Masonic Cancer Center

University of Minnesota

Comprehensive Cancer Center designated by the National Cancer Institute

Biannual Report 2015

Table of Contents

Scientific Advances
- NCI investigator 4
- HHMI investigator 7
- Cancer-fighting virus 10
- Kava plant vs. lung cancer 12
- Tumor/host cross talk 14
- Phase I clinical trial unit 16

Clinical Care
- Innovative MRI technology 17
- Designing targeted toxins 18
- Treating pancreatic cancer 20
- Cancer nurse line 22
- Math fights cancer 22
- Protecting the heart 23
- New Masonic building 25
- Top doctors 26

Training & Mentoring
- Next generation of researchers 29
- Health disparities internships 30

Of Note
- New leaders 32
- New training grant 34
- Masonic scholars 34
- Bringing the best researchers to Minnesota 37
- Sharing resources 38
- Leadership 40

Featured Member
- Rahel Ghebre, M.D., M.P.H. 42
- Hee Yun Lee, Ph.D. 46

In the Community 50

Grant Highlights 53

Select Publications 56

Message from the Director

Dear Friends,

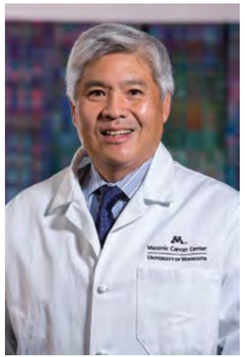
The end of 2015 brought good news to the cancer research community. The US House and Senate passed a budget that increases the National Institutes of Health budget by $2 billion, a 6.6% increase. The National Cancer Institute will receive a $264 million increase to bring the annual budget to $5.2 billion.

These increases are critical to our mission of reducing the burden of cancer and we are grateful that our elected officials recognize this priority for our country. I had the opportunity to participate in the "Rally for Medical Research" day on Capitol Hill in September 2015. Without exception, our legislators understand the value of biomedical research and the bipartisan support for our mission was strong.

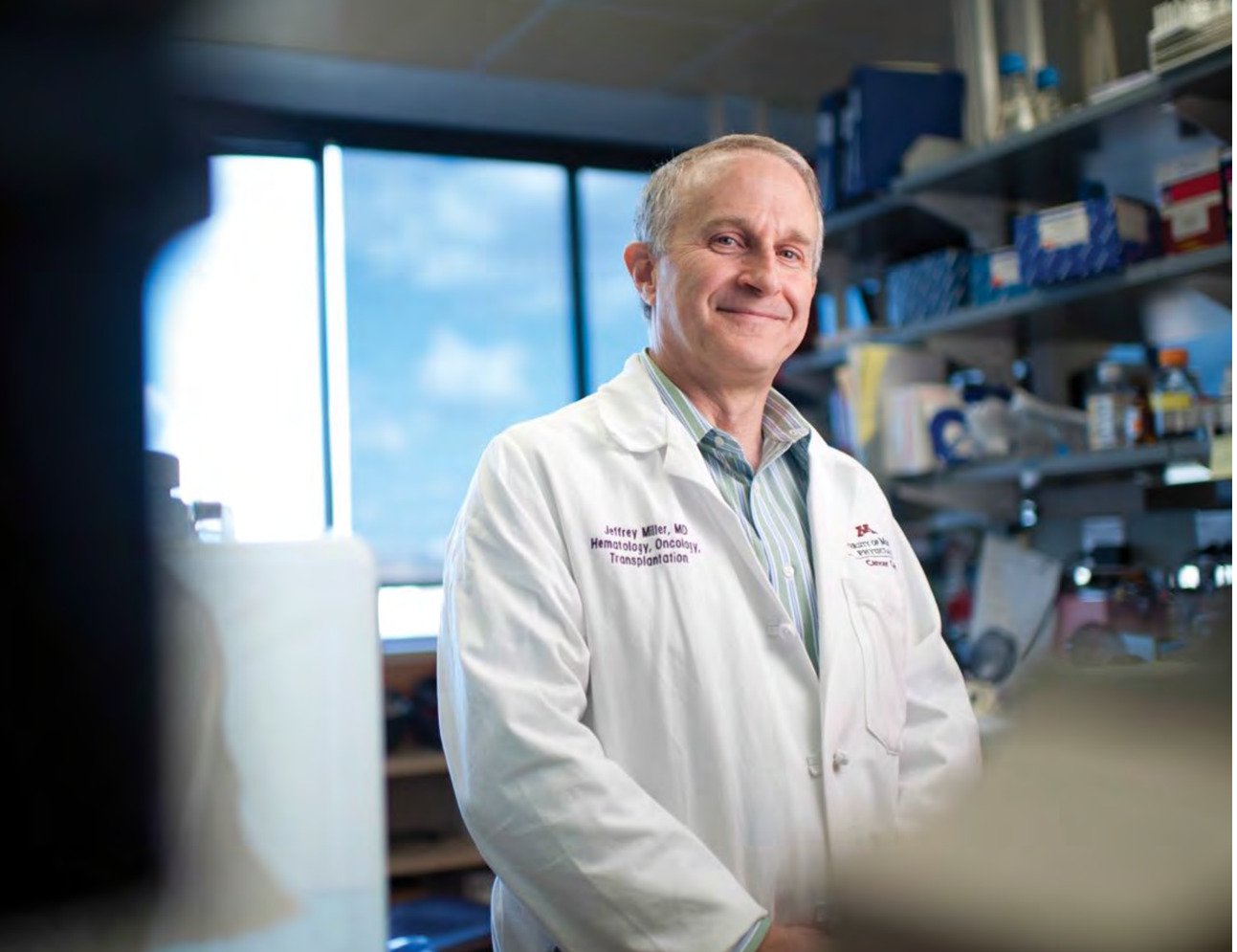
In cancer, the continued decrease in cancer mortality is directly attributable to the investments we've made in cancer research through federal, state and philanthropic funding. Fundamental findings about cancer biology, tumor immunology and cancer risks are rapidly being translated into new therapies for our patients and people at risk for developing cancer. There are multiple ways the Masonic Cancer Center contributes to the overall goal of "solving" cancer and many of our advances are highlighted in this report. While new cancer therapies are an important part of the solution, our members also have made advances in early detection, cancer prevention and improving quality of life for cancer survivors.

This report also highlights the importance of scientific teams. While we have many outstanding individual investigators – Drs. Harris and Miller are featured in this report – our progress is faster when we work together. Our recognition as a National Cancer Institute-designated Comprehensive Cancer Center speaks directly to the scientific advances we are making through teamwork. Certainly, the success we enjoy is due in large part to the collaboration among the Masonic Cancer Center's scientific community. The faculty and staff of the Masonic Cancer Center are dedicated to the support of research – population, laboratory, translational and clinical – to improve the lives of people at risk for developing cancer and for those who have been diagnosed with the disease.

I hope this report sparks your interest in the Masonic Cancer Center. More information can be found on our web site at cancer.umn.edu, and I invite you to e-mail us with questions or comments at ccinfo@umn.edu.



Douglas Yee, M.D.
Director, Masonic Cancer Center, University of Minnesota



Outstanding Investigator Award, coupled with industry partnership, fuels innovative cancer research

For the past 20 years, Jeffrey Miller, M.D., Deputy Director of the Masonic Cancer Center and Deputy Director of the Clinical and Translational Science Institute, has been studying what's known as natural killer (NK) cells in his work with patients with blood cancer. He is internationally known for pioneering the basic research and clinical investigation of NK cell-based immunotherapy, which has the ability to target cancer cells while leaving normal cells unharmed – unlike chemotherapy, which destroys both.

