

PATHWAYS

WINTER 2018



CANCER CENTER AT ILLINOIS

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN



CONTENTS

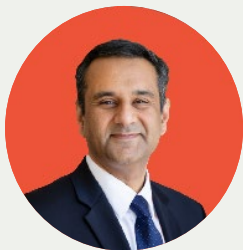
2	From the Director
3	By the Numbers
5	Visionary Research
7	CCIL Annual Meeting
9	Furthering Education
10	Student Spotlight
11	Awards and Achievements
12	Member Spotlight
13	What's Coming Up

Pathways is a Cancer Center at Illinois (CCIL) publication that highlights the interdisciplinary and translational work of CCIL faculty, staff, students, and external partners.

Editor: Tyler Wolpert

Writers: Hannah Mansfield, Susan Mumm, Laura Schmitt, Liz Touchstone, Doris Dahl, and Kim Schmidt

Designer: Suge Lim



FROM THE DIRECTOR

The Cancer Center at Illinois (CCIL) has come a long way since we started coming together as a small “Cancer Community” in 2011. Our membership has grown, we have developed strong educational programs to enhance training for tomorrow’s scientists, and our clinical partnerships continue to thrive. Together, these efforts have led to the elevation of the CCIL as the 8th campuswide research institute at Illinois, demonstrating the university’s commitment to cancer research and education.

Our members are at the heart of this evolution. From Shiva Abbaszadeh’s design of an imaging scanner for head and neck cancer patients to Pablo Perez-Pinera’s genetic research, CCIL members are creating singular approaches to understanding and fighting cancer. Our research excellence is reinforced by national recognition, and I especially congratulate both John Katzenellenbogen for the Outstanding Achievement in Chemistry in Cancer Research award from the American Association for Cancer Research and Paul Hergenrother for the George and Christine Sosnovsky Award for Cancer Research from the American Chemical Society.

Our new Seed Funding Program will support even more innovation and discovery. These pilot projects will encourage new collaborations, unique research, and external funding, ultimately boosting Illinois research teams in developing novel approaches to fighting cancer.

Our educational efforts continue to evolve as we train the next generation of cancer scholars. The TiMe program has selected its new cohort of graduate student researchers, and these 12 exceptional scholars reflect the breadth of Illinois’ cancer research interests. We’ve also recruited our largest cohort of undergraduate Cancer Scholars and our high school program, researchHStart, expanded to eight students this year.

Many thanks for your continued engagement and support! Exciting times are ahead as we prepare for NCI designation, and I hope you continue with us on this journey.

