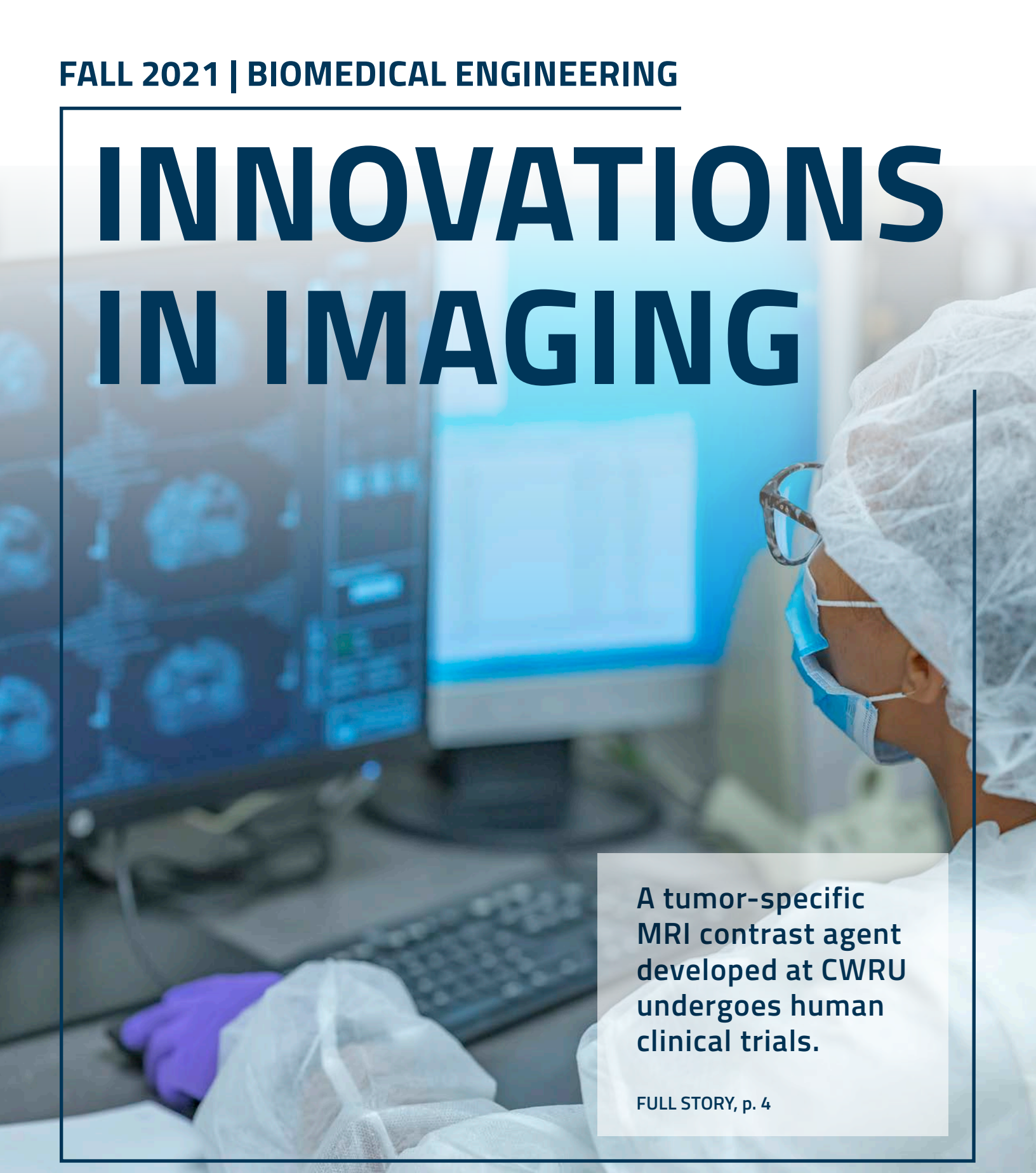


INNOVATIONS IN IMAGING



A tumor-specific MRI contrast agent developed at CWRU undergoes human clinical trials.

FULL STORY, p. 4

The Biomedical Engineering Alliance at Case Western Reserve University and Cleveland Clinic

- 1 From the Chairs
- 2 Student Spotlight
- 4 Research: Innovations in Imaging
- 6 Case-Coulter Translational Research Partnership Awards
- 10 2021 Virtual Summer Internship
- 12 Faculty and Staff Highlights
- 14 Checking in with Alumni
- 16 Faculty Directory

Cover image: PhD graduate student Victoria Laney analyzes the efficacy of the targeted contrast agent for cancer imaging.

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 CWRU, Department of Biomedical Engineering

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ARTIFICIAL INTELLIGENCE IN ONCOLOGY SYMPOSIUM PRECISION MEDICINE AND CANCER DISPARITIES

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CENTER FOR
COMPUTATIONAL IMAGING
AND PERSONALIZED DIAGNOSTICS

FROM THE CHAIRS



Robert F. Kirsch

Allen H. and Constance T. Ford Professor
Chair of Biomedical Engineering
Case Western Reserve University



@RKirschCWRU



Geoffrey Vince

The Virginia Lois Kennedy Endowed
Chair in Biomedical Engineering and
Applied Therapeutics
Lerner Research Institute
Cleveland Clinic



@DGeoffreyVince

Welcome to the BME Alliance newsletter for fall 2021. Many activities are approaching a semblance of normal this semester, including a return to mostly in-person instruction at Case Western Reserve University (CWRU). Our newsletter summarizes numerous recent accomplishments of our students, faculty and alumni, as well as new faces on campus, and activities at Cleveland Clinic BME.

