On the road to better treatments for cystic fibrosis,
Geisel scientists and Dartmouth-Hitchcock clinicians have led
the way to a healthier future for children born with the disease.
MUTATIONS, MEDICATIONS, AND PERSISTENCE
Patients at Norris Cotton Cancer Center have access to one of the most forward-thinking and technologically advanced molecular pathology labs in the country.

TAKING ON CYSTIC FIBROSIS
Sam Neff, a student at Dartmouth College, Class of 2021, is making his own contributions to cystic fibrosis research.

NEW HORIZONS IN NEUROLOGICAL HEALING
Neurological disorders affect an estimated 100 million Americans every year. Neuromodulation holds tremendous promise in bringing transformative relief.

GIVING STORIES

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Dear Friends,

Even before Mary Hitchcock Memorial Hospital first opened its doors 125 years ago, its mission was intertwined with that of Dartmouth’s medical school. Eight years earlier, in 1885, Dr. Carleton Frost, dean of what was then Dartmouth Medical College, had led the formation of the Dartmouth Hospital Association, with the goal of establishing a hospital in Hanover that would not only care for the sick but also provide a place for the training of doctors and nurses. It was the generosity of Hiram Hitchcock—a wealthy hotelier and business leader, state legislator, and trustee of Dartmouth College—that brought that vision to life.

Today, that tradition of partnership and collaboration between what is now Dartmouth-Hitchcock and the Geisel School of Medicine is as strong as ever. Together, we are tackling some of the toughest problems in health care today: pushing the frontiers of cancer research and treatment; piloting innovative solutions to opioid addiction, mental health, and brain injury; improving end of life care; and more. Our ability to integrate biomedical and health care delivery research with clinical research and patient care positions us to lead in forging solutions to these and other challenges.

For both of our organizations—individually and as an academic medical enterprise—the future is bright. Earlier this year, Geisel launched Interaction: The Campaign for Dartmouth Medicine as part of Dartmouth’s institution-wide fundraising campaign, The Call to Lead. Through this campaign, we are investing in Geisel’s distinctive medical education program, our leadership in health systems research, and our groundbreaking multidisciplinary research centers—in particular Norris Cotton Cancer Center.

At the same time, Dartmouth-Hitchcock is planning for an aligned campaign that will amplify our strengths in key areas such as children’s health, cancer, neuroscience, and cardiovascular disease. And as we continue our evolution as a health system, we are strengthening integration with our member organizations with the goal of increasing access, reducing costs, and improving outcomes to ensure that patients receive world-class care and service anywhere within our health system.

But it is in our work together that Geisel and Dartmouth-Hitchcock will achieve the most far-reaching impact. Medical education, biomedical discovery, health-systems research, clinical research, patient care, and community health are not separate goals, but deeply interconnected. They are not the province of one organization or the other, but essential building blocks of the healthier future we are creating together, and with your help.

To our donors, volunteers, and friends who support this work and who share our commitment to advancing health and health care, we thank you for joining us in this endeavor.

Duane A. Compton, PhD
Dean, Geisel School of Medicine

Joanne M. Conroy, MD
CEO and President, Dartmouth-Hitchcock and Dartmouth-Hitchcock Health
In 2018, Sam Neff received the Exercise for Life Scholarship from the Boomer Esiason Foundation for his academic achievements, extracurricular activities, and having the fastest time among the finalists for a 1.5 mile run.

Seventeen years ago, Sam Neff began receiving care for his cystic fibrosis (CF) at Dartmouth-Hitchcock’s Manchester, New Hampshire, clinic—90 miles south of the main medical center. At the time, his parents didn’t know they were accessing a renowned team of physicians, nurses, scientists, and health-system researchers, all working toward a brighter future for families with CF. They just knew that they needed the best care for their son as close to home as possible. Today, Neff is a student at Dartmouth College, Class of 2021, and is making his own contributions to CF research.
o Sam Neff, “Living with cystic fibrosis is like running a marathon.” He began running five years ago and is an avid cross-country skier. “You have to keep yourself healthy along the way,” he says. In addition to regular exercise, Neff follows a daily treatment regimen. Every morning and every evening, Neff dons a black vest that shakes his torso to loosen the thick mucus in his lungs that’s a hallmark of CF. He also takes daily antibiotics, probiotics, digestive enzymes, and a variety of inhaled medications to stay healthy and strong. Neff was diagnosed with CF when he was 6 months old and weighed a mere 11 pounds. Now, age 20, he’s tall, athletic, and hopeful about his future and the future of the disease that’s affected every day of his life.

“I think it’s very important to project an image of strength, to have a positive attitude about the disease,” explains Neff, who is shy by nature and only recently began talking openly about his disease. “If you project to others that you’re healthy, then they don’t feel that you’re sick, and I think that rubs off on you.”

Neff is the beneficiary of decades of collaboration by researchers, physicians, parents, and patients at Dartmouth’s Geisel School of Medicine and Dartmouth-Hitchcock (D-H) and at other academic medical centers nationwide—all in partnership with the national Cystic Fibrosis Foundation. As a child, Neff stayed healthy through the persistence and dedication of his parents, Carol Ann and Ken, and the pediatric CF team at the Children’s Hospital at Dartmouth-Hitchcock (CHaD). Now, as a student majoring in biochemistry (and history), Neff is analyzing genetic studies in one of the top CF research labs in the country, led by Bruce Stanton, PhD, director of the Lung Biology Center at Dartmouth’s Geisel School of Medicine. Neff is also a patient in a clinical trial at D-H, which is testing a new triple combination of drugs to treat CF.

“Living with cystic fibrosis, it’s very difficult to sit and wait for new scientific discoveries to happen. I wanted to make a contribution of my own.”

**EVERY CHILD**

In the late 1990s, Gerald O’Connor, PhD, DSc, then associate director of the medical school’s Center for the Evaluative Clinical Sciences (now the Dartmouth Institute for Health Policy and Clinical Practice), began analyzing data from the Cystic Fibrosis Foundation’s Patient Registry. O’Connor’s analysis showed that a patient could live almost seven years longer depending on at which CF center they received treatment. While a center may have very good nutritional outcomes for their CF patients, that same center may have poor outcomes in measures of lung function, O’Connor found. Simply presenting the outcomes data to CF centers and showing them how their performance compared to other clinics spurred an unprecedented level of self-evaluation and cooperation among physicians and nurses to improve care at their own centers and nationwide.

