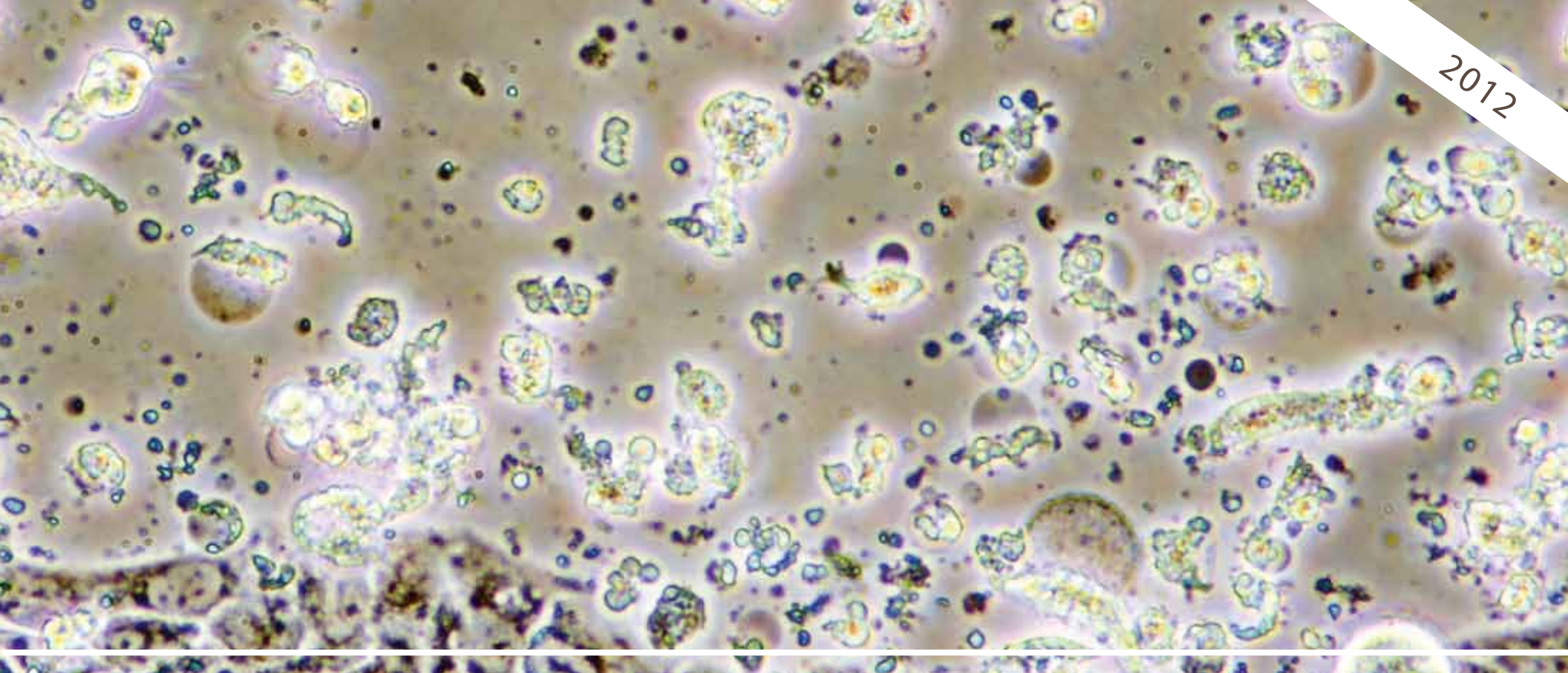
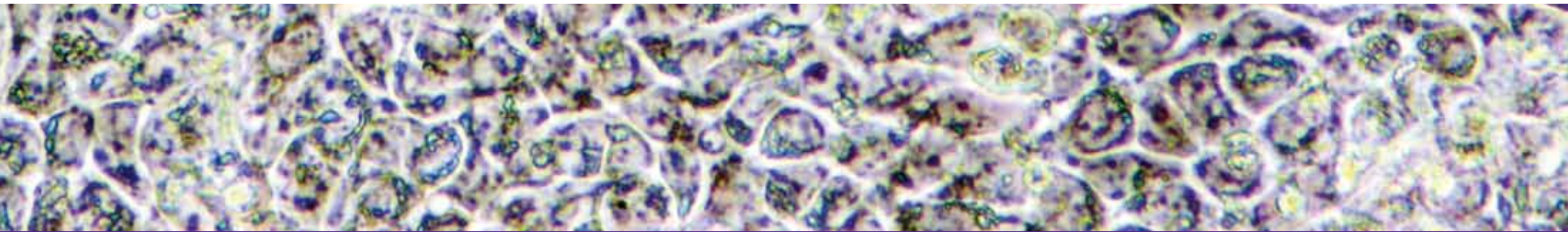


