



INDIANA UNIVERSITY

**MELVIN AND BREN SIMON
CANCER CENTER**

2016 SCIENTIFIC REPORT

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MISSION

To create an expanding community of researchers and health professionals who conduct outstanding translational research, provide excellence in education and deliver high quality patient-centered care.

WHAT MAKES THE IU SIMON CANCER CENTER UNIQUE?

The IU Simon Cancer Center is Indiana's only National Cancer Institute (NCI)-designated cancer center that provides patient care, and is one of only 69 in the nation. The NCI-designated Cancer Centers Program recognizes centers around the country that

meet rigorous criteria for world-class, state-of-the-art programs in multidisciplinary cancer research. These centers put significant resources into developing research programs, faculty and facilities that will lead to better approaches to prevention, diagnosis

and treatment of cancer. The NCI designation not only recognizes excellence but opens doors to greater federal funding, information sharing and resources.



One hundred and eight words

In 108 words, President Obama put the spotlight on cancer in his final State of the Union address in January 2016 when he announced Cancer Moonshot, an accelerated plan to end cancer.

By the end of the year, both the House and Senate passed the 21st Century Cures Act, providing the National Institutes of Health with \$4.8 billion in new funding. Those dollars will help advance Cancer Moonshot.

For those of us who have dedicated our lives and careers to cancer research and caring for cancer patients, and for all those people fighting the disease, Cancer Moonshot was indeed welcome news.



Cancer Moonshot's goal is to make a decade's worth of advances in cancer prevention, diagnosis and treatment in five years.

Patrick J. Loehr, Sr., MD
H.H. Gregg Professor of Oncology
Director, IU Simon Cancer Center
Associate Dean for Cancer Research
Indiana University School of Medicine

We at the Indiana University Melvin and Bren Simon Cancer Center share in that goal as our nearly 200 researchers tirelessly work to find new ways to detect and treat cancer for Hoosiers and others.

IU's version of Cancer Moonshot is the Precision Health Initiative. The initiative—the first recipient of funding from IU's Grand Challenges program with up to \$120 million—will deliver on the promise of patient-centered precision medicine therapies. Much of that work will focus on cancer, and researchers at the IU Simon Cancer Center will play a leading role.

Already, the next generation of personalized medicine is underway by IU Simon Cancer Center researchers, in large part, thanks to the Vera Bradley Foundation for Breast Cancer. Learn more on page 6. Indiana's standing in immunotherapy, another promising frontier, was propelled when IU School of Medicine alumnus Donald Brown, MD, donated \$30 million to the school.

Researchers in the Brown Center for Immunotherapy will discover new ways to deploy immune-based therapies to treat cancers and pioneer use of this powerful technology in other diseases. Again, IU Simon Cancer Center researchers will be a part of this endeavor.



Photo by Liz Kaye/IU Communications

Finally, we have many outstanding faculty, but a special congratulations goes to **Victoria Champion, PhD, RN**, who is an IU Distinguished Professor, an associate director at the cancer center and an international leader in oncology research. Late in the year, she received the IU President's Medal for Excellence—the highest award bestowed to faculty—

for her commitment to research in behavioral oncology, which has improved the quality of life for countless cancer survivors. The new IU School of Nursing Champion Center for Cancer Control Research will strengthen the nursing school's research and

research training program in cancer prevention and control. We at the IU Simon Cancer Center continue to do our part against a common enemy: cancer. We look forward to continuing to work together with our colleagues, both physicians and scientists, nationally to make that happen. Hoosiers —and others—deserve nothing less.



Dr. Korc and team advance understanding on how to conquer pancreatic cancer

Story by Brian Hartz | Photo by Tim Yates

Former Indiana University President Myles Brand and prominent businessman Melvin Simon—whose philanthropic legacy lives on at the IU Simon Cancer Center—both died on Sept. 16, 2009. They were felled by one of cancer’s most lethal forms: pancreatic cancer, which kills nearly 42,000 people every year.

Two years later, **Murray Korc, MD**, arrived at the IU Simon Cancer Center as the inaugural Myles Brand Professor of Cancer Research and as the first director of the cancer center’s Pancreatic Cancer Signature Center. Dr. Korc—who came to IU from the Dartmouth-Hitchcock Norris Cotton Cancer Center—had built a reputation as one of the world’s foremost experts on pancreatic cancer research. Still, he knew that significant work remained. “When I came to visit IU, and I saw the positive things and the tremendous interest and support, I felt that this would be a wonderful opportunity to build a program that relied on the skills and the motivation, the clinical capabilities and the strong, basic research and translational research that already existed here,” Dr. Korc said.

As a physician-scientist, he’s been treating patients since the early 1980s, and at that time he began to notice trends that would end up defining his career for decades to come. “In 1983, I had a patient who had long-standing type 2 diabetes who was diagnosed with pancreatic cancer, and I went to the library and spent a couple of Friday evenings doing some reading,” he

recalled. “I found that there was old Japanese literature that indicated that patients with long-standing type 2 diabetes have a higher incidence of pancreatic cancer. And that piqued my interest. And so, I said, ‘What do we know about the connection between those two diseases?’ And, at that time, nothing was known.”

specifically the role played by a receptor known as the EGF receptor. In lab studies, Dr. Korc discovered some key features of pancreatic cancer that not only gave it an “uncanny ability” to proliferate, but also made it able to resist treatment methods that proved effective with other forms of cancer. “There are pathways in our body that

call, ‘the brakes’ on cell cycle progression. And what we found was that the brake was broken and the accelerator was stuck. Ultimately, we found that the brake actually becomes a second accelerator. It’s a nasty cancer for many, many different reasons.”

