core

Katherine Martucci, PhD
NATIONAL INSTITUTES OF HEALTH: $248,905
The Impact of Opioids on Chronic Pain: Clinical Research and Career Training in Spinal Cord fMRI and Brain Reward Systems

Andrea G. Nackley, PhD
NATIONAL INSTITUTES OF HEALTH: $264,402
Resolving Functional Pain by Complementary Approaches
NATIONAL INSTITUTES OF HEALTH: $525,095
Defining the Role of Peripheral Adrb3 in Chronic Pain and Inflammation
NATIONAL INSTITUTES OF HEALTH: $768,005
Vestibulodynia: Understanding Pathophysiology and Determining Appropriate Treatments

Shad B. Smith, PhD
MCGILL UNIVERSITY: $376,000
DNA Methylation and Mediation of Risk Factors for Chronic Facial Pain

Niccolò Terrando, PhD
ALZHEIMER'S ASSOCIATION: $150,000
Bioelectronic Regulation of CNS Lymphatic Drainage in Delirium and AD
NATIONAL INSTITUTES OF HEALTH: $561,845
Neurovascular Dysfunction in Delirium Superimposed on Dementia
NATIONAL INSTITUTES OF HEALTH: $301,505
Resolution of Postoperative Pain by Complementary Approaches
NATIONAL INSTITUTES OF HEALTH: $322,000
Targeting Microbially-Derived Juvenile Protective Factors to Resolve Neuroinflammation and Delirium

David Warner, MD
NATIONAL INSTITUTES OF HEALTH: $230,605
Integrated Training in Anesthesiology Research
BIOMIMETIX JV, LLC: $156,869
Pharmacologic Suppression of Reperfusion Injury Following Endovascular Thrombectomy in Stroke

Wei Yang, PhD
NATIONAL INSTITUTES OF HEALTH: $347,813
The Unfolded Protein Response and Neuroprotection in Stroke

CARDIOTHORACIC ANESTHESIOLOGY

Jorn Karhausen, MD
NATIONAL INSTITUTES OF HEALTH: $254,308
Mast Cell Activation as a Determinant of Neurologic Injury After Cardiac Arrest

Joseph Mathew, MD, MHSc, MBA
NATIONAL INSTITUTES OF HEALTH: $719,080
Cognitive Effects of Body Temperature During Hypothermic Circulatory Arrest

Madhav Swaminathan, MD, MMCi, FASE
ASTELLAS PHARMA GLOBAL DEVELOPMENT, INC: $145,710
Astellas AKI study

Ian Welsby, MBBS
ARIDIS PHARMACEUTICALS, INC: $175,548
Aridis 301
CERUS CORPORATION: $1,319,695
Cerus/BARDA CLI 00125 ReCePI Study

CRITICAL CARE MEDICINE

Jamie Privratsky, MD, PhD
NATIONAL INSTITUTES OF HEALTH: $187,854
The Role of the IL-1 Receptor in the AKI to CKD Transition

Paul Wischmeyer, MD, EDIC
TAKEDA PHARMACEUTICALS NORTH AMERICA, INC: $301,372
Takeda 954-2004 for the Prophylaxis and Treatment of Postop GI Dysfunction

Vijay Krishnamoorthy, MD, PhD
NATIONAL INSTITUTES OF HEALTH: $377,762
Mechanisms and Clinical Impact of Myocardial Injury Following Traumatic Brain Injury

GENERAL, VASCULAR & TRANSPLANT ANESTHESIOLOGY

Evan Kharasch, MD, PhD
NATIONAL INSTITUTES OF HEALTH: $559,927
Optimizing Outpatient Anesthesia: Improving Analgesia and Reducing Opioid Misadventure

Richard Moon, MD, CM, MSc, FRCP(C), FACP, FCCP
NAVAL SEA SYSTEMS COMMAND: $148,853
Sildenafil for Prevention of Immersion Pulmonary Edema
NAVAL SEA SYSTEMS COMMAND: $326,126
Altitude Study

NEUROANESTHESIOLOGY, OTOLARYNGOLOGY & OFFSITE ANESTHESIA

Miles Berger, MD, PhD
RUTH K. BROAD BIOMEDICAL RESEARCH FOUNDATION: $200,000
Ann B. Bussel Award: Ruth K. Broad Foundation
NATIONAL INSTITUTES OF HEALTH: $236,841
Neuro-inflammation in Postoperative Cognitive Dysfunction: CSF and fMRI Studies

PAIN MEDICINE

Thomas Buchheit, MD
US WORLDMEDS, LLC: $101,121
USWM - Lucemyra

PEDIATRIC ANESTHESIOLOGY

Edmund Jooste, MB ChB
PFIZER, INC: $141,483
Dexmedetomidine (Dex)

REGIONAL ANESTHESIOLOGY

David MacLeod, MBBS
PACIRA PHARMACEUTICALS: $412,108
Exparel Hip Fracture
PACIRA PHARMACEUTICALS: $108,636
Pacira 402-C-332 STRIDE Ankle
PACIRA PHARMACEUTICALS: $1,600,551
Pacira Exparel Intrathecal
MEDTRONIC, INC: $255,206
SONORA

VETERANS AFFAIRS ANESTHESIOLOGY SERVICE

Thomas Van de Ven, MD, PhD
DEPARTMENT OF DEFENSE: $1,426,733
Single Nucleus Expression Profiling of Human Sciatic Nerve After Traumatic Amputation: Predicting Pain and Functional Outcomes

In Remembrance of Dr. William Maixner

Vice Chair, Research • Founder/Co-Director, Center for Translational Pain Medicine

It is with profound sadness that we share with you the passing of a beloved member of our Duke Anesthesiology family, William "Bill" Maixner, DDS, PhD. He passed away on November 2 at the age of 68 after battling an illness. Duke flags were lowered on November 4 in honor of his life and legacy.

Dr. Maixner, the Joannes H. Karis, MD, Professor of Anesthesiology, was a world-renowned pioneer in pain research and one of our department's most distinguished faculty. He will be remembered as an extraordinary leader, innovator, scientist and mentor who dedicated his life-long career to unraveling the mysteries of chronic pain and was committed to translating basic discoveries into novel diagnostics and treatments to positively impact research, education and patient care.

Dr. Maixner's legacy of innovation will forever be remembered here at Duke as we continue to honor his accomplishments and grow his goals. Read Dr. Maixner's memorial tribute article at bit.ly/WMDDSPHD.

Preserve his legacy. Your gifts to the William Maixner Fund will help establish a professorship in his name at the Duke University School of Medicine.
Give at anesthesiology.duke.edu.

"Bill was a force of nature. He always made me think of a renaissance scholar with his wide interests and expertise. We will all miss him."

Francis Keefe, PhD
CHIEF EDITOR OF PAIN

"Bill was a dear friend and wonderful colleague. I miss him very much and I will remember our times together as long as I live."

Ronald Dubner, DDS, PhD
NATIONAL INSTITUTES OF HEALTH

"I was so fortunate to have Bill as my mentor, colleague and good friend. He was truly a visionary scientist and his impact on the field will be felt long into the future. His passing is a tremendous loss for the field, and an even greater one for those of us who knew him well."

Roger Fillingim, PhD
UNIVERSITY OF FLORIDA, COLLEGE OF DENTISTRY

"Bill stood out in the pain research field for his accomplishments, and not only his depth of knowledge, but also the scope of his knowledge across many different areas. I will remember Bill as one of the most inquisitive and welcoming thought leaders in the area of pain. He believed in a truly multidisciplinary team approach to questions, and was always seeking input and ideas from outside of his own area. He was warm, friendly and welcoming, while still being an innovative and driven scientist. I will miss his friendship, counsel and collaboration."

Duncan Lascelles, PhD
NC STATE VETERINARY MEDICINE

"William Maixner was a giant in the pain field and beyond. He was a visionary who recognized instantly a new direction from glamorously packaged. And he was a natural, very kind leader who recognized greatness in each person and helped to develop so many of the young generation of pain researchers; a type of leader whom people would follow because it was exciting and purposeful. Dr. Maixner's unparalleled track record in the identification of the genetic components of chronic pain and the immediate relevance of his research program to the identification of potential therapeutic targets guarantee his legacy to the pain field; he notably pioneered a reverse genetic approach to identify new pain drug targets. His efforts to study genetic contributions to a chronic pain state took an understanding of pain mechanisms and its treatment to new levels. His research program contributed to the groundbreaking changes in the understanding of chronic pain, which will underpin our policies for pain management."

Luda Diatchenko, MD, PhD
MCGILL UNIVERSITY

"Dr. William Maixner, my scientific 'uncle,' was one of the most outstanding clinical pain scientists of our time, a wonderful colleague, excellent mentor, and caring friend. I first met Bill almost 20 years ago when my boss, Michell Max, introduced him stating, 'This is Bill, he is just brilliant.' Since then, I agreed many times with this brief but precise characteristic of Bill – indeed, he was so wise and knowledgeable, so forethinking, so creative and imaginative. For several decades, Bill served as a true leader in the pain field, making breakthrough findings, from his early advances in neuropharmacology to revolutionary progress in personalized pain management of facial and other pain conditions. Bill's main strengths were ongoing scientific drive, exceptional curiosity, and clear vision. For these qualities he was greatly appreciated and respected; for his delightful character and charming personality he was widely loved. Bill was always optimistic, helpful, full of ideas and plans, full of life. He knew how to live a good life, how to enjoy it, and how to light up the life of his team and friends. In my memory, he remains very much alive, smiling, calm, toasting with a glass of red wine for the science of pain and painless life."

Inna Belfer, MD, PhD
NATIONAL CENTER FOR COMPLEMENTARY AND INTEGRATIVE HEALTH

ACADEMIC EVENING GOES **VIRTUAL**

2020

Members of Duke Anesthesiology gathered virtually for the first time on May 5 to share the results of their research pursuits and celebrate scientific excellence at its 28th Annual **Academic Evening, an event that aims to advance anesthesia, critical care and pain management.** The department's junior-level investigators and faculty presented 81 poster abstracts, ranging from basic science, clinical trials and case reports.

"Part of the magic of Academic Evening has always been the social nature of it – investigators from far-flung areas of the department getting together and sharing their ideas with each other," says Dr. Jeffrey Gadsden, event co-chair.

Guest judge, Dr. Vesna Jevtovic-Todorovic, chair of the Department of Anesthesiology at the University of Colorado School of Medicine, spoke to a virtual crowd of at least 130 faculty, trainees, students and staff with the message, "Be the person who blazes the trail. The environment and culture that we create…is what allows us all to realize our dreams. And what an environment you all have created. This is incredible."

One of the anticipated highlights of the annual event is the Bill White Award for resident research; he was involved in the design, data control and examination, and statistical analysis of biomedical studies in both observational and clinical trials within Duke Anesthesiology for 20 plus years. Dr. Ashley McNeil received first place in this category, noting "Having others recognize the importance of my topic motivates me to continue pursuing the research."

2021

Duke Anesthesiology's 29th Annual Academic Evening once again took place virtually on May 11 with at least 115 departmental members in attendance, eager to celebrate scientific excellence. "In a year when clinical research was interrupted by the pandemic, we saw an exceptional number of 84 abstract submissions," says event chair, Dr. Jeffrey Gadsden, "which shows our department's commitment to scholarly discovery and the resilience of our trainees and their faculty mentors." Leadership also honored the life and legacy of the late Dr. William "Bill" Maixner, who served as the department's vice chair for research and co-chair of the event. Dr. Leah Acker, Academic Career Enrichment Scholars chief resident, received the coveted Bill White Award for her research, noting "It's humbling to think of all the seminal trials and research that he was a part of in this department, and to feel that in some small way, my work is helping to carry that tradition of excellence forward." **Guest judge, Dr. Deborah J. Culley, chair of the Department of Anesthesiology and Critical Care at the University of Pennsylvania Perelman School of Medicine,** was particularly impressed with the number of posters submitted by residents, saying "this has been a period of unprecedented pressure" and acknowledging the essential role of residents during COVID surges. "Hats off to you all for being able to accomplish such amazing research during that period of time. Research from this event suggests that there is a bright future in anesthesiology, and you really are that future."

2020 WINNERS

MEDICAL STUDENT RESEARCH: TIM BECK
CRNA/DNP/GRAD/UNDERGRAD RESEARCH: GEORGE CORTINA
CASE REPORT: KATIE HERBERT
POST-DOC BASIC SCIENCE: SHIN HYUNG KIM
FELLOW CLINICAL RESEARCH (DICK SMITH AWARD): LAURIANE GUICHARD
RESIDENT RESEARCH (BILL WHITE AWARD): ASHLEY MCNEIL

2021 WINNERS

MEDICAL STUDENT RESEARCH: TIM BECK
CRNA/DNP/GRAD/UNDERGRAD RESEARCH: ERICA HARRIS
CASE REPORT: ROBERT MORRIS
QUALITY IMPROVEMENT PROJECT: JAMES DIERKES
POST-DOC BASIC SCIENCE: SHARAT CHANDRA
FELLOW CLINICAL RESEARCH (DICK SMITH AWARD): RILEY ANN LANDRETH
RESIDENT RESEARCH (BILL WHITE AWARD): LEAH ACKER

ABLE

ACADEMY FOR BUILDING LEADERSHIP EXCELLENCE

CONGRATULATIONS
TO OUR 2021 ABLE SCHOLARS

Creating a culture of coaching in which every faculty member is invested and engaged in professional growth.

The **ABLE Program** is designed to accelerate career development for junior faculty in their chosen pathway by pairing them in a one-year program with a personal coach. The program involves training in aspects of career development that include strategies to build resilience, enhance professional skills, and learn the infrastructure that supports their chosen domain.

TRANSLATIONAL RESEARCH

Dr. Satya Achanta

CLINICAL RESEARCH

Dr. Melissa Bauer

OPERATIONS

Dr. Harika Nagavelli

EDUCATION

Dr. Angela Pollak

Dr. Vijay Ramaiah

Dr. Peter Yi

Duke Anesthesiology Launches the SMART PROGRAM

The SMART Program
Developing Faculty Mentors

The Supporting Mentorship in Anesthesia Research through Training (SMART) Program, a Duke Anesthesiology faculty development initiative, is designed to enhance mentorship capacity in the department by developing necessary skills in mentors through evidence-based training methods. The program began October 1, 2020.