2012



Conquest

Johnson Cancer Research Center



K a n s a s S t a t e U n i v e r s i t y

The fight starts here! From nanoparticles and stem cells to antioxidants and drug discovery, Kansas State University faculty are conducting the basic and translational cancer research that leads to new treatments and cures, as well as training tomorrow's scientists and medical professionals.

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100% of every gift goes directly to cancer research and education, not administration.

\$500,000 awarded to cancer research faculty and students every year.

77 K-State faculty researchers are fighting cancer in 16 departments of 5 colleges.

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To view the annual report "Accepting a Challenge," visit our website's 'About Us' page.



Welcome to the first issue of *Conquest*, a new magazine highlighting standout cancer research by faculty and students of Kansas State University's Johnson Cancer Research Center.

Like many of you and your loved ones, my wife and I are cancer survivors. We are a testament that research has made headway in fighting cancer. But cancer is still the second-leading cause of death in the U.S. The future is bright, but much remains to be accomplished. Our center is devoted to conquering cancer in our time by supporting

faculty research, student training and public outreach. I hope you will join my colleagues and me as we make K-State a leader in the fight.

A remarkable 77 faculty members with diverse specializations in 16 K-State departments are engaged in cancer research. Many of our researchers are studying cell and molecular biology to better understand tumor initiation, progression and metastasis, while others are focused on prevention through diet, exercise and smoking cessation.

Still others, such as the team we feature in this magazine — Stefan Bossmann, professor of chemistry, and Deryl Troyer, DVM, professor of anatomy and physiology — are pursuing new approaches to diagnosis and treatment. Better methods to diagnose cancers are badly needed, as are ways to treat them without causing the harmful effects of chemotherapy and radiation. This team, which is a fine example of the interdisciplinary collaboration our center encourages, is achieving such advances and getting ever closer to moving them from the laboratory to the patient.

Our center also fosters the next generation of cancer researchers. Our Cancer Research Award mentoring program funds laboratory research experiences for 50 exceptional undergraduates a year. In this issue, you can read about a current one, Kristina Bigelow, working in a diagnostic medicine/pathobiology lab, as well as a former one, Caroline Tsen, M.D., who worked with Dr. Terry C. Johnson himself.

We can conquer cancer — but only with your help. Our programs are funded solely by private donations. I know many organizations ask for your help; you can feel good about choosing ours. In addition to investing in excellent cancer research, your gift helps K-State and boosts the local and state economy. Moreover, we apply 100% of all donations to our programs, not to overhead expenses like salaries and fundraising. In this issue, you'll meet one of our generous friends — local broadcast legend Dave Lewis, who lends his voice to our cause.

We thank all our friends who have made our programs possible over the years, and all of you who have taken an interest in K-State's cancer research and education. I invite you to read on and join our fight against cancer.



Rob Denell

Breast cancer researcher investigates prominent breast cancer gene

by Rachel Skybetter

Despite switching her research focus to breast cancer, Anna Zolkiewska continues her work with one unique family: the ADAMs family.

But instead of television's family of twisted misfits, Zolkiewska, an associate professor of biochemistry, is studying a family of twisted, potentially dangerous genes.

ADAM is an acronym for A Disintegrin and Metalloprotease, and ADAMs are proteins that decorate the cell surface.

"If you are looking at cells from the outside, they are the first thing you would see," Zolkiewska said. "They help cells communicate with their environment, and they're actually enzymes that are an active protease, and they function to cleave other proteins that are present there."

ADAMs are prominent players in many different cancers — including breast, colon and prostate — as well as in cardiovascular diseases, stroke, arthritis and muscular dystrophy, the latter of which Zolkiewska studied before changing her focus to breast cancer tumors.

High levels of ADAM12, a gene in the ADAM family, are found in cancer stem cells, which are highly resistant to chemotherapy and radiation, and can often cause cancerous tumors to resurface years after a patient gets the all clear.

