

Biomedical Engineering
Newsletter SPRING 2025

INNOVATION IN HEALTHCARE

ENGINEERED FOR
WHAT'S NEXT.



Cullen College of Engineering
UNIVERSITY OF HOUSTON

LIFE-SAVING TREATMENTS FOR CHILDREN WITH LEUKEMIA

FEATURED IN NATURE COMMUNICATIONS JOURNAL

Researchers at the University of Houston, in collaboration with Baylor College of Medicine, are developing new devices for treating children with hyperleukocytosis, a condition that develops when the body has an extremely high number of white blood cells, often due to leukemia.

Leukemia is the most common type of cancer in children, with an annual incidence of about 5 per 100,000 children in the United States. About 20 to 30 percent of patients with acute leukemia develop hyperleukocytosis, placing them at risk for life-threatening complications.

Although definitive treatment for acute leukemia involves chemotherapy, leukapheresis — to urgently reduce dangerously elevated white blood cell counts — is a potentially life-saving therapeutic option. During leukapheresis, a large machine uses centrifugation to separate white blood cells, or leukocytes, from the rest of the blood, which is then returned to the patient.

But for children, these conventional blood-filtering machines can be dangerous for several reasons.

On one particularly difficult night in the intensive care unit, Dr. Fong Lam, an associate professor of pediatrics at Baylor College of Medicine and a pediatric intensive care physician at Texas Children's Hospital, thought, "There has to be a better way!"

It was a night he had no choice but to perform leukapheresis on a young infant with leukemia. "The ECV of the apheresis machine is nearly as large as the child's total blood volume!" he remembers thinking.

Lam partnered with **Sergey Shevkopyas**, a professor of biomedical engineering at UH, to test whether performing cell separation with a high-throughput microfluidic device could alleviate these limitations. The results of their groundbreaking study, led by **Mubasher Iqbal**, a Ph.D. candidate in biomedical engineering at UH. ⚙️



Sergey Shevkopyas
Professor of Biomedical Engineering

KIRILL LARIN WINS 2025

SPIE BIOPHOTONICS TECHNOLOGY INNOVATOR AWARD

Kirill Larin, Cullen Endowed Professor and the interim Chairman of the Biomedical Engineering Department at the University of Houston's Cullen College of Engineering, is the recipient of the 2025 SPIE Biophotonics Technology Innovator Award.

SPIE is the international society for optics and photonics, with more than 258,000 constituents worldwide. Larin is the first professor from the University of Houston to win this prestigious award, which dates back to 2013.

"I am deeply honored and humbled to receive the SPIE Biophotonics Technology Innovator Award," Larin said. "Being placed among the distinguished scientists who have shaped the landscape of biophotonics in the past decade is a profound privilege."

According to the press release from SPIE, Larin was recognized for his research into developing optical methods for structural and functional imaging of various tissues, cells and organs. Recently, he has received multiple grants totaling more than \$6 million to develop high-resolution imaging platforms for fetal brains and corneas.

Larin, an SPIE Fellow, is a founding chair of the SPIE Optical Elastography and Tissue Biomechanics conference, which has run as part of BIOS for more than a decade. He is also a frequent contributor to SPIE's Journal of Biomedical Optics. ⚙️



STUDENT SUCCESS

SOCIETY OF WOMEN ENGINEERS' HONORED WITH WIE RISING STAR AWARD

Renee Badilla, who expects to graduate from Cullen College with her Bachelor of Science in Biomedical Engineering in 2026, will be honored with the **Cynthia Oliver Coleman, P.E.** Rising Star Award at this year's Women in Engineering Celebration on Wednesday, March 5 at the Hilton University of Houston.

Having moved to the U.S. from Mexico City not long before starting at UH, Badilla's involvement with the Society of Women Engineers (SWE) has been a steady source of support and engagement, as well as professional skill development, mentorship and networking opportunities over the last three years.

"The Society of Women Engineers was so welcoming and supportive," she said. "I really liked that. I've met most of my friends here. It has given me a sense of community, and as an international student living on campus, I don't have my family right next to me, so having this community and making these connections has really helped me."

"I like to give back to that as well," she added. "I like to talk to prospective members when we hold events and encourage people to join. I feel like SWE has helped me grow a lot in my leadership and speaking skills, because I've always been a very shy person, and this has put me in situations that help me get out of my comfort zone and put myself out there." 🌟

BIOMEDICAL ENGINEERING



*Left: Diana De La Rosa-Pohl
Instructional Associate Professor of
Electrical and Computer Engineering*

*Right: Renee Badilla
Winner of Cynthia Oliver Coleman, P.E.
Rising Star Award*

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HORTON WINS CAREER DEVELOPMENT AWARD

LUPUS RESEARCH ASSOCIATION

Assistant professor of biomedical engineering **Renita Horton**, Ph.D., has been awarded the Lupus Research Alliance's (LRA) Diversity in Lupus Research (DLR) Career Development Award.