THE INAUGURAL SMART CLASS:

Dr. Atilio Barbeito
Dr. Brandi Bottiger
Dr. Anne Cherry
Dr. Jeffrey Gadsden
Dr. Dhanesh Gupta
Dr. Ashraf Habib
Dr. Edmund Jooste
Dr. Negmeldeen Mamoun
Dr. Katherine Martucci
Dr. Marie-Louise Meng
Dr. Timothy Miller
Dr. Andrea Nackley
Dr. Alina Nicoara
Dr. Karthik Raghunathan
Dr. Madhav Swaminathan
Dr. Brad Taicher
Dr. Niccolò Terrando
Dr. Ankeet Udani
Dr. Luis Ulloa

March 2021

Message from Dean Mary E. Klotman, MD

2020 was a year like no other. During the past year, our world and our school have experienced both unprecedented challenges and historic progress. I am incredibly grateful to our faculty, staff, students, alumni, and friends for their sacrifices, commitment and contributions.

When news about the novel coronavirus SARS-CoV-2 first broke out, our entire School of Medicine community sprang to action so we could continue to fulfill our missions as an academic medical center - caring for patients, working to understand and mitigate this new threat, educating our students, and caring for our community.

Our brave and dedicated health care workers showed up on the frontlines on day one—putting others ahead of themselves to care for those suffering from COVID-19, a virus that we still knew very little about. Almost immediately, Duke Health established drive-thru testing sites, and our providers transitioned to telemedicine visits to offer the best, safest care possible for patients while keeping themselves and their families safe.

From the very start, innovation was key to fighting this pandemic, and Duke has helped lead the way. Our expertise in clinical research has been paramount. Our researchers and clinical research staff have led and participated in clinical trials so that Duke could offer patients the most cutting edge therapies available to treat COVID-19.

Many of our laboratory researchers pivoted from their primary research area to focus on COVID-19, bringing their knowledge and expertise to respond to the challenge at hand. Decades of research led by faculty and staff in the Duke Human Vaccine Institute, Duke Global Health Institute, Duke-NUS Medical School in Singapore, and across our campus laid the foundation for the knowledge and data that have allowed Duke to move quickly to understand the virus and transmission, improve testing, and develop vaccines and counter measures – for now and for the future.

Last summer, Duke developed a comprehensive surveillance and testing program so that we could reopen our campus while minimizing the spread of the virus. This incredible work was recognized by the CDC and has been highlighted nationwide as a best practice for other campuses and organizations.

Our students have responded to the pandemic in full force, positioning themselves as an integral part of our response to COVID-19, participating in telemedicine, working in vaccination clinics and in research labs. The year 2020-2021 has provided teaching moments unlike we have seen before. New classes were developed in a span of weeks instead of months, and our students and educators moved to virtually learning in record time.

Together we have embraced two important goals throughout this pandemic: to lead and contribute to the response against COVID-19 and to minimize the spread of the virus among our faculty, staff, students, and in our community. We have joined with community partners, schools, government agencies, and health care organizations to help inform, educate and provide care and have worked to ensure that everyone has access to care and to vaccines – especially our most vulnerable populations, our Latinx and Black communities and the elderly.

Through it all, there have been so many unsung heroes. I want to take this opportunity to thank each and every one of you. I could not be more proud to be a part of the Duke University School of Medicine.

DUMC 2927, DURHAM, NC 27710 **@DUKEMEDSCHOOL / @MARYEKLOTMAN** **LINKEDIN.COM/SCHOOL/DUKE-MED-SCHOOL**

Faculty Earn Distinguished **SoM Awards**

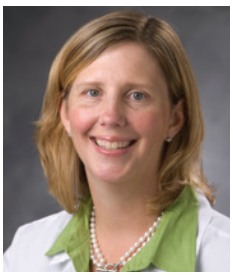
A distinguished faculty committee at Duke has selected Duke Anesthesiology's Nancy Knudsen, MD, as a recipient of the 2020 Leonard Palumbo Jr., MD, Faculty Achievement Award and Adeyemi Olufolabi, MBBS, DCH, FRCA, as a recipient of the 2020 Leonard Tow Humanism in Medicine Award.

Knudsen's award honors a faculty member who displays both a dedication to compassionate patient care and excellence in the teaching and mentoring of young physicians. This award is named for Dr. Leonard Palumbo Jr., who completed his undergraduate and medical degrees, as well as his clinical training, here at Duke. Palumbo was a compassionate and empathetic clinician and a dedicated and talented educator. His commitment to both patients and students inspired the establishment of this award in 1999 by his brother, also a Duke alumnus, Mr. Art Palumbo.

"The honor is in being nominated for the Palumbo award," says Knudsen, professor of anesthesiology and associate professor in surgery, who joined Duke in 1996. "I am deeply honored and moved to know that my colleagues and associates see me as I see the physicians I have always tried to emulate and strive to be like in our department and beyond. I am truly thankful and blessed to be part of this community."

Olufolabi's award is sponsored by the Arnold P. Gold Foundation and has been supported by Leonard Tow since 2003. Winners of this award demonstrate compassion in the delivery of care, respect for patients, their families, and health care colleagues, as well as clinical excellence.

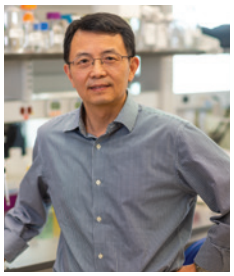
"I am grateful for the recognition, but there is significant work ahead," says Olufolabi, professor of anesthesiology and affiliate of the Duke Global Health Institute, who joined Duke in 1997. "The most vulnerable and the most needy have been pregnant women and babies in low resource countries. They pay the highest price due to broken systems that have known solutions. The loss is always tragic. It is compassion in being part of the solution that drives one to make the necessary sacrifices. This award recognizes that determination."



Nancy Knudsen, MD

Adeyemi Olufolabi, MBBS, DCH, FRCA

Dr. Ji Named a Highly Cited Researcher



Ru-Rong Ji, PhD

Duke Anesthesiology's Ru-Rong Ji, PhD, distinguished professor of anesthesiology, has once again been named among the most "Highly Cited Researchers" in the world. Ji is one of 37 Duke faculty named to the 2020 list; he is one of 22 faculty from the Duke University School of Medicine.

The annual list is based on the number of highly cited papers produced over an 11-year period from January 2009 to December 2019. Citation rate, as tracked by Clarivate's Web of Science, is an approximate measure of a study's influence and importance. 6,127 researchers from 60 countries are recognized by the 2020 listing.

Ji was one of 54 Duke researchers who made the global list of "Highly Cited Researchers" in 2019; a list he also made in 2018. His research focuses on molecular and cellular mechanisms of chronic pain, including but not limited to mediators of inflammation and pain, neuropathic pain and cancer pain.

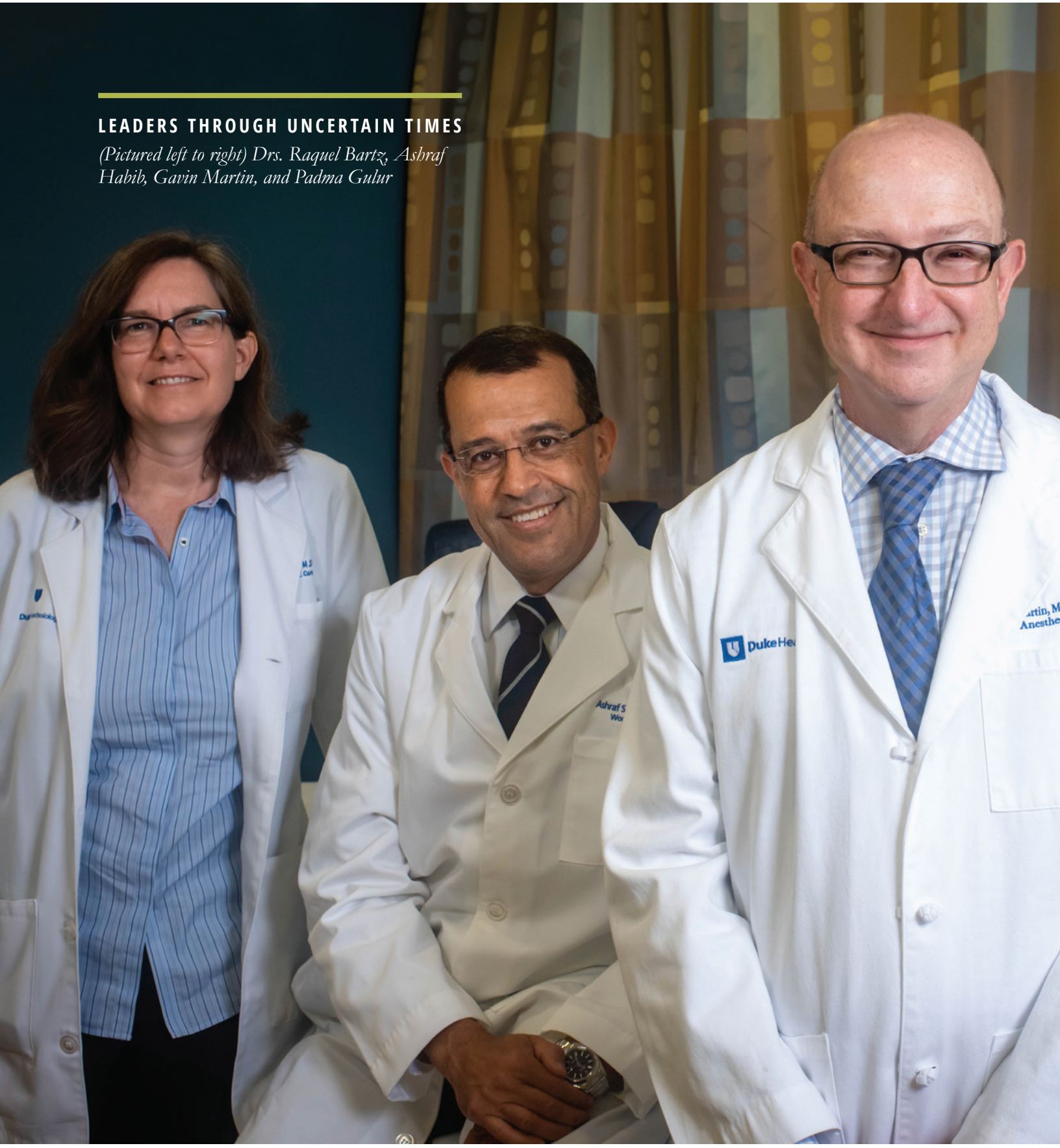
"This list is very dynamic from year to year," says Ji, director of both the Sensory Plasticity and Pain Research Laboratory and the Center for Translational Pain Medicine at Duke Anesthesiology. "I am very pleased that someone from anesthesiology can make the list. I am proud to represent the field, and I appreciate the strong support for my research from the department."

TOP 5

2022 US News & World Report **Rankings**

#3
DUKE UNIVERSITY SCHOOL OF MEDICINE
Best Medical Schools: Research

#4
DUKE ANESTHESIOLOGY
Best Medical Schools: Anesthesiology



LEADERS THROUGH UNCERTAIN TIMES

(Pictured left to right) Drs. Raquel Bartz, Ashraf Habib, Gavin Martin, and Padma Gulur

ANESTHESIOLOGISTS

THE FRONTLINES OF A PANDEMIC

Looking back, even though most would like to forget 2020, it will be the year etched permanently into collective memory.

BY RATNA SWAMINATHAN

"ONE OF THE BIGGEST LESSONS LEARNED IS THAT WE HAD TO BE ADAPTIVE. WE HAD MANY UNKNOWNS, BUT WE COULDN'T STAY STATIONARY. WE HAD TO DEVELOP PROCESSES, TRY THEM OUT, AND IF WE WERE WRONG, CHANGE COURSE - AND CHANGE QUICKLY!"

DR. GAVIN MARTIN

THE FIRST CONFIRMED SARS-COV-2 case in the United States was reported on January 21, 2020. Today, it's a sobering statistic of 33 million diagnosed cases and more than 599,000 people dead. Globally, more than 178 million have been infected and over three million have died.

Anesthesiologists unexpectedly found themselves at the forefront of a critical national response. Airway management along with expertise in critical care gave them a pivotal role in managing COVID-19. In February 2020, Duke anesthesiologists vigilantly watched the case numbers spiral in New York. The rate of spread was profound and local containment seemed impossible. They realized this health crisis would soon be on North Carolina's doorstep. The first positive case was confirmed in Wake County on March 3 and by March 30, the caseload had spiked, and the state went into lockdown.

In early March, Duke anesthesiologists began brainstorming with the perioperative nursing, surgery and infection prevention teams on coordinated steps to keep our patients and staff safe. They focused on airway management, critical care, and expansion of access to prepare their teams for battle against COVID-19. They worked hard to understand the contagion's nature, modify practice, adopt new protocols, and develop operational processes to minimize risk for patients and providers.

"Nobody really knew how the virus was transmittable; there was talk of aerosolization and droplets on surfaces," says Dr. Gavin Martin, vice chair for clinical operations, who led the department's COVID response. "The question of shutting down nonessential health services had started," recalls Dr. Padma Gulur, executive vice chair. "We had to understand the full extent of this outbreak. What is causing this spread and is there a certain patient type who is more prone to developing severe disease from it? How can it go from zero to sixty this fast? How can we respond to it?"

Critical Care Medicine chief, Dr. Raquel Bartz, said the absence of knowledge spurred crosstalk across institutions in Seattle and Stanford. What happened there earlier could soon happen here and any insight into patient management was welcome. Health systems across North Carolina collaborated twice weekly, and the Duke team would meet every day, informs Bartz.

Preparedness for patient admissions kicked into high gear as soon as the COVID positive search engine set

HEROES OF THE PANDEMIC

Faculty Dr. Warwick Ames donning and doffing PPE during a training exercise.

up by Suresh Balu and Mark Sendak of the Duke Institute for Health Innovation first indicated an increased positive test rate at Duke.

With no time to waste, Duke Anesthesiology established an anesthesiology command center in mid-March, under Dr. Joseph Mathew's leadership. In collaboration with division chiefs and the chief nurse anesthetist, Adam Flowe, Martin and Gulur coordinated mitigation efforts. Ken Childs and Stephen White of the department's IT team facilitated uninterrupted connectivity giving the team bandwidth to upload every bit of information in real time. Environmental services installed hand sanitizing stations and sanitized surfaces making the fifth floor conference room a safe hub for interaction.

In conjunction with the Hospital Incident Command Center, the team identified best ways to establish safe care pathways in the perioperative environment and in the care for critically ill patients in ICUs across the health system. All Duke hospitals created structures to move critically ill patients into different areas, adds Bartz. At Duke University Hospital, patients were moved from the Neuro ICU to the newly-created Central Tower to generate more ICU beds for COVID patients. At Duke Regional Hospital, critically ill patients expanded into the Post-Anesthesia Care Unit.