"There are a whole variety of cells in a tumor. There are cells that are not as dangerous, and there are cells that are tremendously vicious, and those are the cancer stem cells," Zolkiewska said. "They are responsible for fueling tumor growth and regrowth. So we're researching how to detect cancer stem cells, kill them effectively and stop them from growing in the future."

She and her team are able to study it closely thanks to a partnership with the University of Kansas Medical Center in Kansas City, Kan., which sends tissue from breast cancer tumors to K-State for research purposes.

Zolkiewska cultivates breast cancer cells in the lab and investigates ways to limit the growth of cancer stem cells, then isolate and kill those cells selectively. It will be many years, however, before effective therapies are tested on human patients.

"It's relatively easy to kill cancer cells in the dish, but a lot of those treatments are so toxic. The challenge is to find treatments that will be less toxic and better tolerated," she said. "I think basic cancer research scientists like us can contribute to this because we can help with estimations and predictions about how toxic those treatments would be."

Zolkiewska is halfway through a three-year grant of \$444,000 from the National Institutes of Health titled, "Structure-Function Analysis of Breast Cancer-Associated Mutations in ADAM12."

Hui Li, PhD, doctoral student Sara Duhachek Muggy, and Anna Zolkiewska

Our researchers won **\$13.4 million** in national funding in 2011, often having leveraged one of our seed grants or matching fund awards.

Communicating for a cure

by Megan Molitor

Improved communication can help human relationships — and may also help treat cancer.

One Kansas State University student is working with top-notch researchers studying cell communication to find a compound to treat colon cancer — all before she receives her bachelor's degree.

A senior in biology and chemistry, Kristina Bigelow has been working with Annelise Nguyen, assistant professor of toxicology in the College of Veterinary Medicine, since she was a freshman.

"I was very impressed with her enthusiasm for science," Nguyen said. "Having grown up on a farm, she values hard work and dedication. My lab is fortunate to have her as part of our team."

Bigelow has been assisting Nguyen's cell-to-cell communication research. Cells send out and receive signals from adjacent cells, Bigelow said, but communication is lacking in cancer cells. When cell proteins band together, they form channels called gap junctions. Bigelow said when gap junctions are closed or not formed because of lack of available proteins, they can lead to cancer formation. The compounds Bigelow tests alongside Nguyen attempt to open the gap junctions, allowing for clearer communication.

"Cancer drugs often have side effects because they kill all cells, whether healthy or cancerous," Bigelow said. "Our compound may be less toxic because it has been shown to affect only the closed channels of cancer cells."

Bigelow recently received a \$1,000 Cancer Research Award from the Johnson Cancer Research Center, which supports 50 undergraduate laboratory research experiences a year. The students spend the spring semester

conducting the research and get \$1,000 awards. Another \$1,000 per student is given to their faculty mentors to cover the additional research expenses.

Bigelow considers her cancer research experience a valuable tool in her undergraduate education.

"I get to do graduate-level research as an undergraduate and work in a lab with professionals," she said. "I learn things most students don't come across until pursuing their master's degrees. I had no idea what any of these words meant when I was a freshman. Now I'm in an environment where I can learn the jargon and how to explain my research."

Bigelow's efforts have been recognized through several other honors and awards. After qualifying for the university's Developing Scholars Program as a freshman, she received the Kansas Idea Networks of Biomedical Research Excellence (K-INBRE) Star Award, which provides her with \$7,500 for research. She was also recently accepted into the National Institutes of Health Summer Internship Program in Biomedical Research, to work at a National Cancer Institute laboratory with Bob Kinders, PhD, a K-State alumnus and member of the Johnson Cancer Research Center's advisory council.

Her achievements have taken a lot of work, but Bigelow credits her great resources. Nguyen, Kansas State University, K-INBRE and the Johnson Cancer Research Center have all put her in an excellent position for what she hopes is her next step: working toward her M.D./Ph.D. degree from the University of Kansas School of Medicine.

Bigelow said she hopes to eventually work in a hospital treating cancer patients and researching. "Great people get sick and it's sad," she said. "I want to help both sides of the cancer field by being in the background and the foreground."





\$1.5 million awarded to faculty for innovative research since 2003. But \$2.5 million was requested.

New test could provide cancer detection in one hour

Part of a person's annual clinical exam may soon include giving doctors a sample of urine or blood, and knowing within 60 minutes or less whether cancer is present in the body.