The Cystic Fibrosis Foundation enlisted the help of O’Connor’s colleagues, too: Paul Batalden, PhD, Marjorie Godfrey, PhD ’95, and Eugene Nelson, DSc, MPH, experts in quality improvement and microsystems at The Dartmouth Institute. With the foundation’s support, the team launched a multi-institution learning collaborative and quality improvement initiative, engaging clinicians, parents, and patients at more than 90 percent of the CF centers nationwide.

“Because of The Dartmouth Institute, we’ve had the opportunity to be at the forefront of cystic fibrosis quality improvement nationwide.”

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Abnormal populations of bacteria in the gut—known as dysbiosis—is a well-known complication of CF and contributes to impaired nutrient absorption. So Madan wondered, What if we could tailor the microbiome of babies with CF to delay or prevent dysbiosis, train their immune system, and prolong health?

To pursue that question, Madan and her scientific collaborator George O’Toole, PhD, professor of microbiology and immunology at Geisel, began studying the bacteria in the intestines and lungs of newborns and children with CF. Madan started one of the first longitudinal CF infant cohorts in the country—a long-term study in which she has enrolled nearly every baby born with CF in New Hampshire since 2009. Her team collects intestinal and lung samples at regular intervals during the first years of life and then follows the children as they grow. The oldest participants are now 9 years old.

In collaboration with Geisel colleagues with expertise in bioinformatics and big data analysis, Madan and O’Toole have shown how bacteria in the intestines and lungs interact, and some of the mechanisms by which dysbiosis relates to the worsening of disease in individuals. “The fact that a neonatologist can so easily and quickly partner with microbiologists and data scientists to pursue a brand new line of research is emblematic of the collaborative, nimble research culture of Dartmouth and its CF researchers and clinicians,” says Madan.

The research team has also identified how the CF microbiome differs from the microbiome of healthy infants and young children, which could point to potential treatments. By identifying the missing microbes in CF that are important to training the immune system, Madan and her team hope to identify probiotic treatments to benefit infants with CF—giving babies with CF a better chance at a long, healthy life.

“Newborn babies with CF are often indistinguishable from other newborns and are beautiful, healthy babies,” explains Juliette Madan MED ’00, MS, an associate professor of epidemiology and pediatrics at the Geisel School of Medicine and a neonatologist at Dartmouth-Hitchcock. The complications arise within the first weeks and months of life.
The Cystic Fibrosis Foundation’s Quality Improvement Initiative continues today and is credited with increasing CF life expectancy by several years. The initiative has become a model for health care improvement in other diseases, too, by demonstrating the value of inviting patients and their families to partner with clinicians on the design and evaluation of care—and, most importantly, sharing data openly among centers, even when it reveals less-than-ideal outcomes.

Kathryn Sabadosa, MPH, a senior research director at The Dartmouth Institute and the mother of a young adult with CF, has helped lead the Quality Improvement Initiative since 2003. “I wanted to ensure that every child with cystic fibrosis could get the best care anywhere in the country,” says Sabadosa. Her son was cared for at D-H from day one. While every center has room for improvement, D-H has consistently provided high-quality CF care, as measured by the nutritional and pulmonary outcomes of its patients.

Today, Sabadosa is in awe of how self-sufficient her son Jack, now 18, has become at managing his CF. Like Sam Neff, Jack is athletic and healthy. He entered college this fall at Queens University in Ontario, Canada. The health of both young men is remarkable and the result of several factors: their own self-discipline and adherence to daily treatments and a healthy lifestyle, the dedication and support of their parents, and the excellence and seamless care of their clinical team at D-H, led by Guill and Brian O’Sullivan, MD.

“I knew Dr. Guill was looking at the whole person every time my son walked through the door,” says Sabadosa. The relationships that she, her husband, and her son were able to build with the clinical teams has been crucial to his success, she says. Sam Neff’s mom, Carol Ann, who also has another son with CF, agrees. “The fact that our boys are healthy and successful is truly a testament to the care they have received and continue to receive from everyone at CHaD,” she says. “The doctors and nurses are always willing to answer every question we have, and we’re so grateful for the relationships they have built with our sons over the years. Because of that, we know that the boys will be able to take fabulous care of themselves as adults.”

MILES TO GO

While the health of young adults like Sam and Jack and the improved CF life expectancy are successes to celebrate, that’s not the full win. Many children with CF still die before adulthood or live with damaged lungs. New CF medications—although remarkable in slowing the progression of the disease—target only some of the genetic mutations responsible for CF and don’t clear the dangerous, persistent, underlying infections. And parents of children with CF still fear that their child will not live a full, healthy life. The marathon continues.

Just as they have for decades, researchers at Dartmouth’s Geisel School of Medicine are among those leading the way to better treatments and a cure.

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A Hub for High-Impact Science

Geisel’s Lung Biology Center is home to one of seven Cystic Fibrosis Research and Translation Centers funded by the National Institutes of Health. The center brings together over 200 scientists, physicians, and trainees to advance the understanding and treatment of CF and other chronic lung diseases. Their diverse expertise and interests yields an unusual breadth and depth of research projects.

The Lung Biology Center’s scientific success and impact lies in its multidisciplinary approach: microbiologists, biochemists, immunologists, neonatologists, pulmonologists, computational biologists, engineers, and data scientists working together to tackle CF from all angles—and from infancy through adulthood.

For example, pulmonologist Alix Ashare, MD, has teamed up with Jane Hill, PhD, a professor at Dartmouth’s Thayer School of Engineering, to develop a breathalyzer for patients with CF. The device will identify which bacteria are growing in a patient’s lungs by measuring metabolites in exhaled breath. That’s essential and hard-to-obtain information that physicians can use to choose the best treatment for each patient.

In another collaboration, James Bliska, PhD, and George O’Toole, PhD, both professors of microbiology and immunology at Geisel, are exploring ways to engineer immune cells to better protect against harmful bacteria in the lungs of people with CF. Bliska also leads the Personalized Treatments for Cystic Fibrosis academic cluster at Dartmouth—a group of researchers including Stanton and three new endowed professorships funded through the generosity of donors.

“Our group is able to tackle cystic fibrosis from so many angles because we integrate so many different kinds of scientific investigators and clinicians,” explains Lung Biology Center director Bruce Stanton, PhD. “We’re big enough to have an impact but small enough to still be highly collaborative and nimble.”

That ease of collaboration filters down to students, too.