Through this turbulent time, the departmental and hospital incident command center became a great "home" for people to interact with the leadership and engage with a supportive community, says Gulur. It gave providers a sense of purpose in the face of great unpredictability, she adds. Meals were provided for in-house teams. Transparency in communication was important. Regular communications providing updates where all perioperative teams from anesthesiology, nursing and surgery were invited, became the norm in place of Wednesday morning grand rounds. According to Martin, they were doing their best with the information they had and were quick to adapt as more knowledge came in. An example was when national mask wearing guidelines changed over a few weeks "from no one needed to wear a mask to everyone must wear masks," adds Gulur.

With surgery and nursing input, the command center drew up a plan to prioritize surgeries for an anticipated COVID surge. When Governor Roy Cooper directed hospitals and ambulatory centers to suspend elective surgeries and non-urgent procedures in May 2020, Duke's perioperative team was well prepared.

Elective surgery cases to be done within a week were prioritized, followed by those that could be done within a month and later. Surgical case volume dropped by 60-80 percent, allowing a ramp up in hospital and ICU bed capacity, informs Martin. Dedicated airway teams, comprising CRNAs and faculty, rotated every 12 hours for COVID patients from June 2020 to June 2021. In collaboration with pulmonologists and surgical critical care, recovery rooms and ORs were to serve as critical care space and anesthesia machines were prepped for use as ventilators.

The hospital ended up responding in a way to keep people maximally safe, adds Bartz. The focus soon shifted to presurgical COVID testing being pivotal to try and keep our patients and staff safe, especially since N95 mask supplies were running low, informs Martin. Patients testing positive were rescheduled according to a data-driven plan of quarantine and recovery. Emergency cases who were COVID positive went to dedicated ORs, with full personal protective equipment (PPE) protection.

The Women's Anesthesiology Division faced a unique challenge. Delivery cases, including COVID positive ones, couldn't obviously be canceled or postponed for women in labor. Division chief, Dr. Ashraf Habib, explains: "Unlike other clinical settings, emergencies can occur quickly and unexpectedly in the labor and delivery unit, meaning that anesthesia providers have to be trained to put on PPE quickly and efficiently to be able to deal with the emergency in a safe way." Furthermore, anesthesiologists in labor and delivery multitasked between labor rooms and operating rooms with the need for donning and doffing when caring for COVID patients, which took time. "We had to create an extra back up call team to manage COVID patients while the 'regular' on call team managed other women on the labor and delivery unit," informs Habib.

A departmental team comprising Drs. Kamrouz Ghadimi, Ankeet Udani, Ian Welsby, Jeffrey Gadsden, Dhanesh Gupta, and Tim Miller quickly developed critical care refresher courses, as well as safe intubations for non-critical care anesthesiologists and simulation training on power air-purifying respirator (PAPR) and airway management.

ON THE PANDEMIC'S FRONT LINES: WHY ANESTHESIOLOGISTS?

Anesthesiologists are in the forefront of intubating COVID positive patients, a process that exposes them to potential infection

- Intubation was always high-risk during the pandemic, particularly due to the aerosolization when caring for COVID patients and a five percent false-negative testing rate among asymptomatic patients

Anesthesiologists cover/run a large number of critical care units in most health systems, placing them at the forefront of caring for critically ill patients in the ICUs

Anesthesiologists are essential in caring for COVID positive obstetric patients, providing epidurals for pain relief during labor and anesthesia for C-sections

Anesthesiologists provide anesthesia to COVID positive patients requiring urgent surgery

LESSONS LEARNED

LEAD WITH EMPATHY AND KINDNESS, ESPECIALLY IN HIGH-STRESS SITUATIONS

- Take into account not just the science, but emotional factors
- Acknowledge stressors and offer support

RECOGNIZE THE RISKS TO PROVIDERS AND DEVELOP ACTION PLANS TO ASSURE STAFF OF THEIR SAFETY

OFFER CONTINUOUS, INCLUSIVE AND TRANSPARENT COMMUNICATION, INCLUDING ESTABLISHING A CENTRAL COMMAND CENTER – BE HONEST ABOUT WHAT YOU DO AND DO NOT KNOW

PREPARE FOR POSSIBLE SURGES AND THE NEED FOR MORE INPATIENT BEDS FOR THE CRITICALLY ILL BY PROACTIVELY DEVELOPING A PLAN TO ONLY PRIORITIZE URGENT SURGERIES

LEARN TO SWIFTLY DEVELOP AND IMPLEMENT OPERATIONAL PROCESSES AND PROTOCOLS (THE TEAM SOMETIMES IMPLEMENTED THESE WITHIN DAYS) TO RESPOND TO RAPIDLY EVOLVING SITUATIONS

DON'T BE AFRAID OF THE RISK OF MAKING A MISTAKE DUE TO NUMEROUS UNKNOWNS

- The only way not to make a mistake is to do nothing, which in itself is a critical mistake

LEARN MORE ABOUT SUPPLY CHAIN MANAGEMENT IN YOUR HEALTH SYSTEM

- Identify the scarce resources (e.g. N95 masks) and develop alternatives to keep people safe - Duke was among the first in the country to have a presurgical COVID testing process in operation

PROVIDE IMPROMPTU TRAINING

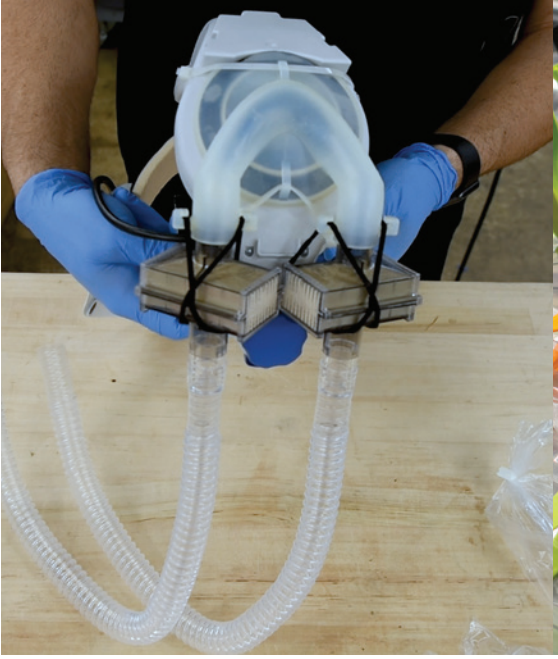
- Early on, the team utilized Duke's simulation labs to train all anesthesia and non-anesthesia critical care doctors on PAPR and airway management
- Fill temporary gaps in health care by offering additional training (e.g. the team trained a large number of anesthesiologists, providing them with hands-on critical care skills so if needed, they could work in the Critical Care Unit)

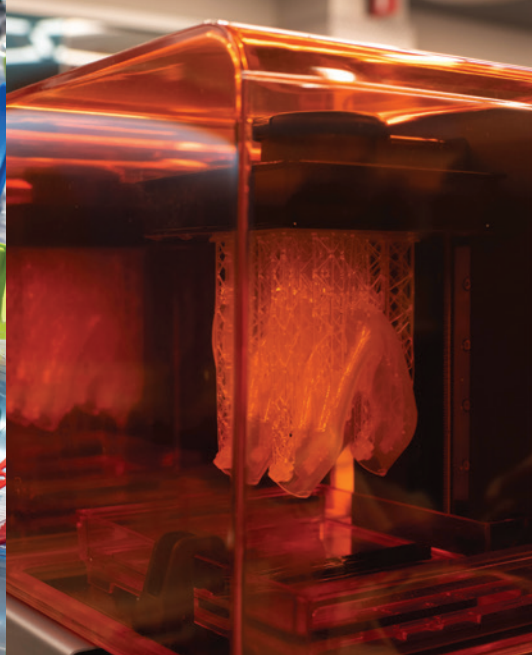
STRATEGICALLY MANAGE SCHEDULES TO ENSURE ALL STAFF HAS EQUAL TIME OFF TO RELAX/RECOVER

- Identify areas doing the "heavy lifting," such as critical care and obstetrics during COVID, and develop plans to not overwork those groups

ENCOURAGE CROSS-DEPARTMENTAL INNOVATION AND TEAMWORK

- Utilizing 3D printing, the team worked with Duke Orthopaedic Surgery and Duke University Pratt School of Engineering to turn striker orthopaedic hoods into PAPR substitutes, equipment that was safe to use with COVID patients because it filtered the air and could be used as PAPRs that were in short supply
- Duke shared the design publicly, offering a template for other hospitals





COVID-19 PERSONAL PROTECTIVE EQUIPMENT INNOVATIONS

(Pictured left to right) Utilizing hair bands to affix air filters to the back of a PAPR; stacks of 3D-printed face shields; a 3D printer extruding the gasket - an essential component of the helmet/Stryker hood that provides an airtight seal.

"We also ended up doing a rapid sequence intubation course for non-anesthesiologists," informs Bartz.

From May to July, along with nursing and surgery, anesthesiologists held regular grand rounds and two virtual town halls focused on COVID topics. Hotels were placed on standby for health care workers who feared taking COVID home to their families. Mattresses were kept ready for roll out in offices and non-perishable food supplies were stocked. Nonessential staff were asked to stay home.

Operating room protocols on emergent and urgent cases required extra protection for the providers, especially during intubations. N95 masks were rationed and preserved for reuse through an innovative sterilization method developed at Duke. With the help of the Department of Orthopaedic Surgery and the Duke University Pratt School of Engineering, Stryker® hoods were innovatively reengineered on 3D printers to serve as PAPRs. "The cross-departmental innovation and collaboration was outstanding. We never fell critically short on PPE and always had access to testing and that is a testament to Duke Health leadership and all the wonderful people from procurement to supply chain," says Gulur. "Our department members from Duke University Hospital, Regional, Raleigh and even as far out as Johnston Health, came together to selflessly contribute and ensure all patients had continued access to excellent care. During the worst months of the pandemic, when most were remote/from home for safety, our anesthesiology providers had to double their in-hospital night and weekend calls to provide expanded services."

The state fortunately ducked the anticipated surge in the summer of 2020. The next big question was how to reopen safely as community spread was pervasive. Gulur informs the availability of the point of care test in early April proved to be a game-changer. Habib agrees: "Shortly after the start of the pandemic we started to test all women who were admitted to the labor and delivery unit using a rapid COVID test. Many positive women were asymptomatic. We were able to conserve PPE and avoid unnecessary complex workflow when caring for COVID negative patients."

By the end of 2020 when COVID-19 numbers skyrocketed, health care professionals had learned a lot. They had expanded remote access to care for patients through telehealth, including video visits and telephone calls, informs Gulur. The pandemic has ushered in a "new normal" forcing changes, some permanent, like higher usage of PPE and sanitizers in everyday practice. The switchover to a hybrid model of conducting business, virtual learning, and flexible work-from-home models had also seen success.

However, reality has become achingly clear. More than a year after it arrived on the scene, the virus continues to stress test the public health system. For health care workers, being in an "always on" mode has led to stress, fatigue and burn out. "The sequela from this is going to be important to consider, we haven't even begun to touch it just yet," adds Gulur. The ability to be resilient should not be taken for granted and is something to be worked on, she says, adding, that "we have to get even more deliberate about personal wellness, including time away and time off." The department too is encouraging taking time to rest and rejuvenate, informs Gulur.

To be able to see a sick patient recover keeps Duke's health care warriors going as this reinforces their trust both in high-level science and in each other to provide timely delivery of care. "All patients and families emerged as heroes as did all staff who worked through the unknown high anxiety period to take care of the patients," says Martin, proudly. "Going forward, we have to recognize signals early, react quicker and move faster."

Looking ahead, until the pandemic is consigned to history, Duke's perioperative health care workers will continue to step in and step up to be the human face in a humanitarian crisis.

SHAPING THE FUTURE OF ANESTHESIOLOGY

faculty spotlight

Growing up in Alaska, DR. NICOLE GUINN, *director of the* DUKE CENTER FOR BLOOD CONSERVATION *and* ASSOCIATE PROFESSOR OF ANESTHESIOLOGY, *never imagined she'd work in the anesthesiology profession.*

By

JENNIFER BRINGLE

"I LIKE THAT YOU'RE *ALWAYS LEARNING*, AND EVERY PATIENT IS DIFFERENT AND PRESENTS UNIQUE CHALLENGES."

Our field is one that a lot of people don't have exposure to early on, so you often find people who go into anesthesiology had a family member in the field," she says. "I am not one of those people—I'm the first physician in my family."

During med school at Icahn School of Medicine at Mount Sinai Hospital in New York City, Guinn says she was impressed by the calm, in-control demeanor of the anesthesiologists she encountered. So, she decided to learn more about the profession.

"I did some shadowing, and I loved it," she says. "It's so hands-on, and you have one patient at a time that you get to focus on and care for."

As Guinn gained more experience in anesthesiology, she discovered how much she also loved the opportunities for growth and specialization that the field offers.

"I'm someone who constantly wants to be moving and learning and doing," she says. "I like that you're always learning, and every patient is different and presents unique challenges."

Guinn says she enjoys the immediacy of anesthesiology, and the challenge of responding to the effects of medications in real time.

"In the operating room environment, we are giving medications and performing interventions, such as taking over ventilation, and watching their effects in real time," she says, "as opposed to a primary care physician, who will prescribe a drug and follow-up weeks or months later to see the change (with an antihypertensive, for example)."

As Guinn began exploring options for specialization, she felt drawn to blood management and transfusion, piqued by both the prevalence and complexity of the procedure.

"I was always interested in transfusion," she says. "Somebody once described a blood transfusion as a blood transplant, and when you think of it, blood is an organ. Blood transfusion is a common procedure—one of the most common performed in hospitals every day."

At Duke, physicians transfuse approximately 5,000 blood products per month, (about 3,000 of which are packed red blood cells, about 1,000 platelets, and the remainder being plasma and cryoprecipitate).

Guinn graduated from medical school in 2003, and after an internship at Columbia's St. Luke's Roosevelt Hospital, she came to Duke to continue her anesthesiology residency along with a cardiothoracic anesthesiology fellowship in 2012. As a fellow, she worked with Dr. Steven Hill, then director of Duke's Center for Blood Conservation, who nurtured her interest in blood conservation. Guinn was particularly interested in the juxtaposition of challenges blood conservation and transfusion present.

"I find the extremes on either end fascinating," she says. "The patients for whom blood transfusion is not an option because of religious or moral beliefs—you have to figure out how to perform this complicated heart procedure without transfusions. You have to think outside the box on how to minimize blood loss—everything from changing the surgery to decrease blood loss (minimally invasive or robot techniques), to techniques to save or recycle the patient's own blood (cell salvage or autologous normovolemic hemodilution), to medications to help prevent and treat coagulopathy (anti-fibrinolytics, commercially available clotting factors)."

And those extremes include also being able to recognize when a blood transfusion is not necessary.

"On the other side, a needed blood transfusion can save a life, but an unneeded one has risks of morbidity and mortality without benefit," Guinn says.