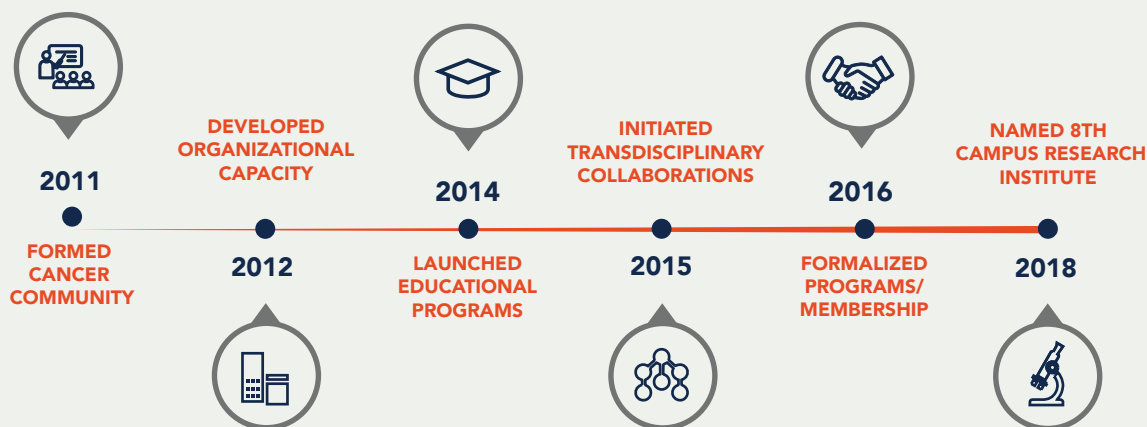
Rohit Bhargava

CCIL: 8TH CAMPUSWIDE INSTITUTE

FORMALIZED IN FALL 2018



125,000+ SQ. FT. DIRECTLY SUPPORTING
CCIL ACTIVITIES AT BECKMAN INSTITUTE



68
FULL MEMBERS



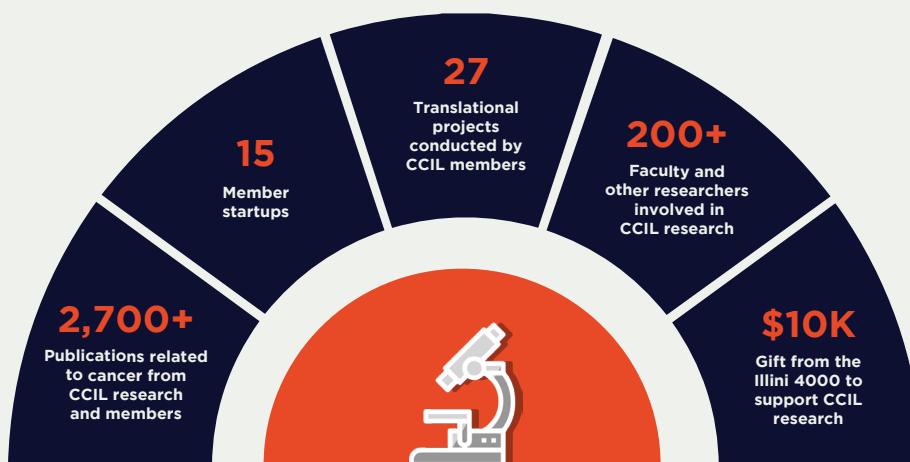
19
DEPARTMENTS



\$31M
RESEARCH SUPPORT

MEMBER BREAKDOWN BY DEPARTMENT

Animal Sciences	3	Food Science and Human Nutrition	1
Biochemistry	8	Industrial and Enterprise Systems Engineering	1
Bioengineering	11	Materials Science and Engineering	3
Cell and Developmental Biology	3	Mechanical Science and Engineering	1
Chemical and Biomolecular Engineering	3	Molecular and Integrative Physiology	4
Chemistry	8	Nuclear, Plasma, and Radiological Engineering	2
Clinical Medicine	1	Physics	2
Comparative Biosciences	2	Statistics	2
Computer Science	3	Veterinary Clinical Medicine	1
Electrical and Computer Engineering	9		



<div>4</div> <p>Shared resources devoted to cancer research—tumor engineering and phenotyping, microscopy, micro- and nanofabrication, and biotechnology</p>	PROGRAM 1: Measurement Technologies and Data Science <i>Program leaders: Stephen Boppart and Brian Cunningham</i>	<div>2</div> <p>Research programs focused on imaging, precision medicine, computation, pathways, drug discovery, and model systems</p>
	PROGRAM 2: Discovery Platforms Bridging the Engineering–Biology Continuum <i>Program leaders: Brendan Harley and Paul Hergenrother</i>	





DESIGNING AN IMAGING SCANNER FOR HEAD AND NECK CANCER

In September 2018, Nuclear, Plasma, and Radiological Engineering Assistant Professor Shiva Abbaszadeh received a \$2M NIH grant to design an imaging scanner for doctors who treat head and neck cancer patients. An expert in radiation detection, her new high-spatial resolution imaging scanner will better evaluate the extent of the disease, detect smaller lymph nodes, and determine the likelihood of recurrence. Abbaszadeh's research team collaborates with colleagues at Illinois; the University of California, Davis; and Carle Foundation Hospital.

FOR MORE: go.illinois.edu/ImagingScanner



ENHANCING CANCER CELL IMAGING

Andrew Smith, an associate professor in the Department of Bioengineering, and a team of Illinois researchers have developed a new molecular probe that measures RNA in cells and tissue without using organic dyes, which can deteriorate rapidly and are limited at imaging in three dimensions. "By replacing dyes with quantum dots, there are no stability issues whatsoever and we can count numerous RNAs with higher fidelity than before," said Smith. This improvement could lead to better assessments of tumor biopsies, more accurate disease diagnosis, personalized treatments, and better prognosis.

FOR MORE: go.illinois.edu/CellImaging



COMBATING RESISTANCE TO CANCER THERAPIES

Paul Hergenrother's lab has discovered a new option for cancer treatment—PAC-1. This new activator, when combined with inhibitors, has a strong anticancer effect. Working in collaboration with Timothy Fan, a fellow CCIL member, researchers have studied the anticancer effect of PAC-1 in pet dogs who have cancer. This research showed that PAC-1 may be an effective new drug in the fight against cancer, with particular success in the treatment of gliomas. Ultimately, this work may serve as a key starting point for the high-impact design of future clinical trials for combating drug-resistant cancers.