During the five years that Dr. Korc has been at IU,



The Pancreatic Cancer Signature Center, led by Dr. Korc, not only includes researchers and health care professionals from the Indiana University - Purdue University Indianapolis campus, but also from the IU Bloomington, Purdue University and the University of Notre Dame campuses.

— Photo by Tim Yates

Dr. Korc was determined to change that.

In his research lab, Dr. Korc focused on growth-factor signaling in pancreatic cancer,

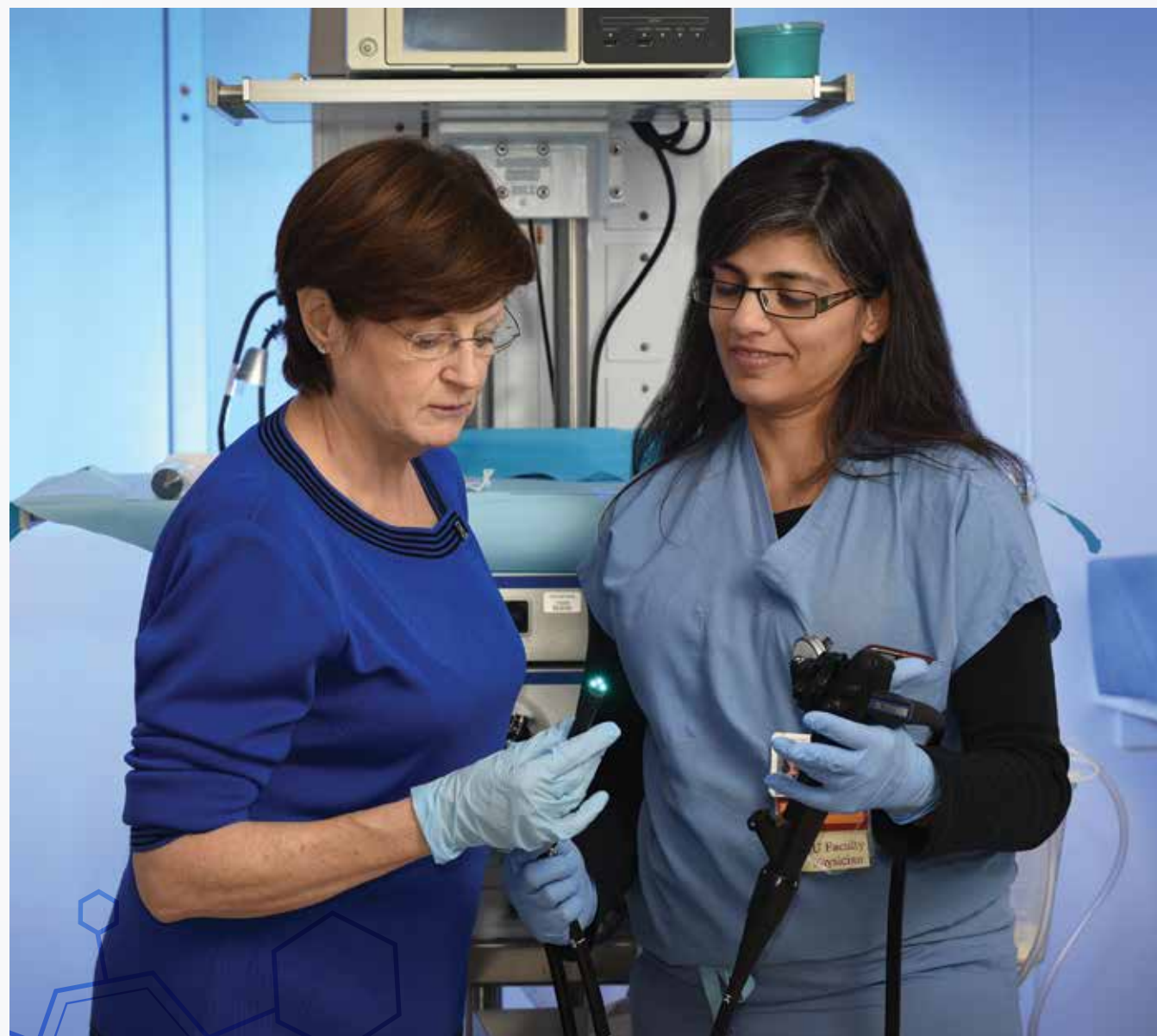
regulate the proliferation of cells, but there are also pathways that tell cells to stop proliferating,” he said. “And those are what I like to

significant strides have been made by cancer center investigators who are part of the Pancreatic Cancer Signature Center. Dr. Korc said a team-based approach to finding a cure for pancreatic cancer is essential to producing results. To that end, the center also counts among its membership investigators from Purdue University and the University of Notre Dame.

“Nobody can do it on their own,” he said. “It really requires a team effort. Although the survival rate is inching up to somewhere between 7 percent and 8 percent, Dr. Korc is not content with the progress made. “It’s definitely not good. It can be better, it should be better and it will be better.”