Kansas State University researchers Stefan Bossmann and Deryl Troyer are currently perfecting a cancer detection method that does exactly this. Having successfully tested samples from dogs, the team is analyzing samples from humans with breast, lung and pancreatic cancer, in collaboration with researchers at NanoScale Corp.,

a Manhattan-based company that manufactures, markets and commercializes advanced products and technologies.

While similar detection methods are being explored elsewhere, the one developed by Bossmann and Troyer uses detection of tumor-specific enzymatic activity, resulting in faster and more accurate results.

Additionally, the testing method could be tweaked for use in monitoring cancer, rapidly determining whether the entirety of a tumor has been successfully removed in a patient.

The team anticipates knowing whether the test is a viable option by summer 2012.



Stefan Bossmann and Deryl Troyer

Stopping a killer

by Greg Tammen

We're at war.

According to the World Health Organization, more than 7 million people worldwide die from cancer each year — and that number is projected to rise. But two Kansas State University researchers are fighting back by creating nanoscale-sized munitions designed to detect and destroy tumors.

For the past four years Stefan Bossmann and Deryl Troyer, two researchers with the Johnson Cancer Research Center, have combined their expertise on a multitude of successful projects. Bossmann, a professor of chemistry, specializes in nanotechnology — creating containers and metal-based particles that are just nanometers in size. Troyer, a professor of anatomy and physiology, engineers stem cells found in Wharton's jelly, the substance that cushions blood vessels in umbilical cords. Troyer is one of the scientists who discovered that the jelly — a noncontroversial source of stem cells because it's discarded after birth — is a rich source of these blank cells.

"There is no magic bullet when it comes to cancer," Bossmann said. "Instead we have to do lots of combinations because a tumor is not one particular type of cell. Tumors are like organs, there's some specialization going on. Because of that, to cure cancer you have to go to war, firing more than one bullet at the same time."

That's exactly what the team is doing.

One of their many projects centers on using iron/iron oxide nanoparticles to overheat a tumor, effectively killing it. The tiny particles are taken up by stem cells, cloaking them from the body's defenses and putting them in delivery vehicles that actively target the tumors. The application of an alternating magnetic field then causes the particles to produce heat, destroying the cancerous cells while preserving surrounding healthy tissue.

"When we tested this magnetic hyperthermia on melanoma in an animal model we didn't totally cure the cancer, but we saw significant results," Troyer said. "Most recently we tested it on a preclinical model with pancreatic cancer, and we have observed even more tumor reduction than what was seen with the melanoma."

Another project involves collecting cells from the patient and engineering them to transport and deliver a suicide gene — an enzyme that converts a preloaded prodrug carried by the same cells into an active drug that is toxic to cancer cells. Prodrugs are drugs that remain dormant until activated by the body's metabolism.

"It's a self-contained package that could be combined with the magnetic hyperthermia to deliver a very potent combination of therapeutics," Troyer said.

In addition to stem cells, the team has found that other cells — like white blood cells — can be used as transport vehicles to target tumors. Through cell engineering, patients could give a pint of blood and then the cells in that sample could be altered and put back into the patient's body to fight the cancer, Bossmann said. "That's the ultimate goal, and we're not too far away from this."

Among Bossmann and Troyer's collaborators are researchers at the University of Kansas Cancer Center. One of their studies together involves using short peptide sequences that have been selected to target prostate cancer cells. White blood cells will be genetically engineered to make this protein and fused to a cancer cell-killing protein to target bone marrow metastases from the prostate tumors. The same short targeting peptide has been linked to a dye designed by Bossmann to show the presence of the bone metastases.

"Our goal is to reveal new trails toward a cure," Troyer said.

"Let's just say that we're going to reach this goal at Kansas State University," Bossmann said.

The power of pink

Center reaches out to community with luncheon focused on breast cancer awareness, education

By Jennifer Tidball

The 150 women who attended the second annual Pink Power Luncheon in October had various encounters with breast cancer: some were survivors, others were currently undergoing treatment and others were there in support of family and friends who had battled the disease.

But the women were united in a common purpose. They laughed, smiled, hugged, shed tears — all in the name of breast cancer awareness and education.

