



Johnson Center for  
**Basic Cancer Research**  
KANSAS STATE UNIVERSITY

**TAKING A LEADING ROLE IN CONQUERING CANCER**

The Johnson Cancer Center's advisory council, affiliated faculty, students, staff and thousands of supporters, all serve in K-State's fight against cancer.

Established in 1980 by its namesake, Terry C. Johnson, the Center, under the direction of Dr. Rob Denell, has grown from humble beginnings to become a tremendous source of pride for K-State and the state of Kansas.

The mission of the Center is to further the understanding of cancers by funding basic cancer research, and by supporting higher education, training and public outreach.

Unique for existing at a university without a medical school, the Center is the hub to a network of 70 faculty researchers and student protégés conducting cancer-related research in the Colleges of Arts and Sciences, Veterinary Medicine, Human Ecology and Agriculture.

This multidisciplinary approach is encouraged by the Center as it supports and enhances their research programs and educational experiences.

**MISSION**

*Basic cancer research*

*Education of the next generation of scientists*

*Outreach to the public*

*Collaborating to cure cancer*



John La Barge, La Barge Imaging Inc.

Rob Denell

The Johnson Cancer Center is committed to its vision: taking a leading role in conquering cancers in our time. At K-State, we do this through a combination of basic and applied research. Basic research improves general understanding of a subject, whereas applied research is conducted to achieve a specific, practical goal.

Some of our affiliated researchers are performing studies to enhance our knowledge of the way cells and organisms work, thus improving our understanding of cancer. Others are performing studies designed to provide practical information that will aid specifically in the fight against cancer. The nanotechnology research discussed in the accompanying article is a good example.

Perhaps a better way to characterize K-State cancer research is as non-clinical or pre-clinical, as opposed to the clinical research involving human subjects that is typical of medical schools. Research using cells and animals is critical for providing the foundation for new preventative, diagnostic and treatment applications for human studies. We need a highly detailed assessment of a new application before we try it out on people.

Fortunately, our new agreement with the KU Cancer Center, designed to foster interaction that takes advantage of both institutions' complementary strengths, will help expedite translation of research done at K-State into clinical studies at KU. We are very optimistic about the future of cancer research, and dedicated to making important contributions to it.

— Rob Denell, distinguished professor of biology and director



Courtesy photo

Ayomi Perera is challenged by Stefan Bossmann, professor of chemistry, while Pubudu Gamage and Thilani Samarakoon listen in. Perera received a summer stipend to work on her graduate research project Fe/Fe 304-nanoparticles for detection and treatment of cancer. Samarakoon and Gamage received travel fellowships to present at the American Cancer Society national meeting. Bossmann and his colleagues received Innovative Research Awards to pursue studies in nanoparticles and cancer treatment.

# Nanotechnology meets cancer research

The National Cancer Institute has made the use of nanotechnology in cancer research a major emphasis. K-State is fortunate to have a world-class nanotechnology program and several such cancer research projects underway.

A nanometer is one billionth of a meter. A human hair can be 60,000 nanometers thick. Nanotechnology involves making little machines (nanites) by assembling small nanoparticles (often less than 10nm in size). In the context of cancer research, the idea is to make nanites in which one component targets them to a tumor and another does an assignment when they get there. A variety of targeting mechanisms exist, including using antibodies that can recognize the tumor, using a molecule that the tumor needs (such as a vitamin) as “bait,” and employing stem cells as carriers for nanoparticles.

One application involves attaching to nanoparticles a molecule that enables accurate tumor imaging, an approach that aids in diagnosis or monitoring the tumor during treatment. Another application is to use the nanite to kill tumor cells. A variety of killing mechanisms are being examined in laboratories nationwide. This approach would overcome one of the major problems of current chemotherapy — that healthy cells also are killed, resulting in the well-known side effects of treatment.

University distinguished professor of chemistry Ken Klabunde is an internationally recognized nanotechnology pioneer who has made important academic contributions and generated commercial applications. Joining him in nanotechnology research are five colleagues in chemistry and two in physics. Several of them have



Stefan Bossmann and Viktor Chikan look at a glass vial filled with hyperthermia-active nanoparticles. The apparatus on the table is used for mouse hyperthermia experiments.

ongoing or planned collaborations with other K-State scientists, a local biotech company and scientists at KU. They will assemble and test a variety of cancer-relevant nanites.

In terms of targeting the nanites to tumors, Deryl Troyer and colleagues in the College of Veterinary Medicine have identified the umbilical cord matrix as a source of non-embryonic stem cells, and have shown that stem cells make their way to tumors. Thus, stem cells can be used to carry nanites to tumors. Chemists Stefan Bossmann, Viktor Chikan and Duy Hua are involved in assembling nanites that can carry either potential anticancer drugs (discovered at K-State or KU) or magnetic nanoparticles which, at the tumor site, can be heated by a magnetic field to destroy the tumor. Nanoscale Corporation, founded by Klabunde, will aid in constructing the iron oxide

or gold cores of these nanoparticles.