FOR MORE: go.illinois.edu/CancerTherapyResistance



SKIPPING OVER DISEASE-CAUSING GENES

In a new study led by Pablo Perez-Pinera, researchers have adapted CRISPR gene-editing technology to cause a cell's internal machinery to skip over a small portion of a gene when transcribing it into a template for protein building, allowing researchers to both eliminate a mutated gene sequence and to influence how the gene is expressed and regulated. This focused editing gives researchers more power over gene expression, regulation, and mutation and may be useful for treating genetic diseases and some cancers in the future.

FOR MORE: go.illinois.edu/CRISPR

“We are interested in the moment when cancer becomes more aggressive, when it starts the transition from an indolent to an aggressive disease.” — Wawrzyniec Dobrucki



DEVELOPING AN IMAGING AGENT KEY TO MULTIPLE DISEASES

An international team of researchers, including CCIL members Wawrzyniec Dobrucki and Dipanjan Pan, have developed a new, noninvasive imaging agent that can assess a key structure in diabetes and may help determine when cancer becomes more aggressive. “We are not interested in the early diagnosis of cancer, because other people are doing this,” said Dobrucki. “We are interested in the moment when cancer becomes more aggressive, when it starts the transition from an indolent to an aggressive disease.” This research may allow for better prediction of future outcomes and more targeted therapies.



FOR MORE: go.illinois.edu/ImagingAgent



CCIL leadership at the 2018 Annual Meeting with Vice Chancellor for Academic Affairs and Provost Andreas Cangellaris. From left to right: Associate Director for Education H. Rex Gaskins, Cangellaris, Director Rohit Bhargava, and Deputy Director David Kranz.

ANNUAL MEETING OVERVIEW

From being named the 8th campuswide research institute to developing new partnerships, it's been a whirlwind year for the Cancer Center at Illinois.

The 2018 CCIL Annual Meeting on November 9th was a chance to reflect on successes and future directions. CCIL Director Rohit Bhargava initiated the conversation by highlighting the center's beginnings. "We started small," said Bhargava. "The initial idea in 2011 was to form a cancer community on campus."

Over the last eight years, this community has evolved into a fully formed center focused on achieving NCI-designation and firmly cementing the university as a leader in basic science–engineering–translation research.

According to Bhargava, "Cancer centers are woven into the fabric of an institution and impact both the campus and community. NCI-designation is an investment in the institutional direction of cancer research for years to come."

Many partners also spoke at the event, including members from the Carle Cancer Center, the NorthShore Kellogg Cancer Center, the OSF Saint Francis Medical Center, and the Cancer Research Advocacy Group.

Attendees were also able to get a glimpse of exciting things on the horizon. The CCIL announced the launch of a new seed funding program (see page 13), and the center will participate in the annual American Cancer Society's Coaches vs. Cancer initiative with the Illinois men's basketball team (see page 14).



PRAIRIE DRAGON PADDLERS GIFT

During this year's annual meeting, the CCIL received generous support from the Prairie Dragon Paddlers, a local breast cancer advocacy group. The Paddlers empower survivors through dragon boating events and community engagement; provide education about prevention, treatment, and life after diagnosis; and support research efforts to find a cure.

Thank you, Paddlers!

NEW STEERING COMMITTEE

The CCIL welcomes the center's new Steering Committee (see below) and thanks the outgoing members for their dedication and efforts over the past year.



STEPHEN BOPPART

*Electrical and Computer
Engineering*



BRIAN CUNNINGHAM

*Electrical and Computer
Engineering*



TIMOTHY FAN

*Veterinary Clinical
Medicine*



H. REX GASKINS

Animal Sciences



BRENDAN HARLEY

*Chemical and Biomolecular
Engineering*



**PAUL
HERGENROTHER**

Chemistry



**JOSEPH
IRUDAYARAJ**

Bioengineering



DAVID KRANZ

Biochemistry

2018-19 TIME PROGRAM STUDENT COHORT

Selected from an exceptional pool of candidates, the 2018-19 Tissue Microenvironment (TiMe) Training Program student cohort reflects the breadth of Illinois research interests, with expertise in fields ranging from nutritional sciences to bioengineering. Supported by the NIH and the University of Illinois, this graduate program enables students to conduct interdisciplinary research focused on tissue microenvironments and their connection to healthcare issues.

Along with research opportunities, students also receive intensive mentoring and training, extracurricular activities, and professional development. Their research explores issues as diverse as the effect of tomatoes on tumor environments to the integration of 3D-engineered tissue.