“Part of our center’s mission is to educate the public about cancer. This luncheon is a great opportunity for us to go beyond research and serve the community, educate about cancer risk reduction and we hope, help reduce the breast cancer death rate in this area,” said Marcia Locke, event organizer. She is the public relations and outreach coordinator for Kansas State University’s Johnson Cancer Research Center.

The Johnson Cancer Research Center and Susan G. Komen for the Cure sponsored the free event. Women who attended received a souvenir item and educational materials.

Aribel León-Lynn, the luncheon guest speaker and a longtime Manhattan resident, talked about her breast cancer experience in the presentation “Breast Cancer Survivor Footprints: An Artful Journey.” During her treatment, León-Lynn turned to painting and poetry, which became little vignettes of her own journey with cancer.

“I’m glad I got to hear her story,” said Sara Thurston-Gonzalez, director of international student and scholar services at Kansas State University who has had two cousins battle breast cancer. “I was jointly interested in her artwork and because of my family connection.”

León-Lynn also encouraged women to pay attention to their bodies, explaining that she discovered cancer in its early stages because she noticed something different in her body.

“Be in tune with what your body is telling you,” she said. “Have those yearly visits and do not ignore the need for those physical exams.”

Educating the women on ways to reduce their risk of cancer was Kristen Bruce, a representative with Susan G. Komen for the Cure, who spoke briefly under the theme “Less talk. More action.” She stressed the importance of self-awareness and encouraged women

to follow several steps for risk reduction and early detection: Know your risk, get screened, know what is normal for you and make healthy lifestyle choices.

“These events truly do bring awareness,” said Janet Rice, a Manhattan breast cancer survivor who attended the luncheon with her friend and fellow survivor, Janet Kiser. “Since I had breast cancer, I have encouraged people to increase awareness about what cancer is. If it is treated early, the survival rate is high.”

“It is something everyone needs to be aware of,” said Brenda Schaffer, a grant specialist in the university’s College of Engineering. “Everybody knows someone who has had cancer. It hits close to home for me as I’m sure it does for many others.”

But for many, including León-Lynn, the event was an opportunity to join in solidarity with other women and to celebrate the importance of pink power.

“We need each other to survive,” León-Lynn said. “The breast cancer journey impacts individuals, it impacts the family and it impacts your friends. We have our individual journeys, but it impacts us all collectively.”



Aribel León-Lynn

Voice to fight cancer

by Trevor Davis

Dave Lewis is using his voice to conquer cancer and honor his late wife.

He is best known around Kansas State University as the man behind the microphone at Bill Snyder Family Stadium and Bramlage Coliseum. He gives fans goose bumps with his booming introductions like, "And noooooooooo the starting line-up for yoooooooooour Kaaaansas State Wiiiiiiiiiiiiidcats!"

Partygoers' ears were treated to Lewis' thundering voice when he served as the emcee and host for the second annual Pink and Purple Polyester Party, an event to raise money to help the Johnson Cancer Research Center fight cancer.

Lewis has plenty of motivation to help fight cancer. He lost his wife, Elena, to a four-year battle with the disease in 2006, and two of her sisters survived battles with breast cancer.

"Elena was an amazing woman and mother, and losing someone that you love so dearly to cancer is just devastating on so many levels," he said. "My hope is that no mother, no wife, no daughter, no sister, no friend will ever have to worry about breast cancer in the future."

Elena's death was unexpected and sudden. She was in remission for about 18 months after chemotherapy, but the cancer came back. She went through another round of treatment and developed a sinus infection that turned into pneumonia. The bout put her in the hospital, and Elena's weakened immune system could not fight any longer. She died at the age of 50 in the hospital.

Lewis lost the love of his life and his wife of 14 years. They married in 1992 shortly after Lewis moved to Manhattan to work in radio. Elena, who was born in Dodge City and raised in McPherson, had eight brothers and sisters. She was well known for her sense of humor and once

toured Russia with a Kansas dance troupe. Her death left Lewis a single father to their daughter Casey, who is now 16 years old.

"People often ask me if I miss doing radio," Lewis said, "but what I miss most in life is Elena. She brought happiness to everyone she touched."

Lewis honored Elena by organizing the first Pink and Purple Polyester Party retro dance party in October 2010. Pink represents breast cancer, purple represents the university, and polyester represents the atmosphere of the party: the era of the late 1960s to early 1980s. The two parties have raised more than \$10,000 for K-State cancer research. Lewis wants to establish an endowed fund within five years.

