Yale School of Medicine adapts to the COVID-19 pandemic

YSM's clinical, scientific, and educational efforts all overcame major challenges

The COVID-19 outbreak forced the Yale medical community to remake clinical care, research, and education at almost unimaginable speed. Doctors and nurses played new and unfamiliar roles; patients were moved between hospitals or cared for by video link. Surgeries were postponed and labs closed. Methods of educating students changed significantly, and some researchers turned on a dime to study the disease. And everyone Zoomed—a lot.

It was trial by fire for Nancy J. Brown, MD, the Jean and David W. Wallace Dean of Medicine and C.N.H. Long Professor of Internal Medicine, whose job began in February. “There’s nothing like a good crisis to help you learn an institution quickly,” Brown said. What has impressed her most about her new school? “How committed and generous our faculty and staff have been, how willing to pitch in, how collaborative they are,” she said. “It’s been really a pleasure to see people rise to the occasion.”

THE CLINICAL RESPONSE

On March 13, the first COVID-19 patient was admitted to Yale New Haven Hospital while the Department of Internal Medicine had already been preparing for a month, led by its chair Gary V. Desir, MD, Paul B. Beeson Professor of Medicine. Beginning in mid-March, elective procedures were postponed across the health system, freeing 700 inpatient beds. The

A vigorous recovery, and appreciation

After delicate brain cancer surgery, a grateful patient generously supports Yale

“Yale has taken me full circle,” says pediatrician Susan Beris, MD. “My professional life began here when I did my residency training.” After that came a thriving private practice in western Connecticut. But then, she says, “two years ago I returned, this time as a patient with a brain tumor.” Beris says she is grateful both to “a fantastic team of physicians” and to Yale for the intricate surgery she received and the strong recovery she has made.

Beris believes in giving back. To that end, she has pledged a generous portion of her estate to Yale School of Medicine, to be shared by the departments of Neurosurgery and Pediatrics. The funds will be directed to the Susan Beris, MD, Fund for the Yale Brain Tumor Surgery Program and the Susan Beris, MD, Fund for the Pediatric Residency Program. This gift follows others she has made to support the brain tumor surgery program.

“I don’t think I was ever a philanthropic person until now,” she says, “But surviving a brain tumor, your perspective changes. I thought, ‘Let me put my money to good use.’” Two passions have

Donors step up to help YSM respond to COVID-19 needs

Since the early stages of the pandemic, the Yale community has acted quickly and generously to support the university’s response to the COVID-19 crisis, with many individuals and groups coming forward to contribute not only with funds, but with vital supplies. Now that the coronavirus has become an enduring, and evolving, threat to public health, many continue to support the sustained action that Yale must take to combat the virus in New Haven, and around the world.

“This is the worst enemy the world has faced in 70 years, and it is ruthless,” said entrepreneur Jonathan Rothberg, MPhil ’87, MS ’87, PhD ’91, as the emergency was beginning early in the spring. “But we know the enemy, and we can defeat it by supporting each other in our generation’s finest hour,” said Rothberg, a scientist and founder of multiple life science and medical device companies that include

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Philanthropist Karen Pritzker funds research to benefit members of what she calls “the world’s largest secret fraternity.”

8 Elections to major societies

Two YSM faculty members were elected to the National Academy of Medicine, and two others named to the AAAS.

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A singleminded pursuit of science

Meticulous preparation leads to investigation of what makes us human

Few pivotal life moments can be traced to a single letter. But Nenad Sestan, MD, PhD, Harvey and Kate Cushing Professor of Neuroscience, and professor of comparative medicine, of genetics, and of psychiatry, vividly remembers flipping the thin pages of a medical encyclopedia set that his mother bought him during grade school. He arrived at the letter ‘M’ for mozak, or brain, in his native Croatian.

Through that exercise, Sestan learned by heart the names of important neuroscientists around the world, including those he would later meet at Yale.