Dr. Miller's groundbreaking research and commitment to the expansion of NK immunotherapy into solid tumor treatment was recognized with a National Cancer Institute Outstanding Investigator (R35) Award of more than $6M over the next seven years. He is one of just 44 researchers from U.S. academic institutions to receive this award and the only one in Minnesota.

Fueled by the R35 award, Dr. Miller's research team will use NK cells primed by viruses to help patients with the most common solid tumor cancers, such as prostate, breast, head and neck and lung. He has partnered with MCC members epidemiologist Heather Nelson, M.P.H., Ph.D., and Jim McCarthy, Ph.D., a solid tumor biologist and leader of the Tumor Microenvironment Program.

Like the more widely known T cells, NK cells are lymphocytes or white blood cells. "It was discovered in 1975 that NK cells are active against certain tumor cells in the lab without vaccination or priming," said Dr. Miller. "They have the natural ability to kill, which is how they got their name." This ability also makes them "naturals" for use in targeted immunotherapy to help treat cancer.

Dr. Miller's research team published a paper in 2013 in which they described discovering a unique subset of NK cells that act like T cells. "They have properties of immune memory and are specifically stimulated by a fairly common virus called cytomegalovirus [CMV]," he said. (By adulthood, about half of us have been exposed to this virus.) "It primes NK cells to have better anti-tumor capability," Dr. Miller added. "We think these unique, 'adaptive' NK cells will be part of a novel strategy for better cancer therapies."

The research team will first identify specific kinds of NK cells and then use them in different studies. Dr. Nelson will determine whether the NK cells have had prior exposure to CMV and see how those cells might affect cancer therapies. Dr. McCarthy will look at tumor targets with which he's familiar and try to make the NK cells antigen-specific.

"T cells work because they have specific receptors on their surface to recognize antigens," noted Dr. Miller. "NK cells don't have these receptors. Instead, they have a number of different activating and inhibiting receptors. Whether or not an NK cell kills a target depends on the balance between the activating and inhibiting signals."

To make an NK cell antigen-specific, the team picked a single, potent activating receptor on the cell and is trying to develop drugs that bind that activating receptor to any type of tumor target. In a way, it's like having a key that you insert in the NK receptor's "lock," and then fusing another key to it designed to be inserted in another lock or receptor on a tumor cell. When that key is inserted, the tumor cell is killed.

"We call these bi-specific engagers or BiKEs," explained Dr. Miller. "We also have tri-specific NK engagers that recognize three 'locks' called TriKEs. In either, we've figured out the way to stimulate the NK cells. We took away the non-specific receptor and fused it with something that recognizes cancer targets. It's incredibly flexible."

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"Part of the intent is to give us the freedom to take more risks that may have the potential to have more impact."

Outstanding Investigator, continued

As a result, the two primary components of the work the team will do under the R35 award include creating BiKEs and TriKEs and working with CMV-induced adaptive NK cells. A third research area of this work will be in collaboration with San Diego, California-based Fate Therapeutics, Inc.

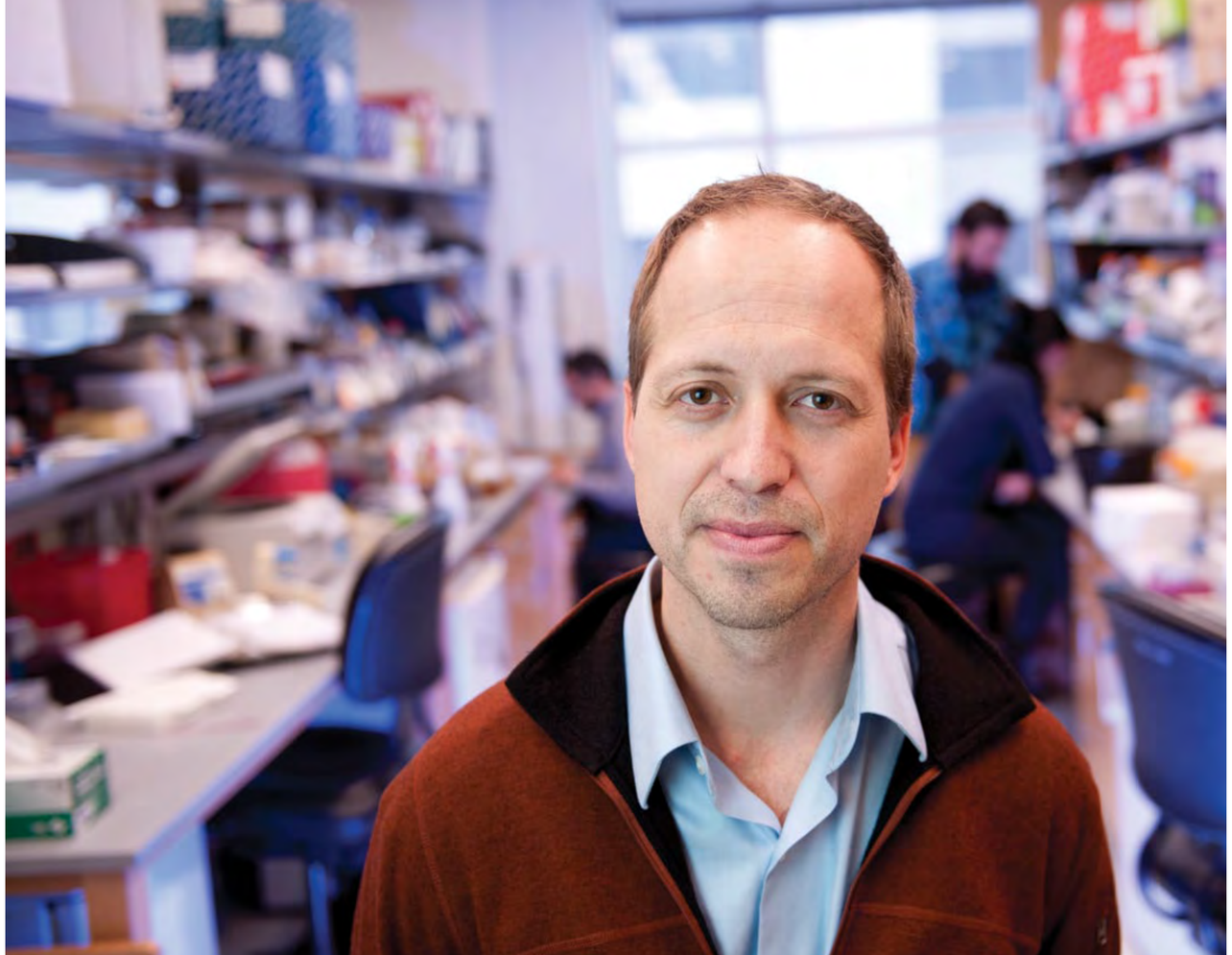
"The goal of the Fate Therapeutics partnership is to design an adaptive NK cell product that can be used to treat cancer patients," Dr. Miller said. "We will use Fate's cell programming expertise to optimize NK cell persistence and cytotoxicity, grow these cells in a GMP [Good Manufacturing Process] facility, and in a couple of years, have a clinical trial in which we test this unique functional property and see if it gives rise to better cancer care."

