University of Minnesota

Fall 2011

Masonic Cancer Center News

A publication for those who support cancer research, education, and care at the University of Minnesota

A better picture of cancer

Researchers and clinicians join forces to bring new imaging capabilities to cancer diagnosis and treatment

For several decades, magnetic resonance imaging (MRI) has given cancer researchers and physicians a sensitive tool to help track down tumors.

"Standard MRI provides great anatomic information about soft-tissue structure and distribution, which is critical in detecting brain and body cancers. You can see things you can't with X-rays or CAT scans, like the difference between tumor and fatty tissue," says Greg Metzger, Ph.D., a University of Minnesota imaging expert who specializes in using MR technology to study prostate cancer. MRI also produces images with harmless radiofrequency waves and powerful magnets rather than the radiation used by X-rays and CT scans, he says.

Still, University scientists believe there is room for improvement. Despite its benefits, MRI is an expensive test and hasn't been practical for widespread application in certain areas of medicine—for instance, in cancer screening.

Now University physicians are working closely with research colleagues at the Center for Magnetic Resonance Research (CMRR) to push the capabilities of MRI and explore new ways it could be used in cancer detection, diagnosis, and therapy.

continued on page 2

Photo by Scott Streble

University of Minnesota imaging expert Michael Garwood, Ph.D., and urologic surgeon Christopher Warlick, M.D., Ph.D., are collaborating on new ways to use MRI technology to diagnose and monitor prostate cancer.

A better picture of cancer *(continued from cover)*

"The goal," says Metzger, "is to bring those capabilities to patient management and treatment."

Detecting breast cancer earlier

MRI is proving to be tremendously versatile. "We're still learning everything it's capable of," says Michael Garwood, Ph.D., associate director of the CMRR.

By manipulating the pulse of radiofrequency waves and altering computer algorithms that process images, researchers can investigate several aspects of the same tissue—showing not only the location of a tumor, but also the chemical composition of malignant cells or blood vessels that have sprung up to help the tumor grow. Such information helps doctors characterize the mass, which in turn may allow them to catch cancers early and recommend treatment plans.

MRI turns out to be better than mammography, for example, at detecting breast tumors at an early stage while they are small, Garwood says. This makes the technique an excellent screening tool for women at the highest risk of developing breast cancer.

MRI also can help determine whether a suspicious mass is invasive cancer. With the help of an injection of contrast dye, MRI can reveal "leaky" blood vessels, characteristic of the type that feed malignancies.

"This technique can also give us information about the margins of a tumor, which may help guide a surgeon in removing it," Garwood says.

MRI may soon be used to determine whether a woman is benefiting from chemotherapy as well.

Douglas Yee, M.D., director of the Masonic Cancer Center, and CMRR researcher Patrick Bolan, Ph.D., have studied the ability of MR technology to measure the chemical choline, a "fingerprint" of tumor cells. With a technique called spectroscopy, they can detect a drop in choline levels after a woman undergoes a *single day* of chemotherapy. They're now determining whether the technique can be applied in medical centers to steer breast cancer treatment.

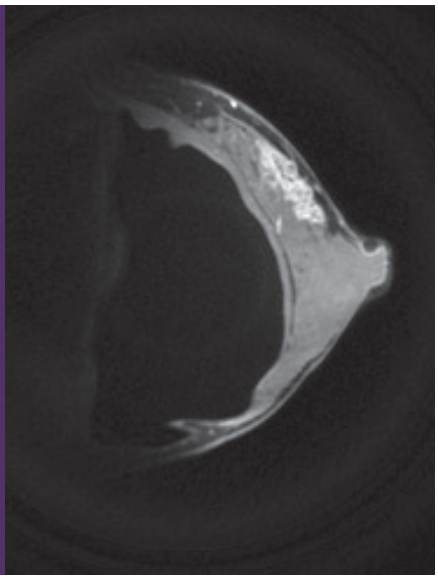
Guiding prostate cancer biopsies

When it comes to prostate cancer, MRI offers a unique view of difficult-to-access tissue. And now, as University professor Timothy Wilt, M.D., M.P.H., found in a recent study that surgery offered no better outcomes than active surveillance (otherwise known as "watchful waiting") for men with nonaggressive prostate cancers, determining who benefits most from each approach is even more critical.

The CMRR's Metzger is working with urologic surgeon Christopher Warlick, M.D., Ph.D., to study cancerous tissue from men who have undergone prostate surgery to identify the extent and aggressiveness of their tumors.