With his university largely spared from the Yugoslav wars, Sestan continued lab experiments after his mentor became Croatia’s vice president. “The biggest thing at the time was the Nobel Prize discovery of nitric oxide as a signaling molecule,” Sestan says, describing how he examined human brain samples for the enzyme that makes nitric oxide. He found it, but sat on the findings; he wanted to determine if other species expressed this same gene in the cerebral cortex region of their brains. (That question would not be settled until Kenneth Kwan, a graduate student in Sestan’s lab, finally completed the study, and the lab published in 2012, that this process is very species-specific, and greatly dependent on when during development the enzyme is expressed.)

In 1994, Sestan applied for a doctoral degree at Yale. “This was the Mecca if you wanted to study the cerebral cortex, the outside part of the brain that processes our senses, commands motor activity, and helps us perform higher-order cognitive functions like language,” he says. He lists his important mentors—whose names he recognized from reading those reprints—who were, and still are, in Yale’s neuroscience department: Amy Arnsten, PhD, Albert E. Kent Professor of Neuroscience and professor of psychology; Michael Schwartz, PhD, associate professor of neuroscience and associate dean for curriculum; and Gordon Shepherd, MD, professor emeritus of neuroscience. Sestan enlisted Pako Racić, MD, PhD, Dorys McConnell Duberg Professor of Neuroscience and professor of neuropsychology, as his PhD adviser. He knew he also needed to understand genetics and molecular biology. Sestan asked Spyros Artavasos Tsakonas, PhD, now professor emeritus of cell biology at Harvard Medical School, to co-advice him. In 2002, at age 31, Sestan became an assistant professor at Yale.

His research has focused primarily on how certain genes control the ability of neurons to acquire distinct identities and form proper connections—collectively called the connectome—in the developing cerebral cortex. “The connections that connect different parts of the cortex, and the cortex with the rest of the central nervous system, I think are key,” Sestan says. He compares the connectome to the Internet’s ability to revolutionize how information is shared without changing the information itself. Sestan and his lab members focus on pyramidal cells, which make long connections originating in the brain’s cortex area.

While following this path, Sestan and his team also took a bit of a detour to find out if they could trace neuronal connections in postmortem brain tissue. Using a perfusion technology they invented, called BrainEX, and a unique liquid that made it work, they restored circulation and some neuronal function in the brains of pigs that had been dead for several hours. They reported their results in Nature in April 2019. Meanwhile, Sestan continues his primary work uncovering how connections in the human brain differ from those in other species.

“I want to understand what makes us human. No animal can write poetry,” Sestan says. “If I find out what makes us human, I would die a happy scientist.”

Hall arrives to take charge of the Yale Center for Genomic Health

The Yale Center for Genomic Health, founded in 2018 as the home of Generations, a comprehensive DNA sequencing project, has entered a new phase with the recruitment of Ira Hall.

M. Hall, PhD, an expert in human genome sequencing and integrative data science, as the center’s director. Hall comes to Yale from Washington University in St. Louis.

The center under Hall’s leadership will have goals that include creating and leading studies of human genome variation and disease; enhancing the university’s abilities in computational genomics, bioinformatics, and data science; and leading efforts at Yale to implement genomics in health care. According to Hall, the clinical component of the center’s work will emphasize making health care delivery more equitable.

Yale University has been designated by The Hartwell Foundation as a Top Ten Center of Biomedical Research for 2020, garnering this distinction for its strengths in child health research in alignment with the foundation’s philanthropic mission.

As a Top Ten Center, Yale will have the opportunity to submit an increased number of applications to The Hartwell Foundation’s Individual Biomedical Research Award program, which supports early-stage, innovative, and cross-disciplinary biomedical research with the potential to benefit children in the U.S.

“The Hartwell Foundation’s support of innovative research with the potential to benefit children stands out among philanthropic organizations,” said Nancy J. Brown, MD, the Jean and David W. Wallace Dean of Yale School of Medicine and C.N.H. Long Professor of Internal Medicine.

“I am grateful for this recognition of Yale’s excellence in this area and look forward to seeing continued impacts made by those supported by The Hartwell Foundation.”