Dr. Miller is working on the Fate Therapeutics partnership with Masonic Cancer Center colleague Dan Kaufman, M.D., Ph.D. "Fate knew they wanted to get into NK cells, read the literature and recognized our strength in the field," he said. "I've been working with blood NK cells and have already treated more than 300 blood cancer patients with NK cell infusions…Dan figured out a way for NK cells to come out of certain unique stem cell populations to give us an unlimited source of the cells."

Working with an industry partner requires that the MCC researchers do everything they can to avoid any conflicts of interest. As a result, most of the work will be done by paid lab technicians, instead of students who have to defend a thesis. "I have clinical colleagues who don't report to me who will be in charge of reporting on the efficacy of these therapies," added Dr. Miller. "It's to separate myself from those primary interpretations."

There are many aspects of this work that are exciting to Dr. Miller. One in particular is the "adventurous" nature of the R35 award. "Part of the intent is to give us the freedom to take more risks that may have the potential to have more impact," he said.

Dr. Miller also enjoys the collaboration. "The most gratifying thing about this work is that we have an outstanding team," he said. "We have a tremendous amount of talent to enable us to move forward fairly rapidly…to collectively think about and understand how to transform our research to human therapy. And we're going gung ho, now that we have this award and our partnership with Fate. Discovery is really a lot of fun, especially if you can bring it to a clinical trial and benefit patients."



Selection as HHMI Investigator gives MCC member freedom to change things "to the point of no return"

Reuben Harris, Ph.D., likes to boldly go where no one has gone before. He is the kind of scientist who has been called an "intellectual catalyst," stimulating his lab members and collaborators to do high-risk, innovative work.

Dr. Harris' boldness was recently recognized by the Howard Hughes Medical Institute (HHMI) when they selected him as an HHMI Investigator, one of just 26 chosen from throughout the United States in 2015. As a result, HHMI will support Dr. Harris' salary and benefits and provide a research budget over the next five years and potentially longer, depending on the progress of his work.

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"That's what makes this award so exciting – having the freedom to answer questions to which there were previously no answers – to constantly seek new knowledge."

Harris, continued

The 2015 HHMI investigators represented 19 U.S. organizations and came from a pool of almost 900 applicants. HHMI encourages its investigators to push their research into new areas of inquiry and gives them the freedom to explore, and if necessary, to change directions.

The impressive support that comes with being an HHMI Investigator gives Dr. Harris, a research member of the Masonic Cancer Center Genetic Mechanisms of Cancer program, the flexibility he naturally strives for. "That's what makes this award so exciting – having the freedom to answer questions to which there were previously no answers – to constantly seek new knowledge," he said.

It was that constant motivation that led Dr. Harris and his research team to discover a mechanism inside the human body that causes many cancer mutations – perhaps playing a role in as many as half of all cancers. In a landmark paper published in 2013 in the prominent journal Nature,[1] Dr. Harris and his team revealed the discovery of an enzyme, called APOBEC3B, which causes many of the DNA mutations that are found in breast cancer and most likely fuel tumor heterogeneity. "We need to know more about how this enzyme is regulated, then we can devise ways to control it to improve cancer therapies."

Dr. Harris' explorations also require new animal models. As there is no equivalent protein in typical lab animals, Dr. Harris' team is working with the cancer center's shared resource, the Mouse Genetics Laboratory, to create mice that express human APOBEC3B. "The goal is to put this human enzyme in the mice and allow it to do its thing, which is to damage DNA and hopefully create a new tumor model that will more closely resemble human cancer," he said. "It's not a routine procedure that every lab does. It's also expensive. I'm really grateful to the Randy Shaver Cancer Research and Community Fund for helping to get that aspect of the overall project off the ground."

Dr. Harris pointed out that, "In addition, we need to think cleverly about ways to spot the enzyme. If it's making a lot of the mutations in cancer, we need to stop it; then we can slow down the bad things that happen, such as metastasis and therapy resistance."

But that's just another day's work for him and Masonic Cancer Center research team partners such as Director Douglas Yee, M.D.; Daniel Harki, Ph.D.; Hideki Aihara, Ph.D.; and David Largaespada, Ph.D. "We can't do everything individually; a lot of what we need to do is done through collaboration. Collaborators give you opportunities to utilize technologies that you couldn't readily assimilate yourself. Some of the things we do are so complex that it takes many years to learn how to do them. The best way is to collaborate."

Dr. Harris also wants to surround himself with the best, most adaptable people. While the HHMI award certainly helps him do that, he uses a very proactive strategy for finding those people. "I am either invited to or attend on my own 20 to 30 conferences, talks or visits each year," he said. "You can meet a lot of different people that way, including future trainees. The university also helps through its undergraduate and graduate programs. We get a lot of great students through them. It really is an active, ongoing process."

For the next five years, Dr. Harris will put the people he hires and collaborates with to work in two big areas: antiviral defense and cancer mutation. "Both areas have big, important projects underway," he said. "Within the next five years, we will bring them to fruition."

That's what Dr. Harris loves about the work he does. "It's the way science goes; no two days are ever the same and your job is never done," he said. "There is always another question to answer."

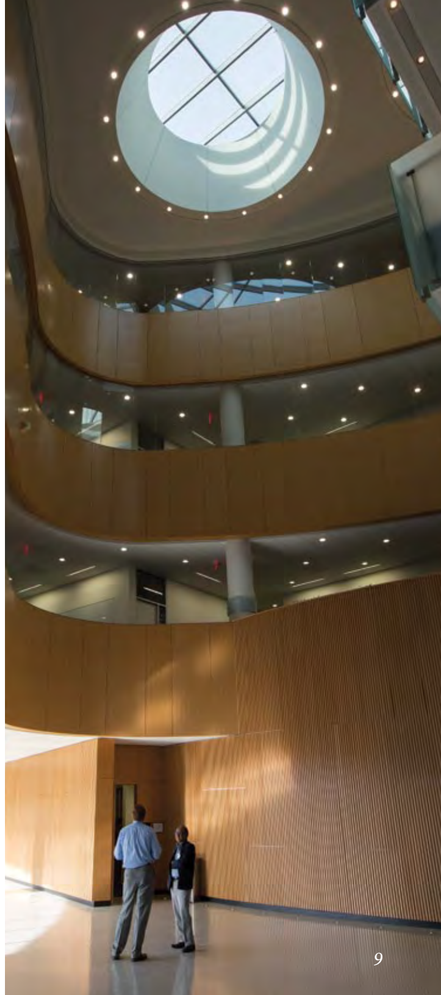
While the HHMI award goes a long way toward helping Dr. Harris and his team seek answers to those questions, he is quick to point out how important having a diverse funding base is to him. "Awards come and go, they're not continuous," he said. "It's important to also have smaller organizations such as the Minnesota Ovarian Cancer Alliance, the Randy Shaver Cancer Research and Community Fund, and even individual donors fund high-risk endeavors that don't fit within the framework of HHMI or other agencies. They provide the critical sparks to ignite larger projects that can then be supported by national organizations such as the National Institutes of Health, the Department of Defense, and the National Science Foundation."

Whether small or large, Dr. Harris uses his funding to push existing boundaries and chart new territory. He also doesn't mind a little risk. "The true definition of innovation is to change things to the point of no return," he said. "Apple is a great example. They've done many things to change the way we view communication and electronics. We're trying to do that in science."

Given his track record, there is no doubt that Dr. Harris will lead everyone around him to new territory…to boldly go where no scientists have gone previously.