Lupus is a potentially debilitating autoimmune disease disproportionately affecting Black, Hispanic, Indigenous, and Asian and Pacific Islander people. Three years ago, the LRA introduced the DLR awards to "foster a diverse scientific community that mirrors the populations most impacted by lupus."

"We are delighted to recognize the talented recipients of the 2024 LRA Diversity in Lupus Research Awards," said Teodora Staeva, Ph.D., LRA Vice President and Chief Scientific Officer. "By supporting these outstanding individuals, we are not only broadening the diversity of our scientific community, but also paving the way for innovative approaches to drive advancements in lupus research."

Horton was one of three 2024 awardees, each of whom received up to \$600,000 disbursed over four years to support the establishment of a competitive research program. Her research proposal, "Investigating the role of

SLE serum factors in neonatal lupus cardiac fibrosis", aims to identify biomarkers and actionable therapeutic targets that may allow clinicians to treat or prevent the fibrosis associated with a condition called neonatal lupus.

Expectant mothers with certain lupus related autoantibodies (antibodies that mistakenly target the body's own cells and tissues) are at a higher risk of having babies with congenital heart block — a serious heart condition. Horton's innovative heart-on-a-chip model — for which she recently won a CAREER award — will be critical in helping to identify key factors that contribute to cardiac fibrosis (the formation of scar tissue) and heart block in newborns.

"Dr. Chandra Mohan, an expert in the lupus field, serves as my primary mentor, and Dr. Todd Rosengart, cardiologist and clinician researcher with the Baylor College of Medicine, serves as my secondary mentor," said Horton. "My mentorship team combines my research interests, lupus and the heart, and will support the continued development of my research program." ⚙️

A portrait of Renita Horton, a Black woman with long, dark, curly hair, smiling warmly at the camera. She is wearing a dark, patterned top. The background is a plain, light-colored wall.

Renita Horton
Assistant Professor of Biomedical Engineering

UH BRAIN CENTER, FDA COLLABORATE ON NSF PROGRAM

A three-year National Science Foundation program is underway at the University of Houston's Industry-University Cooperative Research Center for Building Reliable Advances and Innovations in Neurotechnology Center. The Research Experiences for Undergraduates, or REU site, is focused on safe and effective human-device interaction to help an ailing body move again.

The REU site will prepare students for future careers in regulatory science and medical device development. Regulatory science is the science of developing new tools, standards, methods, and approaches to assess the safety, efficacy, quality and performance of FDA-regulated products.

It's the first REU Site focused on regulatory science. **Jose Contreras-Vidal** is the site's program director and faculty mentor, as well as the director of the UH IUCRC BRAIN Center.

"The program will address best design and engineering practices, computing tools and new computational methods to support early-stage medical device development and their evaluation so that as a nation, we can keep up with

the accelerated pace of technology development and innovation," he said.

"The National Science Foundation's REU Site program leadership is excited by the unique opportunity for program participants to work at both a research institution and a government agency (FDA) as part of the program," said Patricia Simmons, associate program director at the National Science Foundation.

Seven students will engage in the 12-week program in Houston, Texas and Silver Spring, Maryland. They will work closely with leading neural engineers and neuroscientists at the BRAIN Center and then work with FDA scientists at the Office of Science and Engineering Labs in the Center for Devices and Radiological Health on research that leads to development of regulatory science tools to support innovative medical device development and assessment. The tools will be focused on assessment methods for diagnostics, neural interfaces, medical robotics and other ongoing cutting-edge research in neural, cognitive and rehabilitation engineering. ⚙️

A close-up portrait of Jose Contreras-Vidal, a man with short dark hair, smiling slightly. He is wearing a dark suit jacket, a light blue dress shirt, and a red tie.

Jose Contreras-Vidal
Hugh Roy and Lillie Cranz Cullen
Distinguished Professor

STUDENT SUCCESS

A total of 25 students from different organizations received more than \$13,000 in scholarships and awards at the 2025 Industry Awards Night, hosted by the University of Houston's Engineering Alumni Association at the Athletic/Alumni Center.