THE PANCREATIC CANCER SIGNATURE
CENTER BRINGS TOGETHER NEARLY
60 SPECIALISTS, RANGING FROM
BASIC SCIENTISTS, NURSES,
ENDOCRINOLOGISTS, SURGEONS
AND OTHERS ALL WORKING
TO MAKE ADVANCES AGAINST
THE DEADLY DISEASE.





Dr. Rawl awarded nearly
\$2.6 million to increase
colorectal cancer screening

Story by Michael Schug | Photo by Tim Yates

Preparing for a colonoscopy—drinking copious amounts of a bad-tasting liquid—is just one reason why so many people don’t complete this screening test for colorectal cancer.

Aside from the unpleasantness of clearing the bowel, people also tend to avoid a colonoscopy because of fear of pain that may be caused by the procedure, the procedure’s cost, fear of a cancer diagnosis, transportation issues and a lack of understanding of the benefits, especially if the person isn’t experiencing any symptoms.

Susan Rawl, PhD, professor at the IU School of Nursing and co-leader of the cancer center’s Cancer Prevention and Control research program (see page 11), has long known these factors keep people from getting a colonoscopy.

However, she and colleagues are setting out to change the tide, especially among people who actually scheduled a colonoscopy but, for whatever reason, canceled or did not attend their appointment. The researchers will enroll 750 patients between the ages of 50 and 75 who were scheduled to have a colonoscopy in a local health system.

They’re able to embark on this large study thanks to a nearly \$2.6 million award from the Patient-Centered Outcomes Research Institute (PCORI).

Dr. Rawl, who has long focused on interventions to promote cancer screening and reduce cancer risk, received the award to compare interventions to increase colorectal cancer screening among underserved patients with limited resources. The researchers will compare a mailed, tailored DVD alone to a mailed, tailored DVD plus a telephone-based patient navigator to usual care to increase colorectal screening rates. The DVD and the patient navigator are designed to educate people about the importance and benefits of screening as well as provide assistance to overcome each individual’s barriers.

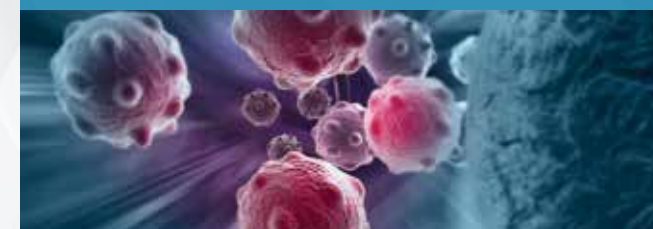
According to Dr. Rawl, patient navigation and computer programs that are personalized to the unique needs of each user have been shown to be effective approaches to increasing screening for colorectal cancer and other cancers, but no studies have combined the two approaches to evaluate their effectiveness.

“We will examine whether these interventions improve knowledge about colon cancer and screening and change persistent health beliefs about screening,” Dr. Rawl said. “Ultimately, the goal is to test whether these interventions are effective approaches to getting people screened.”

Colorectal cancer screening varies from annual stool testing with fecal occult blood tests or fecal immunochemical tests, sigmoidoscopy every five years or colonoscopy every 10 years. The effectiveness of

counsel and prepare patients for screening. Our results may lead them to implement one or both of these interventions in a variety of health systems as a way to increase this much-needed screening.”

COLORECTAL CANCER IS THE SECOND MOST COMMON CAUSE OF CANCER DEATHS IN THE COUNTRY, ACCORDING TO THE NATIONAL CANCER INSTITUTE. ABOUT ONE-HALF OF THE 49,000 DEATHS IN 2016 COULD HAVE BEEN PREVENTED IF APPROPRIATE COLON CANCER SCREENING WAS WIDELY IMPLEMENTED.



any screening depends on the rate of adherence. Up to one-half of people don’t go through with a scheduled colonoscopy.

“Through this study, we seek to learn how to best educate and motivate people to get a colorectal cancer screening test because it can be a life saver,” Dr. Rawl said. “This study—when completed — has the potential to change how health care providers and health care systems educate,

An important component of this study involves the engagement of a diverse, eight-person community advisory board. The board will be involved in all aspects of the study—from developing the research idea to refinement and implementation of the tailored DVD and the patient navigator interventions to interpretation and dissemination of the study findings.

Facing page: Dr. Rawl (left) discusses the equipment used during a colonoscopy with Hala Fatima, MBBS, associate professor of medicine at IU School of Medicine. Dr. Fatima, whose research has focused on improving endoscopic techniques, plays an important role in this study.



Physicians and researchers collaborate on the next generation of personalized medicine

Story by Brian Hartz | Photos by Tim Yates

A dedicated alliance of clinicians and scientists at the IU Simon Cancer Center is intent on transforming breast cancer treatment by studying the genetic codes of each patient and her tumor. Analyzing these distinctive and fundamental pieces of information will identify the most effective treatment to rid her body of cancer and the drug or drugs that will result in the lowest degree of toxicity, or side effects.

This work, known as genomics and pharmacogenomics, is helping to usher in the next generation of personalized medicine. Moreover, it also contradicts the one-size-fits-all approach to cancer treatment that can result in vastly diminished quality of life for patients.