The Howard Hughes Medical Institute's flagship research effort, the HHMI Investigator Program, has joined with more than 70 distinguished U.S. universities, hospitals, institutes, and medical schools to create an environment that provides flexible, long-term support for more than 330 Hughes scientists and their research teams. HHMI investigators are widely recognized for their creativity and accomplishment: more than 160 HHMI investigators are members of the National Academy of Sciences, and HHMI has supported 25 Nobel laureates. Learn more at www.hhmi.org.

[1] Burns MB, Lackey L, Carpenter MA, Rathore A, Land AM, Leonard B, Refsland EW, Kotandeniya D, Tretyakova N, Nikas JB, Yee D, Temiz NA, Donohue DE, McDougle RM, Brown WL, Law EK, Harris RS. APOBEC3B is an enzymatic source of mutation in breast cancer. Nature. 2013 Feb 21;494(7437):366-70.



Masonic Cancer Center plays important role in bringing new cancer-fighting drug to trial

Following years of collaborative research, a new cancer-fighting drug called Oncolytic Adenovirus, developed by Masonic Cancer Center researchers Masato Yamamoto, M.D., Ph.D., and Julia Davydova, Ph.D., is finally under consideration by the FDA. “Hopefully, by next summer, we will have approval to begin clinical trials,” said Dr. Yamamoto, who has been working with other cancer center members to create the trial’s protocol. “NIH supports the basic science, but not the transition from developed material to clinical trial,” he added. “The Masonic Cancer Center’s role in helping us do that is huge.”

Oncolytic Adenovirus (named RGDCRAdCOX2F) has humble roots. It is based on the adenovirus that causes the common cold. By inserting a piece of DNA and using the virus’ own replication machinery, the researchers turned the adenovirus into a cancer-killing machine. “When we think about viruses, we think disease,” said Dr. Yamamoto. “But by redesigning them, we can create therapies that target cancer cells.”

The researchers are focusing the re-engineered virus on pancreatic cancer, one of the most difficult to treat. In addition to the drug that is currently being considered for clinical trial, they have advanced versions of therapeutics in their clinical translation pipeline. “These are even more specially engineered adenoviruses for enhanced potency and selectivity,” said Dr. Yamamoto. In earlier experiments, mice with malignant pancreatic tumors were given a single injection of one of these viruses and four out of ten tumors disappeared completely. “It was an amazingly good result considering the aggressive nature of pancreatic cancer,” he said.

Drs. Yamamoto and Davydova chose the adenovirus as their virus vector because this virus has been well studied for decades. That gave them plenty of information with which to reshape the virus’ natural ability to attack respiratory cells. Dr. Davydova added that the adenovirus doesn’t integrate into the genome, doesn’t cause mutations and is not associated with any severe disease. “It’s an ideal prototype for designing an oncolytic, or cancer-killing, virus,” she said.

The two researchers have put the adenovirus to work in numerous ways. They created a variation that expressed interferon, which is known to boost immunity and the effectiveness of chemotherapy. In an animal model, use of this virus vector in combination with chemotherapy clearly demonstrated significant pancreatic tumor growth suppression. Results of this experiment were published in the journal Surgery in May 2015.[2] And Dr. Davydova has another interest in using the re-engineered adenovirus: as a diagnostic tool. Again, the target is pancreatic cancer, which can be notoriously difficult to diagnose early enough for surgery to be of any use to the patient. Davydova’s research has engineered the virus not only to kill cancer cells, but to express a certain protein called sodium-iodine symporter or NIS. “NIS is a protein normally expressed in the thyroid and is responsible for concentrating iodine,” said Dr. Davydova. “Its natural expression has been used for radiotherapy and imaging of thyroid cancer. The beauty of this gene is that it can work therapeutically with radioactive iodine and can be used for noninvasive diagnostic imaging.”

“We hope this vector can help with early diagnosis,” she continued. “That’s a huge problem for pancreatic cancer treatment – to capture the tumor development.”

“Unless I have clinical application as an end point, I can’t justify myself,” added Dr. Yamamoto. “That’s my drive to develop new therapies.”

[2] LaRocca CJ, Han J, Gavrikova T, Armstrong L, Oliveira AR, Shanley R, Vickers SM, Yamamoto M, Davydova J. Oncolytic adenovirus expressing interferon alpha in a syngeneic Syrian hamster model for the treatment of pancreatic cancer. Surgery. 2015 May;157(5):888-98.

Stopping lung cancer before it starts: kava plant research

"For decades the prevailing feeling has been that we could cure cancer if we just found the right drug," says Chengguo (Chris) Xing, Ph.D., of the Masonic Cancer Center's Carcinogenesis and Chemoprevention program. "Over the years, however, we realized that cancer treatment is not the sole solution. That's why cancer prevention is getting more attention."

Prevention is at the heart of Dr. Xing's work. He and his team have been awarded a five-year, $1,738,500 grant from the National Cancer Institute for a study titled Dihydromethysticin (DHM) for Lung Cancer Chemoprevention. The team will continue their research on the kava (Piper methysticum) plant. "It gives us time to really look into efficacy in different animal models and many other aspects that we think are important for future translational work," he said.

Dr. Xing first became interested in kava after an epidemiological survey seemed to indicate an unusual correlation between kava and lung health. "It was interesting that South Pacific nations with high kava consumption had low lung cancer incidence," he said. "That implied to us that kava usage may reduce lung cancer risk."

The epidemiological evidence showed that rates of lung cancer in the South Pacific Islands of Vanuatu, Fiji and Western Samoa are just 5 to 10 percent of the U.S. lung cancer occurrence, despite having similar smoking rates. "We're trying to understand the molecular mechanism at work here," said Dr. Xing.

As a medicinal chemist, Dr. Xing's approach to cancer research is a little different than that found in other disciplines. "We have the expertise to look into some of these components to identify the active species," he said. "We might even be able to modify them to make them better or reverse adverse effects."