“It was so easy to get involved,” says Neff, who emailed Stanton midway through his first year at Dartmouth to ask if he could work in one of the CF research labs. Stanton responded promptly and invited Neff to come meet with him. Although he had been a D-H CF patient since he was a toddler, Neff had no idea that he was joining a CF research community that had so intimately benefited his own life. Now, he plans to pursue a career in CF research and possibly attend medical school.

Just like training for a marathon, Neff is diligently building the scientific and academic skills he needs to pursue his dreams and contribute to the CF community at large.
When something goes awry in the brain, the consequences are often devastating. Neurological disorders—which impact an estimated 100 million Americans every year—can make a person’s life difficult and unpleasant, or they can take a person’s life away. It’s unknown what triggers many of these conditions, and even when the dysfunction is understood, it’s usually hard to treat.

Neuromodulation—the use of stimulating electrical signals or miniscule devices to alter the way the nervous system functions—is opening new horizons in neurological healing. Patients suffering from pain and epilepsy have benefited from spinal and brain stimulation for decades. Now, with improvements in technology and advances in our understanding of normal brain behavior, neuromodulation is bringing transformative relief to people living with essential tremor, Parkinson’s disease, and obsessive-compulsive disorder.

At the Geisel School of Medicine and Dartmouth-Hitchcock (D-H), scientists and clinicians like the three researchers profiled on the following pages are exploring other applications for neuromodulation that have the potential to make a dramatic difference in the lives of certain patients. Their work includes investigating the use of electrical stimulation to restore cognitive functions lost due to traumatic brain injury or disease, studying neuromodulation as a treatment for symptoms of memory loss and emotional dysregulation, and developing nanoscale devices for early detection of diseases as well as targeted drug delivery.

This is just the beginning. By pinpointing precise areas of the brain, neuromodulation holds tremendous promise in treating depression, addiction, dementia, and other neuropsychiatric disorders. D-H and Geisel—through D-H’s renowned epilepsy center, the Center for Surgical Innovation, Norris Cotton Cancer Center, and collaborations with Dartmouth’s Department of Psychological and Brain Sciences and the Thayer School of Engineering—have a strong history of neuroscientific ingenuity. For example, it was here that Barbara Jobst, MD, the Louis and Ruth Frank Professor in Neuroscience and director of the epilepsy center, helped develop a first-of-its-kind neurostimulator to reduce seizure activity in patients with disabling epilepsy. Building on this foundation, researchers are poised to expand the uses of both long-term and limited-course neuromodulation—potentially reducing the suffering of millions.
Joshua Aronson, MD, performing neurosurgery at the Center for Surgical Innovation at Dartmouth-Hitchcock. Using a custom 3-D printed device, electrodes are placed with great accuracy deep in the brain to record neural signals.

A fall, a car accident, a sports injury, a random act of violence: traumatic brain injury (TBI) can happen to anyone at any time. Long after swelling in the head goes down, severe cognitive deficits often persist. Patients may have trouble retrieving words, recalling events, moving parts of their bodies, and navigating their homes or neighborhoods. Improvement is possible, but it takes a long time and is not guaranteed.

Joshua Aronson, MD, a functional neurosurgeon at Dartmouth-Hitchcock (D-H) and assistant professor of surgery at the Geisel School of Medicine, has helped patients with movement disorders regain some of their former abilities through deep brain stimulation—a form of neuromodulation—and now he’s aiming to do the same for patients with TBI.

“The patients I treat have significant quality of life issues—they’ve lost the ability to do what they want to do,” says Aronson. “But with deep brain stimulation you can see life-changing effects.”

By identifying the brain areas specifically impacted by TBI, Aronson can target them with electrical impulses. In studies with mice, those with conditions similar to TBI that received deep brain stimulation could navigate a maze as easily as healthy mice, while those that had not been treated were unable to learn the paths of the maze.

Aronson is planning a small pilot project with 10 volunteers who have already undergone traditional rehabilitation. He will perform a minimally invasive surgery to implant the electrodes, and use stimulation to trigger a reward signal when the patient successfully completes a cognitive task, such as coming up with a correct word. He expects that these reward signals will help people relearn some of what they’ve lost, and that a combination of neuromodulation with rehab will make recovery from TBI faster and more effective. Through D-H’s partnership with the White River Junction VA Medical Center, Aronson hopes his research will one day benefit a population with a high incidence of TBI: veterans of the conflicts in Iraq and Afghanistan.

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A biologist who focuses largely on detecting, treating, and curing brain cancer, Arti Gaur, PhD, works in another realm of neuromodulation: producing tiny chips that can find disease and deliver medication.

In collaboration with Axel Scherer, PhD, from California Institute of Technology, Gaur is developing devices that are just 1 millimeter by 1 millimeter—about the size of a grain of salt—but their impact could be enormous. These multitasking chips may answer previously inscrutable questions about brain disease by identifying the biomarkers that indicate the presence of disease, carrying medicine to parts of the brain that were until now unreachable, and monitoring the effects of treatment.

“We need to understand what’s right in order to figure out what’s wrong,” explains Gaur. “There’s an absolute randomness to which patients get brain tumors. Why do some children get gliomas? Is there an initial insult to the developing brain, or is it a failure of the immune system? Can we predict brain metastases—which develop from cancers that originate elsewhere in the body but kill more people than brain tumors?”

Gaur and her team of research assistants, graduate students, medical students, and undergrads—a team that includes clinicians, engineers, chemists, and biochemists—already have tested the chips in mice, and Gaur speculates it won’t be long before patients in the intensive care unit volunteer to be part of human trials.

“Patients usually ask, ‘How can I help?’ before we’ve even finished explaining what we’re trying to accomplish,” Gaur says. And though she is not a clinician, she believes speaking with patients is one of the most important parts of her job.

“It’s imperative for basic scientists to see patients, to be reminded of what we’re fighting for and why we fight.”
HEALING THE SYMPTOMS OF EMOTIONAL DYSFUNCTION

In patients with epilepsy who receive neuro-modulation, electrodes in the brain monitor for seizure activity and send an imperceptible pulse to stop the seizure before it spreads—much like a cardiac pacemaker, which helps control abnormal heart rhythms. Krzysztof Bujarski, MD, a behavioral neurologist and epileptologist at Dartmouth-Hitchcock (D-H) and associate professor of neurology at the Geisel School of Medicine, is applying the same principle to problems of memory and emotional control that accompany a variety of neurological disorders.

“We can use technology to modulate sick brain regions,” explains Bujarski, whose research focuses on how people with brain disorders process emotions in daily life. “We can target small networks—the brain tissue involved is the size of a marble—and people don’t feel it, it doesn’t alter consciousness. What changes are the symptoms.”