Two significant leadership changes have taken place at CWRU in the past several months. Eric W. Kaler became president of CWRU on July 1, 2021, and Stanton Gerson was appointed dean of the CWRU School of Medicine (one of the two homes for the CWRU BME department, along with the Case School of Engineering) on Oct. 1, 2021. Both have already launched new initiatives that will enhance research activities throughout the university. In addition, two new faculty, Michael Moffitt and Emily Graczyk, joined the Case BME Department. Two Case BME faculty, Efsthathios (Stathis) Karathanasis and Steve Fening, were also promoted to full professor.

At Cleveland Clinic, Geoff Vince, chair of the Cleveland Clinic BME Department, was named executive director of Cleveland Clinic Innovations, the commercialization arm of Cleveland Clinic. (Geoff also celebrated his 10th anniversary as chair of Cleveland Clinic BME in June.) Kathleen Derwin, associate staff, has been appointed BME Vice Chair. Jay Alberts and his lab (Mandy Koop and Anson Rosenfeldt) received a \$2 million grant from the Michael J. Fox Foundation for some exciting research into deep brain stimulation for Parkinson's disease. Suneel Apte, Staff, was elected president of the International Society for Matrix Biology. Vinod Labhassetwar, staff,

is doing some groundbreaking work in the treatment of spinal cord injury and advanced-stage cancer. Other BME researchers are receiving grants for research into glioblastoma and back pain.

This issue of the newsletter also highlights several amazing accomplishments. It features the breakthrough research of Dr. Zheng-Rong Lu on MRI contrast agents, which are now undergoing human trials. We are extremely proud of our students, many of whom we call out in this issue, who continue to excel and receive recognition for their accomplishments. The winners of departmental and university awards are featured, as are externally awarded fellowships. Likewise, our alumni are accomplished and impactful, and we are proud to be able to spotlight their achievements. Please let us know about your accomplishments or any other BME Alliance news you would like to share.

At the departmental level, the U.S. News and World Report ranking for the Case BME Department improved from #16 to #12 (out of about 130 programs nationwide) – a major jump in one year! The BME Alliance offered a Virtual Summer Internship for the second year and attracted 130 students from 55 universities from around the world. Our partnership with the India-based International School of Engineering (INSOFE) is thriving. The Case-Coulter Translational Research Partnership recently announced more than \$1.9M in awards to assist faculty in translating their laboratory discoveries into products that improve healthcare.

We hope you enjoy our update of the BME Alliance community activities, and we will be back in the spring.

STUDENT SPOTLIGHT

Exceptional Class of Doctoral Students

This fall, 31 new PhD students joined the Biomedical Engineering Department at Case Western Reserve University. "This is one of the most accomplished classes to join the department," says Stathis Karathanasis, professor of biomedical engineering and former director of graduate admissions for the department.

The students hail from some of the top engineering undergraduate institutions in the nation, including Carnegie Mellon University, Case Western Reserve University, Duke University, the University of California

– Santa Barbara, the University of Rochester, the University of Wisconsin and Washington University. The average undergraduate grade point average for the class is 3.8, one-third of the students have earned a Master of Science degree and all of them have significant prior research experience.

"The backbone of our program at Case Western Reserve University is our PhD students conducting cutting-edge biomedical research," says Karathanasis. "They will become the next leaders in academia and industry."

2021 Doctoral Excellence Award



Congratulations to Niha Beig for receiving the Doctoral Excellence Award from the Office of Graduate Studies.

Under the supervision of Pallavi Tiwari, assistant professor of biomedical engineering at Case Western Reserve School of Medicine, Beig's PhD research focused on developing assistive diagnostic tools in the field of neuro-oncology using data science and machine learning techniques. She worked on drawing insights from quantitative medical images and genomic sequencing to help predict outcomes and responses to therapy in adult gliomas.

Beig graduated in 2020 with 16 co-authored publications in top-tier journals and won many scientific awards during her doctoral studies. In 2019, Beig won the Excellence in Mentoring Award in Biomedical Engineering. The Doctoral Excellence Award is one of the highest honors bestowed on a graduate student, and only one award is given each year to a nominated student from every department.

CommonLit Readability Prize Competition



Vinay Ethiraj, an MS student in biomedical engineering at Case Western Reserve University, was ranked in the top 11% in the CommonLit Readability Prize Competition hosted by CommonLit, a non-profit organization, on the Kaggle platform. The purpose of the competition

was to leverage AI to identify the appropriate reading level of a passage of text. The reading level of a passage

helps teachers to quickly and accurately evaluate works for their classrooms on the chosen passage. There were 3,682 teams consisting of 4,447 participants and a total of 73,111 entries. Ethiraj participated as a one-member team. The competition included public and private leaderboards, which were used to evaluate the generalization ability of the model. Ethiraj is mentored by Colin K. Drummond, professor and assistant chair of the Department of Biomedical Engineering at Case Western Reserve University.

Graduate students earn Diversity, Equity, and Inclusion Research Awards



Case Western Reserve University's Graduate Student Council offered its first Diversity, Equity, and Inclusion Research Award to five students, awarding \$4,000 over two award cycles.

These awards provide funding to CWRU master's and doctoral students who are conducting research with marginalized populations. The award winners' research addresses critical gaps across disciplines in the research and application of diversity, equity and inclusion.

Among the awardees within the Department of Biomedical Engineering is PhD candidate Victoria Laney for her project, *"Development of Novel Preclinical Models and Assessment of Immunotherapies with MR Molecular Imaging in Highly Aggressive Pancreatic Cancer Expressed in African Americans."*

Read more about Laney's research on page 4.

NSF Graduate Research Fellowship Program



Alan Chen, a first year PhD candidate in Vijay Krishna's lab at Case Western Reserve University, received the prestigious NSF Graduate Research Fellowship Program (GRFP) award.