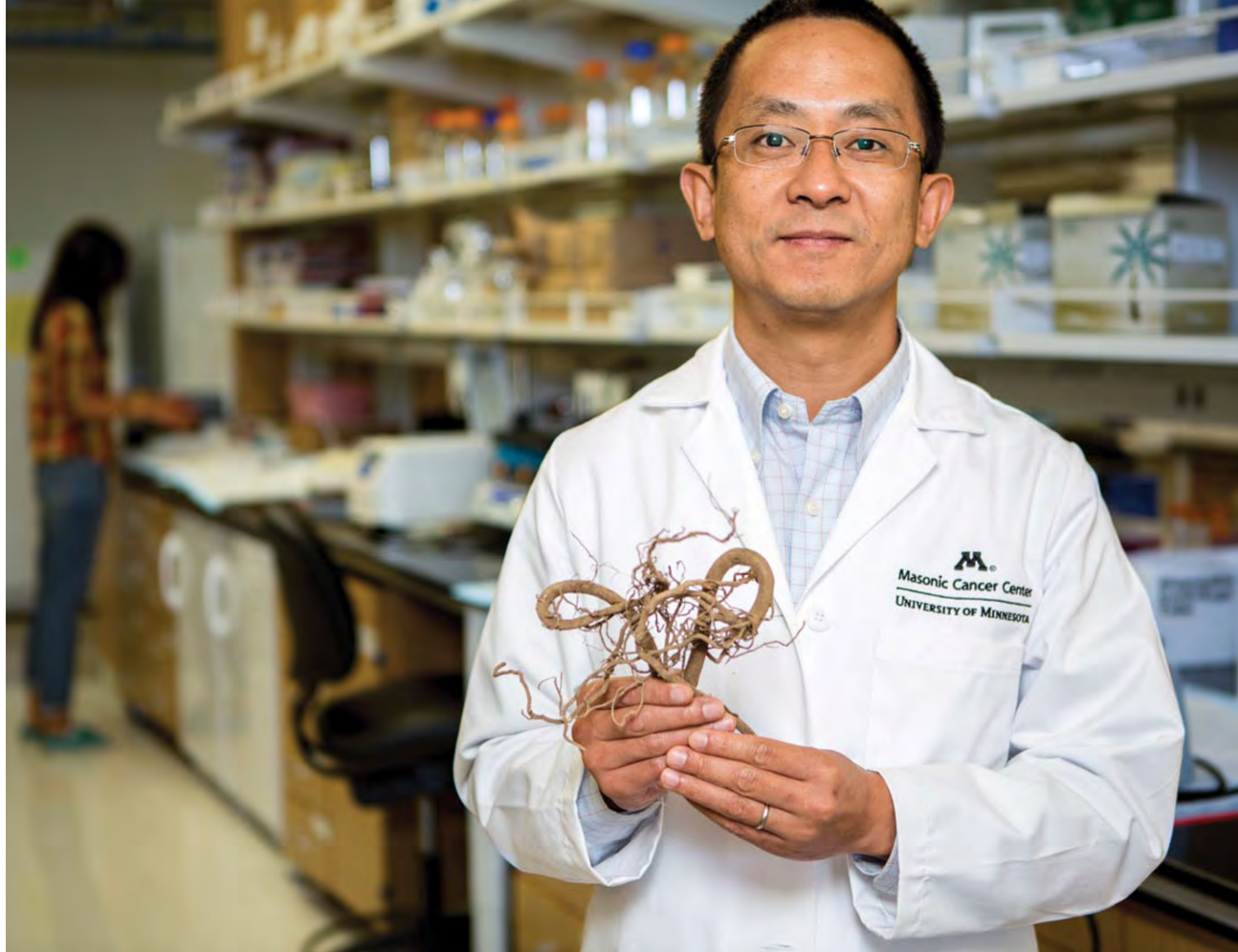
Collaborating with Masonic Cancer Center members such as Stephen Hecht, Ph.D., Wallin Land Grant Professor of Cancer Prevention, Dr. Xing's lab team has identified some components of kava that seem to be cancer-preventative. They also isolated components that have been found to play a role in rare liver toxicity related to consuming kava-derived products. The University of Minnesota team was then able to create a patent-pending blend of kava's cancer-preventing ingredients that doesn't affect the liver.

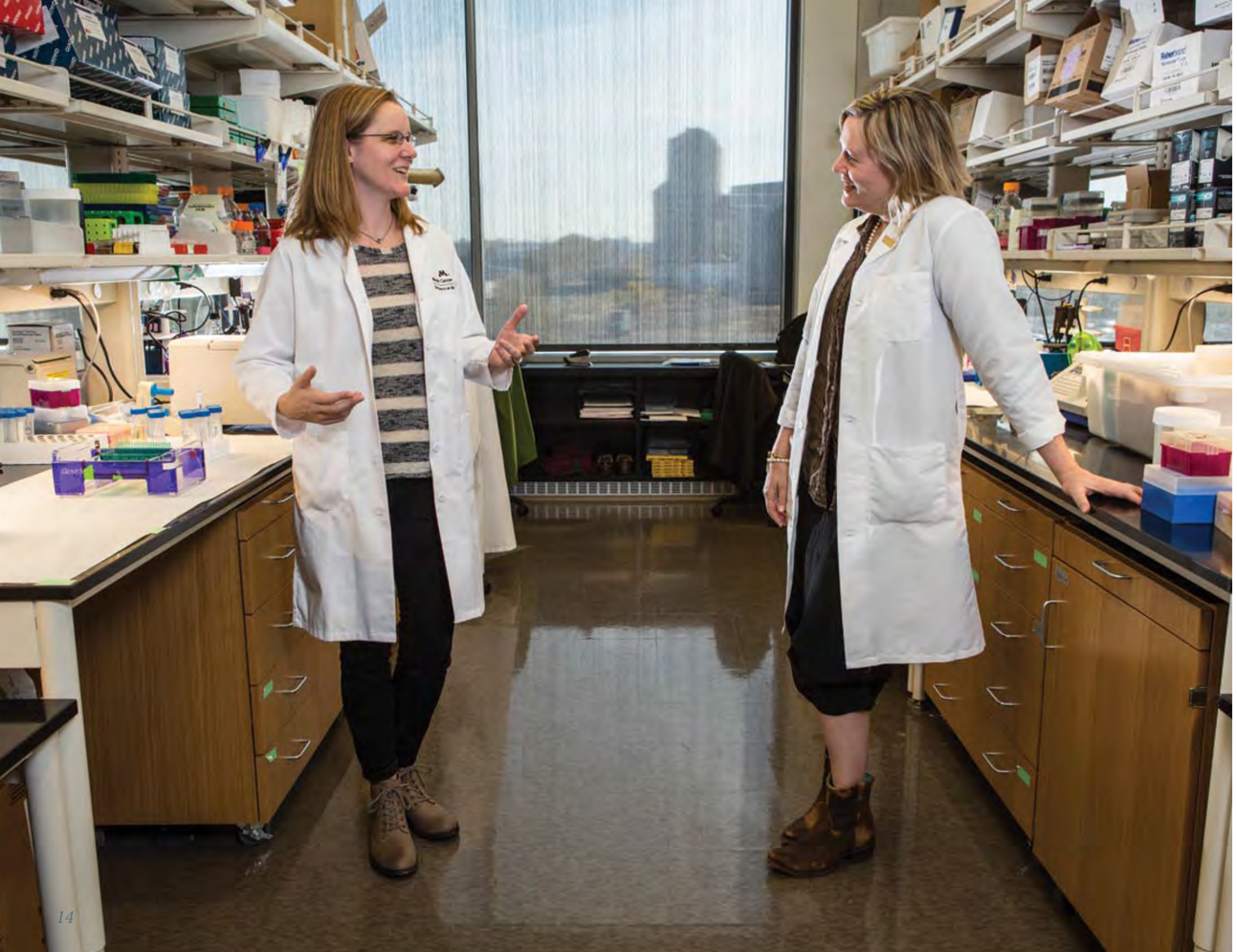
While kava also shows promise of helping prevent other types of cancer, "We're focusing on lung cancer right now because we know who the high-risk individuals are – those who smoke tobacco," said Dr. Xing.

In earlier animal studies, Dr. Xing's research found that daily consumption of the kava-derived blend as a dietary supplement prevented the formation of 99 percent of tumors in a mouse lung tumorigenesis model routinely used to predict lung cancer in humans.

Some mice developed no tumors at all. In addition, DNA damage from tobacco carcinogens was significantly reduced, which may provide a clue to what is potentially behind kava's effectiveness.

"The next step is determining is what is toxic, what's the best dose, the best plant to use, and how to prepare the resulting supplement," Dr. Xing said. "This is very early stage work," he explains to anyone considering using non-FDA approved kava supplements currently on the market as cancer preventatives. "I would be very cautious because the products that are available are very diverse. There could be some that are of benefit, but there are also some that could cause liver damage."