Warlick is optimistic about the latest application for MRI: to help biopsy the prostate. After a standard MRI scan detects a suspicious area in the gland, an MRI-guided needle can take samples from specific locations.

"We now have the opportunity to home in on the very worst-appearing lesions, likely leading to more accurate grading of the disease and more informed treatment decisions," Warlick says. "This may be very important for men considering active surveillance for their prostate cancer."



The bright area in this magnetic resonance image shows ductal carcinoma in situ. (The dark area behind the breast tissue is a silicone implant.) Researchers acquired the image using the SWIFT method developed at the Center for Magnetic Resonance Research. (Image courtesy of Curt Corum, Ph.D.)

Ask the expert:

What is the value of cancer screening?

Beth Virnig, Ph.D., Co-leader, Cancer Outcomes and Survivorship Research Program

We hear a lot of encouragement to get screened for various cancers. Why should we bother?

Cancer screening is based on a simple idea: cancers detected earlier are easier to treat than cancers caught later. If you find cancer when it's small, you have many more treatment options, and the morbidity rates, both from the disease and the treatments, are lower.

How much can we depend on screening to tell us what's going on?

A screen isn't a diagnosis. It finds someone at higher risk for cancer and suggests there's a need for further workup. No screening test is capable of detecting 100 percent of cancers and occasionally may offer a false negative result. Even if your screening result was normal, you should consult a doctor if you discover a lump in your breast, for example. The other imperfection is a false positive, when a screen says there's something suspicious that needs further tests, but it turns out not to be cancer at all. There's a gray area between normal cells and cancer cells, and that intermediary stage can be difficult to detect and categorize from images alone.

Many people have raised concerns about radiation exposure through breast cancer screening. Are there downsides to screening?

Being cautious is a good thing, and it's important that people ask those kinds of questions. But the amount of radiation in mammograms is very low, much lower than for an X-ray. And the trials all show that the benefits of screening far outweigh any risks.

So we can expect cancer screening to remain part of routine health care?

There's no doubt about the value of screening. For most cancers, an increase in screening results in fewer cancer deaths.

Improving the patient experience

As science points to new benefits of MR technology, the latest CMRR developments may make the scanning process better for patients.

Garwood was playing with his computer at home when he had a physics epiphany: he realized it's possible to condense a two-stage process (creating a radiofrequency wave and then capturing an image) into one step. The condensed MRI technique he developed, called SWIFT, was patented by the University of Minnesota and licensed exclusively by GE Healthcare last April.

SWIFT images are captured more quickly and make it possible to see more subtle contrasts in soft tissue, and, for the first time, hard tissue like bone and teeth.

The new SWIFT-based scanners, which could go into production in the next year or so, may cut down the time patients need to spend in the scanning machine, Garwood says. Better yet, SWIFT doesn't make the loud banging noise of traditional MRI machines.

"Mike is really paying attention to the clinical issues," says Yee.

And that's an increasingly good thing, as these advanced technologies continue to become more useful in the clinic.

"I believe MRI will become even more indispensable in diagnosis and monitoring of patients as time goes by," Garwood says.

A winning combination

Woman's support of comparative oncology aids the search for better treatments for both dogs and humans

Sally Sweatt surrounds herself with animals. The Minneapolis resident grew up with dogs and horses, and she has shared her love for dogs by introducing underprivileged children to them.

Today Sweatt breeds and shows Sealyham terriers and French bulldogs. In the winter of 2010, she also became a co-owner of a "beautiful" Scottish deerhound named Hickory.

And when Hickory was named best in show at the 2011 Westminster Kennel Club Dog Show in New York last February, Sweatt was stunned and thrilled. It was the first time a Scottish deerhound had taken the honor.

"It was so unexpected—by everyone. It was a dream come true for all of us," Sweatt says. "[The judge] knew the quality of that dog, and he could not take his eyes off of her."

Strengthening the connection

Aside from the thrill of winning at Westminster, Sweatt says that the bond with her dogs helped her deal with breast cancer.

Diagnosed in the spring of 2010, Sweatt underwent treatment at the Masonic Cancer Clinic at the University of Minnesota. A year later, a mammogram gave her the results she was hoping for—no sign of cancer.

Sweatt says her relationship with her dogs helped her get through the treatment.

"You have something to think about, things to look forward to, something to take your mind off of yourself," she says. "It helps you mentally as well as physically."

A perfect pairing

It only made sense for Sweatt to support research that would help animals and humans who have cancer through the University's comparative oncology program.