Lang Li, PhD, an informatics expert, **Bryan Schneider**, MD, a medical oncologist, and **Todd Skaar**, PhD, a clinical pharmacology expert, are three of the key players in Monogrammed Medicine, a \$10 million initiative made possible by the Vera Bradley Foundation for Breast Cancer. Dr. Schneider, who is the Vera Bradley Investigator in Oncology, and tumor geneticist **Milan Radovich**, PhD, have also established a precision

GENOMICS: The study of the complete set of DNA (including all of its genes) in a person or other organism.

PHARMACOGENOMICS: The study of how a person's genes affect the way he or she responds to drugs.

oncology clinic and are in the midst of a clinical trial focusing on this individualized approach to treating breast cancer patients.

Dr. Schneider balances clinical treatment of breast cancer patients with laboratory research focused

on ways of predicting which mutations are the optimal ones to target and then delivering multiple medications that will block the various gas pedals of the tumor. That requires advanced informatics because each tumor might have a unique combination of genetic factors."



FEMALE BREAST CANCER IS THE FOURTH LEADING CAUSE OF CANCER DEATH IN THE UNITED STATES. IN 2016, AN ESTIMATED 246,660 NEW CASES OF FEMALE BREAST CANCER WERE EXPECTED, WITH AN ESTIMATED 40,450 DEATHS FROM THE DISEASE, ACCORDING TO THE NATIONAL CANCER INSTITUTE.

on personalized medicine. One of his goals is to make genomic treatment more widely available for patients with all types of cancer. This means matching tumor genes with drugs, not just drugs prescribed specifically for breast, colon or other cancers.

"We look for an Achilles heel within each tumor ... but it's not like all tumors have only one vulnerability," Dr. Schneider explained. "They are driven by more than one 'gas pedal,' or mutation. What we are trying to come up with

That's where the work of Drs. Li and Skaar enters the picture. Dr. Li's lab has spent years on data-mining projects that delve into public domain databases in search of correlations between drugs and side effects in specific cancer patient populations.

"The goal," Dr. Li said, "is to use genomics to predict which patient population will most benefit and get the least amount of side effects based on genomic profiles. Also, cancers share many common genetic mutations. What we see in breast cancer, we also see in, say, ovarian cancer. So everything we see in breast cancer can be translated to other types of cancer."

While Dr. Li operates on the macro level, Dr. Skaar takes a deep dive into the micro level. His lab work focuses on inherited genetics that affect a person's response to a drug, which encompasses both the drug's efficacy and toxicity. Reducing the latter, according to Dr. Skaar, has taken on new importance. "Quality of life is becoming more of a factor because patients are living longer," he said.

Drs. Li and Skaar have been collaborating for more than a decade, and now, thanks to Drs. Schneider and Radovich, they're part of a broader, multi-disciplinary precision genomics clinic that could very well revolutionize how clinical investigators and oncologists approach cancer research and treatment.

"While we are developing a treatment model based on breast cancer, we're hopeful it will be applicable to other cancers," Dr. Schneider said.

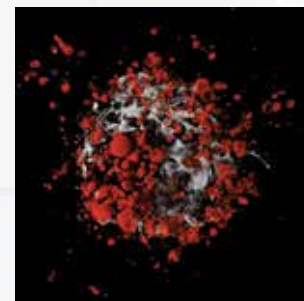
Facing page: Drs. Li, Radovich, Schneider and Skaar are focusing on breast cancer, but their work may have implications for other cancers.



Dr. Kelley and colleagues
moving science from lab
to patient's bedside

Story by Michael Schug | Photos by Tim Yates

The search for effective therapy for pancreatic cancer has long bedeviled researchers and physicians, as well as the countless people it has stricken, robbing them of their lives. Most patients with pancreatic cancer have no symptoms until it's too late, seeking medical attention only after the cancer is wide-spread and untreatable.



This image reveals pancreatic cancer cells from a three-dimensional co-culture assay.
— Indiana Center for Biological Microscopy 3D reconstruction

However, there is hope that the work of **Mark Kelley**, PhD, associate director for basic science research at the IU Simon Cancer Center, will make inroads against the devastating disease.

With almost three decades of cancer research under his belt—he started studying the genetics of fruit flies while an undergraduate—Dr. Kelley and his colleagues are moving science from the laboratory to the patient's bedside. In early 2017, a phase I clinical trial will open at the IU Simon Cancer Center in which study participants—those with solid tumors that are no longer treatable by standard therapy—will take pills twice a day. The clinical trial will help to determine the drug's safe dosage. Once

that's been determined, it will be evaluated in a number of different cancer patients including those with pancreatic cancer.

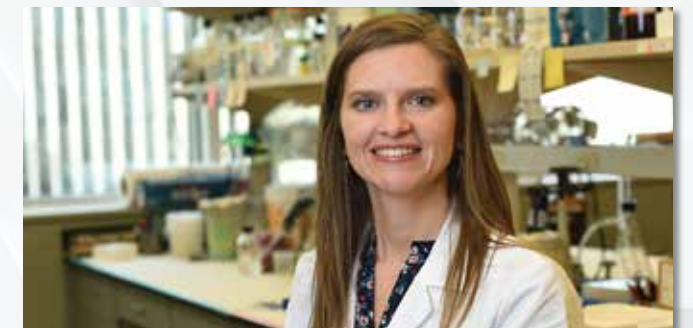
The drug used in the clinical trial—a molecular compound known as APX3330—targets the APE1/Ref-1 protein that is important to the development of pancreatic cancer and other cancers.