For graduate student Emon Bashar, the program's promise of collaboration and mentorship was enticing. "I am delighted to join the cohort since I relish interdisciplinary collaboration and the ability to contribute to the collective research effort of such a diverse group."



**CATHERINE
APPGATE**
Nutritional Sciences



SUSHANT BANGRU
Biochemistry



EMON BASHAR
*Mechanical Science
and Engineering*



IAN BERG
Bioengineering



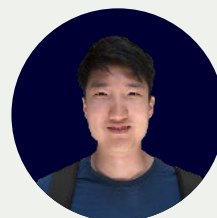
SLAV DVORETSKIY
*Kinesiology and
Community Health*



PARINAZ FATHI
Bioengineering



AIDAN GILCHRIST
*Materials Science
and Engineering*



YONGDEOK KIM
*Materials Science
and Engineering*



HAILEY KNOX
Chemistry



CARLOS RENTERIA
Bioengineering



CRAIG RICHARD
Bioengineering



WHITNEY SINCLAIR
*Chemical and Biomolecular
Engineering*

**SYLVIA CROWDER**

C*STAR PROGRAM

When asked about the inspiration for her research, Sylvia Crowder's answer was immediate: "Everyone knows someone affected by cancer."

For Sylvia, it was her grandma and the countless patients who she worked with at Carle Foundation Hospital. This is where she became passionate about her research goals, which include the impact of oncological treatment on nutrition in head and neck cancer survivors, and found inspiration to join C*STAR, a graduate educational program focused on translational research and near-term benefits for local patients.

Within the program, Crowder examines the impact of nutrition on the quality of life for cancer patients, particularly in the survivorship stage. The most beneficial parts of C*STAR for her are working across disciplines and her experiences with the patients. "The patients at Carle are incredible," said Crowder. "They are so passionate about furthering the research so others don't have to endure what they have." Crowder is on track to graduate from her doctoral program in May 2020.

**JOY CHEN**

RESEARCHSTART AND CANCER SCHOLARS PROGRAM

Joy Chen is no stranger to research labs. She's been working in them since high school as a part of researchHStart, the CCIL's high school educational program. For her, the value and challenge of cancer research is exciting.

"There's not just one solution," said Chen. "Even making the smallest difference in the lab may have a real-world impact."

Her proudest moment during researchHStart was the closing symposium. "It felt so rewarding to share what I was doing," said Chen. "Completing a project on my own inspired me to continue doing research."

Now an Illinois student, she's moved to the Cancer Scholars Program, where she works with CCIL member Erik Nelson. In his lab, she explores the effect of cholesterol on breast cancer. Upon graduation, Chen plans to attend medical or graduate school and pursue research in oncology, cancer, and new targeted therapies.



AACR AWARD FOR OUTSTANDING ACHIEVEMENT IN CHEMISTRY IN CANCER RESEARCH

John Katzenellenbogen, the Swanlund Professor of Chemistry at Illinois, received the American Association for Cancer Research's Outstanding Achievement in Chemistry in Cancer Research award in 2018. Award recipients are recognized for outstanding, novel, and significant chemistry research which has led to important contributions in basic cancer research, translational research, diagnosis, prevention, or treatment. Katzenellenbogen was honored for his contributions to improving the diagnosis and therapy of breast and prostate cancers through both the development of tools to study the estrogen receptor, an important biomarker and a target for endocrine therapy in breast cancer, and PET imaging agents used to diagnose prostate and breast cancer.



GEORGE AND CHRISTINE SOSNOVSKY AWARD FOR CANCER RESEARCH

Paul Hergenrother, the Kenneth L. Rinehart Jr. Endowed Chair in Natural Products Chemistry and Professor of Chemistry, received the George and Christine Sosnovsky Award for Cancer Research from the American Chemical Society. Bestowed biannually, this award recognizes outstanding achievements in exploring the chemical and biochemical pathways of human cancers, leading to the discovery and development of improved therapy. His research interests include synthetic organic chemistry, chemical biology, and biochemistry.



ZEYNEP MADAK-ERDOGAN

ASSISTANT PROFESSOR, FOOD SCIENCE AND HUMAN NUTRITION

Zeynep Madak-Erdogan's research improves the quality of life for postmenopausal women and breast cancer survivors by exploring how diet and nutrition affect hormone action.



Scholarly
citations
since 2014.*



Named a Future
Research Leader
by the NIH
in 2017.



Co-founded the
Cancer Research
Advocacy Group.