Canine studies can help scientists understand the genetic origins of cancer in both dogs and humans. And some breeds of dogs develop types of bone cancer and blood cancer, for instance, that progress similarly to the way human bone cancers and blood cancers progress.

Sweatt herself has had two Sealyham terriers who have had lymphoma as well as dogs from other breeds with different types of cancer.

Though she has supported veterinary medical research at the University for more than a decade, one of Sweatt's most recent gifts provided funding that allowed the College of Veterinary Medicine (CVM) to restart its oncology residency program, says Jaime Modiano, V.M.D., Ph.D., director of the University's Animal Cancer Care and Research program, a collaboration of the CVM and Masonic Cancer Center. With that start-up funding, the school built a financially self-sustaining program.

For Sweatt, the more she learns about the similarities between canine and human cancers, the more fascinated she becomes.

"It's amazing to see what the two can find out from one another," she says.

Sally Sweatt has four canine companions at home and owns four others.

"I feel dogs are like children," she says. "They need time and attention."

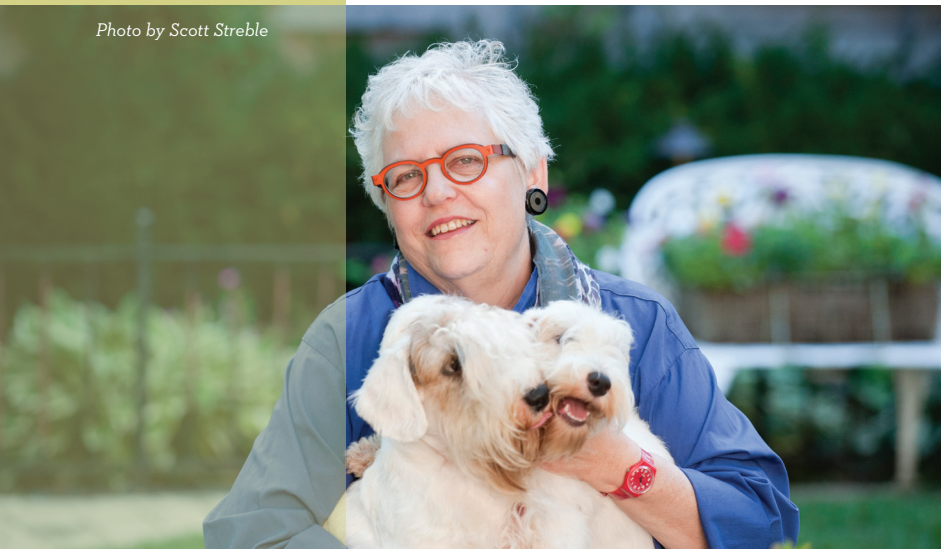


Photo by Scott Streble

Of dogs and women

Masonic Scholar Erin Dickerson, Ph.D., bridges veterinary medicine and cancer research

Dickerson with her dog Kiko

Tucked into a lab on the Masonic Cancer Research Building's fifth floor, Erin Dickerson, Ph.D., spends her days investigating potential new treatments for ovarian cancer—using tumor cells from dogs being treated at the University of Minnesota's College of Veterinary Medicine.

Straddling the worlds of veterinary medicine and human cancer research, Dickerson is developing a therapy that targets cancer stem cells—thought to be the source of tumor generation and regeneration—in hemangiosarcoma, a cancer common in dogs that also occurs in humans. Results from her studies could also be applied to human ovarian cancer.

"Working with dogs just makes sense," says Dickerson, who loves animals and once considered becoming a vet. "They have similar immune systems, we share an environment, and some diseases are very similar in dogs and humans."

Dickerson came to the University as an assistant professor of oncology and comparative medicine in late 2009. "My research focus has been drug delivery," she says. "If we can overcome resistance to therapy, that would be huge."

Indeed: 10 years ago, late-stage ovarian cancer survival rates were about 25 percent; a decade later, the rate has improved, but not fast enough for Dickerson.

"Going from a 25- to a 30- to 40-percent survival rate in 10 years is not the kind of progress we want to make," she says with steely determination.

Dickerson got some welcome support for her research when she was named a Masonic Scholar last year. "The one-year appointment came with funds that supported my work in general," she explains, "so I could continue my research without having to focus on just one aspect."

Still, the work remains challenging, and she has learned to deal with defeat. "But then we run a small experiment and discover that, *yes!*, it worked. And that's what keeps us going day to day."