"It very specifically targets the APE1/Ref-1 protein and that protein talks to other proteins so you get a multiplier effect by blocking APE1/Ref-1. By doing so, you affect other signaling factors. In other words, you disrupt several proteins involved in the growth of the cancer," Dr. Kelley, also associate director of the Pancreatic Cancer Signature Center, explained. "It's targeted therapy and the first drug ever to go into the clinic targeting the APE1/Ref-1 protein in cancer patients."

Dr. Kelley is an APE1 protein expert. He and his team were one of the first groups to demonstrate that the APE1 protein has an additional function: It helps cancer cells "turn on" genes that regulate transcription factors that cancer cells need to survive.

Dr. Kelley and his colleague **Melissa Fishel**, PhD, an associate research professor at the IU School of Medicine and a researcher at the

cancer center, have tirelessly worked to get to this point. Their research has shown that APX3330 is effective in reducing tumor growth and metastases in mouse models with pancreatic and other cancers.



Melissa Fishel, PhD

Dr. Kelley pointed out that when it's combined with gemcitabine, a chemotherapy medication used as standard of care for pancreatic and other cancers, it further decreased tumor growth.

As an added benefit, APX3330 may protect against neuropathy – numbness, weakness, tingling and pain that a significant number of cancer patients experience and for which there are no approved treatments. This work by Dr. Kelley and his colleagues illustrates progress against cancer's intricacies that is often measured in years. From Dr. Kelley's early focus on DNA repair pathways, he eventually discovered that APE1 enhances cancer cell survival and how it functions

and ultimately discovered how to stop its activity. His discoveries led to the establishment of Apexian Pharmaceuticals, of which he serves as chief scientific

officer. Apexian took charge of regulatory issues, drug manufacturing and more—areas typically not handled by scientists in academia—thus, bringing APX3330 to reality for this clinical trial.

Decades after he first started working on APE1/Ref-1 in cell cultures, Dr. Kelley's life-long work is moving into the next stage—a stage that may indeed benefit patients. "It's very rewarding," he said of the accomplishment. "It's a huge landmark. It's a massive milestone to get a drug to clinic based on a target that you've been working on for decades. But it's also a collaborative effort. Melissa's lab has been working on it, and it's been a wonderful academic-industry team effort with Apexian."

PANCREATIC CANCER IS THE THIRD LEADING CAUSE OF CANCER DEATH IN THE UNITED STATES, ACCORDING TO THE NATIONAL CANCER INSTITUTE. IN 2016, THERE WERE AN ESTIMATED 53,070 NEW CASES OF PANCREATIC CANCER WITH 41,780 DEATHS CAUSED BY THE DISEASE.

Research programs

At the IU Simon Cancer Center,

more than 200 scientists

conduct research in five

different programs. The goals

of those programs range from

understanding the molecular

changes that cause cancer to

developing targeted therapies

to prevent and treat cancer.



Breast Cancer (BC) research program

The Breast Cancer research program is a highly interactive program which combines basic, translational and clinical research skills with the scientific goals of understanding the biology underlying breast cancer, and applying that understanding to improve prevention, diagnosis and treatment.

KATHY MILLER, MD
Professor of Medicine; Ballve Lantero Scholar in Oncology | IU School of Medicine

HARIKRISHNA NAKSHATRI, BVSC, PhD
Marian J. Morrison Professor in Breast Cancer Research; Professor of Surgery; Professor of Biochemistry and Molecular Biology | IU School of Medicine

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| Bennett Elzey, PhD | Clark Wells, PhD |
| Linda Han, MD | Hiroki Yokota, PhD |
| Chunyan He, ScD | Richard Zellars, MD |
| Brittney-Shea Herbert, PhD | Jian-Ting Zhang, PhD |
| Mircea Ivan, MD, PhD | Siyuan Zhang, MD, PhD |
| Steven Johnson, PhD | |
| Jaeyeon Kim, PhD | |
| Lang Li, PhD | |
| Laurie Littlepage, PhD | |
| Xiaowen Liu, PhD | |
| Yunlong Liu, PhD | |
| Natascia Marino, PhD | |
| Samy Meroueh, PhD | |
| Kenneth Nephew, PhD | |
| Samilia Obeng-Gyasi, MD, MPH | |
| Jenifer Prosperi, PhD | |
| Sara Quinney, PharmD, PhD | |
| Milan Radovich, PhD | |
| Zachary Schafer, PhD | |
| Bryan Schneider, MD | |
| Todd Skaar, PhD | |

(Bold denotes members accepted in 2016)



Cancer Prevention and Control (CPC) research program

Cancer Prevention and Control researchers are engaged in innovative and collaborative research with the potential to decrease cancer morbidity and mortality. CPC researchers are also involved in prevention and early detection of cancer through cancer risk reduction and screening as well as preventing and reducing debilitating symptoms caused by cancer treatment while tailoring interventions to individuals.