The designation comes after 10 years of continuous participation by Yale in the foundation’s awards process, through which Yale has won eight Individual Biomedical Research Awards and received five postdoctoral fellowships. The most recent Yale awardee was Richard Pierce, MD, assistant professor of pediatrics (critical care), in 2019.

Yale school of medicine

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When patients need a vascular graft, as during heart bypass surgery, surgeons often use blood vessels from elsewhere in the body, but these are not always available.

As an alternative, Yale researchers led by Yibing Qyang, PhD, associate professor of medicine (cardiology) and of pathology, are developing grafts in the lab using human-induced pluripotent stem cells differentiated into smooth muscle cells, which are then seeded onto tube-shaped scaffolds and grown into blood vessels in a bioenvironment.

In the past, vessels generated this way were weak and often swelled. To generate stronger vessels, Qyang and colleagues applied surges of radial pressure to the developing vessels, stretching them as if they were pulsing with blood. When grafted onto the aortas of rats, as reported in Cell aortas of rats, as reported in Nature Biotechnology, the engineered vessels made bloating and proved nearly as strong as vessels generated this way in the lab using human-induced pluripotent stem cells. Additional blood vessels made this way were transferred one by one via aorto-bypass techniques and the flow of the patient’s blood was smoothly restored, according to Dr. Qyang, who was the first to use this methodology.

IVIM is a non-invasive imaging tool that allows the estimation of diffusion characteristics of various tissues. Diffusion-weighted imaging (DWI) and diffusion tensor imaging (DTI) are two key techniques used in IVIM. DWI measures the apparent diffusion coefficient (ADC), which reflects the mobility of water molecules within the tissue. DTI, on the other hand, provides information about the directionality of water diffusion, which is particularly useful in studying fibrous tissues.

In a study published in the Journal of Magnetic Resonance Imaging, researchers used IVIM to analyze the diffusion characteristics of the brain in patients with multiple sclerosis (MS). They found that the IVIM parameters, including the ADC and the fractional anisotropy (FA), were significantly different in the white matter of MS patients compared to healthy controls. These findings suggest that IVIM can be a valuable tool for the non-invasive assessment of tissue integrity in MS and other diseases.

In another study, IVIM was used to evaluate the effects of a new drug on the brain of patients with Alzheimer’s disease. The investigators observed changes in the IVIM parameters that correlated with the degree of clinical improvement, indicating that IVIM can provide a valuable biomarker for monitoring the effectiveness of new treatments.

The results of these studies highlight the potential of IVIM as a non-invasive imaging tool for the assessment of tissue integrity and the evaluation of treatment efficacy in various neurological disorders. Further research is needed to validate these findings and to explore the use of IVIM in the diagnosis and management of neurological conditions.
November 7, 2019 The Yale Child Study Center Associates Annual Meeting convened in the Yale Child Study Center (YCSC) and was followed by a reception in Harkness Ballroom. The focus of the 2019 meeting was development across the lifespan. 1. From left, Cary A. Koplin YC’66, Linda C. Mayes, MD, director of YCSC, Arnold Gesell Professor of Child Psychiatry and deputy dean for professionalism and leadership, Office of the Dean; and Thomas C. Israal YC’66, chairman and CEO, Ingleside Capital Co., Inc. 2. From left, Andrew Klingenstein YC’80, president of Klingenstein Philanthropies; Caroline Simmons, senior specialist for policy innovation and impact at Elevate; Megan Smith, DrPh, MPH, associate professor of psychiatry and in the Child Study Center; and Elliot Brenner, PhD ’95, executive director of Klingenstein Philanthropies.

November 21, 2019 A Celebrity Fundraiser Breakfast at the Italian Club of Stamford featured Brian Cashman, general manager for the New York Yankees, as keynote speaker for Yale Eye Center’s annual fundraiser, where $93,000 was raised. From left, Bobby Valentine, legendary baseball player and manager; Brian Cashman, general manager of the New York Yankees; Lucian V. Del Priore, MD, PhD, chair and Robert R. Young Professor of Ophthalmology and Visual Science; and Gene Rubino, chair, Yale Eye Center Advisory Board.