For her clinical practice, Guinn de-

At Duke, physicians transfuse approximately 5,000 blood products per month

UNDER GUINN'S LEADERSHIP, THE *DUKE CENTER FOR BLOOD CONSERVATION* HAS SHIFTED TO A MORE PROACTIVE APPROACH WITH A BROADER GROUP OF PATIENTS, ASSESSING THEIR LEVEL OF RISK FOR A BLOOD TRANSFUSION AND OPTIMIZING THEIR BLOOD COUNTS PRIOR TO SURGERY TO *PRODUCE THE MOST SUCCESSFUL OUTCOME*.

cided to pursue two subspecialties—cardiothoracic anesthesiology and neuroanesthesiology. While these two focused subspecialties may not seem to have much in common, Guinn says they play directly into her focus on blood conservation.

"Those two specialties dovetail well into my interests since there's a potential for blood loss in both," she says. "They both have elements of those large blood loss cases and also coagulopathy—in cardiac, the coagulation issues are related to cardiopulmonary bypass, whereas in neuroanesthesiology, it's different, more from large blood loss and large-volume transfusion."

In 2013, Guinn was appointed as director of the Duke Center for Blood Conservation. When she took on the role, Guinn says the center's mission was a bit different from the work it does today.

"At that time it was focused on managing patients who would refuse a transfusion, identifying them and going over the consent process of what they would or would not accept," she says. "Many of these patients were Jehovah's Witnesses, and within their faith, they refuse what they consider to be the major fractions of blood—red blood cells, platelets, and plasma. But many will accept albumin, clotting factor concentrates, and cell salvage."

Under Guinn's leadership, the center has shifted to a more proactive approach with a broader group of patients, assessing their level of risk for a blood transfusion and optimizing their blood counts prior to surgery to produce the most successful outcome.

"Since then, we expanded to the preoperative anemia clinic," she says. "There are lots of other patients undergoing surgery that have potential for blood loss and transfusion, so we're trying to identify them ahead of time, and instead of just treating anemia with a blood transfusion, we're determining the cause of their anemia and treating it to increase the patient's hemoglobin before surgery."

Guinn also works to decrease perioperative transfusion rates as vice chair of Duke's transfusion committee. A recent initiative, the "Why Give 2 When 1 Will Do?" educational campaign encouraged physicians to order single units of red blood cells.

"This campaign significantly reduced the number of two-unit orders of red blood cells across the hospital," she says.

And Guinn says the mindset of preoperative care can help improve the patient experience across the anesthesiology field, not just in blood transfusion.

"One of the newer things as anesthesiologists, we're learning to step outside the OR, thinking about not just how to care for patients during surgery, but preparing them ahead of time so they're fit and able to have better outcomes," she says.

Guinn has applied that perspective beyond her work at Duke, as well. For more than five years, she has served as a physician volunteer with the American Board of Anesthesiology, contributing to the board's work in a number of ways, including writing questions for certification examinations.

That led to a position on the board's Objective Structured Clinical Exam (OSCE) Committee, where she and her fellow committee members were tasked with creating a complementary test to the structured oral exam. The OSCE, in conjunction with the structured oral exam, is designed to test not only a candidate's knowledge base, but also how and why they apply and adapt that knowledge.

"We were the first medical specialty to develop an OSCE in addition to an oral exam and implement it," she says. "I joined the committee before the new exam started, and I actually got to be part of deciding how we would create this exam, writing and administering it."

The OSCE examination assesses whether candidates have not only the technical skills to be a successful anesthesiologist, but also the interpersonal and communication tools to effectively handle a variety of scenarios such as informed consent, peri-procedural complications, and ethical issues.

"Being a part of the creation of this exam has been one of the most rewarding things I've done in my career," Guinn says. "It's not just about making another test—it's about driving how the residents are trained. There are important skills anesthesiologists need, such as disclosing a complication and discussing the need to cancel a case with a surgeon, and by testing on them we're making sure the residents are being taught those skills. That really drives the specialty forward."

Guinn says she feels fortunate to have the opportunity to help shape the future of the anesthesiology profession. But as her career continues to evolve, she admits she sometimes struggles with a common issue among physicians—striking a balance between a demanding profession and maintaining a healthy home life.

"The biggest challenge I continue to struggle with, as we all do, is finding balance," she says. "I am a mother to three children—I have a two-year-old, a five-year-old, and a seven-year-old. It's challenging to try to be a mom and wife and daughter and sister in addition to being a doctor and teacher and administrator."

But Guinn says her community at Duke has helped make it possible to pursue her passion for the anesthesiology profession without her home life suffering.

"I've been very fortunate that I've had support not only from my husband and parents, but also support from my colleagues and bosses," she says. "I was able to take my maternity leave and breastfeed and pump until each of my younger children was more than a year, and that's because I have colleagues who helped make that possible."

BLOOD CONSERVATION STRATEGIES BY PERIOPERATIVE PHASE OF CARE:

01.
PREOPERATIVE:

- Diagnosis and treatment of anemia
- Discontinuation of anticoagulants and herbal supplements that interfere with coagulation
- Consent and documentation of accepted blood products and procedures

02.
INTRAOPERATIVE:

- Autologous cell salvage
- Acute normovolemic hemodilution
- Antifibrinolytics
- Viscoelastic testing for early identification of coagulopathy
- Avoidance of hypothermia and large volume crystalloid
- Topical sealants and hemostatic agents
- Minimally invasive techniques

03.
POSTOPERATIVE:

- Minimizing laboratory testing
- Low volume tubes for phlebotomy
- Tolerance of lower hemoglobin levels

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Paul Lachiewicz
Debra Clayton LaMay
Marlon Levy
Steve Lipson
Matthew Lucido
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Melinda Macalino
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David Maixner
Dylan Maixner
Jim Maixner
Viravan Maixner
William Maixner
Gavin Martin
Katherine Martucci
Jed Maslow
Joseph Mathew
David McDonagh
Matthew Meng
Timothy Miller
Dave Moore
Jenifer Murphy
Monty Mythen
Andrea Nackley
Dennis Norwood
David Palanzo
John Parham, Jr.
Helen Pavilonis
Keith Phillippi
Alexandra Povlishock
Buddy Pritchard
David Pritchard
Francis Quinn, Jr.
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Pablo Vega
Chi Viet
Daniela Vivaldi
Kevin Vorenkamp
Anil Vyas
Gina Waller
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13 YEARS OF GIVING: DREAMCAMPAIGN.DUHS.DUKE.EDU

CAMPAIGN UPDATE

Chances are our research program has positively impacted your life.

13 YEARS

of the DREAM Campaign

$922,374

in DREAM Innovation Grants have led to nearly

$15m

in extramural funding

Goals

1 Establish Endowed Professorships

to invest in world-class faculty who would, in turn, secure extramural funding. Interest dollars from these endowments are to be used to support investigator salaries and provide them with the time and resources necessary to develop research programs.

2 Raise Funds

to support research through the DREAM Innovation Grant, known as DIG.

3 Establish Philanthropic Support

as a long-term mechanism of limiting the adverse consequences of cyclical federal funding.

What is a "DIG?"

The DIG is an annual competition held among Duke Anesthesiology faculty members. Recipients can receive up to $30,000 in seed money for their innovative pilot studies, which ultimately help them apply for and obtain extramural funding. This grant creates an avenue for healthy competition among faculty, inspires ingenuity, promotes the careers of young physician investigators, enhances donor communication, and furthers the department's academic mission.

Visit us online to read more about the campaign and make a gift!
dreamcampaign.duhs.duke.edu

DR. ANDREY BORTSOV

BACKGROUND

- **MD:** Pavlov State Medical University
- **PHD:** University of South Carolina

Voltage gated sodium channel isoform 1.7 (Nav1.7) is a major subtype of sodium channel in primary sensory neurons, which plays a crucial role in pain transduction. Previous studies have validated Nav1.7 as a promising drug target for new analgesics development. Recent discovery of an extracellularly accessible and isoform-specific pocket on voltage-sensing domain 4 (VSD4) resulted in an array of Nav1.7 inhibitors (e.g. aryl-sulfonamides) that show good isoform selectivity and high efficacy in vitro and in vivo. Unfortunately, sulfonamides have several drawbacks resulting in unfavorable pharmacokinetic profile and limited clinical efficacy. There is a need to design new Nav1.7 inhibitors that have high selectivity and potency similar to sulfonamide-based compounds but devoid of their drawbacks.

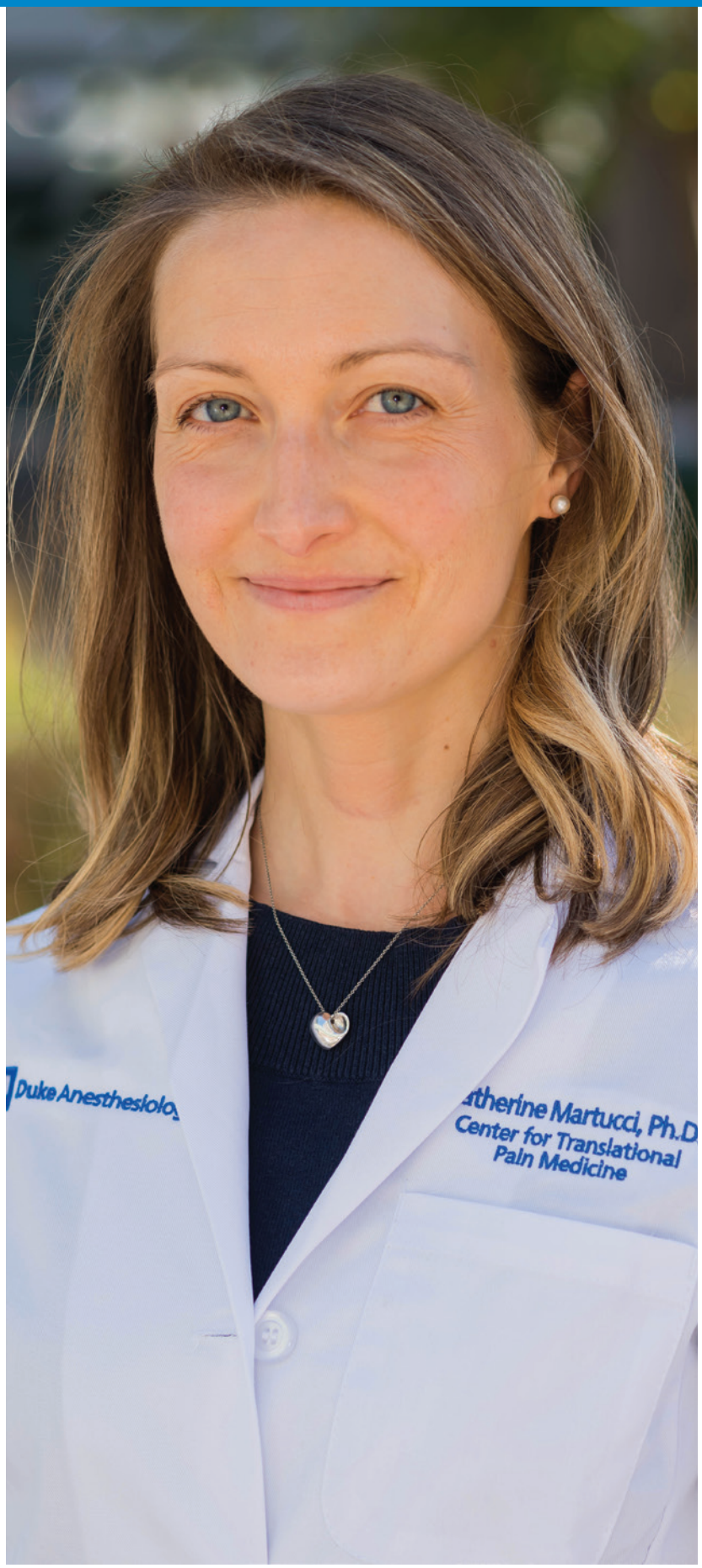
Dr. Andrey Bortsov's research group, in collaboration with Dr. Ru-Rong Ji, has identified a novel series of Nav1.7-specific small molecule inhibitors, which potently inhibit sodium currents in Nav1.7-expressing cell line. Systemic and intrathecal administration of the lead compound DA-0218 substantially reduced formalin-induced inflammatory and paclitaxel-induced neuropathic pain, as well as acute and chronic itch, in murine models.

With the help of the DIG award, Bortsov and his team are performing lead optimization of DA-0218 to generate preliminary data for future extramural funding applications, with the ultimate goal to develop new non-opioid treatments for pain and itch. Novel selective Nav1.7 inhibitors will help overcome the opioid crisis by reducing opioid exposure of pain patients and avoiding serious side effects associated with prolonged opioid use. This would lead to improved patient care and better quality of life.

DR. KATHERINE MARTUCCI

BACKGROUND

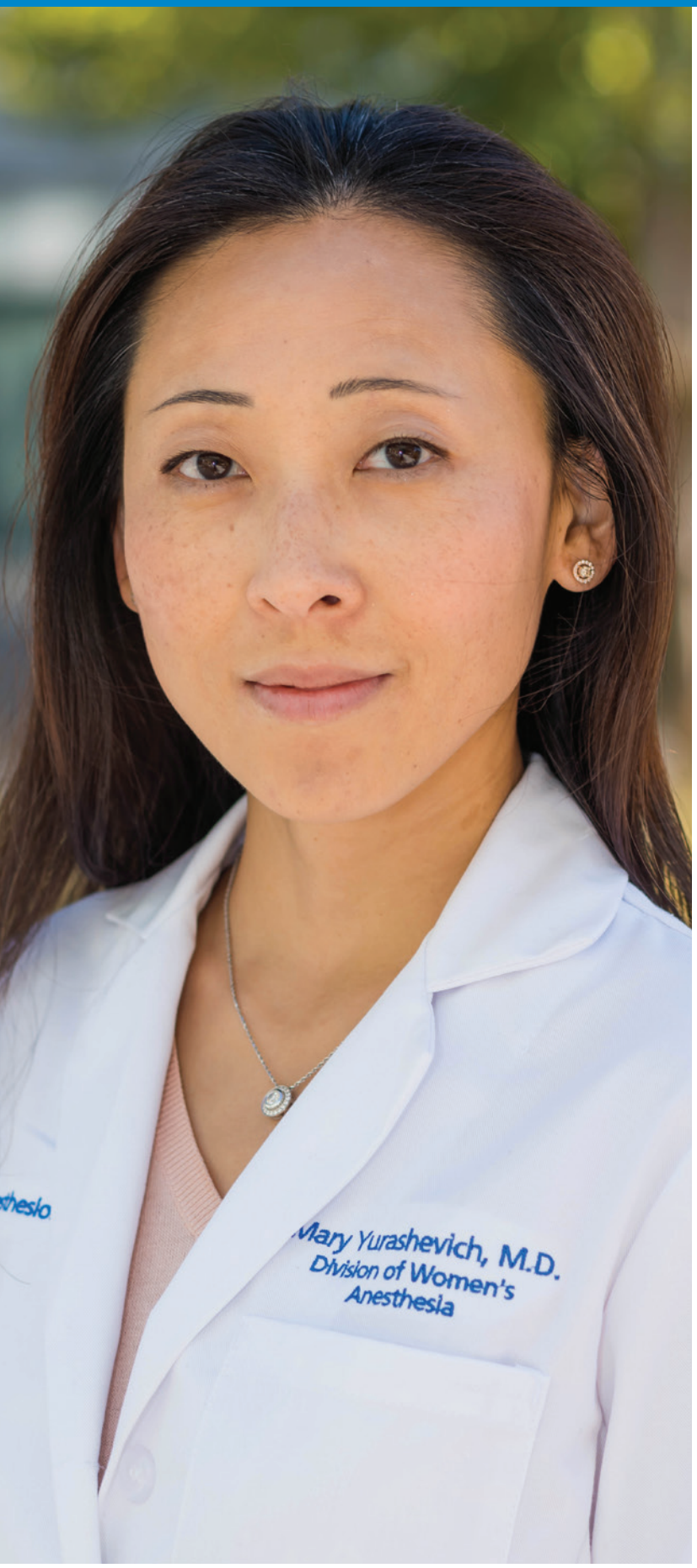
- **PHD:** Wake Forest University School of Medicine
- **POST-DOC:** Stanford University



While chronic pain is highly-prevalent and negatively impacts many lives, it remains unclear how the central nervous system (CNS) is altered and contributes to chronic pain. To study chronic pain, Dr. Katherine Martucci uses advanced technology of functional magnetic resonance imaging (fMRI) to investigate CNS activity in the brain and cervical spinal cord.