Bujarski notes the example of patients who struggle with emotional or behavioral self-control or suffer from post-traumatic stress disorder (PTSD). In these patients, the amygdala—a part of the brain responsible for emotional reactions—becomes overactive. Electrodes monitoring for such activity, Bujarski hypothesizes, could provide deep brain stimulation to quiet the function of the amygdala and relieve disruptive symptoms.

In a study at D-H of patients who already had electrodes in place, participants viewed visceral images, with some subjects receiving deep brain stimulation. Those subjects perceived the images as more neutral and were less likely to remember them—a finding with important implications for people with impulse control disorders or PTSD. Bujarski’s goal is to run additional clinical trials with patients who live with neurological conditions that induce emotional dysregulation.

“The objective of neuromodulation is to heal a specific brain network,” says Bujarski. “In time, the hope is that injured or diseased parts of the brain work normally again independent of stimulation.”

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Matching patients’ genetic profiles with effective treatments requires a highly skilled team of scientists and caregivers, a state-of-the-art pathology lab, and a willingness to chart a new course when needed.

Two years ago, VitaMarie “Vivi” Torres was diagnosed with metastatic pancreatic cancer and told she probably had 6-12 months to live. She was shocked. As the primary caregiver for her husband, who has Alzheimer’s, Torres was tired but she had no other symptoms.

When her oncologist in Boston outlined her treatment options, she decided to seek a second opinion. She turned to Dartmouth-Hitchcock (D-H), where she met Gabriel Brooks, MD, MPH, an oncologist at Norris Cotton Cancer Center and an assistant professor at the Geisel School of Medicine.

“She was told that her cancer should be treated like a garden-variety pancreatic cancer. Our pathologists looked at it and came to a different conclusion—that she had a very rare form of pancreatic cancer called acinar cell carcinoma. That was a key distinction.”
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BEHIND THE SCENES

While patients with cancer tend to think of their oncologists as the ones directing their care, at a comprehensive cancer center like Norris Cotton Cancer Center, a team of pathologists and scientists collaborate to figure out the very best treatment for each patient. And when patients choose Norris Cotton Cancer Center, they are tapping into one of the most forward-thinking and technologically advanced pathology labs in the country.

The D-H pathology lab was among the first in the country to routinely perform next-generation gene sequencing on patients’ tumors, beginning in 2013, to reveal genetic mutations that are driving a tumor’s growth. The lab is also one of five designated gene-sequencing centers for the National Cancer Institute’s precision medicine treatment trial, dubbed MATCH.

“Gene sequencing used to be very manual and examine only one fragment of DNA,” explains Greg Tsongalis, PhD, director of the D-H laboratory for Clinical Genomics and Advanced Technology and a professor at Geisel. “With next-generation sequencing, we can put millions of fragments of DNA from one patient sample on a small chip.” The chip, which measures about one inch square, is inserted into a machine that churns out data that is then analyzed by bioinformatics specialists and pathologists.

Cancers have traditionally been defined by their primary location—lung, breast, prostate, pancreas—and how they look under a microscope. But that framework is starting to break down as oncologists and pathologists discover that classifying tumors based on their genetic mutations can sometimes provide critical insight into which treatment to use.

That’s why Tsongalis and his team were especially excited when they discovered a rare mutation in VitaMarie Torres’s biopsy sample. Not only did she have a rare form of pancreatic cancer, but she also had a rare mutation called an SND1-BRAF fusion, which is very difficult to detect, according to Tsongalis. The discovery was good news because a medication called Mekinist (trametinib) has been shown to extend the lives of patients with SND1-BRAF fusions in other cancers.

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The Hard Science of Precision Medicine

The concept behind precision medicine in cancer is relatively simple: identify a genetic mutation or cellular process that is contributing to the growth of a tumor and block that action. But discovering, developing, testing, and prescribing such targeted therapies is anything but simple.

KONSTANTIN DRAGNEV, MD
Finding the right drug for the right patients

“Cancer is not a single disease,” explains Konstantin Dragnev, MD, a professor of medicine and the Irene Heinz Given Professor in Pharmacology at Geisel, who is also a lung cancer specialist at Dartmouth-Hitchcock. “While under the microscope cancer cells may look the same, their genetics may be very different.”

In addition, tumors often have more than one dysfunctional cellular process, or pathway, fueling their malignant growth. It follows, then, that an effective way to treat many cancers may be in combining treatments. That’s a strategy that Dragnev, associate director for clinical research at Norris Cotton Cancer Center, pursues in the laboratory and in clinical trials. Pharmaceutical companies are often hesitant to invest in combination therapies because of proprietary concerns and the potential for more toxicities. But Dragnev and others have found a way forward.

“We’ve focused on having very strong preclinical evidence, using an investigational drug in combination with an approved drug, and working with industry partners who welcome this approach,” says Dragnev. His pursuit of new cancer therapies is beginning to yield results for patients. Dragnev is helping to lead several clinical trials—one of which grew out of a discovery he and a colleague made more than 15 years ago. “That’s how long this work can take,” says Dragnev. “It requires persistence and optimism.”

YOLANDA SANCHEZ, PHD
Discovering the cancer drugs of tomorrow

It takes decades of scientific investigation, big data analysis, and preclinical studies before a targeted therapy makes it to a patient’s bedside. That process starts with identifying the characteristics of cancer cells that could make them vulnerable to treatment.

“We then screen tens of thousands of chemical compounds to find ones that can target cancer cells’ weaknesses and test the most promising compounds in tumors grown from patients’ samples,” explains Yolanda Sanchez, PhD, associate professor of molecular and systems biology at Geisel and associate director of basic sciences at Norris Cotton Cancer Center. Sanchez is also working on better ways to identify patients who might benefit from a targeted therapy. She and 12 collaborators from around the country recently published a study about a promising new method to identify malfunctioning cellular pathways in cancer, regardless of the genetic mutation that caused the malfunction. The researchers’ innovation is two-fold—focusing on m-RNA (molecules that indicate which genes are turned on) and using machine learning (training computers) to find tumors that are using an errant cellular pathway to grow. This new method can help scientists to identify compounds with the potential to be developed into effective drugs—and may one day allow physicians to better predict which patients will benefit from which targeted therapies.

JOHN X.J. ZHANG, PHD
Building better diagnostics and monitoring

“Biopsies are limited by location and frequency,” explains John Zhang, PhD, a professor at Dartmouth’s Thayer School of Engineering and member of Norris Cotton Cancer Center. This means that patients’ diagnoses and treatment plans are based on samples that are taken in one location in the body—usually the primary tumor site—and at one point in time.