The NSF GRFP recognizes and supports outstanding graduate students in NSF-supported STEM disciplines who are pursuing research-based master's and doctoral degrees at accredited U.S. institutions.

Specialized Master's Program Welcomes 13 Students from India



Students from the INSOFE program tour Case Western Reserve University's campus during orientation week.

The Biomedical Engineering Department welcomed 13 students to campus this fall as part of the [INSOFE program](#), which offers an MS degree in biomedical engineering with a dual specialization in digital health analytics. The students, who spent two academic terms in India completing data science courses, are now enrolled in biomedical engineering courses at Case Western Reserve University. They join four other students already on campus in the INSOFE program.

"We are pleased to welcome this group of students from India to our campus through this unique program," says Brian Amkraut, executive director of Siegal Lifelong Learning at Case Western Reserve University. "This partnership with INSOFE gives students the opportunity to build a foundation in data science in combination with an engineering degree to open doors for career opportunities in the U.S., India and around the globe."

2020-2021 Department of Biomedical Engineering Graduate Student Awards



OUTSTANDING GRADUATE CAREER

Jacob Antunes & Ujjal Didar Singh Sekhon
Nominated by Satish Viswanath & Anirban Sen Gupta

EXCELLENCE IN GRADUATE TEACHING

Prathyush Chirra & Amogh Hiremath
Nominated by Satish Viswanath & Anant Madabhushi

OUTSTANDING MASTER'S WORK

Ryan-David Reyes
Nominated by Ronald Triolo

OUTSTANDING PUBLICATION

Pranjal Vaidya
Nominated by Anant Madabhushi

EXCELLENCE IN MENTORSHIP

Yijiang Chen & Prathyush Chirra
Nominated by Anant Madabhushi & Satish Viswanath

EXCELLENCE IN DEPARTMENTAL AND EXTERNAL SERVICE

Victoria Laney & Sydney Song
Nominated by ZR Lu & Jeffrey Capadona

OUTSTANDING CREATIVITY IN EXPERIENTIAL GRADUATE INSTRUCTION

George Hoeflerlin, Olivia Krebs, Yue Xu
Nominated by Andrew Shoffstall

THE CAMERON MCINTYRE OUTSTANDING AWARD FOR 2021

Olivia Krebs
Nominated by J. Thomas Mortimer

INNOVATIONS IN IMAGING

A tumor-specific MRI contrast agent developed at CWRU undergoes human clinical trials.



PhD graduate student Victoria Laney analyzing the efficacy of the targeted contrast agent for cancer imaging.

Last spring, the U.S. Food and Drug Administration approved clinical trials to test the safety of a tumor-targeting contrast agent that accurately detects aggressive prostate cancer in a magnetic resonance imaging (MRI) scan. The molecular-targeted imaging agent was invented in the lab of Zheng-Rong Lu, the M. Frank Rudy and Margaret Domiter Rudy Professor of Biomedical Engineering at Case Western Reserve University.

“Since MRI was approved for human use in the 1980s, there have been nine contrast agents approved – none of

them tumor-specific,” says Lu. “We have developed the first tumor-specific contrast agent to enter clinical trials.” Clinical trials are currently underway at Ohio Clinical Trials Inc. in Columbus, Ohio, on 30 healthy males from 18 to 55 years old.

Potential for Patients

Lu began researching a system to non-invasively detect cancer nearly 20 years ago. “There is a huge clinical need for something simple and non-invasive to detect cancer at a very early stage and also to differentiate aggressive tumors from benign ones,” he says.

PhD graduate student Victoria Laney tests the contrast agent for cancer imaging in a tumor model with a preclinical MRI scanner.



MRI is widely used to diagnose prostate cancer, however limitations within contrast agents added to tissues to reveal tumors can contribute to imprecise diagnosis, says Lu. Similarly, the 12-needle puncture biopsy guided by rectal ultrasound is still the most used method today to distinguish between malignant and benign tumors. “But it’s not very accurate,” says Dr. Lu. “If you don’t sample the right location, you may get wrong information.”

Approximately one in eight men will be diagnosed with prostate cancer in their lifetime, according to the American Cancer Society. However, only one in 41 will die of the disease. More than 3.1 million men are currently living with prostate cancer. These statistics highlight the importance of Lu’s work.

“Research shows that only 20% of patients diagnosed with prostate cancer will develop aggressive tumors,” he says. “Our technology has the potential to spare the other 80% from aggressive over-treatment, which could lead to serious infections and reproductive and urinary side effects.” Conversely, it could help prevent under-treatment.

The Biology Behind the Agent

The imaging agent, known as MT218, is licensed to [Molecular Theranostics LLC](#), a Cleveland-based startup company co-founded by Lu, and its partners U.S. Motek LLC and Jiangsu Motek Pharmaceuticals Ltd. in China. The

patented gadolinium-based MRI contrast agent binds to a molecular marker, called extracellular matrix fibronectin, which is a cancer-associated subtype of fibronectin. The gadolinium agent is a paramagnetic substance that can enhance MRI signals of aggressive tumors to improve the accuracy of cancer diagnosis.

“The technology is based on cancer biology,” says Lu. “It detects an oncoprotein that is only overexpressed in highly aggressive tumors, which is why it works so well.” Pre-clinical data is promising, says Lu, showing the agent’s efficacy and safety in animal models. “It has the potential to do what we think it can,” he adds. The goal of the ongoing clinical trials is to validate the imaging agent’s safety in humans. A phase 2 clinical trial is being pursued to test its effectiveness in detecting aggressive tumors and differentiating the types of tumors.

“We are very excited about this phase 1 clinical trial because it means our research product is now under clinical development to help people,” says Lu. “The agent was FDA-approved for prostate cancer, but its application is not limited to prostate cancer. We have shown the same technology works well for other aggressive tumors, such as breast cancer, pancreatic cancer and lung cancer.”