Getting down to the cellular microenvironment to prevent or treat breast cancer

If you want to understand what's happening in a city, you might look at a single family in a single building in one of its neighborhoods – going from a macro to a microenvironment. How that family interacts, both with its members and with its neighborhood, might speak volumes about the overall health of the city itself. That concept may hold true for breast cancer research as three Masonic Cancer Center (MCC) members are discovering.

For Carol Lange, Ph.D., Kaylee Schwertfeger, Ph.D., and Julie Ostrander, Ph.D., the "family" they're studying lives in the cellular microenvironment of breast tissue. Family members include several different types of molecules, including estrogen (ER) and progesterone receptor (PR) positive cells and a molecule known as PELP1. It's beginning to look like these family members interact in ways that are important in the formation of breast cancer tumors.

Luminal breast cancers, which account for about 70 percent of all cases, contain between 3 to 100 percent estrogen and progesterone receptor positive cells. Why is that significant? According to the researchers, hormones are known to contribute to breast tumor initiation and the microenvironment surrounding the lesion is key to determining the tumor's evolution and ultimate fate.

"My lab started working on the relationship between estrogen and progesterone receptors," said Dr. Lange, leader of the MCC Cell Signaling program. "We looked at all the genes regulated by progesterone. When we did that, we realized that all of those so-called progesterone genes were also estrogen genes."

Perhaps, Dr. Lange's lab team thought, the ER and PR receptors in cancer cells are actually in the same complex that regulates these genes. "We asked ourselves how these two hormones could collaborate in breast cancer tumor formation," Dr. Lange noted. When they were discussing this in the lab, thinking about how these molecules could bind to one another, Dr. Ostrander, a member of the MCC Cell Signaling program, said, "I bet it's PELP1."

Turned out she was right. "Now, we have three molecules in the complex and the way we got to the leukocytes is that Julie discovered that PELP1 is really good at regulating genes that create secreted proteins, which attract the leukocytes into the breast tumor," said Dr. Lange. "Kaylee's [Schwertfeger's] work is focused on this very process. It seemed like our projects suddenly all came together." Schwertfeger is a member of another Masonic Cancer Center program: Tumor Microenvironment.

Together, the three researchers posited that the three molecules were working together to regulate genes that then form paracrine factors – cell-to-cell communicators that produce signals to induce changes in nearby cells. "All the paracrine factors that get secreted – proteins, small molecules, peptides – are recognized by the immune system," said Dr. Schwertfeger. "In the tumor inflammation field, the dogma is that if you have a tumor cell, it's going to secrete these things and then bring in the immune system to help it grow. These things would be the tumor's friends. There is other evidence out there, including from my own lab, suggesting that in some cases, this inflammation can actually help get rid of the tumor."

Dr. Schwertfeger's lab, working with MCC Immunology program member Michael Farrar, Ph.D., has identified certain immune cell type subsets that can actually inhibit these tumors. "We're getting some data that's anti-dogma and that I think will be very important for the field," she said.

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"Together, we can do a lot more than we can as individual investigators."

Breast Cancer, continued

These discoveries have engendered three major research projects, all funded by an MCC grant mechanism that provides $300,000 to support team science that will ultimately lead to a program project NCI grant application. Funds to support these projects are raised by a group of Minneapolis-based MCC supporters in an annual event called the Varsity Team Rally and the Emerging Research Award from 5th District Eagles from Rochester.

For this project, the scientists first want to understand the biochemistry of the proteins that are interacting and which genes they regulate and how that's done. Second, they are exploring how the cancer cell that has this complex communicates with immune cells, identifying the molecules needed for that communication and whether or not that communication is good or bad for the tumor. And finally, when a tumor contains this complex and fully functioning interaction between the tumor and the host – the immune cells – can it be manipulated to inhibit the tumor progression? "Can you leverage that to create new therapies?" Dr. Lange asked.

"It's both prevention and therapy," added Dr. Schwertfeger. "If you can figure out early events that cause the hormones to amplify hormone signaling, you could prevent breast cancer in women who are at high risk. Or, if the tumor is full blown and it's determined that the immune system is playing a role, you could use that to block the immune system from helping the tumor."

The three scientists involved believe they might not ever have gone down these paths without collaboration. "As far as driving innovation, getting some depth to your research and making it multi-disciplinary, collaboration is the way to go," said Dr. Lange. "Together, we can do a lot more than we can as individual investigators."

And without the Masonic Cancer Center, that collaboration may never have happened.

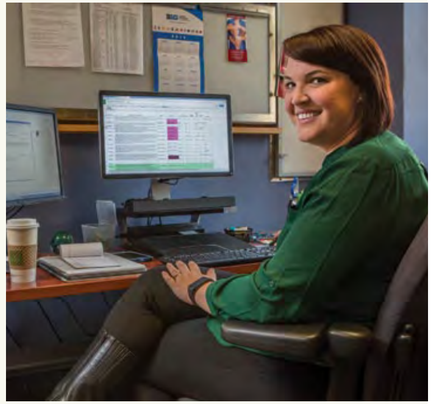
Phase 1 clinical trial facility provides expert care for cancer research patients

Thanks to a multi-organizational partnership that includes University of Minnesota Health, University of Minnesota Physicians, the Masonic Cancer Center's (MCC) Clinical Trials Office, and the U's Clinical Translational Research Institute, the fifth floor of the University of Minnesota Medical Center (UMMC) houses a state-of-the-art Phase 1 clinical trial facility. The Early Phase Clinical Research Unit treats patients participating in therapeutic cancer research studies at the university. This unit has the capability to treat and manage oncology patients 24 hours a day.

Located in the UMMC's Blood and Marrow Transplant Unit, the facility is staffed by a skilled care team that specializes in working with high risk, complex patients. The BMT unit was renovated to include single-patient rooms that are used exclusively for advanced treatment options including clinical research trials.

"This enables us to tell our industry partners that we have a unit in which we can see patients 24 hours a day, 7 days a week in an acute care setting," said Katie Mellskog, Program Director, MCC Clinical Trials Office. "We have the staff required to facilitate first-in-human drug testing who can handle any crisis in real time."

The Early Phase Clinical Trials Unit will help UMN experts translate breakthrough lab research into new therapies for patients. "There are a lot of studies in the pipeline that will be able to take advantage of this unit, so the future is going to be very exciting," Mellskog noted. "It's a good thing because it has been so successful."



To get more information about cancer clinical trials, visit the Masonic Cancer Center website at https://omis.cancer.umn.edu/research/clinicaltrials/

Innovative MRI techniques help make cancer diagnosis a more precise science

Advances in imaging have enabled researchers at the Masonic Cancer Center (MCC) and the UMN's Center for Magnetic Resonance Research (CMRR) to more precisely locate small tumors, which can lead to early and/or more accurate cancer diagnoses. This can be especially important for breast or oral cancer patients.

Masonic Cancer Center Tumor Microenvironment program member Michael Garwood, Ph.D., collaborated with another UMN researcher and CMRR researcher Djaudat Idiyatullin, Ph.D., to co-invent and patent an MRI technique that uses magnetic nanoparticles to make tiny breast tumors more visible and easier to detect.[3] The technique is known as SWIFT (SWeep Imaging with Fourier Transformation).