November 20, 2019 At an Innovations and Discoveries on the Horizon Dinner held at the Boyer Center, faculty and researchers from the medical school, including Hugh S. Taylor, MD, Elena Ratner, MD, and Alessandro Santin, MD gave presentations on the theme of “Medical Advancements for Women” to prospective donors. From left, Caroline C. Herrick: Hugh S. Taylor, MD, chair and Anita O’Keefe Young Professor of Obstetrics, Gynecology, and Reproductive Sciences; and Theodore D. Sands YC’67.

January 12, 2020 At a Yale Reception held at the 38th Annual JP Morgan Healthcare Conference in San Francisco, Roy S. Herbst, MD, PhD, Ensign Professor of Medicine (Medical Oncology) and chief of medical oncology at Yale Cancer Center; and Stephanie Double, director of shared interest groups with the Yale Alumni Association, greet attendees at the start of the event.

February 19, 2020 More than 40 medical school alumni and friends gathered for a Yale Medicine Discovers Symposium in Palm Beach, Fla, to hear presentations by Matthew Ellman, MD, professor of medicine and director of Yale Internal Medicine Associates; David A. Hafler, MD, chair and William S. and Los Stiles Edgery Professor of Neurology; Roy S. Herbst, MD, PhD, Ensign Professor of Medicine (Medical Oncology); David J. Leffell, MD, David P Smith Professor of Dermatology; Elena Ratner, MD, associate professor of obstetrics, gynecology, and reproductive sciences; and Peter G. Schulam, MD, PhD, then chair of the Department of Urology.

1. Beach, a neurosurgeon at Yale who operates on Beris, says Moliterno. “We have excellent results with this type of surgery in our hands, using a well-designed protocol that includes a highly specialized team of neurophysiologists and neuroanesthesiologists, as well as intraoperative imaging. We can be as aggressive surgically as is safely possible, which is important in this disease.”

While the notion of awake brain surgery strikes fear in the hearts of many, Beris was in all when she learned that it offered the best chance of removing the tumor while preserving motor function. The procedure was successful, with all of the tumor removed and Beris maintaining her strength. She experienced no pain or anxiety and she made a quick recovery. She went home two days after surgery and just one month later, she completed a 10K run, a fundraiser for the Connecticut Brain Tumor Association.

Few patients with glioblastoma survive for two years beyond surgery and Beris is happy to be one of them. Her health intact, she is focused on philanthropy. “Thinking about all I’ve been given, I wanted to support this program,” she explains. “Other brain tumor patients should have access to the same excellent care I had.”

“I am so happy with how well Susie has done and beyond grateful for her incredibly generous gift,” says Moliterno. “We’ll use these funds to support a series of educational programs for patients and the medical community, informing them about the exceptional care Yale has to offer.”

One such event is the Susan Beris, MD, Brain Tumor Symposium, tentatively scheduled for spring 2021 if COVID-19 restrictions permit, with smaller continuing medical education seminars in the interim. The Department of Pediatrics plans to use its gift to support residency training. “It will enable us to provide enhanced educational experiences designed to enhance critical thinking skills for our residents,” says Clifford W. Bogue, MD, chair, and Waldemar Von Zedtwitz Professor of Pediatrics. “The fund may also support our resident education tracks where residents receive focused educational experiences in areas such as advocacy, quality improvement, medical education, child health research, and global health.” Bogue adds, “Susie Beris is an incredibly positive force for good, and Yale Pediatrics is very proud to call her one of our own.”
**RNA molecule seeks out resilient tumors**

Because many viruses have RNA genomes, the immune system has developed systems for detecting and attacking foreign RNA. Yale researchers have exploited this system to set the immune system on cancer, as reported in the Journal of Experimental Medicine.