Spinal cord imaging in humans is critical to the mission of advancing the understanding of chronic pain. Studying the spinal cord in humans is very challenging, and Martucci's lab is one of only a handful of research sites globally that have pioneered the use of spinal cord fMRI for chronic pain. In 2019, Martucci and her colleagues published the first evidence of imbalanced spinal cord activity at rest in patients with fibromyalgia, a condition of widespread pain. This finding indicates that increased pain and decreased non-painful sensations may be transmitted to the brain in a different way in patients with chronic pain.

The 2020 DIG is assisting Martucci to establish new research that will advance the understanding of human spinal cord activity in patients with chronic pain. She will further investigate the imbalanced spinal cord activity using a combination of imaging techniques and sensory tests. Ultimately, Martucci and her laboratory will use the data obtained through this award to advance the understanding of fibromyalgia and chronic pain.



DR. MARY YURASHEVICH

BACKGROUND

- **MPH:** Columbia University
- **MD:** Rutgers Robert Wood Johnson Medical School
- **RESIDENCY:** Loma Linda University School of Medicine
- **FELLOWSHIP, OBSTETRIC ANESTHESIOLOGY:** Stanford University School of Medicine

Persistent pain after cesarean delivery has an incidence as high as 23 percent, while perinatal depression has an incidence of 15 percent nationwide. The economic burden is about $635 billion in the United States alone, not to mention the emotional and social burden that persistent pain and depression can have on the mother, infant and social support network.

Recently, neuroinflammation has emerged as an important mediator of persistent pain with the release of inflammatory cytokines, such as TNF-α, IL-1β, and IL-18 in the central nervous system (CNS) implicated in central sensitization. Furthermore, there is significant overlap in the inflammatory mediators associated with depression and those involved in the pathogenesis of persistent pain, suggesting that neuroinflammation may be a common etiological process. The studies associating neuroinflammation with the development of persistent pain and/or perinatal depression in parturients are limited. Most studies measure plasma cytokine profiles and it is unclear if plasma reflects the CNS neuroinflammation underlying persistent pain and perinatal depression. The objective of Dr. Mary Yurashevich's study is to identify biomarkers associated with persistent pain and perinatal depression. The central hypothesis is that the peripartum neuroinflammatory cytokine profile is significantly different among women who develop persistent pain and/or perinatal depression, compared to those who do not develop these conditions.

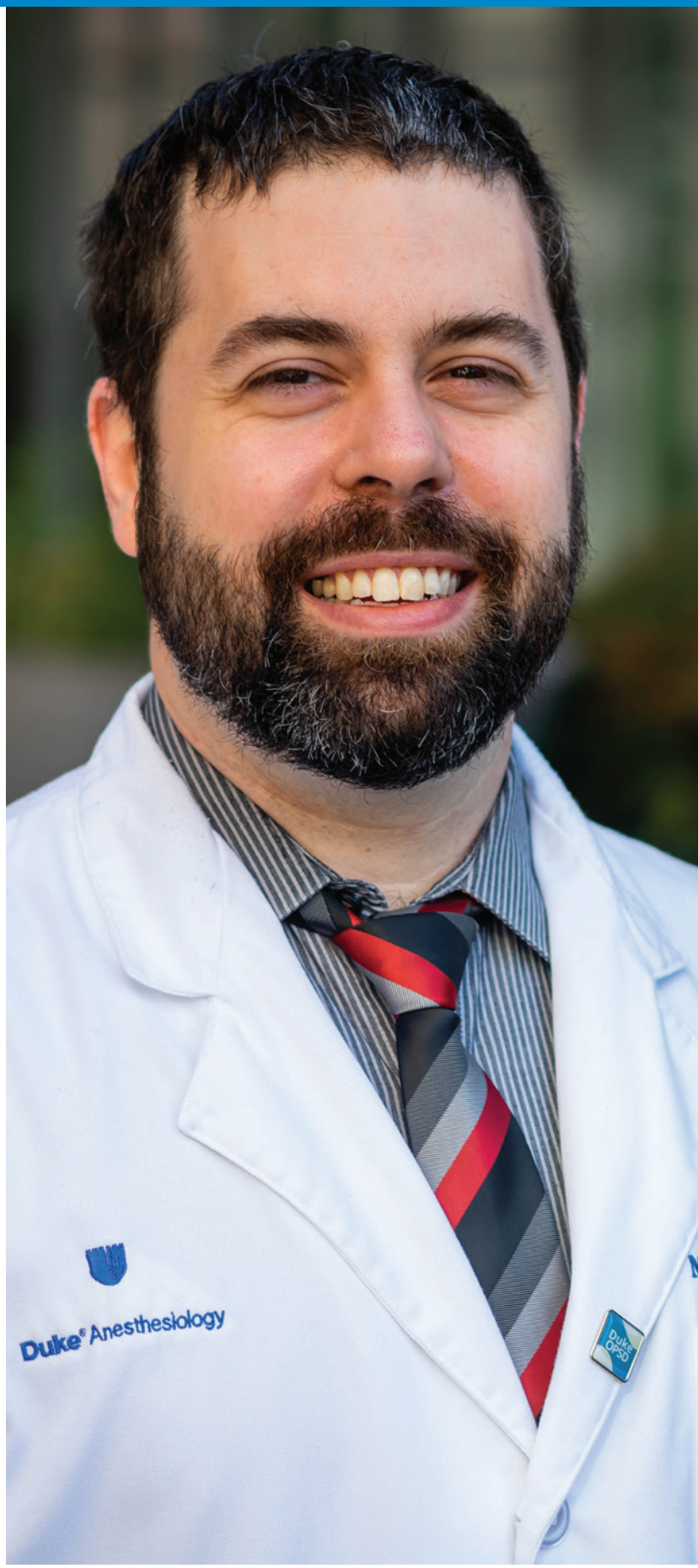
The 2020 DIG will assist Yurashevich to further pursue studies examining the role of biomarkers in predicting persistent pain and peripartum depression in cesarean delivery, which accounts for roughly one-third of the four million annual births in the United States.

DR. MICHAEL DEVINNEY

BACKGROUND

- **PHD:** University of Wisconsin at Madison
- **MD:** University of Wisconsin at Madison
- **RESIDENCY:** Duke University School of Medicine
- **FELLOWSHIP, CRITICAL CARE:** Duke University School of Medicine

Dr. Michael Devinney's research aims to discover mechanisms underlying postoperative delirium, an acute confusional state that affects up to 40 percent of older surgical patients and is associated with decreased quality of life, cognitive decline and increased mortality. The 2021 DIG is assisting Devinney's team to uncover delirium mechanisms, by enabling his team to perform unbiased proteomics on cerebrospinal fluid (CSF) obtained after surgery in patients who developed delirium. Unbiased proteomics will allow his team to measure the levels of hundreds of different proteins to identify potential neuro-inflammatory pathways associated with postoperative delirium. One possible neuro-inflammatory pathway that could be activated after surgery and trigger delirium is the complement cascade, because complement activation can result in synaptic phagocytosis by microglia, leading to decreased synaptic connectivity and cognitive deficits. Thus, Devinney hypothesizes that postoperative CSF complement activation is associated with increased postoperative delirium severity. Another pathway potentially involved in postoperative delirium is the coagulation pathway, because surgery activates peripheral coagulation factors that could pass through a disrupted blood-brain barrier which could then cause neuroinflammation. Thus, Devinney also hypothesizes that postoperative CSF coagulation pathway activation is associated with increased postoperative delirium severity. The DIG will allow the establishment of this line of innovative research using unbiased proteomics of postoperative CSF to uncover specific neuro-inflammatory pathways underlying postoperative delirium. This work will provide the groundwork for grant proposals for larger studies aimed at uncovering mechanisms of postoperative delirium that could lead to new drug targets to reduce postoperative delirium and its sequelae.



DR. HEATH GASIER

BACKGROUND

- **PHD:** Texas A&M University
- **FELLOWSHIP, HYPERBARIC PHYSIOLOGY:** Duke University School of Medicine

Age related decline in muscle mass and obesity, sarcopenic obesity, is characterized by oxidative damage and low-grade inflammation that are linked to impaired mitochondrial quality control and function. Because the heme oxygenase (HO)-1 enzyme system is critical in the cellular antioxidant and anti-inflammatory stress response that is linked to mitochondrial quality control (mitochondrial fusion and fission, mitophgagy and biogenesis), HO-1 induction impairment may be a mechanism for disease progression and increased mortality rates. The objective of this research is to determine whether the skeletal muscle HO-1 enzyme system is impaired in sarcopenic obesity. The central hypothesis is that sarcopenic obesity suppresses stress-induced activation of skeletal muscle HO-1 resulting in increased oxidant production, inflammation, and impaired mitochondrial quality control. Young and old mice will consume a high-fat or control diet for 16 weeks. At the end of the dietary intervention, mice will be exposed to room air or 100 percent oxygen to induce HO-1. Measurements will include skeletal muscle HO-1 mRNA and protein expression, and HO-1 enzyme activity, mitochondrial oxidants and antioxidants, biomarkers of inflammation and anti-inflammation, and mitochondrial quality control. The expected outcome of this work is a basic understanding of whether the HO-1 enzyme system is impaired in sarcopenic obesity. The results will have an important positive impact because they lay the groundwork for testing targeted interventions for preserving skeletal muscle mass and metabolic health in obesity and aging, and reducing mortality in critically ill patients.

DR. MARIE-LOUISE MENG

BACKGROUND

- **MD:** Harvard Medical School
- **RESIDENCY:** Columbia University
- **FELLOWSHIP, OBSTETRICAL ANESTHESIOLOGY:** Columbia University
- **FELLOWSHIP, CARDIOTHORACIC ANESTHESIOLOGY:** Columbia University

Preeclampsia is a hypertensive disorder of pregnancy that is associated with cardiovascular morbidity. The mechanism of this association is unknown. Studies of women with preeclampsia with careful phenotyping, including cardiovascular imaging and biomarkers, are vital to address this knowledge gap. Women with preeclampsia have been shown to have diastolic dysfunction and myocardial strain impairment, but the prevalence and biological underpinnings of this relationship have been incompletely evaluated. Metabolism is at the core of cardiac dysfunction and markers of impaired metabolism are elevated in heart failure, but whether these metabolic processes are also impaired in preeclampsia is unknown.

The DIG is allowing Dr. Marie-Louise Meng to conduct a prospective study that assesses echocardiographic phenotype and measures metabolic markers of myocardial dysfunction as well as candidate preeclampsia and heart failure biomarkers in women with early onset preeclampsia with severe features. The results of this study aim to shed light on the metabolic underpinnings of cardiac dysfunction and related metabolic defects in preeclampsia.

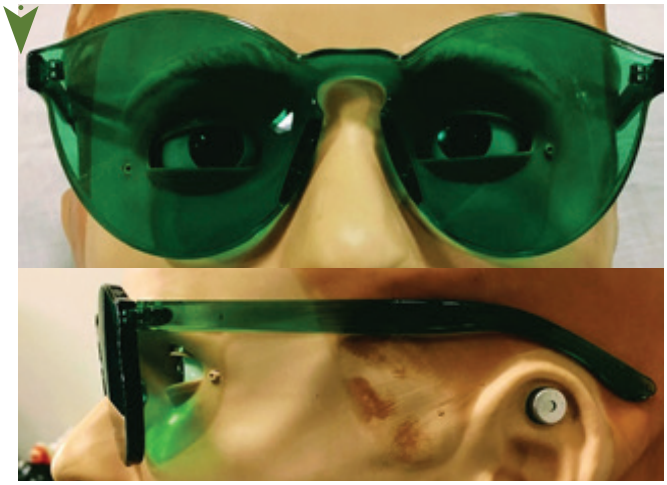
INNOVATIVE RESEARCH

Providing state-of-the-art methodology for clinical, basic science and translational research empowers Duke Anesthesiology to explore revolutionary clinical inquiries by using innovative investigation methods.

Through significant research in neuroscience, molecular biology, molecular and human pharmacology endeavors, our team is making crucial advancements for patients worldwide.

Novel Approach to Pain Management Could Get the green

How do you feasibly deliver green light to people in a way that doesn't interfere with their quality of life and increases their compliance with the therapy?



light

Researchers study effects of light-induced analgesia for acute, chronic pain

Dr. Padma Gulur

*Dr. Amanda Nelli**

In the ongoing search for effective acute and chronic pain management that reduces reliance on opioids, Duke researchers are examining the pain-relieving potential of a novel, nonpharmacological treatment: the antinociceptive effect of green-spectrum light exposure.

"The medical community has recognized that pain is helped the most with a multimodal approach," says Padma Gulur, MD, pain medicine specialist, director of pain management strategy and opioid surveillance for Duke University Health System, and lead investigator for the NIH-funded, two-year clinical trial. "Medications alone rarely control pain fully; you have to look for additional strategies to try and help. The bottom line is that we need lots of tools to manage pain."

Gulur, who is an internationally recognized expert in the field of pain management, explains that visually mediated cognitive and biological effects of specific color ranges of light are broadly recognized in areas of affect and circadian rhythm, but similar effects on pain perception are less understood.