“Cancer is very smart. It’s changing all the time in the body,” says Zhang, whose lab focuses on building easy-to-use, low-cost, microchip technologies to detect and analyze rare biomarkers—such as circulating cancer cells and the bits of DNA and debris that tumors shed into the bloodstream. Such “liquid biopsies,” as they are called, could provide a new and less invasive approach to improve cancer detection, diagnosis, and treatment monitoring. One of Zhang’s technologies is being developed for market by NanoLite, a company he cofounded. The NanoLite CellRich system is already in use in Asia and is undergoing clinical trials necessary for approval in the U.S.

Zhang is also collaborating with the director of the Dartmouth-Hitchcock laboratory for Clinical Genomics and Advanced Technology, Greg Tsongalis, PhD, to develop a way to detect pancreatic and prostate cancers early, before they have spread to other locations in the body and become difficult to treat.
Targeted therapies rarely cure a patient’s cancer, but such medications can extend life by months or years, even for advanced cancers.

Brooks took this information to the Cancer Center’s Molecular Tumor Board—a group of oncologists, pathologists, scientists, and other specialists who meet regularly to review the test results of individual patients, scour the scientific literature, and tap into their collective knowledge to recommend the most promising treatment options. Together, they agreed that trametinib was, theoretically, the best option. The problem was that they could find no reports of the targeted therapy being used for pancreatic acinar cell carcinoma, and that use was not approved by the U.S. Food and Drug Administration.

UNCHARTED WATERS

“So even though we had a rationale—it looked like the drug should work—there was no published data for this plan,” explains Brooks. The tumor board had recommended that Torres apply to a clinical trial that would have given her access to the drug, but her application was denied. She didn’t meet the enrollment criteria. And at a cost of $12,000–$13,000 per month, Torres could not afford the medication on her own.

Brooks and Torres faced a difficult decision: continue to push for the theoretical treatment or enroll in a clinical trial with a different class of medications that she was eligible for and could potentially benefit from.

“As an oncologist, it’s hard to give someone a treatment for which there’s no human data for their particular cancer,” explains Brooks. “How could I recommend trametinib as a first-line or even a second-line treatment when we had a different clinical trial that might help her?”

Precision medicine—matching treatment plans with patients’ unique genetic profile—is still not an exact science, in part because the science is evolving so rapidly. Likewise, targeted therapies rarely cure a patient’s cancer, but such medications can extend life by months or years, even for advanced cancers.

Brooks and Torres decided to enroll her in a clinical trial that they hoped would stop her cancer from progressing. But after several months, it was clear that the treatment was not working.

“\textit{If this therapy can help her live a fulfilling life today and tomorrow and over the coming months, that’s the point of it.}”

Gabriel Brooks, MD, MPH, is an oncologist at Norris Cotton Cancer Center and an assistant professor of medicine and of The Dartmouth Institute for Health Policy and Clinical Practice.
It was the fall of 2017, and Torres was nearly out of options. Brooks suggested they make one more push to try to get her access to trametinib. When Torres’s health insurance company denied coverage of the treatment, the next step was to petition Novartis, the drug’s manufacturer.

Brooks enlisted the help of Lanelle Jalowiec, an oncology resource specialist at the Cancer Center, who helps patients to apply for grants to cover their medication co-pays and to access free medications from pharmaceutical companies. Even with good insurance, notes Jalowiec, patients typically face out-of-pocket costs of $3,000 per month for oral cancer medications.

“My goal is to get patients the right medication at the lowest cost as quickly as possible and to minimize patients’ stress,” says Jalowiec. Within a couple weeks, Jalowiec succeeded. Novartis agreed to provide one year of trametinib to Torres at no cost. She took her first dose in November 2017.

**PERSISTENCE AND PROMISE**

Getting access to trametinib was good news for Torres, but even better news came at her first follow-up appointment after starting the medication. A blood test revealed a dramatic decrease in CA19-9—a biomarker indicating tumor activity that had been steadily climbing since her diagnosis. More good news followed in March 2018, when a CT scan showed no new growth in the primary tumor nor metastases.

“The truth is this may stop working at any time,” cautioned Brooks. “But if it can help her live a fulfilling life today and tomorrow and over the coming months, that’s the point of it.”

Brooks’s warning came true in September, when imaging tests showed that tumors on Torres’s pancreas and liver had grown; her cancer had become resistant to the targeted therapy.

Though Torres faces new uncertainty and treatment decisions, she is grateful for the many months she has enjoyed with a relatively good quality of life. She has been living her life to the fullest, spending several afternoons a week with her nine-year-old grandson, attending his soccer games, playing bridge, walking regularly, and even traveling to California earlier this year. “The fact that she is alive with a good quality of life is remarkable,” says Brooks.

Although the gains for patients like Torres may seem incremental, the future of precision medicine is bright. As the science advances, many more patients will be outliving their prognoses and living life to the fullest. Less toxic treatments, longer lives, and, eventually, cures—those are the promises of precision medicine in cancer.

“If Dr. Brooks hadn’t gotten his team to look into my tumor and find out that its composition wasn’t ordinary, I probably wouldn’t be here,” says Torres. “They were willing to dig deeper.” And that persistence has made all the difference in the world to Torres and her family. 

Members of the Cancer Center’s Molecular Tumor Board—which includes oncologists, pathologists, scientists, and other specialists—meet regularly to review the test results of individual patients, scour the scientific literature, and tap into their collective knowledge to recommend the most promising treatment options.