Researchers, led by Akiko Iwasaki, PhD, Waldemar Von Zedtwitz Professor of Immunobiology and professor of molecular, cellular and developmental biology, and Anna Marie Pyle, PhD, Sterling Professor of Molecular, Cellular, and Developmental Biology and professor of chemistry, induced melanoma growth in mice, then injected the tumors with a solution of an RNA molecule called SL14. The RNA injection slowed tumor growth, increased survival, and boosted the effects of an immunotherapy drug. Current immunotherapies, which ramp up the immune response, can only kill tumors that stimulate an immune response in the first place. Accordingly, immunotherapies do not work for many tumors, Iwasaki says. Pall, and colleagues found that SL14 injection stimulated immune responses against what are usually non-immunogenic tumors, perhaps making them more immunogenic.

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**Dyslexia center receives Pritzker gift**

The funding supports an effort to study the course of dyslexia over a lifetime

“If you have dyslexia,” says Karen Pritzker, a filmmaker and philanthropist, “you are part of one of the world’s largest secret fraternities.” Dyslexia affects one in five Americans, including Pritzker. It is an unseen challenge which results in difficulty reading for people who otherwise have the intelligence to be much better readers. “There is a lot of people who don’t talk about it, struggle, and deal with it every day.”

Through her recent gift to Yale Center for Dyslexia & Creativity, Pritzker aims to shed light on the challenges of people with dyslexia. It forms part of her long-standing support of the center’s founders and co-directors, Bennett Shaywitz, MD, Charles and Helen Schwab Professor of Pediatrics (Neurology); and Sally Shaywitz, MD, Audrey G. Ratter Professor of Pediatrics (Neurology). The Shaywitzes, both elected members of the National Academy of Medicine, are leaders in dyslexia research who have been featured in the science section of the New York Times and awarded the 2019 Genius Award from the Liberty Science Center for their contributions to understanding dyslexia. “The center has illuminated both the positives and the unexpected of dyslexia, as well as the understanding of what interventions are most helpful to the members of this secret society of which my father was a part, as I and three of my children,” says Pritzker.

The Shaywitzes conduct the groundbreaking Connecticut Longitudinal Study, which they began in 1983 to follow an epidemiologic sample survey of 445 kindergarteners, and continued through high school graduation and beyond to their current age of 42.

The study is responsible for major breakthroughs in the understanding of dyslexia. Before their study, dyslexia was thought to only affect boys, which their data have proven untrue. “When we saw that, we said, ‘we have to take action,’” says Sally Shaywitz. The Shaywitz DyslexiaScreen early screening test is an efficient, evidence-based test for children in K-3. The Shaywitzes also developed a screening test for adolescents and adults.

“This gift allows the Shaywitzes to answer a lot of big questions, and provide for insight into how dyslexia affects people at every stage and age,” says Pritzker. Today, the Shaywitzes are following up on the study’s now-adult subjects. “We are looking to connect outcomes to pedigrees,” Sally Shaywitz says, which is possible because of the long timeline of their data. “We want to understand not only the consequences, but the factors that exacerbate or ameliorate the outcomes. We will be in the extraordinary position to act on the knowledge to the immediate benefit of people with dyslexia.

This means not only outlining the challenges of people with dyslexia, but also revealing their hidden strengths which are captured in their sea of strengths model of dyslexia. “They read more slowly but comprehend at a high level,” Sally Shaywitz says. “From a longitudinal perspective, we are trying to develop insights that can be helpful early on, but also to have everyone know you can be dyslexic and be highly intelligent.”

This understanding can lead parents and schools to recognize dyslexic children and help them reach their full potential, say the Shaywitzes. “We always want new knowledge, but in the case of dyslexia, we have sufficient knowledge to move forward,” says Sally Shaywitz. “We must bring 21st century science together with education. We must and we will.”

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**Donors (page 1)**

Butterfly Net-work, the maker of the world’s first handheld whole-body ultrasound scanner. He and his wife, Bonnie E. Gould Rothberg, MD ’94, PhD ’09, MPH ’05, FACP, an oncology hospitalist working on the frontlines of patient care at Smilow Cancer Hospital during the pandemic, were early contributors to Yale’s effort to address the pandemic with a $2 million gift in April. The gift has aided Yale’s ongoing clinical and research response to the coronavirus emergency.

The Ludwig Family Foundation also made a substantial early gift to fund investigators at Yale School of Medicine working on vaccines to prevent future outbreaks, as well as treatments for people who already are infected.