Don't miss your chance to make the most of an IRA gift

There is still time to take advantage of the Tax Relief Act signed into law last year and make the most of your charitable donations. You can make a gift of up to $100,000 directly from your IRA to the Minnesota Medical Foundation (MMF) for the Masonic Cancer Center and avoid paying income tax on the amount of your gift. But the extended IRA Charitable Rollover option is set to expire on December 31, 2011. These rules apply:

- Only IRAs are eligible (other types of retirement accounts are not).
- The donor must be over age 70½.
- The gift must come directly from the IRA custodian to MMF.
- The maximum amount allowed is $100,000 per year, per donor.
- Gifts cannot fund a charitable remainder trust or gift annuity.
- Tax deductions are not available when completing an IRA Charitable Rollover.

If you are not eligible to make a gift through the IRA Charitable Rollover option, you can still support the Masonic Cancer Center by naming MMF as a beneficiary in your estate plans.

To learn more about this opportunity, contact MMF's gift planning team at 612-625-1440, 800-922-1663, or giftplanning@mmf.umn.edu.

Internship program opens door for minority students to conduct cancer research

For most undergraduate students, opportunities to work closely with mentors on leading-edge cancer research projects come few and far between. For students from minority communities, such connections can be especially valuable, says Kola Okuyemi, M.D., M.P.H., director of the University of Minnesota Medical School's Program in Health Disparities Research.

"There are populations in this country who experience vast differences in the prevalence of disease," explains Okuyemi. "They get diabetes at much higher rates, or have much lower rates of survival for diseases like breast cancer. We call these 'health disparities,' and it's a problem that's plagued our health system for decades."

Okuyemi has long believed that increasing the number of medical professionals from minority groups is key to fighting health disparities.

Abdi Jibril participated in the internship program two summers ago and now works in his former mentor's lab.

Photo by Rebecca Wilson

To encourage more minority students to pursue careers in medicine, Okuyemi, along with Christopher Pennell, Ph.D., created an internship program at the Masonic Cancer Center. Launched in the summer of 2009, the paid internship pairs undergraduate students with professors currently conducting cancer research. Students spend time in the lab learning basic protocols and procedures, and they are required to design their own research projects.

A grant from the National Cancer Institute provided funding for the first two summers of the program, and philanthropy from the Sylvia H. Lam Endowed Cancer Research Fund supported it in 2011.

Abdi Jibril was one of 10 students awarded a spot in the highly competitive program in 2010. Jibril, a premedical student, is a native of Oromia who moved to Minnesota in 2005. "But I didn't know much about research," he says, "so I applied for the internship to find out more about it."

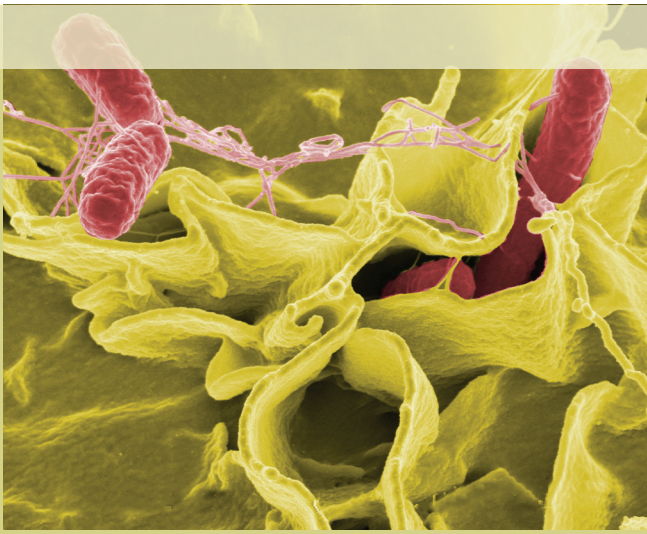
He quickly developed a passion for research as he studied the prevalence of water pipe, or hookah, smoking in the Somali and Oromo immigrant communities. So successful was his project that Jibril was hired as a research assistant for his mentor, Janet Thomas, Ph.D., who specializes in tobacco-related studies at the Masonic Cancer Center.

"Because of the internship, I've been able to network with like-minded students and even attend meetings with world-class researchers and physicians," Jibril says. "I couldn't have asked for anything better than this."

Jibril was part of a group that included African American, Southeast Asian, Native American, and Latino students—all from communities that traditionally suffer from significant health disparities.