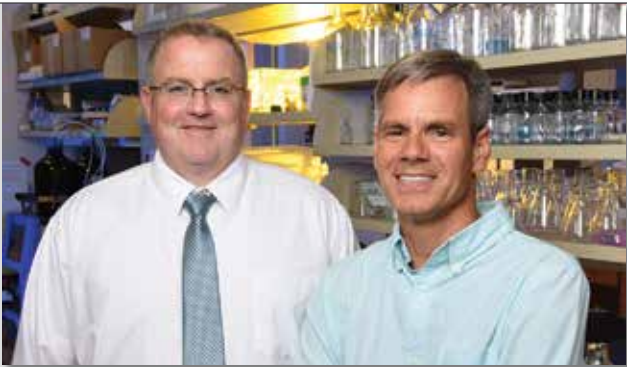
SUSAN RAWL, PhD
Professor of Adult Health, IU School of Nursing

JIALI HAN, PhD
Rachel Cecile Efroymson Professor in Cancer Research | IU School of Medicine; Professor and Chair of Epidemiology | Richard M. Fairbanks School of Public Health at IUPUI

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| Juhua Luo, PhD | Gregory Zimet, PhD |
| Jonathan Macy, PhD, MPH | |
| Brenna McDonald, PsyD | |

(Bold denotes members accepted in 2016)



Experimental and Developmental Therapeutics (EDT) research program

The Experimental and Developmental Therapeutics program is a multidisciplinary program that promotes and facilitates the development of new cancer therapies from bench to bedside. The scientific goal of the EDT Program is to discover and develop novel cancer therapeutics, fitting well with the overall mission of the IU Simon Cancer Center.

BERT O’NEIL, MD
Joseph W. and Jackie J. Cusick Professor of Oncology; Professor of Medicine | IU School of Medicine

JOHN TURCHI, PhD
Tom and Julie Wood Family Foundation Professor of Lung Cancer Research; Professor of Medicine; Professor of Biochemistry and Molecular Biology | IU School of Medicine

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| Tao Lu, PhD | |
| Timothy Masterson, MD | |
| Lindsey Mayo, PhD | |
| Marc Mendonca, PhD | |

(Bold denotes members accepted in 2016)

Research programs



Hematopoiesis, Hematologic Malignancies, and Immunology (HMI) research program

The central themes of the Hematopoiesis, Hematologic Malignancies, and Immunology (HMI) program are: (1) Hematopoiesis; (2) Hematologic Malignancies; (3) Immunology. The ultimate programmatic goal of the program is to use results from member studies to develop novel therapeutic approaches for treating patients with malignancies. These comprehensive studies include basic normal and disordered hematopoiesis, the pathophysiology of hematologic malignancies and immune cell function associated with hematopoiesis, hematopoietic cell transplantation and tumors.

G. DAVID ROODMAN, MD, PhD

Director, Division of Hematology/Oncology; Kenneth Wiseman Professor of Medicine; Professor of Biochemistry & Molecular Biology | IU School of Medicine

HAL E. BROXMEYER, PhD

Distinguished Professor; Mary Margaret Walther Professor Emeritus; Professor of Microbiology/Immunology | IU School of Medicine

REUBEN KAPUR, PhD

Frieda and Albrecht Kipp Professor of Pediatrics | IU School of Medicine

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Utpal Dave, MD

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Noriyoshi Kurihara, DDS, PhD

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Yan Liu, PhD

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Sophie Paczesny, MD, PhD

Louis Pelus, PhD
- Michael Robertson, MD

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Rebecca Silberman, MD

Edward Srour, PhD

Attaya Suvannasankha, MD

Mervin Yoder, MD

Momoko Yoshimoto, MD, PhD

Baohua Zhou, PhD

(Bold denotes members accepted in 2016)



Tumor Microenvironment and Metastasis (TMM) research program

The Tumor Microenvironment and Metastasis program arose as a consequence of existing collaborations established in a working group among interactive investigators studying solid tumors and metastatic processes. The scientific goals of the TMM program are to advance our basic understanding of the role of cancer cell stromal interactions in cancer initiation, progression and metastasis; to evaluate the functions of the metastatic niche; and to translate discoveries of the pathobiology of solid tumors, the tumor microenvironment and the metastatic niche into new cancer targets and novel therapies.

MURRAY KORC, MD

Myles Brand Professor of Cancer Research; Professor of Medicine; Professor of Biochemistry and Molecular Biology | IU School of Medicine; Director, Center for Pancreatic Cancer Research

THERESA GUISE, MD

Jerry and Peggy Throgmartin Professor of Oncology; Professor of Medicine | IU School of Medicine

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Lynda Bonewald, PhD

D. Wade Clapp, MD

Marion Couch, MD, PhD

Karen Cowden Dahl, PhD

Jesus Delgado-Calle, PhD

Mahua Dey, MD

Hong Du, PhD

Melissa Fishel, PhD

John Foley, PhD

Mark Geraci, MD

Shannon Hawkins, MD, PhD

Reginald Hill, PhD

Peter Hollenhorst, PhD

Heather Hundley, PhD

Travis Jerde, PhD

Melissa Kacena, PhD

Chien-Chi Lin, PhD

Anirban Mitra, PhD

Khalid Mohammad, MD, PhD

Kenneth Nephew, PhD

Heather O'Hagan, PhD

Beth Pflug, PhD
- Karen Pollok, PhD

Lawrence Quilliam, PhD

Kent Robertson, MD, PhD

Ravi Sahu, PhD

Uma Sankar, PhD

Christian Schmidt, MD, PhD

Dan Spandau, PhD

M. Sharon Stack, PhD

William Thompson, DPT, PhD

Ronald Wek, PhD

Kenneth White, PhD

Laura Wright, PhD

Jingwu Xie, PhD

Yan Xu, PhD

Cong Yan, PhD

Toshiyuki Yoneda, DDS, PhD

Teresa Zimmers, PhD

(Bold denotes members accepted in 2016)

Unique program brings attention to health care disparities, encourages careers in oncology

Story by Brian Hartz and Michael Schug | Photo by Tim Yates



Dr. Zellars (center) and his inaugural CUPID class at IU: Justin Michael, Mirian Okoye, JaneFrances Egbosiuba and Adam Stepanovic.