“Given the time pressure to find treatments and ultimately prevent COVID-19-related deaths, we are aware that a wave of developing vaccines to prevent future outbreaks, as well as treatments for people who already are infected.”

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Sally Shaywitz (left) and Bennett Shaywitz will use a gift from philanthropist Karen Pritzker to delve more deeply into dyslexia. Those affected by dyslexia are what Pritzker calls “one of the world’s largest secret fraternities.”
In early March, researchers on the medical campus founded a laboratory working group that came to be known as IMPACT (Implementing Medical and Public Health Action against Coronavirus). It was headed by Albert Ko, MD, professor and chair of epidemiology (microbial diseases) at the School of Public Health, and professor of medicine (infectious diseases). The group began to test patient samples for the coronavirus, characterize the virus, and map the human immune response.

“In our work at Yale, we had a giant head start” because of a preexisting collaboration between Ko and Akiko Iwasaki, PhD, in the Department of Immunobiology, “said Ruth R. Montgomery, PhD, professor of medicine and of epidemiology (microbial diseases); director of the Yale C/TOP Facility; and associate dean for scientific affairs.

“Because Albert is a real live epidemiologist and had very recently been through the Zika epidemic in Brazil, he knows how to handle an outbreak,” Montgomery said. “They just jumped fast.”

Montgomery’s own lab made a “natural pivot” to COVID-19, she said, since she studies human responses to viruses. Using high-throughput technology and advanced computational analysis, she began to study the proteins produced by COVID-infected airway cells.

Testing was an urgent problem, and Yale’s Department of Laboratory Medicine rose to the challenge. In late February, Marie-Louise Landry, MD, MPH, professor of medicine (occupational medicine) and of epidemiology; and medical director, occupational medicine and of immunology and medical director of the Immune Monitoring Core Facility. Wilen studies when the virus infects airway cells, how it compares to other lethal coronaviruses, and which human genes permit infection.

Though some federal grants became available, funding was, for many, a scramble. Discretionary departmental and medical school funds covered some expenses, while private donors stepped up to pay for others. Wilen’s experiments required that he upgrade some equipment in Yale’s small pathology lab. Thanks in part to alumni, Dean Brown came up with funding the day he was diagnosed with COVID-19.

Many other researchers studied the pandemic from home offices. Kaplan, for example, created computer mathematical models to predict the course of the local outbreak; his results helped inform the university’s decisions about re-opening.

Summer was the time when clinical trials to evaluate the safety and efficacy of COVID-19 vaccines proceeded in earnest. Led by principal investigator Onyema Ogbuagu, MBChB, associate professor of medicine, Yale ran clinical trials for the mRNA vaccine developed by Pfizer and Germany’s BioNTech. Efforts by Ogbuagu and colleagues, and those who volunteered for the trials, helped establish a 95% efficacy rate for the vaccine and a strong safety profile. On December 11, the Food and Drug Administration gave emergency use authorization to the vaccine, and three days later vaccinations began in New Haven and other locations around the country. Ogbuagu said he was thrilled to be one of the first recipients. “You study a drug, you find it out works, and then you become one of the first people to receive it yourself and experiencing the benefit.”

TESTING/SCREENING/SAFETY

As early as January 2020, the Yale New Haven Health System began laying in extra supplies of PPE. In February, it began buying them from the industrial sector. New protocols reduced the rate at which PPE was used up and discarded, but the need to conserve it grew so extraordinary that it contributed to hals in elective surgeries and student clerkships.

With most operations in her department postponed for the duration, Lisa L. Lattanza, MD, professor and chair of the Department of Laboratory Medicine and of Epidemiology at Yale, had to close as part of a university-wide safety protocol, a situation that made her feel useless.

“I had slated that time to do lab work. Then not only was I not on the floor seeing patients, but I wasn’t doing research,” Desruisseaux said.

When she learned the U.S. Food and Drug Administration (FDA) was authorizing emergency access to convalescent plasma for COVID-19 patients, she signed on as a principal investigator for a clinical safety study. “It was too therapeutic to do this,” she said. “I did feel like I was actually doing something to help.”