Using dipole matched filtering helps SWIFT make tissues close to the nanoparticles brighter and tissues further away black or darker on MRI images. The filter matches the nanoparticles' unique magnetic field pattern. In a breast cancer model, it can also match the field pattern of microcalcifications previously only detected by methods such as mammography or computerized tomography.

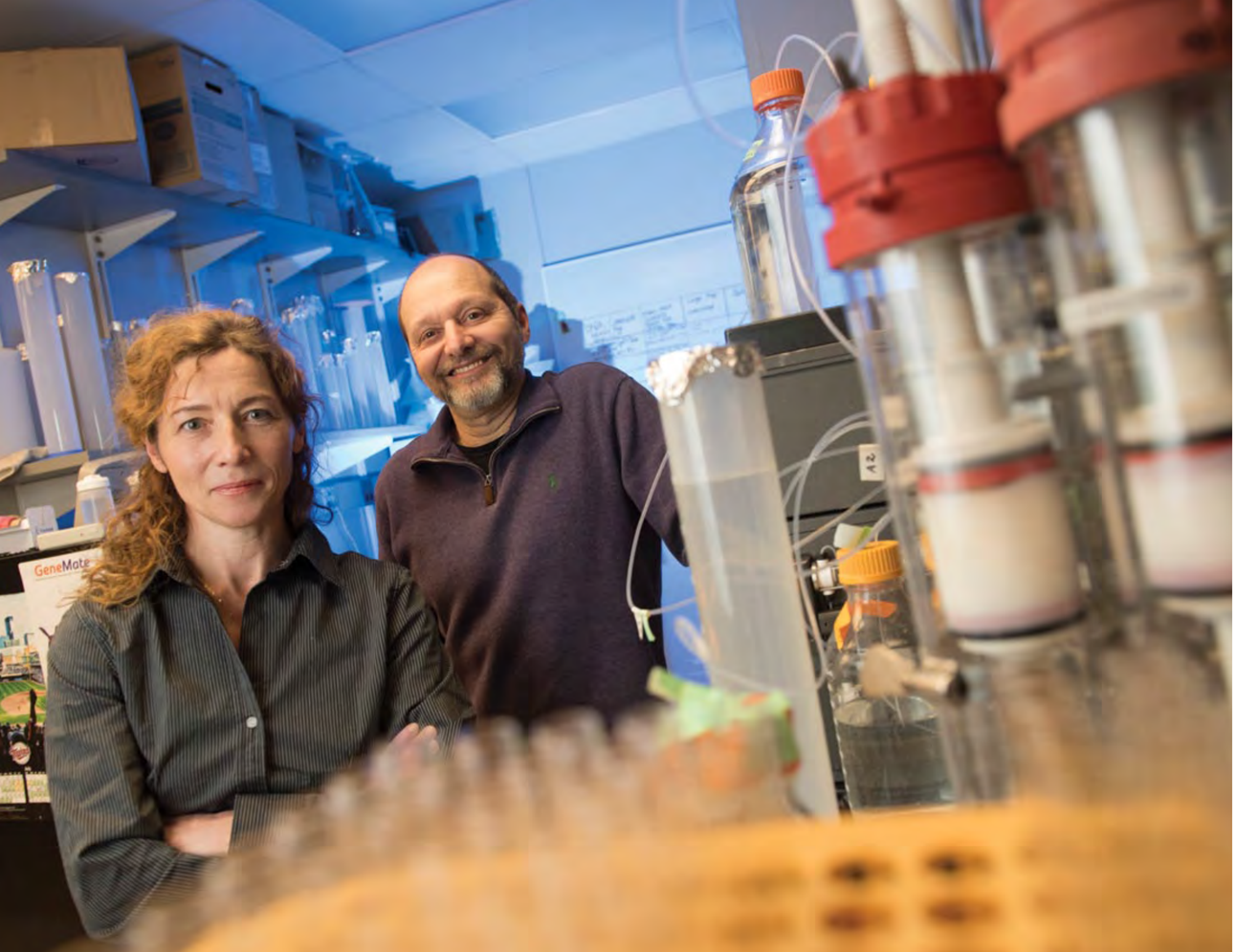
[3]According to a recent Health Talk blog post written by Matt DePoint

Dr. Garwood and his colleagues completed a study earlier in 2015 that was designed to optimize SWIFT MRI for breast cancer and develop guidelines for minimal clinical implementation. The study was expanded to use dipole matched filtering for improved diagnosis of DCIS (ductal carcinoma in-situ), the most common type of non-invasive breast cancer.

Dr. Idiyatullin has collaborated with another MCC member, Samir Khariwala, M.D., of the Carcinogenesis and Chemoprevention program, to combine MRI with another version of SWIFT technology – Multi-band SWIFT – to determine whether or not oral cancer has reached a patient's jawbone. Making that determination can enable a surgeon to remove the correct amount of bone or to decide that surgery isn't yet needed.

MB-SWIFT images are sharper and don't have the fat suppression that sometimes reduces the signal from the bone, which can lead to a less-complete diagnosis.

The researchers continue to work hard to harness the potential of this technology, including coupling it with thermal therapies being developed in the mechanical engineering lab of MCC researcher John Bischof, Ph.D. The team hopes to enable vastly improved diagnoses and targeted therapies for breast and other cancers.



Designing cancer drugs for "real people" with urgent needs

It's not often that a researcher has the opportunity to meet a patient who directly benefited from his work, especially in its early phases. Masonic Cancer Center Tumor Microenvironment program member Daniel Vallera, Ph.D., had that opportunity. Late last year Dr. Vallera met Cynthia Cattell, Ph.D., recipient of drugs based on Vallera's life's work.

Dr. Cattell, a University of Minnesota professor of physics and astronomy, participated in a 2014 Phase 1 clinical trial of an anti-cancer drug named DT2219 that Dr. Vallera had developed for patients with B cell cancers, such as leukemia and lymphoma. When she went into the trial, her aggressive lymphoma had resisted chemotherapy, radiation and two bone marrow transplants. She had been in and out of the hospital for months.

When Dr. Cattell was asked if she wanted to participate in the cancer center trial, her response was an enthusiastic, "Absolutely!" Although 25 patients were enrolled in the three-center study, Dr. Cattell would be the only one to go through two rounds of the drug. Why? Dr. Vallera's Masonic Cancer Center colleague, Veronika Bachanova, M.D., Ph.D., who designed and managed the trial, had found a mind-blowing 75 percent reduction in the size of Dr. Cattell's tumor following just one round of the drug. After receiving special permission from the FDA to give Dr. Cattell a second round, her tumors vanished. She remains in complete remission.

From no hope to a new lease on life – that's why Dr. Vallera got into developing drugs that would cause remission in patients with cancer. In 2001, he retooled his lab from focusing on bone marrow transplants in animal models to creating genetically engineered anticancer agents for use in human trials. In a 2015 interview with Jordana Green on Minneapolis-based WCCO radio, Dr. Vallera said, "I'm at a research mecca here at the U, so I had the resources and colleagues to put everything together to make the project work."

The drug designed for the trial is what's known as a targeted toxin and is made by taking pieces of DNA that encode two different antibodies that selectively bind to the cancer cells. These are spliced to a gene that encodes a potent toxin – in this case, the diphtheria toxin – and mutates it to behave in a certain way…killing the cancer, for instance. Bacterial fermentation is then used to make the drug. "It's like making beer," Dr. Vallera said during the WCCO interview. "We ferment it to make 250 liters of bacteria, then crack it open, collect the product and purify it."