That’s hopeful news for the 18 million or so people worldwide who are diagnosed with cancer each year, a figure that is expected to rise to [29.5 million](#) by 2040.

CASE-COULTER TRANSLATIONAL RESEARCH PARTNERSHIP AWARDS

Cutting-edge biomedical technologies receive nearly \$2 million in funding and support.



Translational Research Partnership

The Case-Coulter Translational Research Partnership (CCTRP), with the support of the JobsOhio Cleveland Innovation District, has announced more than \$1.9 million in funding and support for six biomedical technologies. "The infusion of resources from the JobsOhio program is part of a multiyear commitment from the State of Ohio and Case Western Reserve University to grow the local innovation economy," says Mitch Drumm, Interim Vice President for Research and Technology Management at Case Western Reserve.

Ten projects were selected for full program funding, which ranges from \$50,000 to \$200,000. Several additional pilot projects have or will be awarded pilot funding by the end of the year. All projects are partnerships between a clinician and a biomedical engineer and are focused on solving areas of unmet healthcare needs.

The 15-year-old program invests more than \$1.1 million annually in direct funding and support services to help research teams from Case Western Reserve and its partner institutions advance products from the laboratory to the marketplace, where they can improve patient care.

Funding focuses on preparing projects for commercialization, such as demonstrating technical feasibility, deciphering the business opportunity and gauging market feasibility and industry interest. Sixty-

nine full projects have been supported to date, which has led to 38 licenses, 30 startup companies and delivered 38 technologies to patients. For each dollar invested by the program, the university technologies have received an additional \$25 of investment, mostly as at-risk capital.

"The Case-Coulter Translational Research Partnership continues to be a cornerstone of our department, filling an essential gap to transition university biomedical technologies from research to products, where they can significantly improve the health of our society," says Robert Kirsch, the Allen H. and Constance T. Ford Professor and chair of the university's Department of Biomedical Engineering.

The Case-Coulter oversight committee reviewed 29 proposals during this cycle. Projects must have the potential to advance to a commercial entity within 12 to 30 months.

"As a group, the quality of the evaluated technologies continues to improve each year, demonstrating the robustness of the biomedical research-based technology pipeline," says Steve Fening, CCTRP managing director. "Even with the infusion of additional capital from JobsOhio, we still had many more proposals that were deserving of inclusion into the program than we were able to accommodate, making the selection process as challenging as ever."

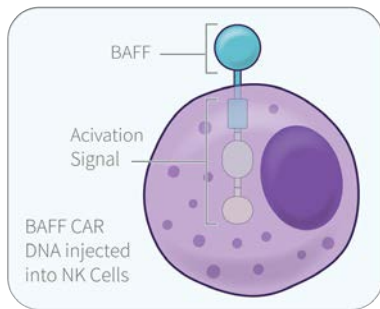


Illustration by Erika Woodrum

BAFF CAR-NK Cells: An Immunotherapy with Fewer Side Effects

Reshmi Parameswaran, assistant professor of medicine, and Umut Gurkan, Warren E. Rupp Associate Professor of mechanical engineering

B cell Activating Factor Chimeric Antigen Receptor-Natural Killer (BAFF CAR-NK) cells can specifically kill B cell cancers in a very effective manner with minimum side effects. This is a potentially curative therapy to address patients who are not responding to the current cancer treatment methods.

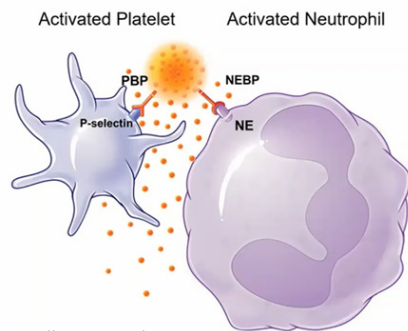


Illustration by Amanda Mendohlsen

Safety and Pharm-Tox Evaluation of NeuroStat: Neutrophil-Targeted Nanomedicine for VTI

Evi Stavrou, associate professor of hematology/oncology, and Anirban Sen Gupta, professor of biomedical engineering

The NeuroStat technology consists of a nanoparticle loaded with specific neutrophil signal inhibitory drugs. The nanoparticle can specifically target to activated neutrophil-platelet complexes (NPCs) that are the hallmark of developing clot niche in venous thrombosis (VT) and attenuates the clot growth by dialing down neutrophil-driven thrombotic mechanisms. This unique approach treats venous thrombosis by specifically dialing down neutrophil-driven upstream mechanisms of clot growth rather than downstream anticoagulation therapy (current standard-of-care in venous thrombosis).

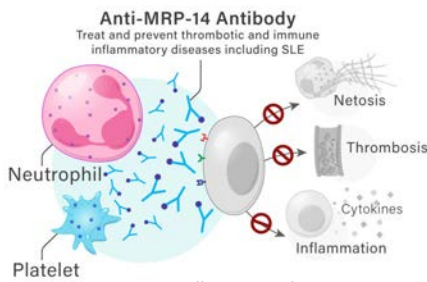


Illustration by Erika Woodrum

Pharmacokinetic-Pharmacodynamic Efficacy and Safety Studies of Humanized Monoclonal Antibodies for the Treatment of Inflammatory and Immune Diseases

Yunmei Wang, associate professor of medicine, Xin Yu, F. Alex Nason Professor of biomedical engineering, and Daniel Simon, professor of medicine

We have developed novel monoclonal antibodies (mAbs) against a key extracellular signaling protein, the myeloid related protein-14 (MRP-14, aka S100A9), that act as a potent driver of inflammation and thrombosis. MRP-14 has been implicated in the pathogenesis of several human diseases, including SLE, thrombosis, atherosclerosis, and acute lung injury.