Desruisseaux was in the majority of research labs across the university that were forced to close because of the need for physical distancing.

“Obviously in a research lab, you’ve got lots of people crowded around,” Smith said. “All of that came to a halt.”

Some labs were able to change course to study COVID-19. In fact, the pandemic seeded an extraordinary opportunity for researchers studying immune responses to the virus.

“Iwasaki, the Waldemar von Zedtwitz Professor of Immunobiology and Molecular Cellular and Developmental Biology; and Howard Hughes Medical Institute investigator, formed numerous collaborations to study the human immune response to the virus, including with Ko, Grubaugh, and Craig B. Wilen, MD, PhD, assistant professor of laboratory medicine and of immunobiology and medical director of the Immune Monitoring Core Facility. Wilen studies when the virus infects airway cells, how it compares to other lethal coronaviruses, and which human genes permit infection.

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Though some federal grants became available, funding was, for many, a scramble. Discretionary departmental and medical school funds covered some expenses, while private donors stepped up to pay for others. Wilen’s experiments required that he upgrade some equipment in Yale’s small pathology lab. Thanks in part to alumni, Dean Brown came up with funding the day he was diagnosed with COVID-19, the medical director of corporate supply chain for YNHHS. Kenney led a team including Richard A. Martinello, MD, associate professor of pediatrics and of medicine (infectious diseases), and medical director, infection prevention; Mark Russi, MD, MPH, professor of medicine (occupational medicine) and of epidemiology (environmental health); and Ben Chan, PhD, research scientist. They demonstrated that vitamin C, which contains the enzyme peroxide is able to eliminate virus on respirators. A reprocessing facility was rapidly built with the capacity to reprocess more than 200,000 respirators a day. Kenney also worked with Connecticut cut manufacturers of surgical goods and other companies to repurpose their plants to create masks, face shields, and gowns.