"It should be a national priority to encourage students from these populations to choose careers in the health sciences," says Okuyemi, who is already looking ahead to next year's program. "Without them, these communities will suffer the same health disparities for generations to come."

Investigators use salmonella to fight cancers of the gut



Color-enhanced scanning electron micrograph showing Salmonella typhimurium (pink) invading cultured human cells

Image: Rocky Mountain Laboratories, NIAID, NIH

It's almost unfathomable that salmonella, the bacteria transmitted through food that sickens thousands of Americans each year, could actually help people feel *better*.

But researchers with the Masonic Cancer Center believe that salmonella may be a valuable tool in the fight against cancer in organs surrounding the gut—such as the liver, spleen, and colon—since that's where salmonella naturally infects the body. So they're turning salmonella into a weapon, allowing the bacteria to attack cancer cells in their natural environment.

Animal studies at the University have shown that salmonella can successfully control tumors in the gut. Now human clinical trials under way here also show promise.

"Many bacteria and viruses—even harmful ones—can be used to fight disease," says Edward Greeno, M.D., the clinical study's lead researcher.

For these investigations, Greeno's colleague Daniel Saltzman, M.D., Ph.D., genetically modified a batch of salmonella and then added a molecule called Interleukin-2 (IL-2) that helps the body identify invaders. IL-2 made near tumors will identify cancerous cells as threats and trigger an immune response in that part of the body with the goal of destroying the tumor.

The immune system response called in by IL-2 and the salmonella itself create a two-pronged attack on the cancer.

The therapy is administered simply: it's mixed with a few ounces of water and swallowed.

"This probably won't replace other ways of treating cancer such as chemotherapy and radiation," Greeno says. "But it's a promising area of study, and we hope it can be a potent tool in our battle against cancer. It also has potential to be a much cheaper and less toxic alternative to chemotherapy and radiation."

Upcoming events

First Annual Twin Cities CureSearch Walk
Sunday, Sept. 25
Lake Calhoun, Minneapolis

The CureSearch Walk raises funds for lifesaving research and honors children whose lives have been affected by childhood cancer. To register or for more information, visit **www.curesearchwalk.org/minneapolis.**

Mini Medical School: Battling Cancer
Mondays, Oct. 10–Nov. 7
University of Minnesota East Bank, Minneapolis

Join us for Mini Medical School this fall as we focus our attention on cancer—from prevention to outcomes—and the latest in new therapies being developed at the University of Minnesota. To register or for more information, visit **www.ahc.umn.edu/mini-medical-school.**

Dawn of a Dream
Saturday, Nov. 5
The Depot, Minneapolis

This 31st annual black-tie event benefits Children's Cancer Research Fund, a decades-long supporter of pediatric cancer research at the University of Minnesota. For more information, visit **www.childrenscancer.org/dawnofadream.**

University of Minnesota

Minnesota Medical Foundation
McNamara Alumni Center
200 Oak Street SE, Suite 300
Minneapolis, MN 55455-2030

Construction under way on new research building

See the progress in action at **www.ahc.umn.edu/research/bdd/web-cam.**

When the University of Minnesota's new, state-of-the-art cancer and cardiovascular research building is complete in 2013, it will bring top researchers together across disciplines to discover the next generation of cancer and heart therapies.

The cancer researchers housed there plan to study chemical biology with a focus on chemical carcinogens as a cause of cancer. Others will build new models to find better cancer treatments.

The building will be the gateway to the University's Biomedical Discovery District (BDD), the result of a $292 million funding program approved by the state of Minnesota in 2008. The projected economic impact of this district is truly impressive:

- The BDD is expected to attract as much as $40 million in new research funding each year.
- In the short term, the BDD has created approximately 5,000 construction jobs. In the long term, it will create more biomedical science jobs at the University and fuel Minnesota's biomedical industry.
- Every $1 million in federally sponsored research generates more than $2 million in new business activity in the state.

Masonic Cancer Center News Fall 2011

Published twice a year by the Minnesota Medical Foundation and Masonic Cancer Center, University of Minnesota

Nicole Endres and Lee Engfer, *Editors*
Barbara Knox and Kate Ledger, *Writers*
Lisa Haines, juju, *Design*

To find out how your gift can make a difference, please contact:
Cathy Spicola
Director of Development
612-625-5192
c.spicola@mmf.umn.edu

www.mmf.umn.edu/cancer
www.cancer.umn.edu

Masonic Cancer Center
University of Minnesota
Driven to Discover℠