Mary Chamberlin, MD (left), assistant professor of medicine and a Dartmouth-Hitchcock oncologist, and Todd Miller, PhD (right), associate professor of molecular and systems biology, co-direct the Cancer Center’s Molecular Tumor Board.
IT TAKES A VILLAGE

Behind each patient’s care are people in myriad roles—not only the physicians and nurses who provide direct care, but also researchers advancing biomedical science and clinical care; students and the faculty who train and mentor them; those in allied health professions; those who provide supportive services, who schedule appointments, prepare food, or keep our facilities clean and safe; the volunteers who assist patients; and the generous donors whose gifts advance research, patient care, and education.
17. Jenni Perri, MD (left), and Lizzie King-Paulson, MD (right), Vascular Surgery
18. Joshua Aronson, MD, Neurosurgery
19. Sandra Wong, MD, Surgery
20. Mary Klassen-Lands, Creative Arts Program
21. Matthew Maughan, Telehealth
22. Madeline Levesque, Dietary Services
23. Shepard "Colby" Conner ’20, Dartmouth College Student, and Patricia Poli, PhD, Immunology Research
24. Michael Zegans, MD, Ophthalmology
25. Anna Thorburn, RN, Intensive Care Unit
26. Stephanie White, MD, Pediatrics
27. Gregory Bailey, Environmental Services
28. Briane Pinkson, Massage Therapy
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31. Heather Blunt, MSLIS, Biomedical Library
32. Konstantin Dragnev, MD, Oncology
33. Sol Rockenmacher, MD, Alumnus ('61), Donor
34. Roshini Pinto-Powell, MD, Internal Medicine
35. Alexander Jamerson, Patient Transportation
36. Tabatha Richardson, Administration, Norris Cotton Cancer Center

All photos by Mark Washburn except as follows: 2, 5, 9, and 15 are by Rob Strong; 29 is by Doug Rathburn.
The opening of Mary Hitchcock Memorial Hospital in 1893, made possible by Hiram Hitchcock's founding gift in memory of his beloved late wife, brought critical health care services to the region, established a teaching hospital for Dartmouth's medical school, and planted the seeds of what is now a leading academic health system.

It was a visionary gift, and one that began a tradition of giving that continues with our donors' generous support of the Geisel School of Medicine and Dartmouth-Hitchcock (D-H).

During the past fiscal year (July 1, 2017–June 30, 2018), 24,767 individuals, foundations, and organizations made gifts and pledges totaling almost $41 million in support of research, medical education, patient care, and community health and prevention.

The stories in the following pages highlight a few examples of this generosity. In addition, we list all those who gave $1,000 or more between 7/1/17 and 6/30/18.

We are honored by your support, and by the caring and compassion that your gifts represent. Thank you.
“This hospital at the time of its completion will perhaps be the most perfect of its kind then in existence. It is a memorial of one of the noblest and best of God’s gifts to the human race. God grant that this hospital may be all, and more than all, that she would have it to be. She was my life here. May God in His infinite mercy unite us again.”

—Hiram Hitchcock

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The clinicians and scholars immersed in palliative care at Dartmouth-Hitchcock (D-H) and the Geisel School of Medicine have a vision: a world in which everyone facing a serious illness or a sudden life-threatening event receives personalized care that results in the best possible outcomes. The path to realizing this vision begins with a better understanding of the impact of palliative care on the experience of patients, their families, and their caregivers. Currently, limited data about this experience are available.

That’s about to change. Thanks to a grant from the Gordon and Betty Moore Foundation, D-H and The Dartmouth Institute for Health Policy and Clinical Practice have begun collaborating with the American Academy of Hospice and Palliative Medicine (AAHPM) on the creation of a palliative care learning health system. “A learning health system allows clinicians to learn from each other, provide the best evidence-based care to their patients, and contribute evidence to help others in the future,” explains Eugene Nelson, DSc, MPH, professor of community and family medicine at Geisel and The Dartmouth Institute and principal investigator on the project. Researchers from The Dartmouth Institute have generated similar frameworks for cystic fibrosis, inflammatory bowel disease, and rheumatoid arthritis that have led to significant improvements in health outcomes and patient experience.

The three-year palliative care project will involve the development of tools to aid communication between patients, families, and clinicians; the rollout of those tools at D-H; and sharing the tools with other palliative care centers across the country by working with the AAHPM.

“We’re invested in the care of patients with serious illness and incredibly grateful for the funding that enables us to conduct this research.”
In the first phase of the project, the research team—including Nelson and co-principal investigators Amber Barnato, MD, MPH, MS, the Susan J. and Richard M. Levy 1960 Distinguished Professor in Health Care Delivery at Geisel, and Kathryn Kirkland MED ’86, the Dorothy and John J. Byrne, Jr., Distinguished Chair in Palliative Medicine at Geisel and section chief and director of the palliative medicine program at D-H—will codesign the communication tools with patients, families, caregivers, and health care professionals. An electronic information-gathering tool that links to patients’ health records will enable patients and their health care teams to focus each office visit on the most critical needs, priorities, and concerns. A facilitated support network will give patients and their families both in-person and online resources for sharing knowledge and experiences with others facing similar challenges.

“The information we gather while patients and families are using tools like these allows us to learn as we go and make ongoing improvements in care, so we can keep making things better for seriously ill patients and their families,” says Kirkland.

“When we start to see why one patient group is doing better than another, or what works well for what kind of patient, clinicians can offer the best possible care,” adds Nelson.

People in the D-H palliative care program will be the first to test the tools, followed by D-H patients and health care teams in another area, such as oncology or cardiology. Finally, through a close partnership with the AAHPM and its Palliative Care Quality Collaborative, the tools will be tested at a medical center outside of D-H.

“We’re invested in the care of patients with serious illness,” says Barnato, “and incredibly grateful for the funding that enables us to conduct this research.”

The Gordon and Betty Moore Foundation’s work in serious illness care is aimed at improving the experience and outcomes of people with multiple chronic conditions and who have limited ability to perform everyday tasks, such as eating, bathing, and dressing.

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IRONWOOD

In this room
a daughter remembered
In this room
the first days of September
In this room
a daughter raged
In this room
a daughter forgave
In this room
a daughter came to repent
and through love, iron bent
In this room
a daughter found peace
In this room
a sought release
In this room
a daughter cried
In this room
her mother died.
—Beth Jones-West

Since opening almost a year ago, the Jack Byrne Center for Palliative & Hospice Care has provided over 250 patients with serious illnesses and their families highly personalized care in a homelike environment. By supporting the emotional, spiritual, and physical needs of patients, Jack Byrne Center staff and volunteers help every patient live his or her life well, with meaning and purpose, doing what is most important as life draws to a close.

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From left to right: Eugene Nelson, DSc, MPH, professor of community and family medicine at Geisel and The Dartmouth Institute, Kathryn Kirkland MED ’86, the Dorothy and John J. Byrne, Jr., Distinguished Chair in Palliative Medicine, and Amber Barnato, MD, MPH, MS, the Susan J. and Richard M. Levy 1960 Distinguished Professor in Health Care Delivery.
As a beloved professor at Dartmouth’s Tuck School of Business for more than 35 years, the late Brian Quinn established a reputation as an expert on entrepreneurship and technology. Outside of the classroom, he and his wife, Allie, were known for their active involvement in the Dartmouth College, Dartmouth-Hitchcock (D-H), and Upper Valley communities.