"I want to take every opportunity I can to assist in funding research," Lewis said. "As an entertainer and not a scientist, this is my small way of helping pave the road toward a cure."

Lewis, a member of the cancer research center's advisory council, learned more about student research during a tour of labs where he met with faculty and student researchers.

In addition to supporting faculty research, the center offers 50 undergraduate student cancer research awards every year to encourage students to consider careers in research and medicine. Awardees participate in laboratory research projects alongside faculty mentors.

"I was inspired by the amazing work of our student researchers at K-State," he said. "These are the future leaders in the medical field who will find a cure, and my hope is that we are able to find a cure within my lifetime."

Lewis first heard about the cancer research center through his work in the radio business, where he was involved in community events. Lewis was a radio announcer for more than 25 years, 15 of them as the morning show host on Manhattan radio station KMAN-AM. He grew up in Dickinson County on a farm, where he would carry around a radio on tractors and imitate radio announcers.

No longer in the radio business, Lewis has hosted more than 2,000 events as a deejay, emcee and entertainer, and he's a Riley County commissioner. He is well known for putting the perfect inflections on names when he introduces players during K-State sporting events, and brides and grooms during weddings. Lewis also has a 3-year-old son, Noah.

"I like to make people feel good, and I enjoy making people laugh," Lewis said. "I've just always had a knack for relating to people, and I want them to feel good about themselves so that they have the time of their lives."



Every donation helps, and last year, gifts of less than \$1,000 contributed to a third of total dollars raised.

A path to success:

Time in lab helps Cancer Research Award alumna shape career in medicine

by Beth Bohn

Dr. Caroline Tsen is wrapping up a busy workweek on a sad note. She's attending a memorial service for a favorite patient of hers, who at age 45 died of a very rare form of sarcoma.

Battles with cancer are not new to Tsen, a primary care internist with Kaiser Permanente in the San Francisco area. She treats a diverse adult panel of about 1,400 patients, many of whom have cancer. She's also coped with cancer in her own family. Her mother died of pancreatic cancer, while her father, Cho Chin Tsen, a professor of grain science and industry at Kansas State University, died of colorectal cancer.

Tsen, who had an interest in medicine at an early age, started her work with cancer while an undergraduate at Kansas State University. It's where she earned a Cancer Research Award from the university's Terry C. Johnson Cancer Research Center. The award supported a laboratory research experience with her faculty mentor, Johnson, the cancer research center's namesake.

The award program, open to undergraduates interested in doing cancer-relevant research, provides \$1,000 stipends to as many as 50 students a year; their faculty mentors also receive \$1,000 for research expenses. Nearly 900 students have earned these awards to date, all made possible by private donations.

Tsen's project, "The Ability of a Monoclonal Antibody to a Cell Surface Growth Regulatory Signal to Influence Growth Kinetics of Normal and Tumor Cells," supported the ongoing research of Johnson, whom she called one of her first and most memorable mentors.

It was Johnson, Tsen said, who helped her realize her path was as a clinician rather than as a researcher. "My lab experience at the cancer research center helped define my career path because it gave me insight into where my strengths and interest lie," she said.