Microfluidic Impedance Red Cell Diagnostic Assay (MIRCA-Dx): A revolutionary new way to assess targeted and genetic therapies for inherited red cell disorders

Umut Gurkan, Warren E. Rupp Associate Professor of mechanical engineering, Pedram Mohseni, Goodrich Professor of Engineering Innovation and Chair, electrical engineering and biomedical engineering, and Sanjay Ahuja, professor of pediatric hematology/oncology

New genetic therapies can correct unhealthy red blood cells, but there is no way to assess the health and functional properties of the newly made red cells in a patient. We offer a novel reproducible portable diagnostic test for physicians and pharmaceutical companies to measure how well the new genetic therapies work for a red blood cell disorder, such as sickle cell disease.



Illustration by Emily Imka

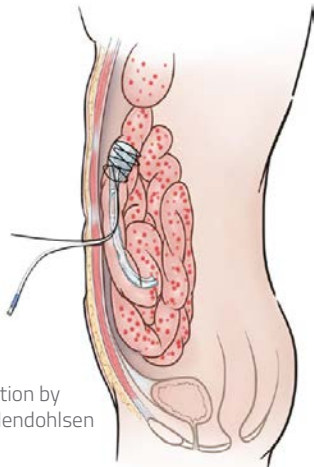


Illustration by
Amanda Mendohlsen

Gastrointestinal Liner for Diversion of Intestinal Contents

Steve Schomisch, assistant professor of surgery, and Jeff Marks, professor of surgery

People sometimes develop a wound connecting their intestine to their skin. This horrible complication is incredibly debilitating and costly. The intestinal contents leak out onto the skin causing injury to the skin and muscle, dehydration and malnutrition, and there is currently no way to stop it. We are developing a novel management strategy to greatly reduce the leak, reducing the costs and helping these patients recover faster.

3D-UBS for Fast Volumetric Evaluation of Ocular Injuries and Disease

David Wilson, professor of biomedical engineering, Faruk Orge, professor of ophthalmology and pediatrics, and Mahdi Bayat, assistant professor of electrical engineering

This technology will be the first high-resolution, 3D microscopic ultrasound system to provide novel visualizations of eye structures to better understand pathophysiology, plan treatments and assess treatment results. Ultrasound is an effective ophthalmic imaging method that allows structures behind the iris, including the lens and ciliary body, as well as key portions of the aqueous outflow system, to be seen. This region of the eye plays a critical role in glaucoma—which affects over 2.7 million people in the United States alone—and cataract, which are leading causes of reversible and irreversible blindness.

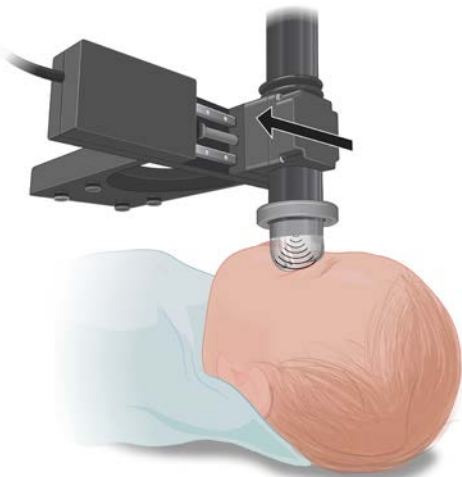


Illustration by
Cam Kowalski

HXB-319 as an Engineered Mesenchymal Stem Cell (MSC) Based Treatment for the Rare/Orphan Autoimmune Disorder Goodpasture Syndrome

Hulya Bukulmez, associate professor of pediatrics, and John Chae, professor of biomedical engineering

We have developed a novel Cell Therapy (HXB-319) based on naked MSCs, engineered to enhance immune responses to reduce inflammation and its resulting organ damage. The work proposed will help to advance HXB-319 cell therapy toward clinical use by targeting systemic autoimmune inflammatory diseases that cause end-stage organ damage, such as pulmonary hemorrhage and end-stage kidney disease.

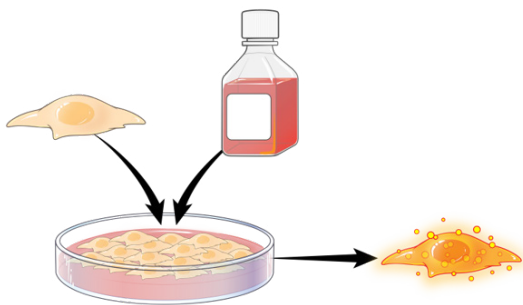


Illustration by
Amanda Mendohlsen

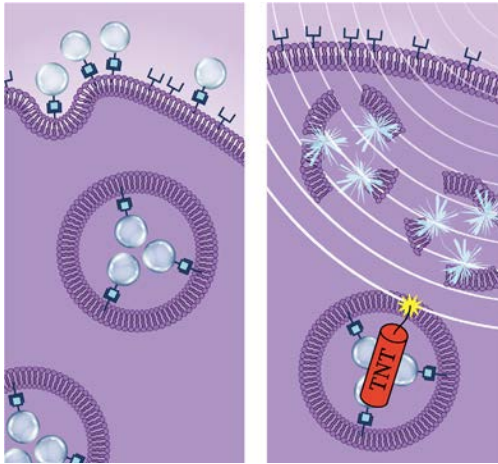


Illustration by Erika Woodrum

Nanobubble Contrast Agents as an Enabling Technology for Management of Prostate Cancer

Agata Exner, professor of radiology and biomedical engineering, Jim Basilion, professor of radiology and biomedical engineering, and Lee Ponsky, professor of urology

A new ultrasound contrast agent (nanobubble) which can improve the detection and treatment of prostate cancer by targeting the prostate specific membrane antigen (PSMA) - a biomarker overexpressed on prostate cancer cells, to enable highly specific detection and focused therapy, which affects only cancer cells and leaves normal cells unaffected. The nanobubble is a versatile technology with several potential uses within prostate cancer management, including improved delineation of tumors, guidance of focal therapies and targeted therapy.