FOR MORE: go.illinois.edu/Zeynep

*Information from Google Scholar.



CATHERINE MURPHY

LARRY R. FAULKNER ENDOWED CHAIR AND PROFESSOR, CHEMISTRY

Catherine Murphy's research is at the nexus of materials, inorganic, and biophysical chemistry and nanotechnology. Her lab develops nanomaterials for biological and energy-related applications.



Journal articles
published over the
past decade in the
nation's leading
publications.*



Named to the 2018
Clarivate Analytics
Highly Cited
Researchers list.



Elected a member
of the U.S. National
Academy of
Sciences in 2015.

FOR MORE: go.illinois.edu/CatherineMurphy

*According to Illinois Experts.

SPRING 2019 FACULTY SEMINAR SERIES

The CCIL is pleased to present the Spring 2019 Faculty Seminar Series. Each seminar includes brief individual talks from a group of faculty members followed by a Q&A period. All sessions will be at the **Beckman Institute (Room 4269) from 3:00 to 4:00 p.m.**

JANUARY 24, 2019	FEBRUARY 21, 2019	MARCH 14, 2019	APRIL 18, 2019
Emad Tajkhorshid <i>J. W. Hastings Endowed Chair in Biochemistry</i>	Hong Jin <i>Assistant Professor Biochemistry</i>	Cecilia Leal <i>Assistant Professor Materials Science and Engineering</i>	Pablo Perez-Pinera <i>Assistant Professor Bioengineering</i>
Paul Selvin <i>Professor Physics</i>	Bo Wang <i>Assistant Professor Comparative Bioscience</i>	Raven Huang <i>Professor Biochemistry</i>	Catherine Murphy <i>Professor Chemistry</i>

CALL FOR PROPOSALS: CCIL SEED FUNDING PROGRAM

The CCIL builds campus capacity in cancer research, and this new seed funding program provides support for Illinois cancer research teams to develop new ideas and innovative approaches to understand and fight cancer. The CCIL anticipates funding up to three interdisciplinary research proposals during the 2018-19 cycle.

APPLICATION TIMELINE:

NOVEMBER 9, 2018	JANUARY 7, 2019	FEBRUARY 15, 2019	MARCH 15, 2019
Call for Proposals Announced	Open Date	Proposal Deadline	Award Notification and Start of Funding



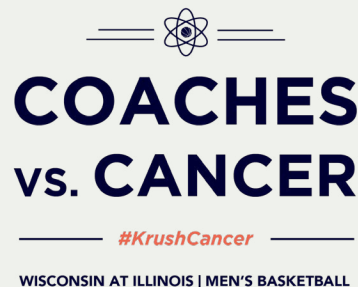
CCIL SEED FUNDING CALL FOR PROPOSALS



go.illinois.edu/CCILSeedFunding

COACHES VS. CANCER

For the past 25 years, the American Cancer Society's Coaches vs. Cancer program has united coaches and fans nationwide to fight a common enemy—cancer. This year, the CCIL and the Illinois men's basketball team are joining forces to raise awareness and support for cancer research, outreach, and education efforts. **Join us on January 23rd** as the Illini take on the Wisconsin Badgers at the State Farm Center. Help us #KrushCancer.



SAVE THE DATE: CANCER RESEARCH ADVOCACY DAY

Mark your calendars for May 17, 2019, for Research Advocacy Day hosted by the CCIL's Cancer Research Advocacy Group (CRAG) at the I-Hotel and Conference Center. Composed of individuals who have been diagnosed with cancer or have a strong personal connection to it, CRAG promotes interactions between cancer survivors, researchers, and clinicians that are essential in the fight against cancer and lead to better outcomes for all. This event will promote these types of interactions and honor those who have been impacted by the disease.

Speakers at the conference will include leading cancer researchers from across the country. There will also be a poster session for students that will be judged by local advocates. More details, including a complete schedule, will be coming soon.

JOIN US IN THE FIGHT AGAINST CANCER

YOUR GIFT WILL MAKE A DIFFERENCE.

Help us fund new research, train the next generation of researchers, expand outreach efforts, collaborate across disciplines, and bring industry experts together.

Find out how at cancer.illinois.edu/donate.



FOLLOW US!

@CANCERCENTERIL
CANCER.ILLINOIS.EDU

CANCER CENTER AT ILLINOIS

BECKMAN INSTITUTE FOR ADVANCED SCIENCE AND TECHNOLOGY
405 N. MATHEWS AVE. URBANA, IL 61801