"In our study, we're comparing people who are exposed to different wavelengths of blue, clear, and green light to see which one is beneficial by measuring participants' pain relief and response. We've had early results in pilot studies where green seems to help, so now we're studying the role of the visual cortex in those signals, understanding which wavelengths are particularly useful, and looking at the reasons for this phenomenon," Gulur says.

"Dr. Gulur's pioneering clinical protocol will help us understand translationally relevant aspects of fascinating but also puzzling basic science discoveries of how light—especially green light—can attenuate pain, which neural circuits might be involved, and which individual predisposing factors we can identify toward personalized medicine," says Wolfgang B. Liedtke, MD, PhD, a Duke neurologist and pain medicine specialist who is in charge of two outpatient clinics: one in neurology/headache pain, and one in innovative pain therapy.

With a vision for eventually developing a commercially available wearable technology based on the results of the study, Gulur acknowledges the challenges to come. "How do you feasibly deliver green light to people in a way that doesn't interfere with their quality of life and increases their compliance with the therapy?" she says. "We can't change to green screens in every environment, nor can we ask people to sit in rooms with ambient green light for long periods of time. So, part of our study is about refining the science—identifying ways in which we can target the visual cortex in the brain and personalize the experience for patients."

The light exposure study is a continuation of Gulur's research goals of finding additional nonpharmaceutical avenues for pain management, including nutritional and musical interventions.

"The possible ramifications of this study are huge," says Gulur. "We have such a tremendous burden of pain management in the nation now that even if we see 50% of patients benefit from this therapy, then already it becomes something worth trying to give them a better quality of life."

"As someone who takes care of many patients suffering from chronic pain who are in need of improved treatment, I am looking forward to the study's results," Liedtke adds.

Malone, Lori (August 2020). *Novel Approach to Pain Management Could Get the Green Light* (Duke Health).

*Dr. Amanda Nelli is involved in this clinical trial as a Duke Anesthesiology postdoctoral researcher.

Mechanisms and Clinical Implications of Myocardial Injury Following Traumatic Brain Injury

Dr. Vijay Krishnamoorthy

Traumatic brain injury (TBI) is a major public health concern, affecting more than 1.7 million individuals annually in the United States. Hypotension after severe TBI results in cerebral hypoperfusion and poor clinical outcomes. Approximately 50 percent of severe TBI patients are treated for hypotension and maintenance of cerebral perfusion; this may be due to unrecognized myocardial injury and cardiac dysfunction. Dr. Vijay Krishnamoorthy's prior research has demonstrated that: 22 percent of patients with moderate-severe TBI have early cardiac dysfunction, patients with TBI and cardiac dysfunction exhibit signs of sympathetic activation, and patients with TBI and cardiac dysfunction experience hypotension and cerebral hypoperfusion. Sympathetic activation is implicated in cardiac dysfunction and hypotension after TBI, but mechanistic data is limited. The central hypothesis of this study is that severe TBI causes myocardial injury through activation of the sympathetic nervous system and this results in cardiovascular dysfunction, hypotension and poor neurologic outcomes.

Results of this study, as well as a rigorous career development plan, will lead to a larger trial that examines the impact of reduction of sympathetic nervous system activation on myocardial injury and clinical outcomes after severe TBI. The long-term goal of this work is to personalize hemodynamic management in order to improve clinical outcomes after severe TBI.

Aims and Hypotheses

1. ***Aim:*** Determine the effect of severe TBI on autonomic nervous system function.

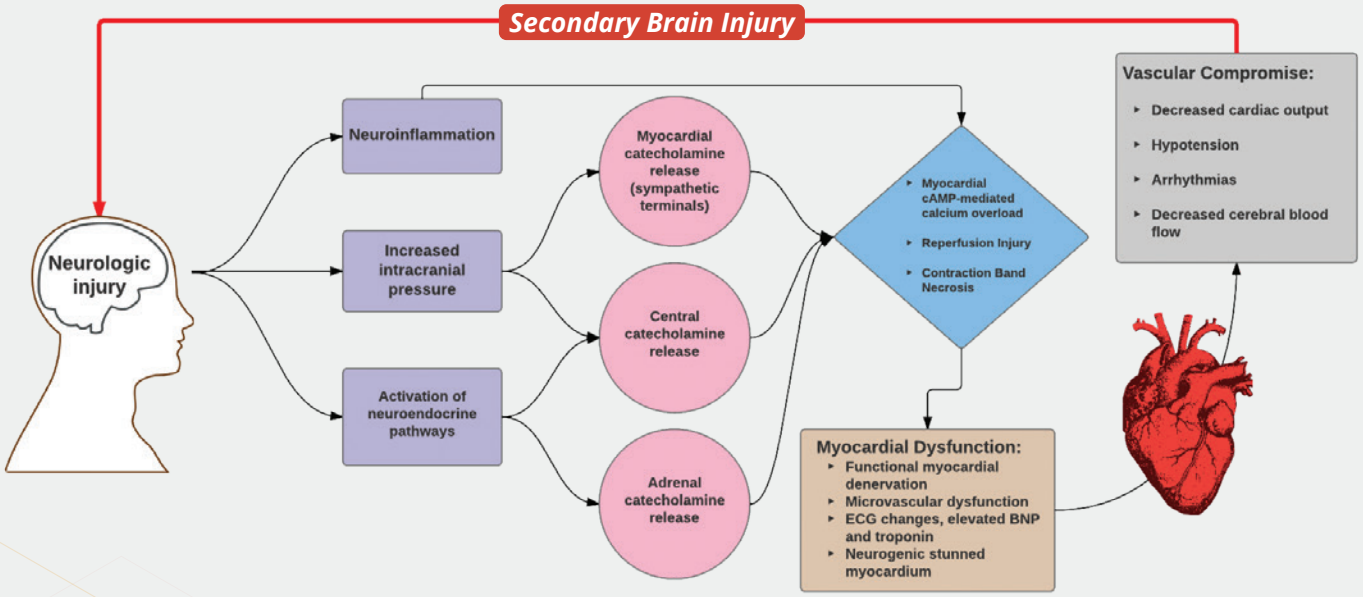
   Hypothesis: Compared to patients with orthopedic injury, patients with severe TBI will have increased sympathetic nervous system activation (lower heart rate variability, higher myocardial workload, higher plasma catecholamines, and altered lymphocyte adrenergic receptor gene expression) within 24 hours after injury.

2. ***Aim:*** Determine if autonomic dysfunction contributes to myocardial injury after severe TBI.

   Hypothesis: A third of patients with isolated severe TBI will experience myocardial injury (high sensitivity troponin greater than the 99th percentile for a standardized reference population) within 24 hours after injury; increased sympathetic nervous system activation will mediate this relationship.

3. ***Aim:*** Examine the impact of myocardial injury on cardiovascular dysfunction and clinical outcomes after severe TBI.

   Hypothesis: During the first week following isolated severe TBI, patients with myocardial injury will have a higher incidence of cardiovascular dysfunction, shock and multi-organ dysfunction, compared to severe TBI patients without myocardial injury. The Extended Glasgow Outcome Scale (GOS-E) score will be worse in patients with myocardial injury following severe TBI.



Funding Source: National Institute of Neurological Disorders and Stroke

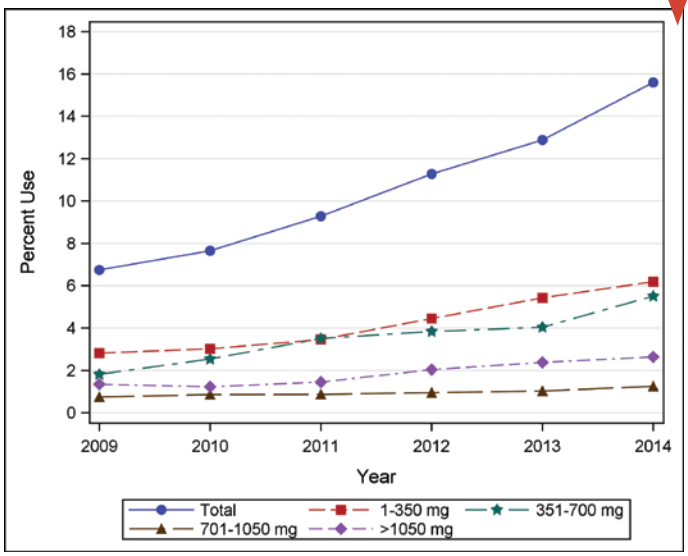


FIGURE 1A

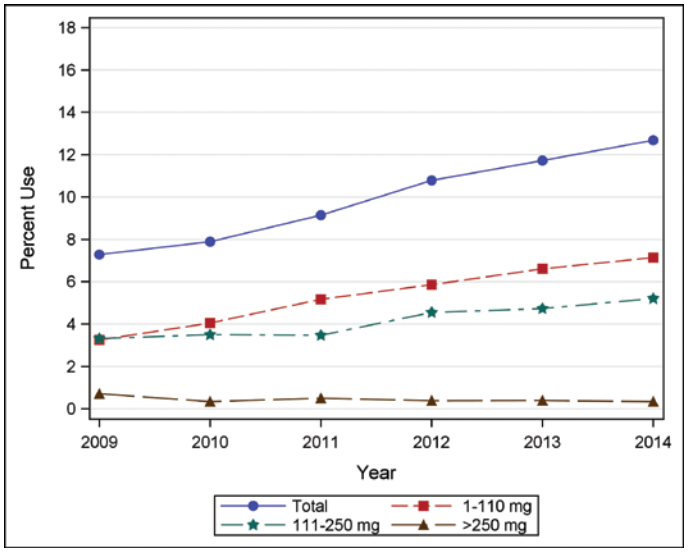


FIGURE 1B

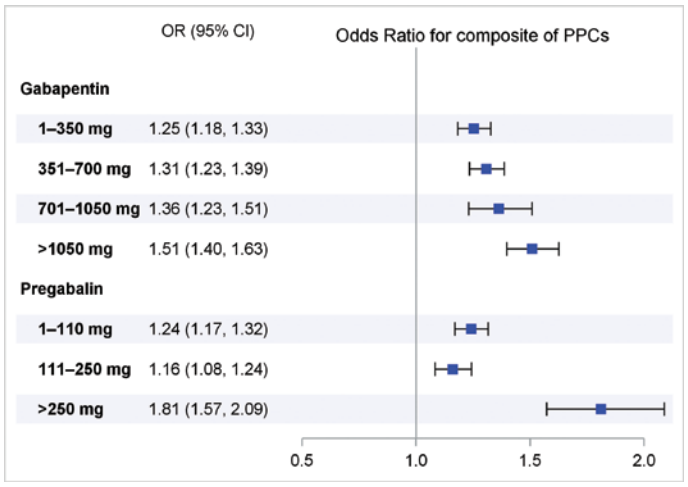


FIGURE 2

Critical Care and Perioperative Population Health Research (CAPER) Unit

Mission:

To improve the lives of patients undergoing surgery and critical care globally, through the conduct of large-scale observational research using rigorous population health methods.

Project Example:

One area of inquiry in the CAPER Unit is the pharmacoepidemiology of commonly used perioperative and critical care medications. In this case, researchers examined the day of surgery utilization of gabapentinoids for joint replacement surgery in the United States *(Figures 1A and 1B)* and its association with post-operative pulmonary complications *(Figure 2)*.

RESEARCH PORTFOLIO

CAPER's research spans multiple areas in perioperative and critical care medicine, with a focus on five research pillars:

1 METHODS FOR PERIOPERATIVE AND CRITICAL CARE POPULATION HEALTH RESEARCH

- Improving the rigor of observational research through methodologic innovation

2 INJURY EPIDEMIOLOGY (TRAUMA, OPIOIDS, PUBLIC HEALTH)

- Examining trauma, the opioid epidemic and public health

3 RESUSCITATION, ANALGESIA AND NUTRITION

- Comparative effectiveness of common critical care and perioperative interventions

4 MULTI-ORGAN DYSFUNCTION

- Studying organ dysfunction and clinical outcomes in critical care and perioperative medicine

5 LEARNING HEALTH

- Moving from "data to knowledge" to "knowledge to practice"

Exploring the Human Spinal Cord Using Functional MRI

Advancing Understanding of Chronic Pain and Effects of Opioids on Central Nervous System Activity

Dr. Katherine T. Martucci

The spinal cord is a critical physiological nexus for pain processing and the chronic pain experience. While research on spinal cord mechanisms of chronic pain is abundant within the cell and molecular realm and that of animal models for chronic pain, research on the spinal cord mechanisms from a human clinical perspective is more limited. Technological limits have delayed our ability to study spinal cord activity in humans using non-invasive imaging of the spinal cord. However, spinal cord imaging techniques have been steadily advancing over the last decade so that now reliable and clearer functional MRI (fMRI) images of the spinal cord can be used to study conditions in humans, including for chronic pain.

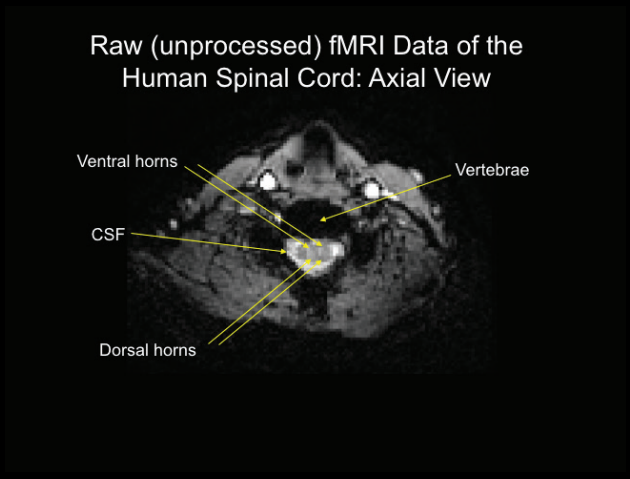
The Human Affect and Pain Neuroscience (HAPN) Laboratory at Duke Anesthesiology, led by Dr. Katherine Martucci, is one of few research locations globally using and advancing spinal cord fMRI. Their application of spinal cord fMRI is primarily for the study of chronic pain, with a current particular focus on fibromyalgia - a chronic pain condition characterized by widespread pain throughout the body accompanied by comorbid symptoms of cognitive disturbance, depression, anxiety, and fatigue that occurs among both sexes but predominantly in females. As part of a K99/R00 "Pathway to Independence" grant from the National Institutes of Health, Martucci and her team have been advancing the use of spinal cord fMRI to compare spinal cord activity in individuals with fibromyalgia vs healthy controls. For these studies, both healthy individuals without chronic pain and individuals with fibromyalgia underwent a spinal cord scan session to collect both structural MRI scans and resting-state fMRI data. The resting-state fMRI data were collected at the level of the cervical spinal cord (corresponding vertebrae C5, C6, C7). The resting-state data were analyzed using a measure of the amplitude of low frequency fluctuations (ALFF). ALFF is a measure of low frequency oscillatory power (0.01 - 0.198 Hz) related to the blood oxygenation level dependent (BOLD) fMRI signal (ie, correlate estimate of regional neural activity). Through these analyses, differences in spinal cord activity (ie, regional ALFF) were identified between the groups. Specifically, the group of individuals with fibromyalgia showed greater levels of activity in ventral regions of the spinal cord, and lesser levels of activity in the dorsal regions of the spinal cord, as compared to the healthy control participants. These findings were published in the journal Arthritis and Rheumatology *(see citation on the next page)*.