Justin Michael, a second-year student at IU School of Medicine, may follow a different career path than he initially envisioned when he graduates after taking part in Cancer in Under-Privileged, Indigent, or Disadvantaged (CUPID) in the summer of 2016.

“Oncology was a very terrifying field for me,” he said. “I entered the medical field with aspirations to cure patients and cancer was a disease that I believed to be incurable.” While doing rounds with radiation oncologist **Richard Zellars**, MD, the founder of CUPID,

Michael had the chance to interact with cancer patients.

“When I stepped into the breast cancer clinic, the first thing I saw was not tears but smiles,” Michael said. “Every woman that I met was optimistic and full of cheer. I was blown away ... now the picture in my mind of oncology transformed from despair to hope. I now realize that cancer is a disease that we are understanding and being able to manage. Without CUPID, I would never have faced my fears, and I would still have a very wrong perspective on the

field of oncology. CUPID took oncology from the bottom of my list in career interests and put it at the top.”

Michael and classmates Mirian Okoye, JaneFrances Egbosiuba and Adam Stepanovic were the first four students in CUPID at IU.

Dr. Zellars, chair of the Department of Radiation Oncology at the IU School of Medicine and a member of the IU Simon Cancer Center’s breast cancer research program, introduced the successful summer program at IU after he had started it

more than a dozen years ago at Johns Hopkins University. It provided four second-year IU medicine students the chance to shadow medical oncologists, radiation oncologists and surgical oncologists as they worked with patients from underserved communities in the Indianapolis area. During the seven-week program, students also attended daily lectures delivered by IU and Johns Hopkins faculty and conducted research and basic science lab work alongside faculty mentors.

To learn more about CUPID, visit public.onc.jhmi.edu/cupid. CUPID plans to launch at Ohio State University in 2017.

Shared facilities

The IU Simon Cancer Center provides its nearly 200 members (researchers) with access to cutting-edge equipment, technology and services with 14 shared facilities. Each facility, staffed by experts, helps members make advances in cancer research.

Angio BioCore

Karen Pollok, PhD
Director
317.274.8891
Emily Sims
Manager
317.278.7232
www.cancer.iu.edu/angiobiocore

A state-of-the-art facility that provides validated and highly reproducible in vitro and in vivo assays to study angiogenesis, endothelial and hematopoietic cell biology, and their role in normal and pathological conditions, including cancer, diabetes, cardiovascular and infectious diseases. Services provided include functional studies, metabolism assays, multi-parametric flow cytometry assays and screenings for anti-angiogenic compounds.

Behavioral and Cancer Control Recruitment Core

Stephanie Wofford, MSM
317.278.0608
www.cancer.iu.edu/behavioral

The mission of the Behavioral and Cancer Control Recruitment Core is to serve the needs of all cancer center investigators whose research has a behavioral or cancer prevention and control focus and involves human subjects. The core was established to optimize behavioral and cancer control research recruitment. Its purpose is to coordinate, support accrual and supervise recruitment of all approved behavioral and cancer control studies. The core provides supervised recruitment throughout the IUSCC, other sites and regional social networks. In addition, it provides recruiter training, communication with clinical care groups, recruitment material preparation and ongoing recruitment strategy assessment.

Biostatistics & Data Management

Susan Perkins, PhD
Director
317.274.2626
www.cancer.iu.edu/biostats

The Biostatistics and Data Management Core of IU Simon Cancer Center has statistical, data management, administrative and educational responsibilities. The core participates in every level of research, from study planning and monitoring to data analysis and dissemination of results.

Clinical Pharmacology Analytical Core

David Jones, PhD
Director
317.630.8726
Jamie Renbarger, MD
Scientific Director
317.944.8784
www.cancer.iu.edu/cpac

The Clinical Pharmacology Analytical Core provides services to IU Simon Cancer Center members as well as Indiana University School of Medicine faculty to assist in the:

- quantification of drugs and new chemical entities in tissues (including blood, plasma, serum and solid tissues) and on dried blood spot card
- pharmacokinetic analysis of data (noncompartmental only)
- qualitative and quantitative assessment of formulations for use with new chemical entities in preclinical studies
- measurement of metabolic stability and metabolite identification of new chemical entities
- measurement of protein binding of drugs and new chemical entities

Clinical Trials Office

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Director, Pediatric CTO
Melissa Lee, BS, CCRA
Clinical Research Manager, Pediatric CTO
www.cancer.iu.edu/cto

The Clinical Trials Office provides comprehensive clinical trials services to IU Simon Cancer Center members. Services include protocol review and monitoring, protocol development, data safety monitoring and data management, as well as training and supervision of staff and maintenance of research databases.