In addition, a team headed by Jun Li is working toward using nanotubes made of carbon to analyze various metabolic properties of tumor cells in order to monitor treatment effectiveness and develop a tool for cancer prevention.

Preliminary studies for all of these projects have been supported by the Johnson Cancer Center. The goal is to vary components and characteristics of the nanoparticles and determine, using cells or experimental animals, which approaches look the most promising for use with human patients. This is one reason the Center's relationship with the KU Cancer Center is important. These collaborative projects are anticipated to expedite the translation of basic research, like this nanoparticle research, to applications for human cancer diagnosis and treatment.

# Old and new friends make a difference

Courtesy photo



John La Barge, La Barge Imaging

Les '65 and Sandy '64 Regier visit Varney's Book Store to view the marquee that store managers dedicated to the Rob Regier Memorial Golf Tournament.

Les '65 and Sandy '64 Regier, Overland Park, Kan., got involved with the Center after losing their son Rob to cancer in 1992. Rob, who was only 26 years old when he died, was a 1988 K-State graduate in pre-dentistry. Les, Sandy and Rob's twin brother Randy — all K-State alumni — established a fund in Rob's memory, to support the university's cancer research and education programs.

To help get the fund started, they held two mega garage sales and a garden gala. In 1996, some of Rob's friends and Sigma Phi Epsilon fraternity brothers started the Rob Regier Memorial Golf Tournament, which is still an annual success at Colbert Hills Golf Course.

Additionally, Sandy, a realtor

for Prudential Kansas City Realty, has won four grants totaling \$3,750 for the center from the Prudential CARES Volunteer Grants Program, which recognizes associates who volunteer and awards grants to their charitable organizations.

The Regiers have raised more than \$150,000 for the Center, and Sandy is an active member of its advisory council. She also is a cancer survivor herself.

"The wave of emotions — disbelief, fear, depression and especially total helplessness — is overwhelming when cancer invades your life," Sandy said. "Our dream is that a cure will be found so other families won't have to experience the tragedy of these terrible diseases."

The Center has a special new friend as well. Ten-year-old Seth Carlson, Randolph, Kan., walked into the Center one day with an envelope full of cash. He had put a collection can at his parents' business, Lakeside Plumbing. Fortunately for the Center, Seth learned volunteerism from his mom, Jessica Boeckman, who works on the annual Tough Enough to Wear Pink rodeo that benefits the Center.



Courtesy photo

## CANCER RESEARCH AND EDUCATION ADVISORY COUNCIL

Left to right: (front) Lorene Oppy, Manhattan, Kan.; Sandy Embick Regier '64, Overland Park, Kan.; Julie Veatch '88, '89, '06, Shawnee Mission, Kan.; Mary Jo Heyka, Manhattan, Kan.; Jennifer Sowers '94, Dodge City, Kan.; (back) Jack Ryan '74, Manhattan, Kan.; Bill Stamey, Manhattan, Kan.; Mark Weiss, Assoc. Dir., Manhattan, Kan.; Jim Ronen '60, St. John, Kan.; Cibyl Teichman Ronen '60, St. John, Kan.; Keith Chapes, Assoc. Dir., Manhattan, Kan.; Beverly Lueers '76, Topeka, Kan.; Dave Lewis, Manhattan, Kan.; Bob Kinders '80, Wakersville, Md.; Albert Perry '70, Potomac, Md.; Ken Jennison '49, Salina, Kan.; Charles Bascom '86, Hamilton, Ohio; John Carlin '62, Manhattan, Kan.; Clif Jones '77, Topeka, Kan.; Brent Benkelman, Manhattan, Kan.; Rob Denell, Dir., Manhattan, Kan.; Todd Herrington '86, Wellington, Kan.; Edie Dahlsten '66, Lindsborg, Kan. Not pictured: Jim Haymaker '69 Edina, Minn.; Clay Harvey '74, Topeka, Kan.; Elaine Jacobson, '67, '71 Tucson, Ariz.; Michael Jacobson '70, Tucson, Ariz.; Bill Snyder, Manhattan, Kan.; Dale Wright '99, Longmont, Colo.

## TOUGH ENOUGH TO WEAR PINK

When the Kaw Valley Rodeo Association joined the national Tough Enough to Wear Pink campaign to help beat breast cancer, they chose to keep their contribution local. Since 2007, it has raised nearly \$20,000 for the Center. The rodeo takes place the Friday night of the Riley County Fair and features pink-clad cowboys and cowgirls and a spectacular pink balloon launch to honor survivors.