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Pandemic has been eroded," Brown wrote the you with meaningful educational Dean Brown and Richard Belitsky, unfortunately, many lectures were already Schwartz, PhD, associate professor ing in the online tools, said Michael a week, faculty and the Office of Edu - students not to return to campus education from home asked during the crisis to provide in- YNHHS Supply Chain, Kenney was made up for lost time with acceler- sume on July 6. Preclinical students and bringing students back to the campus. On April 29, at last, more patients inpatients across the health system. On April 21, COVID-19 admis- sions peaked, with a census of 791 students found additional ways beyond 112. I hope I never see another China's sudden cutoff of the drug letrozole (Femara). We can try to plan ahead, but it is challenging with so much unknown.” Desir said teams needed to be “flexible and resil- ient” during the pandemic. “We were so successful, people began to think about the possibilities and new ways of doing things. It was amazing to see people rise to the challenge,” Desir added. “It’s just amazing, how much people are willing to give, how committed they are to the mission.” Zampano, who spent 16 years caring only for gynecologic oncology patients, staffed an end-of-life care unit for the first time during the pande- mic, as well as a COVID-19 rapid evaluation clinic. The pandemic was awful, she said. “I’ve had my share of tears. I hope I never see another pandemic in my lifetime.” But, she added, her glass is half full. “I’ve worked with some unbe- lievable people. The camaraderie that has come out of this and the ability to be there for people has been amazing,” Zampano said, “I wouldn’t consider myself a flexible person. I’m a nest- builder. And I have flown out of my nest beyond anything I thought I would ever do.” Brown reflected that they were able to do what we did—it was really extraor- dinary,” Desir said. “The entire sys- tem came together really quickly to make major, major changes. The idea of one team really came together.” // Pandemic (page 6) a roughly 90% reduction in respiratory burn on a per patient basis compared to baseline. Based on the successful efforts of YNHH Supply Chain, Kenney was asked during the crisis to provide in- formation and advice to Visient mem- bership, the U.S. Defense Logistics Agency, the World Bank, and FEMA. EDUCATION FROM HOME On March 11, the university asked students not to return to campus after spring break, announcing that classes would resume online. Within a week, faculty and the Office of Edu- cation launched online learning experiences for medical and physician assistant students—a “heroic” effort requiring intensive faculty train- ing in the online tools, said Michael Schwartz, PhD, associate professor of neuroscience; director of medical studies in neuroscience; and associate dean for curriculum in the School of Medicine’s Office of Education. For- tunately, many lectures were already available by video or podcast. “More disappointing and disrup- tive news came on March 16. Post- poned procedures and the need to conserve PPE and limit the number of people at patients’ bedside led Drs. Brown and Richard Belitsky, the Harold W.-Jockers Associ- ate Professor of Medical Education, associate professor of psychiatry, and deputy dean for education, to cancel clinical clerkships and electives, fol- lowed by nearly all off-campus rotations on March 28. “Our ability to provide you with meaningful educational experiences during your clerkships has been eroded,” Brown wrote the students in an open letter. “You can imagine the angst that the students are going through that need these [clerkships and subin- ternships] for graduate residency matching,” Schwartz said. Though the problem isn’t new, which led the Association of American Medical Colleges to discourage away rotations and recommend virtual interviews, that was small consolation, he said: “While the environment has changed for most everyone in medicine, it doesn’t make the student feel good.” Under Schwartz’s leadership, faculty, students, and the Medical Education staff quickly created six new electives, particularly valuable at students whose rotations and subinternships were on hold. In one, students practiced management of acute disease processes through virtual case scenario simulation; another covered research methods, focusing on critically appraising literature about COVID-19, which often has not been peer reviewed. Two explored the pandemic through interdisciplinary lenses and two allowed students to join clinical teams through telehealth. While sheltering at home, stu- dents found additional ways beyond electives to help with the pandemic effort. Some helped set up COVID-19 related clinical studies. Others as- sisted clinical teams by performing literature searches or calling patients for follow-up. In addition, many took it upon themselves to be as positive as possible for the New Haven community in need. Second Look Weekend, Match Day celebrations, Medical Education Day, and Commencement were suc- cessfully moved online. REOPENING On April 21, COVID-19 admis- sions peaked, with a census of 791 inpatients across the health system. On April 29, at last, more patients were being discharged than admi- tted. It was time to discuss reopening laboratories and childcare, resuming clinical trials and elective procedures, and bringing students back to the wards. Some clinical electives and subinternships resumed in late May, and clerkship clinical rotations re- sumed on July 6. Preclinical students made up for lost time with acceler- ated courses. Some COVID-19-related changes are likely to become the new normal, such as telehealth. “I don’t think the patients or the doctors want to go back” to mostly in-person visits, said outgoing uro- logy chair Peter Schulam, MD, PhD, who spent much of the pandemic working on COVID-19 testing pro- tocols in his role as chief innovation and transformation officer at YNHH. “It’s just amazing, how much people are willing to give, how committed they are to the mission.” Zampano, who spent 16 years caring only for gynecologic oncology patients, staffed an end-of-life care unit for the first time during the pande- mic, as well as a COVID-19 rapid evaluation clinic. The pandemic was awful, she said. “I’ve had my share of tears. I hope I never see another pandemic in my lifetime.” But, she added, her glass is half full. “I’ve worked with some unbe- lievable people. 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Immediate relief from symptoms after taking the anesthetic ketamine. In 2019, the Food and Drug Administration approved a new antidepressant, esketamine, that is now available by prescription. Esketamine is a nasal spray form of ketamine that has been and continues to be an incredible home for translational neuroscience,” Krystal said. “There were very few other places in the world where we could have conducted our research.”

Shaywitz, co-director of the Yale Center for Dyslexia & Creativity, is being honored for his distinguished contributions to the public’s understanding of the biological basis and natural history of dyslexia and communicating these discover-ies to the public. In addition to publishing more than 350 scientific publications with Bennett Shaywitz, MD, Charles and Helen Schwab Professor of Pediatrics (Neurology), she is author of the book “Overcoming Dyslexia,” which has transformed people’s understanding of dyslexia and provided practical approaches and specific interventions for parents and educators.

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