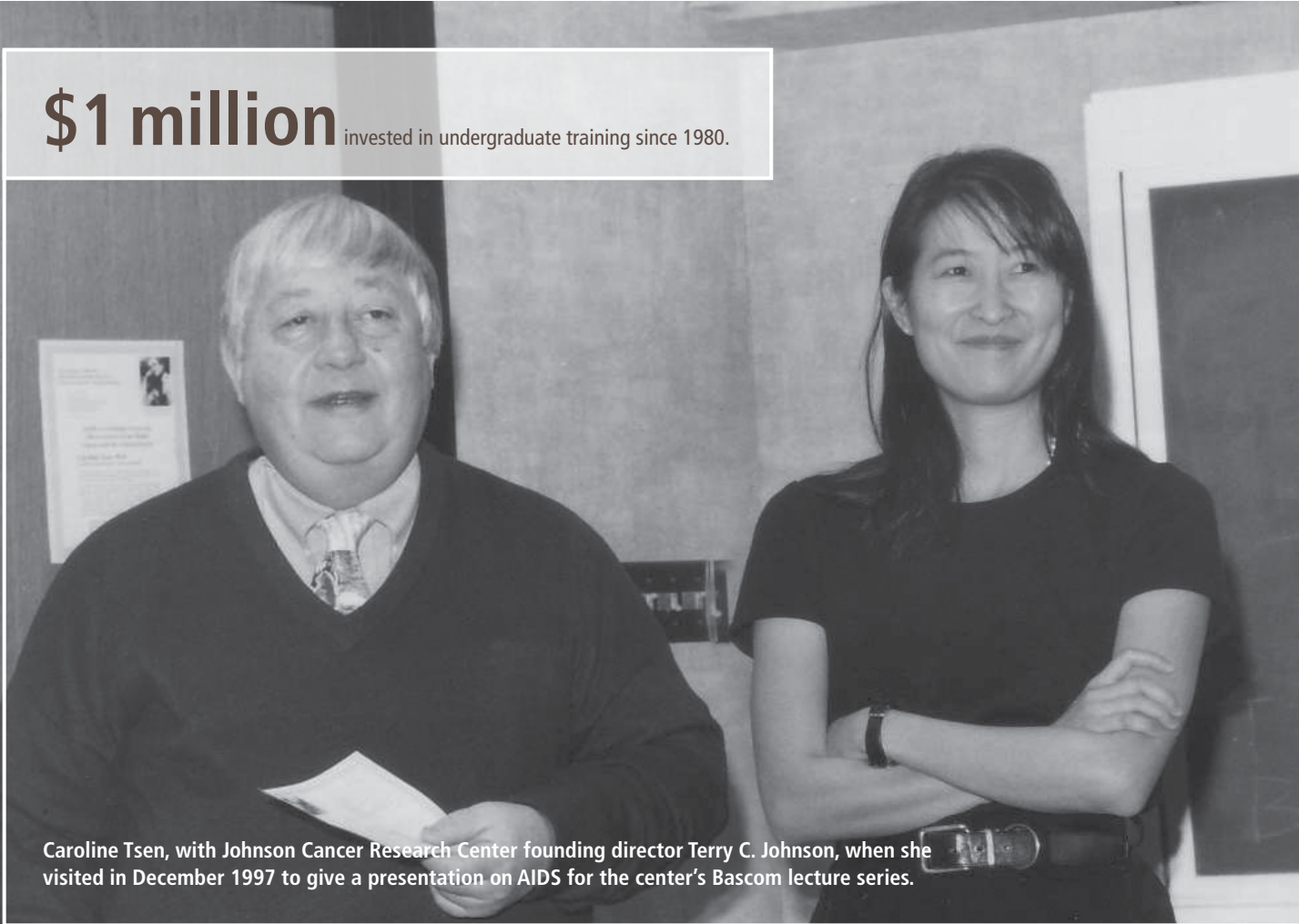
After graduating from Kansas State University in 1986 with a bachelor's in premedicine, Tsen earned a master's in public health and a master's in public policy from the University of California at Berkeley. She went on to graduate from Harvard Medical School in 1994 and served an internship and residency at Harvard/Massachusetts General Hospital. She joined Kaiser Permanente in 2004 after serving as a staff physician and faculty member at teaching hospitals in San Francisco and Boston.

Tsen returned to Kansas State University in 1997 to present a lecture on AIDS for the cancer research center's George S. Bascom memorial Workshop Series on Current Issues in Clinical Medicine.


For budding doctors or cancer researchers at the university, Tsen's advice: "Work hard and play hard, stay open-minded, and be curious all the time."

Also, she highly recommends the book she read recently, "The Emperor of All Maladies, A Biography of Cancer" by Siddhartha Mukherjee.

\$1 million invested in undergraduate training since 1980.



Caroline Tsen, with Johnson Cancer Research Center founding director Terry C. Johnson, when she visited in December 1997 to give a presentation on AIDS for the center's Bascom lecture series.



\$100,000 is what one microscope can cost.

\$42,000 awarded for laboratory equipment in 2011. But hundreds of thousands of dollars are needed.

Join K-State's fight against cancer!

To help the Johnson Cancer Research Center conquer cancer in our time, simply use the enclosed envelope to send your gift, or make a donation online at www.found.ksu.edu/cancer.

With your help, we make a difference! To learn more about how you can support K-State cancer research and education, contact Tracy Robinson at 800-432-1578 or tracyr@found.ksu.edu.

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Cancer Research Departments

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