Currently, Martucci and the HAPN Lab are collecting a new set of spinal cord fMRI data from individuals with fibromyalgia and healthy control volunteers to replicate the initially published findings. A larger sample size of neuroimaging data are being collected for the current study at Duke University's Brain Imaging and Analysis Center using an upgraded spinal cord fMRI sequence that has more advanced images than collected in the previous study.

An additional focus of the lab's spinal cord research is to identify potential effects of opioid use on spinal cord activity in patients with chronic pain. It is known that opioid use alters brain structure and function, but it has remained relatively unexplored, particularly in humans, how opioid use affects spinal cord activity in chronic pain. Opioid use can influence both local inhibition within the spinal cord and mechanisms of descending control. Martucci and the HAPN Lab are therefore also studying how opioid use may influence spinal cord activity in chronic pain by comparing resting-state fMRI of the spinal cord in fibromyalgia patients who take opioids vs fibromyalgia patients who do not take opioids. Similar analyses as mentioned above, using ALFF, are hoped to allow for identification of regionally altered spinal cord activity associated with opioid status. Ultimately, the focus of this clinical research by the HAPN Lab aims to advance the understanding of spinal cord alterations in fibromyalgia, and chronic pain more generally. Simultaneously, these projects aim to identify potential new avenues for non-invasively determining benefits vs harms of opioid use in individuals by visualizing alterations in spinal cord activity.

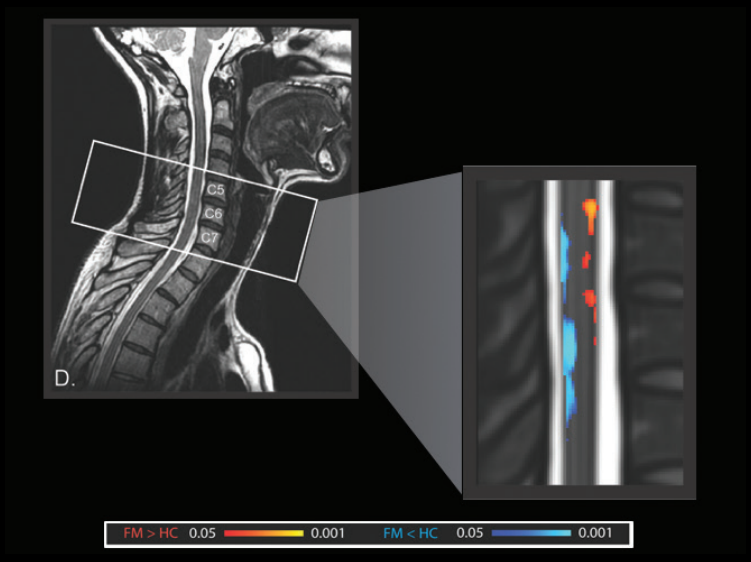
Authors: Katherine T. Martucci, PhD. Collaborators: Kenneth A. Weber II, DC, PhD (Stanford University), Allen W. Song, PhD (Duke Departments of Radiology, Psychiatry and Behavioral Sciences, Neurobiology), Anne Baker, MSW, PhD (HAPN Lab postdoc).

The HAPN Lab is one of few research locations globally using and advancing spinal cord fMRI.



Axial view of an example human cervical spine functional MRI image.

In the center of the image, the cervical spinal cord is identified as the light gray oval region, which is surrounded by a brighter white region of cerebrospinal fluid (CSF). The approximate location of dorsal and ventral horns within the spinal cord (ie, faint lighter gray/white traces within the spinal cord light gray oval) are indicated with arrows.



Sagittal view of group (patient vs. healthy control) differences in spinal cord fMRI activity.

Left: full sagittal view of structural MRI image, with rectangular highlighted area showing the fMRI-imaged region within the cervical spine (ie, corresponding to C5, C6, and C7 vertebrae). **Right:** functional image overlay with structural MRI background. Compared to healthy controls, individuals with fibromyalgia showed several regions of greater (ventral, red) and lesser (dorsal, blue) spinal cord activity (ie, Mean ALFF). D, dorsal; FM, fibromyalgia; HC, healthy controls. P values are uncorrected < 0.05.

Citation of the published research: Martucci, K. T., Weber, K. A. and Mackey, S. C. Altered Cervical Spinal Cord Resting-State Activity in Fibromyalgia. *Arthritis and Rheumatology* (2019).

Duke Health Sends Supplies to India to Assist with Covid-19 Crisis

Duke Health providers preparing shipments (to New Delhi) of more than 100 boxes of protective gear and equipment.

Hundreds of boxes of protective gear and equipment are now available to health care workers in New Delhi thanks to the quick, coordinated response of Duke Health faculty and staff. India experienced a sharp spike in COVID-19 cases in the spring of 2021, overwhelming the country's health system.

When he first learned of the crisis, Madhav Swaminathan, M.D., professor in the Department of Anesthesiology at Duke, swiftly coordinated colleagues across Duke Health -- in the departments of anesthesiology, perioperative services, pharmacy, surplus, supplies and more -- to gather more than 150 boxes of equipment into two large shipments.

Donated supplies included personal protective equipment such as masks, gloves, and isolation gowns as well as respiratory care equipment such as filters, oxygen masks, resuscitators, and oxygen delivery devices. The first two shipments both arrived in May during the height of India's COVID crisis.

"We wanted to do something helpful and tangible for the people on the ground who are suffering. Through our contacts and networks, we know a lot of hospitals and charities that are working to help sick patients who are ill with COVID," said Swaminathan. "We wanted to help them, so we gathered a whole group of people here at Duke and friends and colleagues throughout the Triangle and we started raising funds and donations for this effort."

Duke Health donated a large amount of the equipment. In choosing what to donate, staff took into account surplus items and also the types of items that would be most useful for providing continuous respiratory care.

"It's not just the ventilators that run out, it's some of the basic, disposable items, and that's where we can step in and help," said Charlotte Reikofski, health systems director for Respiratory Care Services at Duke University Hospital.

After supplies were collected, the next hurdle was to organize and label them in a manner so they would reach the specific end donation where each item was needed -- a massive coordination that the team accomplished in just a few days.

Kuldip Patel, Pharm.D., associate chief pharmacy officer at Duke University Hospital, coordinated his team to assist with this effort. Colleagues in the American Society of Echocardiography (ASE) -- a professional organization in which Swaminathan is a member -- provided funds for the shipment. Colleagues in the Duke Global Health Institute's Global Health PLUS program helped organize the in-country delivery.

"As an Indian, I think this is an amazing chance and opportunity for the team here at Duke with support from Duke leadership to contribute to this tremendous effort," said Patel. "COVID is not over. Though we may have started to see signs of improvement in this country and other countries, we're far from solving the crisis. This is a global pandemic and it's not over yet so we want to continue to do as much as we possibly can to prevent further loss of life."

Swaminathan is equally amazed and grateful for how many people in the community came together so quickly to make it happen.

"I think that everyone in the Triangle who has roots or connections in India knows someone who is ill, has been hospitalized, or has passed away," he said. "I think it's very meaningful for all of us who work in healthcare -- no matter what our role is -- that we're able to help people who are struggling in other parts of the world. India happens to be the hot spot at this point, but anyone who is struggling around the world really deserves our help -- our expertise, knowledge, and materials."

Key, Lindsay. *Duke Health Sends Supplies to India to Assist with Covid-19 Crisis*. Duke Health News, May 2021.

WHERE DO YOU WANT TO CHANGE LIVES?

Duke Anesthesiology Global Health Program

"We have a role to play in global health to make the world a better place."

– Adeyemi J. Olufolabi
MBBS, DCH, FRCA
Professor of Anesthesiology
Affiliate, Duke Global Health Institute
Senior Advisor, Anesthesiology Inclusivity Committee

Anesthesia plays a critical role in global health care, not only in times of crisis, but also in day-to-day events, such as childbirth. Things that we consider routine or trivial in the U.S. can be life threatening in third-world countries. In response, Duke Anesthesiology's doctors and staff are committed to actively taking mission trips to countries that need help the most. Our goal is to achieve health equality worldwide by meeting the health challenges of today and tomorrow.

Ready to make a difference?

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Duke Anesthesiology

Visiting a happy patient's baby, Yemi, named after her anesthesiologist, Dr. Adeyemi "Yemi" Olufolabi

Training senior residents on performing neuraxial labor analgesia

Blogs *from* Abroad

MAKING A DIFFERENCE 7,300 MILES FROM DURHAM

The world changed in 2020 with the arrival of the coronavirus pandemic. Despite significant challenges that curbed many programs and goals, the one constant was our department's global engagement and defining achievements, 7,300 miles away in Rwanda, known as the "Land of a Thousand Hills."

Having spent close to two years there in 2018 and 2019, I had introduced labor pain analgesia in the highest tertiary hospital of the country, the University Teaching Hospital of Kigali (CHUK). Both IV and neuraxial labor analgesia were established. Dr Edouard Uwamahoro, my protégé who had trained in Nigeria and is the only Rwandan obstetric anesthesiologist in the country, partnered to ensure sustainability.

Unfortunately, mission duties sent him to neighboring countries and the program was in danger of a setback. Within the last few months of 2020, and through advocacy, I successfully received approval from the government and the CHUK administration to deploy a newly-appointed consultant dedicated to maternity care at CHUK, who is driving forward the anesthesia service within the maternity unit. The hospital is now working towards ensuring this process is sustained to the benefit of its patients.

I trained and introduced the use of intrathecal morphine for cesarean section and other gynecological operative procedures using specific guidelines and protocols, significantly improving pain management. I am pleased to say this has continued with anecdotal feedback from the midwives caring for postoperative patients.

I returned to Rwanda in September 2020 on the invitation of the largest private hospital in the country to initiate a similar comprehensive obstetric and gynecological analgesia program. Didactic training occurred over a three-day period followed by a three-week on-site setup, initiating a structured rollout, showcased in the Rwandan media.

The King Faisal Hospital team was determined to ensure this service is sustainable and that it has provided staffing, equipment and drugs. The staff was extremely grateful for the institution of this new service and we celebrated on my final visitation day. **We have now established improved pain management in the maternity units in the biggest public and private hospitals in Rwanda. A laudable achievement.**

by Dr. Adeyemi Olufolabi

My trip to Rwanda with Dr. Olufolabi was focused on getting a "taste of global health." I spent time with the residents at Rwanda's main academic medical center, the University Teaching Hospital of Kigali, observing how they practice anesthesia in a resource-limited setting. Much of my time was spent working with their residents in the maternity and general ORs and teaching at Monday all-day resident education conferences. I had the fortune of visiting at the same time as a small team from the University of Virginia, and together we gave short lectures, held problem-based learning sessions, and ran low-fidelity simulations with a marker and easel pad to "display" vital sign changes on the "anesthesia machine" in response to interventions. Teaching in an austere environment was challenging, but we were met with an enthusiasm from the residents that was incredible. Dr. Olufolabi and I also traveled to different hospitals of varying care acuity levels throughout the country to see differences in anesthetic care. There are so many things we take for granted here in the US that you realize are not available everywhere else (like various medications, ultrasound, IV infusion pumps, body warmers, technician and biomedical engineering support), and it helped me to better appreciate all the vast infrastructure that keeps Duke running day to day. There were many moments where we had to engineer innovative solutions to problems - like using a hair dryer as a heat source for a body warmer. At the end of the month, I helped gather data on maternal mortality to assess the efficacy various QI measures implemented in the maternity ORs over the past year. All in all, it was a fantastic opportunity that I highly recommend for anyone who is even remotely interested in global health.

by Dr. Andrew Wong

resident spotlight

Kathryn Pearson, MD, CA-2

Growing up, I was a serious violinist and was playing semiprofessionally by the time I was in high school. When it came time to apply to college, I auditioned at conservatories and music departments with the intention of becoming a professional musician. Ultimately, Duke was the best choice because the university was committed to supporting me in academics and music, while providing a stellar experience in both areas. I had a wonderful experience here as a music major and have maintained many relationships within that department, but started to feel that I would prefer to play violin on the side instead of pursuing it professionally. My first exposure to medicine came during my freshman year at Duke when I volunteered as a musician at the hospital. The hospital setting piqued my interest and I started to explore medicine and took some of the required pre-med courses. The more I looked into medicine as a future career, the more I felt that it would be both fulfilling and exciting.

As a medical student at Johns Hopkins, I decided to take the anesthesia elective following a summer shadowing experience as an MS-1. I chose anesthesia because I wanted to be able to take care of a wide variety of patients and enjoyed the hands-on approach to medicine in the OR. I also had a lot of great mentors in the department of anesthesia who influenced my decision.

Now that I'm a CA-2, I have found that the same skills essential for success as a musician are important as an anesthesia resident. I used to spend a lot of time analyzing mistakes in my performances of a piece in order to avoid the same slip-ups in subsequent performances. I often find myself going through this same routine as a resident since I am working to improve on procedures that I wasn't doing several months ago!

Lori Jones, MD, CA-3

Duke and Durham have been part of my intellectual, professional and personal growth since being dropped off on East Campus (shoutout to Blackwell, one of the only air-conditioned dorms at that time) as an undergraduate, and I've truly come to think of both as home. The similarities between the gothic architecture of the buildings on Duke's campus with that of the National Cathedral near my parents' home in Washington, DC gave my new surroundings a subtle sense of familiarity, which helped quell some of my freshman nerves. Also helpful were the ample depictions of Dr. Samuel Dubois Cook (political scientist and first African-American professor at Duke in 1966), who had become a familiar figure in my upbringing as the president of Dillard University, where my father graduated as first in his class and with the "Samuel Dubois Cook/Benjamin E. Mayes Most Outstanding Student Award" in 1982. So, in a way I have always felt that I belong here.

I decided to major in English after finding the mandatory (and dreaded, by word of mouth) "Writing 20" freshman seminar unexpectedly enjoyable. I found the use of prose to carefully construct universes around people (fictional or otherwise) and their lives - and the triumph, despair, resiliency, and so on therein - to be exhilarating. And, it felt as though by telling these stories that I was paying homage to the persons being depicted.