Toxicokinetic (TK) Analysis of BG34-200 Immunotherapy

Mei Zhang, assistant professor of biomedical engineering, and Alex Huang, professor of pathology

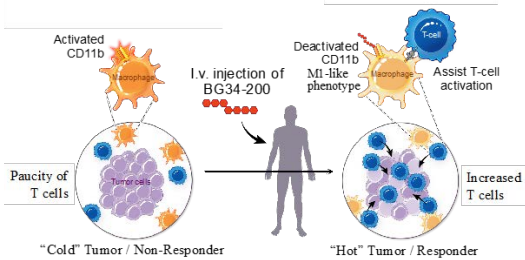


Illustration by Amanda Mendohlsen

A significant portion of patients with solid tumor cancers do not respond to immunotherapies due to a lack of T-cell-inflamed tumor microenvironment. This novel plant-derived non-toxic BG34-200 molecule can be intravenously injected to modulate macrophages and create a tumor microenvironment that is vital for the generation of antitumor T-cell responses. The team is launching a clinical trial targeting canine metastatic osteosarcoma to collect key and gap data in preparation for a first human clinical trial targeting pediatric osteosarcoma.

Enabling Closed-loop Baroreflex Activation in the Treatment of Refractory Hypertension

Jonathan Baskin, associate professor of otolaryngology-head & neck surgery, Dustin Tyler, Kent H. Smith Professor II of biomedical engineering, Gilles Pinault, assistant professor of surgery, and Steve Majerus, Cleveland VA

High blood pressure or hypertension is a serious healthcare problem associated with considerable morbidity and mortality. Currently, physicians rely heavily on drugs to treat hypertension, but there is a significant and growing population that is drug resistant. Our approach employs an implanted neuromodulatory system to address this unmet need. We have demonstrated efficacy of our novel stimulation system in an acute human model, however, a vital element in this treatment modality is sensing blood pressure.



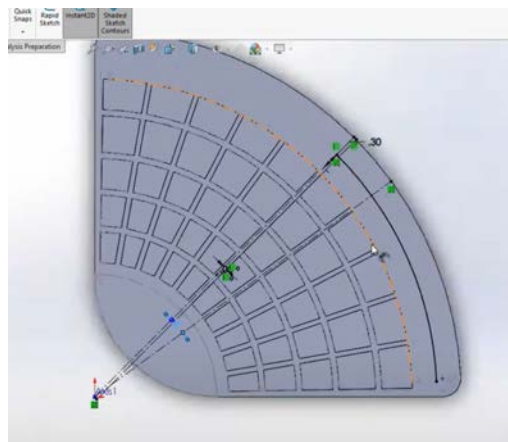
Illustration by Erika Woodrum

STUDENTS CREATE REAL-WORLD SOLUTIONS IN DESIGN CHALLENGE

Approximately 130 students from 55 universities around the globe participated in the Virtual Summer Internship hosted by the BME Alliance between Case Western Reserve University and Cleveland Clinic. The 8-week program provided a non-traditional academic experience for students, including online seminars and “fireside chats,” during which leading researchers shared their work in a discussion-based setting. The culmination of the internship was the engineering design challenge. Groups of three to five students developed, tested and pitched solutions for individuals with impaired or encumbered hands to use a computer more effectively.

“Upper limb impairment could relate to a medical problem, such as spinal cord injury or partial hemiparesis due to stroke. It could be situational, such as a surgeon who needs to interface with a computer while operating,” says Matthew Williams, an assistant professor of biomedical engineering at Case Western Reserve University who oversaw the Virtual Summer Internship. “We created an intentionally ambiguous design challenge so students had free reign to explore innovative ideas.”

The teams created an array of solutions, which were presented on [YouTube](#). The winning design, selected because it received the most “likes,” was created by a team dubbed [Ctrl+Keys](#). Members included Shashvat Bargale, Shri G.S. Institute of Technology & Science; Amal Damouche, Politecnico di Milano; and Brett Zaorski, Case Western Reserve University. The team garnered 1,400 votes for development of an ergonomic, portable, one-handed keyboard for people affected by stroke or with one hand.



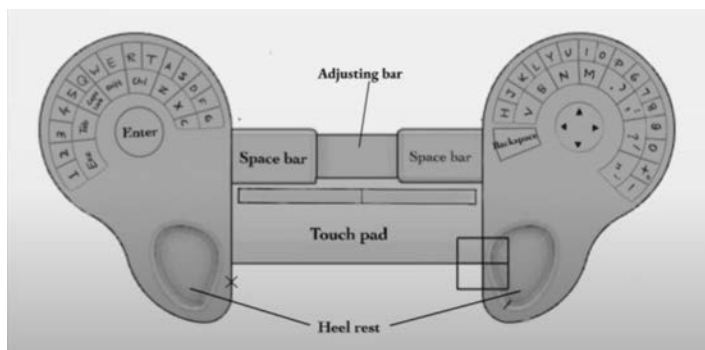
One-handed portable keyboard designed by Ctrl+Keys for people affected by stroke or with one hand.

The second-place team, [Biomedical Macro Keypad](#), received 942 votes for its device to mitigate pain and increase ease of use for people with arthritis.



Biomedical Macro Keypad delivers their research on market need.

[Feet for Hands](#) earned third place with 443 votes for creating a foot-operated keyboard for amputees and others who have lost the use of their hands.



The foot-operated keyboard was designed by Feet for Hands for amputees and others who have lost the use of their hands.