Brian Quinn passed away in 2012 and Allie died earlier this year, but thanks to their foresight as well as the initiative of their three children, Virginia, Jim, and Brad, their legacy will continue through a new innovation awards program at Norris Cotton Cancer Center. The Quinns advised that funds from an IRA their parents left to the Cancer Center be used to help launch a new program to support Cancer Center investigators working to transition promising new drugs and devices from the laboratory to clinical use. Recipients of the award will be known as the J. Brian and Allie J. Quinn Scholars.
“Whenever my mother was given credit for her community work, she would be quick to say that it took a lot of people working together to make anything happen.”

"It takes bold ideas to develop new drugs and devices to advance the treatment and prevention of cancer. Our Cancer Center has been the source of many such discoveries, and these bold ideas need to be supported," says Steven Leach, MD, the Preston T. and Virginia R. Kelsey Distinguished Chair in Cancer and director of the Cancer Center. "I’m so grateful to the Quinns for their visionary gift.”

Long before Brian was himself treated for a rare and serious form of cancer in the 1990s, both of the elder Quinns were involved with D-H and the Cancer Center: Allie as a member of the hospital’s Assembly of Overseers, Brian as a hospital trustee, later as chair of the Assembly of Overseers, and as a collaborator on strategic initiatives with then Cancer Center director Mark Israel, MD.

“Mark and our father were allies, and became close friends,” says Jim. “Our parents credited Mark’s leadership and the Cancer Center for another wonderful decade together, and this gift reflects their deep appreciation for Mark’s contributions to both the institution and their lives.”

Whether through teaching or philanthropy, Brian and Allie made giving a cornerstone of their lives. "Mom was a community activist," Jim recalls. "Through her volunteer work and her devotion to environmental and educational causes such as the Montshire Museum, Vital Communities, Vermont Institute of Natural Science, and the Hanover Conservancy, she made significant contributions to the Upper Valley.”

The Quinns are thrilled that the funds will be directed toward entrepreneurship and research. "It’s a perfect fit with our parents’ lifelong interest in scientific innovation," says Virginia. “Our hope is that this will also encourage other donors to jump in with their own support.”

The idea of their gift inspiring other donors fits with their parents’ philosophy as well, affirms Brad. “Whenever my mother was given credit for her community work, she would be quick to say that it took a lot of people working together to make anything happen. My parents always looked for ways to build bridges between where a need existed and where the effort to meet that need could best be made.”

From left to right: Jim Quinn, Virginia Quinn, Cancer Center director Steven Leach, MD, and Brad Quinn celebrating the Quinn family gift to Norris Cotton Cancer Center in June 2018.

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Lois and Harvey Watson
A Heartfelt Gift

By Lauren Seidman

Harvey Watson’s heart was giving him trouble again. A second aortic valve had worn out, 34 years after his first open heart surgery. He was 95 years old and needed oxygen 100 percent of the time.

Harvey and his wife, Lois, were at their winter home in Stuart, Florida. The doctors there thought it would be too risky to treat Harvey, so Lois called Hugh Hermann, MD, the physician they saw during their summers in Woodstock, Vermont. Hermann reached out to James DeVries, MD, assistant professor at the Geisel School of Medicine and director of interventional cardiology, of endovascular cardiology, and of the cardiac catheterization laboratory at Dartmouth-Hitchcock.

“Dr. DeVries phoned me and said, ‘Hugh Hermann told me about your husband. Can you get him here in five days?’” Lois, 89, recalls. “I said, ‘No, but I can get him there in 10 days.’”

“If not for Dr. DeVries and his ability, Harvey wouldn’t be here. He’s given us these three years and we enjoy every day.”
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Elizabeth Holland

It's been three years since DeVries performed the successful transcatheter aortic valve replacement (TAVR) procedure on Harvey, now 98, and the Watsons have shown their gratitude by establishing a planned gift to benefit the section of cardiology in honor of DeVries. “If not for Dr. DeVries and his ability, Harvey wouldn’t be here. He’s given us these three years and we enjoy every day,” says Lois.

Enjoying every day is what the Watsons have been doing since they met in 1982. Both of them surviving spouses—Harvey’s first wife passed away after suffering a heart attack, and Lois’s first husband lost a long battle with Hodgkin’s disease—they understand the importance of living in the moment. Former pilots, they used to fly a Piper Twin Comanche, lunching on a whim in Montreal, Bar Harbor, or Martha’s Vineyard. They also share a passion for fishing and went once a year to Canada to cast for salmon.

Today they appreciate the simpler pleasures of driving backroads in their convertible, dining out locally, and welcoming guests to their home for tea and cookies or wine and cheese. Lois kayaks with a women’s group, and Harvey likes to cut the grass on his riding mower, tend to his vegetable garden, and follow the New York Yankees.

Marveling at Harvey’s continued good health, Lois says, “I got him back.” Then she teases, “And how do you feel about me?”

“What do you mean, ‘How do I feel about you?’” Harvey says with a grin, his voice full of heart.
Since being diagnosed with cystic fibrosis as an infant, Hannah Smith has been coming regularly to the Children’s Hospital at Dartmouth-Hitchcock (CHaD) for treatment. So the 13-year-old can describe firsthand how the $2 million renovation of CHaD’s Inpatient Unit at Dartmouth-Hitchcock (D-H)—nearly $1.8 million of which was funded by philanthropy—is benefitting her and other young patients.

“The patient rooms are really cute and colorful now, and the new playroom is really nice,” says the eighth grader from Lancaster, New Hampshire. She also appreciates that each pod of patient rooms now has its own nursing station. “Before, the nurses were all in the middle, so if the kids or parents needed to ask for anything there wasn’t a lot of privacy. Now the nurses are right there and they can see into your room if you need something.”

“This renovation has enabled us to flexibly meet the needs of patients at all levels of acuity in a single setting.”

A child life specialist assists two young CHaD patients.
The new play room in CHaD’s Inpatient Unit features rubberized flooring and improved storage for toys and art supplies.

The redesigned space brings together CHaD’s Pediatric Intensive Care Unit (PICU) from the third floor and Pediatric/Adolescent Unit on the fifth floor. This enables clinicians to provide all levels of care in a single area, decreasing the need for patient transfer moves.

“This renovation has enabled us to flexibly meet the needs of patients at all levels of acuity in a single setting,” says Keith J. Loud, MD, MSc, FAAP, chair of pediatrics and CHaD physician-in-chief. “It positions us for ongoing improvements that allow for more integrated care and collaboration between physicians and nursing teams.” Bringing the two units together has also resulted in more efficient use of resources, notes Loud.