I went into my undergraduate studies knowing that I was interested in science and medicine but struggled with how to unite this with my newer interest in humanities/narratives - until my sophomore year, when I registered for an elective titled "Literature and Medical Ethics." The professor of this course became a close mentor, and deepened my engagement with topics that have continued to be of interest to me throughout my education and medical career thus far; namely, social determinants of health and health inequities.

Ultimately, I chose Duke Anesthesiology for many reasons, but largely because: (1) I found that, as a field, anesthesiology is at the forefront of many patient outcome-centered initiatives, including quality improvement, of which equity is one of the defining principles; (2) Duke is a national leader in the provision of this care; and (3) Duke has always felt like home to me. Here, I've been able to expand my knowledge and technical skills under the mentorship of truly exceptional clinicians and researchers and continue to make the kind of lifelong friendships (with mentors and fellow residents alike) that I had as an undergraduate. I knew that residency was going to be challenging - that it had to be, if it was to make a life-and-death-decision-maker out of me - and I wanted to do that in an environment that I knew would be supportive when it mattered. So, it kind of just felt like coming home.

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University of Utah

Ryan Gessouroun
(CA-1) *University of Oklahoma*

alumni shoutout

with Drs. William Fox and Eun Eoh

William Fox, MD

Where are you now?

I am active duty in the Air Force and stationed at Joint Base Elmendorf-Richardson (JBER), Alaska. I am the Critical Care Air Transport Team (CCATT) medical director. Currently, I am deployed overseas as a physician in the Air Force's CCATT and responsible for transporting critically ill patients onboard military aircraft back stateside.

Why did you choose anesthesiology as your specialty?

I chose to become an anesthesiologist because I enjoy being involved in the intervention process and seeing the immediate results of actions. Whether it is managing the hemodynamics of very ill patients in the OR or continuing to advance their care in the ICU (and ultimately following them until discharge), I enjoy being able to make a meaningful impact on their lives.

How did your training prepare you for being an anesthesiologist in a pandemic?

By taking care of ill, complex patients at Duke, I feel that I had years of experience condensed into my training. Being able to manage airways, hemodynamics and understanding the pathophysiology of ARDS allowed me to become a consultant for the military hospital on managing COVID-19 in the OR and ICU.

What is your greatest takeaway over the past year as a practicing anesthesiologist?

Always be your patient's best advocate.

Advice for our residents graduating from our program?

Take what you have learned at Duke to go out into the world and make a difference.

Eun Eoh, MD

Where are you now?

After I finished the Adult Cardiothoracic Anesthesiology Fellowship at Duke, I joined a private practice group in Austin, Texas called US Anesthesia Partners, formerly known as Capitol Anesthesiology. I am part of the cardiac division, so I perform pump cases, but I also take care of all patients ranging from healthy pediatric to vasculopaths. As a new partner, I had the opportunity to become involved with the recruitment committee and currently am one of the recruitment chairs for our group. It has been really neat being part of a group that believes in sponsoring their new partners to be successful. There were six of us who started together, and we call ourselves the "Six Pack."

Why did you choose anesthesiology as your specialty?

I am a first generation physician who grew up in a small cow town. I think I got lucky - I became a physician because that seemed like a way I could help people. I chose anesthesiology because those were the physicians I wanted to be like - calm, reliable and always willing to lend a hand. I went into cardiothoracic anesthesiology not only for the complex and interesting cases, but also because the attendings in that division are brilliant and resilient clinicians who genuinely enjoy their work. I am lucky to say, three years into it, I still really enjoy practicing anesthesia.

How has your training at Duke Anesthesiology accelerated your practice thus far?

The training at Duke is excellent! Coupled with great mentorship, I was very well prepared for "the real world." Duke's large case volume allows residents to provide anesthesia for bread and butter cases, as well as more complex vascular, neuro and cardiac cases. By CA-3 year, we had completed well over the GME case requirements, so we were able to hone in on our interests and skills with electives. My experiences as a chief resident, making schedules and supervising junior residents and CRNAs (while on call with attending back-up), have been useful tools in my practice.

What do you miss the most about Duke/Duke Anesthesiology?

I definitely miss being able to pop into Dr. Thompson's office to gab with her throughout the day. She is still a wonderful friend and mentor who I keep in touch with. Her greatest asset (besides her sense of humor) is her ability to really listen and hear what someone needs and then giving productive advice. Her career and clinical advice has really helped me navigate the tricky waters of private practice. Her support, empathy and resilience as a female physician is priceless and are traits I try to emulate in my work.

Advice for our residents graduating from our program?

Keep learning! Try new (safe) things in the OR. It's easy to get into a routine and be comfortable. Use your CA-3 year to really hone in on your skills. Lean in: talk to your surgical colleagues, do the extra fiberoptic intubation, ask to place a subclavian, be inquisitive. You will be a better anesthesiologist because you understand what is going on across the drapes.

new& noteworthy

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Doximity rankings

For 2020-2021:
#1 in the South
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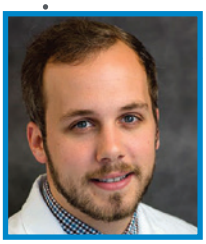

Congrats

2020 Feagin Leadership Scholar, Dr. Michael Cutrone

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Annemarie Thompson, MD

"The residency program is the crown jewel of our department; our residents represent the future of our specialty and become the strongest ambassadors of our commitment to perioperative medicine and leadership. In the era of a pandemic, their leadership skills and poise in the face of uncertainty have been remarkable as they have grown to be compassionate physicians, lifelong learners, and leaders who understand there is strength in flexibility."

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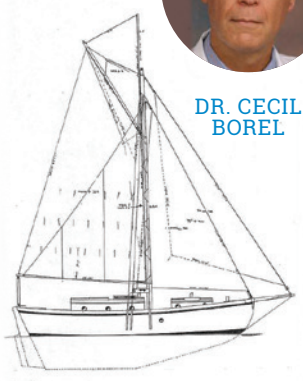
"Perseverance is an important trait. If you can just keep going, you'll get it done, it's worth it. Boat building is a noble tradition. You must be wholly committed to your project or the project will get lost and is bound to break up. With that mindset, as with anesthesia, just keep trying to figure out what's going on with your patients, try to do a better job, teach those you're working with, and learn from those you're working with."

TWO DECADES - TWO PASSIONS

BY STACEY HILTON

DR. CECIL BOREL



When recruited to Duke Anesthesiology in 1993, Dr. Cecil Borel, a renowned anesthesiologist and critical care physician, was an avid sailor who found peace in the power of the wind. Looking back, he best describes his next two decades as a marriage between two disparate ideas that fulfilled two of his life's passions: building his own sailboat and building a world-class neurocritical care program and Neurosurgical ICU at Duke.

"Work can be stressful and building a boat requires exercise, so there was a balance between the two," says Borel. "My passion has always been building the boat, not particularly sailing the boat. So, I don't resent the time I spent on it, but I do wish I was smarter about it."

Within both passions, he found overlapping challenges and lessons learned. Borel poured significant resources into his sailboat: building a two-story boat shop in the backyard of his Chapel Hill home, learning certain trades *(such as carpentry, wiring, engineering, and welding)*, and even training those he hired for additional help on the build. Much like turning a blueprint into an actual boat, Borel says there was no real guidance on how to establish a neurocritical care unit nor any certainty at the time that neurocritical care improved patient outcomes. "There was a development process for that too, thinking my way through things and figuring out the resources to use to get the job done. Training was probably the most important part of my role as chief of the Neuroanesthesiology Division. At Duke, we trained each other toward a common goal, much like the boat."

1993: Recruited to Duke Anesthesiology

1999: Began building the sailboat, Janetess, named after his wife

JULY 2012: Retired

JULY 2017: Finished building the sailboat. Transported it to a boat yard & planned to launch, but noticed several weather-related damages

JULY 2017-JULY 2019: Remained in the boat yard for numerous repairs & endured Hurricane Florence

JULY 2019: Launched the sailboat (but not yet commissioned) - started on the first pull and motored it from the boat yard to the marina - took a year off to rehabilitate from heart surgery

2020: Motored to and from the boat yard a few times

2021: Plans to commission the boat for the first time

Borel's story last left off on July 19, 2017, as he and his wife watched their 32-foot, six-ton sailboat leave their home to be transported to a New Bern boat yard. After 18 years of sweat equity, he thought he had finally reached the finish line, looking forward to sailing the coasts of North Carolina and Maryland with his wife, as they had always dreamed. But the second part of his story was just beginning. He spent the next four years overcoming continual hurdles: ongoing maintenance due to exposure from the boat being docked outside; Borel traveled back and forth to the boat yard, fixing leaks around the port holes and storage compartment, rebuilding hatches and lights, refinishing the mast and boom from sun damage, replacing failed batteries; then, in September 2018, Hurricane Florence made landfall in New Bern, causing severe flooding and more setbacks. Borel recalls the water rose 2.5 feet under the boat's hull with parts of the boat yard practically swept out to sea, ending up on residents' front lawns. And, after finally celebrating the boat's launch in 2019, he underwent coronary artery bypass surgery from which he is now recovered.

"Many have asked how I kept going all these years. I've learned a lot from the boat, but mainly to persevere," says Borel. "You just come to a point where you don't think you can solve something, and then you start solving it. I've learned to just keep going, and if you can't solve it now, you can solve it later. Any mistakes can be undone and fixed again. It wasn't until I got the boat to the boat yard that I learned it wasn't so much fun to fix them!" Borel says jokingly. "Because I enjoyed boat building so much, I never got to the point where I didn't want to see the boat again. It's surprising how much time things take and life gets in the way, but perseverance is a desirable feature."

Throughout his passion project, he also discovered that in phrasing his questions, he found his own answers. "I learned that if you just stop and think about what you're doing, give it a rest for a couple of days, you'll figure it out without having to ask. That also works well in the context of being an anesthesiologist."

As with building, he was drawn to the anesthesiology specialty because he found it personally challenging. Originally set out to be a primary care doctor, Borel realized that he enjoyed taking care of very ill patients and that anesthesiology training brought many skills to critical care, which allowed him to better care for those patients. "Ultimately, I enjoyed anesthesiology for what it is itself, the ability to make very difficult procedures possible; anesthetizing patients and bringing them back safely – safely being the key."

Feeling lucky to have survived coronary artery disease, Borel continues to persevere and is looking forward to this summer when he'll once again travel to the boat yard – this year, to put on the sails and commission it for the very first time. "There's still work to do on the mast and the deck, which makes it hard to sail," laughs Borel, "but we'll get it sailing!" says the neurocritical care pioneer, who leaves his anesthesiology colleagues with this advice: "Duke is a special place and it has a strong reputation that is well deserved. I wouldn't advise everybody to start building a boat, but don't forget to take time to have personal interests; allow yourselves to recover, relax and take time for things that make life sweeter."

DR. BOREL'S LEGACY

Established the third Neuroscience Critical Care Unit in the world at Johns Hopkins University

Recruited and established an esteemed neuroanesthesiology program and a world-class Neurosurgical ICU at Duke – one of the top five in the world at the time

Among the first credited for developing the subspecialty of Neurosurgical ICU care

Early recognition of multidisciplinary nature/ collaboration of the subspecialty

- Instrumental in the recruitment and training of internal medicine, neurology, anesthesiology, neurosurgery, neurointensive care positions to maintain the Neurosurgical ICU
- Imperative to the successful care of the neurosurgical patient

Established (with Joanne Hickey, PhD, RN) one of the earliest Acute Care Nurse Practitioner programs in the country - if not the world - with a focus on neurocritical care

Created the nurse practitioner (NP) rounding model, where NPs are the cornerstone of the providers

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Associate Professor of Anesthesiology

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W. Michael Bullock, MD, PhD
Joshua Dooley, MD
Amanda Kumar, MD
David MacLeod, MBBS, FRCA, Dip IMC
Erin Manning, MD, PhD
Gavin Martin, MB ChB, FRCA, MMCi
Hector Martinez-Wilson, MD, PhD
Brian Ohlendorf, MD
Stephen Parrillo, MD
Neil Ray, MD

CHIEF
Atilio Barbeito, MD, MPH
Associate Professor of Anesthesiology

VETERANS AFFAIRS ANESTHESIOLOGY SERVICE

Juliann Hobbs, MD, MPH
Hung-Lun (John) Hsia, MD
Eric JohnBull, MD, MPH
John Lemm, MD
David Lindsay, MD
Amy Manchester, MD
Jonathan Mark, MD
Grace McCarthy, MD
Harika Nagavelli, MD
Srinivas Pyati, MD, MBBS
Karthik Raghunathan, MBBS, MPH
Lance Roy, MD
Rebecca Schroeder, MD
Timothy Stanley, MD
Thomas Van de Ven, MD, PhD

CHIEF
Ashraf S. Habib, MBBCh, MSc, MHSc, FRCA
Professor of Anesthesiology
Professor in Obstetrics and Gynecology

WOMEN'S ANESTHESIOLOGY

Terrence Allen, MBBS
Melissa Bauer, DO
Matthew Buck, MD
Jennifer Dominguez, MD, MHS
Jennifer Mehdiratta, MD, MPH
Abigail Melnick, MD
Marie-Louise Meng, MD
Adeyemi Olufolabi, MBBS, DCH, FRCA
Cameron Taylor, MD
Mary Yurashevich, MD, MPH

ASA Highlights from "The City Beautiful"

Duke Anesthesiology hosted its 31st Annual American Society of Anesthesiologists (ASA) Alumni Event at Lafayette's Music Room in Orlando, Florida – a local staple for live music - bringing together faculty, trainees, staff, alumni, donors and friends for a night of celebration.

Two anticipated highlights of the evening were the silent auction of Duke signed basketballs and the reveal of the 2020 DREAM Innovation Grant (DIG) recipients: Drs. Andrey Bortsov, Katherine Martucci and Mary Yurashevich. DIGs are part of the Duke DREAM Campaign; they support innovative high-risk and potentially high-reward investigations to accelerate anesthesia and pain management research. Thanks to the winning bidders, $2,450 was raised to benefit the department's Global Health Program. Those donations directly support residents' global health missions.

Forty-three Duke Anesthesiology faculty and trainees participated in the five-day ANESTHESIOLOGY Annual Meeting 2019, which included 86 departmental lectures, workshops, panel discussions, presentations, and more.


HISTORIC
LAFAYETTE'S
MUSIC ROOM
LAFAYETTE'S

INSIDE
Duke Anesthesiology
PODCAST

Hosted by Stacey Hilton
DIRECTOR OF COMMUNICATIONS

Launched in 2020

The Inside Duke Anesthesiology Podcast takes you behind the curtain for one-on-one interviews with experts in our department and across Duke to discuss how we're "changing the face of anesthesiology."

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