The keynote address was given by Kelvin King, a graduate of the Electrical and Computer Engineering Department and the chief delivery officer of Gain Technology, LLC. For a full photo gallery from the night, [click here!](#)

The following awards were given out:

Biomedical Engineering Award

- Be-Once Marsh

Brown & Gay Engineers' Ronald L. Mullinax Endowed Scholarship (Civil Engineering)

- Sofia Diaz
- Zeus Gallo
- Pichpiseth Long
- Deena Mir
- Diego Ramirez

WSB Inspiration Award (Civil or Environmental Engineering)

- Christian White

Conoco Phillips' Engineering With SPIRIT (Petroleum, Chemical, Mechanical or Electrical)

- Hanna Vu
- Omotolase Osisanlu

The Huerta Scholarship (Civil Engineering)

- Liliana Perez Villarreal
- Brenda Roman

Petroleum Engineering Advisory Board's (PEAB) Dr. John Lee Engineering Legacy Award

- Alexandra Montana

PEAB Petroleum Engineering Minds Awards

- Aarati Kumari Agri
- Steven Garrett
- Azamat Sabyrov
- Francisco J. Santibanez

PEAB Dr. Thomas Holley Engineering Professionalism Award

- Christina Renee Castillo

Draco Spring Mfg. Co.'s Spring Forward Award (Any Major)

- Alexis Castillo

Blackline Engineering Innovative Award (Any Major)

- Melody Nguyen

Nathan and Carol Schmidt Engineering Scholarship (Chemical or Mechanical)

- Angel Rosa

American Society of Indian Engineers and Architects' Indian Engineers Engineering the Future (Any Major)

- Rajvi Patel

EAA's Excel in Engineering Award (Any Major)

- Jay Lim

EAA's Emerging Engineering Leader Award (Any Major)

- Kathryn Kalchik

UH EWeek Sponsorships (Any Major)

- Jonathan Gaucin
- Katlinh Nguyen



Left: UH student received scholarships and awards at the Industry Awards Night

*Right: Kirill Larin
Interim Chair, Cullen Endowed Chair and Professor*

RESEARCHERS PAVING THE WAY FOR NEW ERA IN MEDIAL IMAGING

FEATURED IN JOURNAL OF MEDICAL IMAGING

New technology developed by researchers at the University of Houston could revolutionize medical imaging and lead to faster, more precise and more cost-effective alternatives to traditional diagnostic methods.

For years, doctors have relied on conventional 2D X-rays to diagnose common bone fractures, but small breaks or soft tissue damage like cancers often go undetected. More expensive and time-consuming MRI scans are not always suitable for these tasks in these detection or screening settings. Now, **Mini Das**, Moores professor at UH's College of Natural Sciences and Mathematics with a joint appointment in the Biomedical Engineering Department at the Cullen College of Engineering, has developed a 3D solution.

In a paper featured on the cover of the Journal of Medical Imaging, Das explains how photon counting detectors along with novel algorithms allow for more precise 3D visualization of different tissues and contrast agents by capturing X-rays at multiple energy levels simultaneously, which helps differentiate materials inside the body.

"There are so many other potential applications for this technology including in materials imaging, baggage scanning for security, imaging for geophysics, and micro- and nano-electronics imaging — it's very promising," she said. ⚙️



Mini Das
Moores Professor

LI PAVES THE WAY FOR NEW WEARABLE SENSORS

A NEW WAY TO DETECT COLORECTAL CANCER

A new way to detect colorectal cancer through wearable sensors has reached a development milestone. University of Houston researcher **Zhengwei Li** has recently completed a Pilot Program initiative supported by NIMHD and HEALTH-RCMI.

Li's pilot study is entitled, Development of Ultrasensitive Smart Bioelectronic Sensors for Colorectal Cancer Prevention and Health Disparities Reducing among Black Americans. The project was funded \$50,000 by NIMHD and HEALTH-RCMI.

"From this pilot project, we have established a foundation for this work and created new building block components," Li said. "This offers a good foundation for us—not only for cancer detection but also for other applications."

Li's pioneering research is supported by a joint appointment at **Tilman J. Fertitta Family College of Medicine at the University of Houston**. He is an assistant professor and Presidential Frontier Faculty Fellow in the Department of Biomedical Engineering at the Cullen College of Engineering. ⚙️



Zhengwei Li
Assistant Professor of Biomedical Engineering

The University of Houston

Cullen College of Engineering

The University of Houston Cullen College of Engineering addresses key challenges in energy, healthcare, infrastructure, and the environment by conducting cutting-edge research and graduating hundreds of world class engineers each year. With research expenditures topping \$40 million and increasing each year, we continue to follow our tradition of excellence in spearheading research that has a real, direct impact in the Houston region and beyond.



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