Collaborative Core for Cancer Bioinformatics

Jun Wan, PhD
Core Director
Nadia Atallah, PhD
Core Manager
Purdue University Center for Cancer Research
Lijun Cheng, PhD
Core Manager
IU Simon Cancer Center
844.740.0040
www.cancer.iu.edu/bioinformatics

The Collaborative Core for Cancer Bioinformatics is unique in that it is available to members of both the IU Simon Cancer Center and Purdue University Center for Cancer Research. The core's goal is to integrate and accelerate cancer discovery, drug discovery, precision medicine and training through a joint bioinformatics/molecular genetics/genomics initiative that will enhance research capability and form the foundation for more rapid data generation, manuscript publication and joint multi-investigator grant applications. Bioinformaticians at IU and Purdue—Drs. Atallah and Cheng—manage the core to serve members.

Epidemiology Consultation Core

Hongmei Nan, MD, PhD
Director
317.278.3907
www.cancer.iu.edu/epi

The overall goal of population research is the prevention and early diagnosis of human diseases, proper treatment fitting the patients, as well as improved survival rates. The Epidemiology Consultation Core aims to promote population research and education in epidemiology at the IU Simon Cancer Center by facilitating collaborative interactions between faculty members from the cancer center and the multiple academic institutions in Indiana, thus, promoting joint research projects and grant proposals related to population research.

Shared facilities

Flow Cytometry Resource Facility

Edward Srour, PhD
Director
317.274.3589
www.cancer.iu.edu/flow

The Flow Cytometry Resource Facility (FCRF) provides flow cytometric analysis and cell sorting services including consultation, technical advice and collaboration, thus, promoting the application of cutting-edge flow cytometric protocols to varied scientific needs of cancer center scientists. In addition, the FCRF provides state-of-the-art Time of Flight analysis using the new CyTOF2 technology as well as single cell genomics including RT-PCR, DNA sequencing and RNA-seq based on the Fluidigm platform.

In Vivo Therapeutics Core

Karen Pollok, PhD
Director
317.274.8891
www.cancer.iu.edu/ivt

The mission of the In Vivo Therapeutics Core is to provide IUSCC investigators with cost-effective and comprehensive services to facilitate the development and testing of novel pharmacological and cellular therapies. In addition, the core has partnered with the Pediatric Precision Genomics Program to develop new patient-derived xenografts from sarcoma patients at Riley Hospital for Children at IU Health.

Multiplex Analysis Core

Christie Orschell, PhD
Director
317.278.2485
www.cancer.iu.edu/mac

The Multiplex Analysis Core offers microplate-based bioassay systems that can perform multiplex analysis of multiple different analytes in a single sample. Multiplex systems are faster, more efficient and use less sample volume than other technologies such as ELISA and Western Blot. The core provides technical expertise and consultation for high-quality protein quantitation (pictogram/femtogram level), using commercially available kits or custom kits designed by the PI. Multiplex kits for phosphor-proteins and nucleic acids are also available.

Susan G. Komen Tissue Bank at IU Simon Cancer Center

Anna Maria Storniolo, MD
Executive Director
Jill Henry
Chief Operating Officer
317.278.2829
www.komentissuebank.iu.edu

The Komen Tissue Bank at the IU Simon Cancer Center is the only normal breast tissue bio-repository of its kind in the world, making it uniquely positioned to characterize the molecular and genetic basis of normal breast development and compare it to the different types of breast cancer. It was established expressly for the acquisition of normal tissues—breast tissue, cryopreserved tissue, serum, plasma and DNA—from volunteer donors with no clinical evidence of breast disease and/or malignancy, providing a resource to investigators around the globe.

Therapeutic Validation

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Ahmad Safa, PhD
Co-director
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The Therapeutic Validation Core assists clinical investigators in the development and execution of correlative biological assays needed to validate mechanism(s) of action of candidate drugs/therapies and to develop and test new hypotheses. It also provides technical and intellectual support in the development, implementation and validation of predictive and pharmacodynamic biomarkers for novel, molecularly-targeted anti-cancer agents.

Tissue Procurement and Distribution

Mary Cox
Operations Manager
Oscar Cummings, MD
Director
George Sandusky, DVM, PhD
Associate Director
Attaya Suvannasankha, MD
Associate Director of Clinical Research
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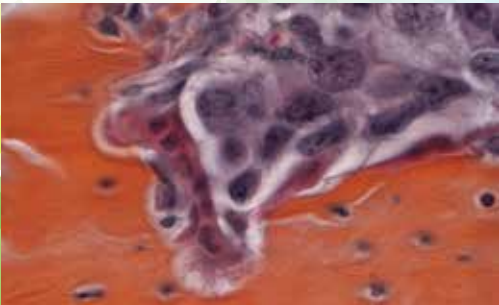
Tissue Procurement and Distribution provides samples for the discovery of new drug targets and biomarkers, the development of cancer cell lines and patient derived xenografts (PDX) as well as DNA and RNA research. It serves as a resource for the centralized banking of tissue, blood, bone marrow and buccal swab specimens procured from patients.

Transgenic and Knock-Out Mouse

Loren Field, PhD
Director
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Hanying Chen
Core Manager
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The Transgenic & Knock-Out Mouse Core provides services for the production of traditional transgenic mice and CRISPR-mediated knockout mice via pronuclear injection. The core also provides services for embryo and sperm cryopreservation and recovery.

What does cancer look like when it spreads to bone? This microscopy image, Cancer to Bone, by IU Simon Cancer Center researchers Khalid Said Mohammad, MD, PhD, and Theresa Guise, MD, shows such a view. It was one of more than 80 images selected by the National Cancer Institute for its Cancer Close Up project in 2016.



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