The renovation took two years to complete and was the largest remodel undertaken by DH’s engineering staff since the medical center opened in Lebanon in 1991. “Nothing is the same up there,” says Engineering Services’ construction project manager Eugene Plummer, whose crew was putting the final touches on the unit’s new family lounge in late August.

Other improvements include rubberized flooring that is easier to clean and more comfortable for staff who spend many hours on their feet and a secure, central location for medication and nutritional supplies. Generous gifts from individuals, corporations, and the CHaD HERO funded 90 percent of the project cost.

Hannah’s mother, Jessica Smith, appreciates how the renovation has made families’ lives easier. “We’re pretty independent since Hannah has been coming here for so long, but now it’s easier to grab things like fresh linens or an extra blanket from an alcove near the kitchen. And the kitchen is really nice and in a central location that is great for socializing. It’s been a good change for us and other families in terms of convenience. But the one thing the renovation hasn’t changed is that the nurses are still amazing!”

Generous gifts from individuals, corporations, and the CHaD HERO funded 90 percent of the project cost.
CYN BARRETTE
A Champion for Integrative Medicine

By Tom Haushalter

“Evidence-based integrative medicine can benefit everyone—people who are healthy and want to stay healthy, and patients with chronic conditions. Cyn has been a true champion of this type of personalized, patient-centered care and instrumental in helping us to bring it to Dartmouth-Hitchcock.”
Cyn Barrette knocks on wood. Aside from some occasional neck and hip pain, she's been generally healthy for most of her life. Yet, she says, only in recent years has she come to fully appreciate what it means to be responsible for her overall health and well-being. It's a discovery she's eager to share with others.

Four years ago, Barrette became a patient of Louis A. Kazal, Jr., MD, a family physician at Dartmouth-Hitchcock (D-H) and an associate professor at the Geisel School of Medicine and of The Dartmouth Institute for Health Policy and Clinical Practice. She'd heard about Kazal's comprehensive approach to primary care and his interest in creating a program that combines primary care and integrative medicine.

"I found in Dr. Kazal someone who would work with me the way I wanted to be worked with," Barrette says, "and we have explored many alternative ways to help me feel energetic and happy and healthy as much of the time as possible.

Barrette's deepening belief in Kazal's philosophy and practice grew into a shared sense of emphasis on the patient-clinician partnership. "Evidence-based integrative medicine can benefit everyone—people who are healthy and want to stay healthy, and patients with chronic conditions," says Kazal. "Cyn has been a true champion of this type of personalized, patient-centered care and instrumental in helping us to bring it to Dartmouth-Hitchcock."

As Kazal and his team work with D-H leadership to develop this program, Barrette stands poised both to continue her support and to encourage others in the community to lend theirs.
Attending to the Needs of Vulnerable Patients

by Tom Haushalter

Janet Carroll never imagined her career in nursing would lead her to be doing the specialized work she does now. But while employed at another hospital years ago, she says, “We had a patient who had been terribly sexually assaulted, and I didn’t feel that anyone was able to give her the one-on-one care that she needed.”

Carroll recalls that the physician treating the patient was able to spend only 10 or 15 minutes with her, which included everything from consultation to evidence collection. “And I thought, we need to do better for these folks.”

Since 2006, Carroll has served as clinical coordinator for Dartmouth-Hitchcock’s (D-H’s) sexual assault nurse examiner program (SANE). Made up of a group of specially trained nurses, the program provides comprehensive medical and forensic evaluations to patients who have experienced violence such as sexual assault, intimate partner violence, and elder abuse.

A recent grant from an anonymous family foundation has supported the training, certification, and hiring of additional nurses into D-H’s SANE program. The gift underscores the need to invest in specialized and continuing education for nurses, so that all patients get the particular care they need.

“The grant has helped us hire new nurses much more quickly than we would have been able to without it,” says Carroll. Since 2017, seven nurses joined D-H’s SANE team, and funds from the grant covered the costs of their certification process, including a 64-hour training course, hands-on clinical simulations, and an extensive orientation period.

Carroll and her team feel empowered by the funder’s acknowledgment of the attentive, compassionate care they provide to this uniquely vulnerable population. “When a SANE nurse goes in to see a patient,” she says, “it’s generally three or more hours of one-on-one time.”

While the grant has helped D-H increase the number of SANE staff, Carroll hopes for additional funding to make ongoing nurse training possible, to allow for the purchase of state-of-the-art equipment for forensic documentation, and to hire even more staff, especially as the caseload continues to grow. “There’s a constant need for more SANE nurses in this very intense, important work.”
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Supporting Students
Making Dreams Possible

By Jennifer Durgin

For Tlalli-Aztlan “Tlalli” Moya-Smith, a confluence of personal interests and passions, all rooted in her family history, has made Geisel a perfect fit.

“My grandfather was a bracero, or farm worker,” she explains. “And my father and mother actually met doing farm worker aid in Texas.” Growing up in a Mexican-American family with parents committed to improving the lives of others, Moya-Smith knew she too wanted to pursue a career of service to people in need. But she also loved science.

“Medicine just combined all of that into one,” she says. She’d seen firsthand the effects of rural poverty on the health of people in Latino communities. “I found out that Dartmouth had these really great programs for rural communities, and I knew I wanted to be a part of that.”

Now in her third-year at Geisel, scholarship support is making her medical education possible. Every year, Geisel distributes millions of dollars in need-based scholarships thanks to the generosity of current and past donors. Scholarship endowments enable Geisel to attract the best students, year after year, regardless of their ability to pay and to help students stay focused on their passions, not their debt. Through the Interaction campaign, Geisel aims to raise an additional $20 million in scholarship funds to reduce the educational debt burden of its students. Even with the maximum available scholarships, Moya-Smith expects to graduate with a medical school debt of almost $200,000.

“That’s daunting,” she admits. But mostly, she feels grateful. “Donors whom I’ve never met are instrumental in my life. For that, I want to say thank you from the bottom of my heart.”

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At Dartmouth’s Geisel School of Medicine, we believe the best ideas arise through interaction—interaction between creative minds and diverse disciplines.

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“Whenever my mother was given credit for her community work, she would be quick to say that it took a lot of people working together to make anything happen.”

—Brad Quinn

The generosity of donors like the late Allie and Brian Quinn fuels innovations in research and patient care. Read more on page 22.