Williams says completing the design challenge is a constructive experience because it mimics projects that engineers may participate in when they land jobs. "It's not just about building something and trying it out. It's about building something with the intention of solving a real problem," he says. "In addition, the students met and interacted with peers across time zones using video conferencing. They may one day be engineers working for companies with offices throughout the world, from the U.S. to Asia and Africa. Learning to manage your time and communicate virtually is invaluable."

To support students in the design challenge, the Virtual Summer Internship featured weekly seminars to teach them about assessing user needs, creating functional and technical specifications, developing prototypes and business plans, and more. The program also included general seminars and fireside chats hosted by members of the BME Alliance from Case Western Reserve University and Cleveland Clinic, as well as industry professionals. The general seminars covered topics of interest to BME students, ranging from how to apply to medical school to what careers are available for BME majors. Fireside chats explored the breadth of research being done in biomedical engineering.

"It's about building something with the intention of solving a **real problem.**"

— Matthew Williams
Assistant Professor of Biomedical Engineering
Case Western Reserve University

To view all videos, visit bme.case.edu/Summer2021VSI

FACULTY & STAFF

Jay Alberts



Jay Alberts, staff, Mandy Koop, project staff, and Anson Rosenfeldt, senior physical therapist, Cleveland Clinic Lerner Research Institute Department of Biomedical Engineering, received a grant of \$2 million from The Michael J. Fox Foundation for Parkinson's Research for their proposal "Utilizing Neural Signatures and Virtual Reality to Advance DBS programming."

Suneel Apte



Suneel Apte, staff, Cleveland Clinic Lerner Research Institute Department of Biomedical Engineering, was elected president of the International Society for Matrix Biology. Apte was also the keynote speaker at the virtual combined meeting of the German and French Matrix Biology Societies.

Kathleen A. Derwin



Kathleen A. Derwin, associate staff, has been appointed vice chair of the Cleveland Clinic Lerner Research Institute Department of Biomedical Engineering.

Dominique Durand



Dominique Durand, Elmer Lincoln Lindseth Professor in Biomedical Engineering and director of the Neural Engineering Center at Case Western Reserve University, recently published a manuscript in collaboration with CCF faculty Jennifer Yu that for the first time shows that tumors generate neural activity that can be recorded and linked to metastasis.

McCallum, G.A., Shiralkar, J., Suci, D. *et al.* Chronic neural activity recorded within breast tumors. *Sci Rep* 10, 14824 (2020). <https://doi.org/10.1038/s41598-020-71670-y>

Steve Fening



Steve Fening, managing director of the Case-Coulter Translational Research Partnership, has been promoted to professor of biomedical engineering at Case Western Reserve University.

Chris Hubert



Chris Hubert, research associate, Cleveland Clinic Lerner Research Institute Department of Biomedical Engineering, received a CTSC Pilot award for the project "Therapeutic Targeting of Glioblastoma through WDR5 inhibition."

The goal of this pilot project is to test the importance of WDR5 for GBM proliferation and self-renewal using two tool compound inhibitors in isogenic transformation models, ex vivo culture models and in vivo xenografts.

Efstathios (Stathis) Karathanasis



Efstathios (Stathis) Karathanasis has been promoted to professor of biomedical engineering at Case Western Reserve University.

Vinod Labhassetwar



Vinod Labhassetwar, staff, Cleveland Clinic Lerner Research Institute Department of Biomedical Engineering, received a grant from the NIH for the project "Neupron™: A Neuroprotective Agent for Treating Acute Spinal Cord Injury." Labhassetwar also received a Caregiver Catalyst Grant from the Cleveland Clinic Philanthropy Institute for his idea demonstrating that increasing anti-cancer drugs in lymph nodes is more effective in treating advanced-stage cancer than IV injection and minimizes side effects through lower, more targeted doses.

Xin Li



Xin Li, postdoctoral fellow, Cleveland Clinic Lerner Research Institute, Department of Biomedical Engineering, was selected as one of the top three trainees from across the nation to present their research at the NIH-sponsored StrokeNet meeting.

Anant Madabhushi



A paper by Anant Madabhushi, the Donnell Institute Professor of Biomedical Engineering and director of the Center for Computational Imaging and Personalized Diagnostics at Case Western Reserve University, is in the top 10% most cited PLOS ONE papers published in 2018, "[A deep-learning classifier identifies patients with clinical heart failure using whole-slide images of H&E tissue.](#)"

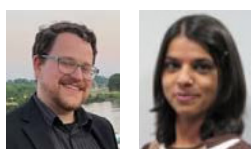
Ed Maytin and Sanjay Anand



Ed Maytin, staff, and Sanjay Anand, project scientist, Cleveland Clinic Lerner Research Institute Department of Biomedical Engineering, were invited to

write a review (Anand S, Chan TA, Hasan T, Maytin EV. Current Prospects for Treatment of Solid Tumors via Photodynamic, Photothermal, or Ionizing Radiation Therapies Combined with Immune Checkpoint Inhibition (A Review). *Pharmaceuticals*. 2021; 14(5):447. <https://doi.org/10.3390/ph14050447>) in a special issue on photodynamic therapy (PDT) in the journal *Pharmaceuticals*.

Matthew Rudy and Snehal Chokhandre



Matthew Rudy, research engineer, and Snehal Chokhandre, principal research engineer, Cleveland Clinic Lerner Research Institute, Department of Biomedical

Engineering, were accepted by the Office of Strategic Alliances and Technology Development Innovation Fellow Program as Innovations Fellows.

Carl Saab



Carl Saab, staff, Cleveland Clinic Lerner Research Institute Department of Biomedical Engineering, was awarded an Oracle for Research Cloud Grant for the project "EEG CNN Classification of Distinct Back Pain."

Pallavi Tiwari



Pallavi Tiwari, assistant professor of biomedical engineering at Case Western Reserve School of Medicine, received [The Early Career Achievement Award](#) from the Society for Imaging Informatics in Medicine

(SIIM) for recognition of significant and innovative technical contributions in imaging informatics.

Dustin Tyler



A team led by Dustin Tyler, the Kent H. Smith Professor II of Biomedical Engineering at Case Western Reserve University, was among the [2021 Think Big Leadership Awardees](#).

Winners were chosen by Think Big Pathway Leaders in conjunction with the Office of the Provost. Their project was "Advancing the Symbiotic Integration of Humans and Technology." Team members included Dustin Tyler, Emily Graczyk, Michael Fu, Luis Mesias Flores, Xufei Wang and Leah Roldan.

Tyler's research for Human Fusions also moved to the Semifinals for the [XPRIZE Avatar competition](#) for a live demo in Miami in September. Up to 20 of the top-performing teams at Semifinals will share a milestone prize purse of \$2M and move on to Finals Testing in fall 2022 for their chance to win part of the \$8M Finals prize purse.

D. Geoffrey Vince



D. Geoffrey Vince, chair, Cleveland Clinic Lerner Research Institute Department of Biomedical Engineering, has been named Executive Director of Cleveland Clinic Innovations, the commercialization arm of Cleveland Clinic. Vince also celebrated his 10th anniversary as chair of Cleveland Clinic BME in June.

WELCOME NEW FACULTY



Michael Moffitt

Associate Professor, Biomedical Engineering Case Western Reserve University



Emily Graczyk

Assistant Professor, Biomedical Engineering Case Western Reserve University

IN THE NEWS



Zheng-Rong Lu

[First clinical trials set for MRI cancer detection](#)



Anant Madabhushi

[Case Western Reserve awarded \\$3 million National Cancer Institute grant to apply AI to immunotherapy in lung cancer patients](#)



Pallavi Tiwari

[How One Scientist Fights Brain Tumors Every Day](#)



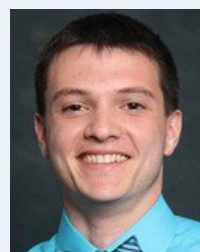
Agata Exner

[Tiny bubbles making large impact on medical ultrasound imaging](#)

CHECKING IN WITH ALUMNI



Prabhani Atukorale (GRS '20), a post-doctoral researcher from the Laboratory for Cancer Nanotechnology and Immunotherapy, was appointed assistant professor in the Biomedical Engineering Department at the University of Massachusetts Amherst. She opened the Atukorale Research Lab at UMass Amherst earlier this year to develop nanomaterials-based technologies to modulate immunity in complex disease settings such as cancer.



Sam Guadagnino (BS '18, MS '19), joined Under Armour as a biomechanics analyst. He conducts biomechanics testing on footwear and apparel to drive innovation of future products. A member of Case Western Reserve University's varsity track and field team, Guadagnino earned a bachelor's degree in biomedical engineering in 2018 and master's degree in biomedical engineering in the Translational Health Technology program a year later.

NEW SUMMER FELLOWS PROGRAM FOCUSES ON MEDICAL LITERATURE RESEARCH



As physicians, Elisabeth Uy Dexter (MED '90), and Franklin Dexter, III (GRS '88, '89; MED '90), work with a variety of medical professionals,

including non-clinicians. These non-clinicians include analysts who can help problem solve in order to ensure safe and efficient medical care.

Hospitals need analysts who can determine what solutions have already been shown to work for specific clinical or managerial problems by searching published literature, says the Dexters. If approaches are not published, innovative methods may need to be developed and implemented in environments with regulatory restrictions, they add.

The need for and importance of this type of analysis inspired the Dexters to fund the eight-week Medical Informatics and Healthcare Engineering Summer Fellows Program. Co-led by Colin K. Drummond, the program aims to help undergraduate students interested in medical informatics, healthcare engineering and analytics and translate their aptitude into abilities needed by the market. The students participate in mentored, small-group, medical literature research activity to tackle contemporary clinical or administrative problems.

"We would like to raise the awareness of undergraduate students about career possibilities which are necessary to provide safe and timely medical care, but are not directly involved in patient care. Engineering, computer science, statistics, etc., courses teach technical skills," said the Dexters.

"The benefit to the students is that they have a renewed sense of the importance of the discipline of research, and this includes the medical literature search that might seem less exciting than other types of research," says Drummond.

The fellows' work is experiential, but the unique challenge of medical informatics and healthcare engineering is that it is highly multi- and interdisciplinary, thus creating a barrier to entry for students with little experience. Students in the program have the opportunity to work with seasoned practitioners who utilize teaching techniques that are simple, yet effective in the area of medical literature research.

"The fellowship program is definitely eye-opening as we learn an often overlooked aspect of doing research, which is literature search and review. Before this summer, I never considered how important this process is," says current fellow Michael Zhang.

Another fellow, Tejas Bejwa, agrees: "The skills learned throughout the duration of the fellowship are applicable to almost all research projects. Dr. Dexter's method of assessing clinical need is unique and provides a very much needed outlook on the future of research. ...The fellowship was critical in changing how I viewed the significance of research projects and how valuable a literature review can be."

The abundance of research published and data made available over the past two decades that can be leveraged to improve health outcomes is daunting. The premise of the Summer Fellows Program is that students immersed in a formalized literature research process will acquire literature research skills that will improve healthcare quality and management by reducing the need for creative re-invention of problems already solved.

"This is a program for personal development. Unique requirements require unique funding. ... Philanthropy-sponsored summer programs allow leading-edge educational programs to be offered that create competencies leading to career success in subtle ways," says Drummond.

For more information about this program, please contact Lisa Tersigni, executive director of development and alumni relations, at 216.368.5426 or lisa.tersigni@case.edu.

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