The DT2219 clinical research team, headed by Dr. Veronika Bachanova, a member of the Transplant Biology and Therapy program, published a paper on the results of the Phase 1 clinical trial in March of 2015. In September 2015, pharmaceutical company Oxis Biotech, Inc., announced that it had entered into an exclusive worldwide license agreement to further develop and commercialize DT2219. "We are very excited to continue this work with Oxis Biotech," said Dr. Vallera. "A stellar commercialization partner is critical at this juncture because of the excessive costs. Our FDA trial is scheduled to resume and we need to improve the dose schedule in which the drug is given. We expect even better responses with more aggressive treatment and need to move forward quickly."

The Phase I/II trial is designed to give the drug in subsequent cycles to see if it's feasible and tolerable, according to Dr. Bachanova. "We believe the drug needs to be given in at least three cycles to meet its full therapeutic potential," she said. The researchers received FDA approval to proceed with their Phase 1/Phase 2 trial in November.

Creating and developing genetically engineered drugs is a slow, painstaking process that requires lots of funding. Dr. Vallera is fortunate – and extremely grateful – to have the support of two particular donors. Although he has received funding from the National Cancer Institute for more than 30 years, Dr. Vallera said he never could have brought DT2219 to trial without the help of these philanthropists. It's a deeply personal gesture on the part of the donors. Both of their sons had an aggressive form of childhood blood and bone marrow cancer known as acute lymphoblastic leukemia or ALL. One survived, one did not. *(continued on page 20)*

Cancer Drugs, continued

Donor Jeff Lion, a California resident whose son survived, encourages others to open their checkbooks. "At the end of the day, scientists like Dan are going to cure cancers one at a time; it won't be the same cure for all," Lion said. "A disease like ALL? Ultimately, there might be 10 or 12 cures for it, and they'll all be expensive to develop."

Working with these donors and meeting Dr. Cattell caused Dr. Vallera to think about his work in a new way. "It reminds me that there are very real people out there, waiting, and their need is urgent," he said. According to the Leukemia and Lymphoma Society, almost 1.2 million people in the United States are either living with or are in remission from leukemia, lymphoma or myeloma, and approximately every 10 minutes, someone in this country dies from blood-related cancer.

Urgent, indeed.

UMN–patented drug shows promise for treating pancreatic cancer

Patients with pancreatic cancer who enrolled in a Phase 1 clinical trial led by Principal Investigator Edward Greeno, M.D., Medical Director of the Masonic Cancer Clinic and pancreatic cancer specialist, are receiving the newest weapon against the most lethal form of cancer. These patients are helping to determine whether one of the drugs developed by Masonic Cancer Center members will become a more effective pancreatic cancer treatment than the current approved drugs which result in a median survival of only six months.

Building on work done by a team led by Ashok Saluja, Ph.D., Masonic Cancer Center Associate Director for Experimental Therapeutics, the trial will help determine the appropriate safe dose of a UMN-patented drug called Minnelide.

It all started in 2007 when Dr. Saluja was researching how to protect the pancreas in patients who had pancreatitis. "It was generally accepted at the time that one of the ways to do that is to increase heat shock proteins," said Dr. Greeno. Dr. Saluja discovered, however, that the pancreatic cancer cell lines he was using in his research already had high levels of heat shock proteins.

"Then he had an idea…maybe pancreatic cancer is so hard to treat because it has this self-protective mechanism, which prevents the tumor cells from dying," said Dr. Greeno. "So let's eliminate the effect of the heat shock proteins."

Following a review of the literature for heat shock protein inhibitors, Dr. Saluja found triptolide, one of many bioactive components of the Thunder God vine, a plant used in traditional Chinese medicine for thousands of years. A water-soluble version of triptolide was created by the UMN team led by Masonic Cancer Center members Gunda Georg, Ph.D. and Bruce Blazar, M.D.. The new drug was named Minnelide, which is licensed through a company that Dr. Saluja co-founded called Minneamrita Therapeutics, L.L.C.

Minnelide has similar in vitro and in vivo activity as the parent compounds triptolide with good single agent activity in patient derived xenograft models. Since the drug has little effect on the normal pancreas, Dr. Greeno says "we could basically get rid of the pancreatic cancer with no toxicity."

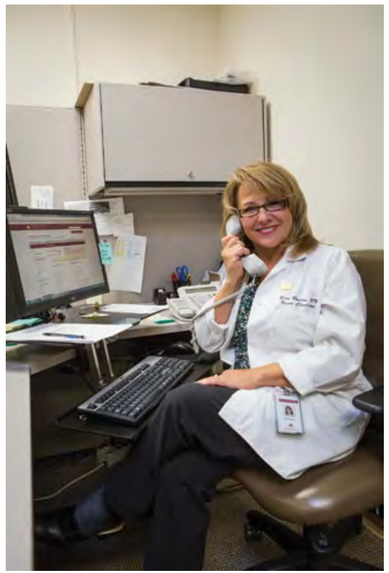
With about 30 patients enrolled in the trial, results have focused on toxicity and so far, the therapy has been generally well tolerated, as predicted.

Dr. Greeno's hope is that the study won't need to enroll many more patients in this phase. "We've had a couple of participants who have clearly responded, which is remarkable at this stage of development," he said. "The trial is set up so we're generating data in a way that if we do get more than a few good responses, we'll be able to start down the FDA's breakthrough designation path, which could lead to expanded trials."

Eligible study participants must have exhausted all other treatment paths and are enrolled in cohorts of three. Although patients with other types of cancer are being enrolled because Minnelide is effective against a range of cancer types, Greeno noted that, "Our main focus is on pancreatic cancer because it has the worst outcomes and the most limited set of treatment options."

For more information about the study, call 1-855-486-7226.

Cancer Information Nurse Line: First line of help for newly diagnosed cancer patients



Recently, a caller thanked nurse Rita Bouley for giving him hope because she told him about current national clinical trials for which he might be eligible. Bouley, a registered nurse with a background in oncology and research, fields telephone calls in a full-time position sponsored jointly by the Masonic Cancer Center and our clinical partner, University of Minnesota Cancer Care. Callers can get answers to questions about things such as cancer diagnoses, treatments, and clinical trials. Bouley can also help callers find UMN physicians that best fit their needs.

A cancer diagnosis can be overwhelming. Rita provides callers with a connection – someone they can call for help who understands, has answers and follows up. Rita considers herself to be an advocate, an educator and someone who can help people navigate the decisions they are facing.

You don't have to be a UMN patient to access the nurse line. Calls to the line (612-624-2620) will either be answered directly or returned Monday through Friday, 8 a.m. to 4:30 p.m. Read more about the Cancer Information Nurse Line and other patient care information at http://www.cancer.umn.edu/patient-information/index.htm.

Math provides insights to help fight cancer

Better cancer treatment through math? It's now possible, thanks to research done by Masonic Cancer Center member Jasmine Foo, Ph.D.

Dr. Foo applies probability theory (the study of randomness) to create models that predict how cancers will grow, or at what point they will become resistant to treatment. She developed a model that significantly improved treatment for non-small-cell lung cancer; the protocol is currently being evaluated through a clinical trial in New York.

Dr. Foo studies how cancer cells arise out of healthy tissue. She looks for distinct differences in how cancers evolve in various parts of the body. She's also interested in quantifying genetic diversity of cells within a single tumor, which can give a treatment team insight into how to best attack tumors at various stages.

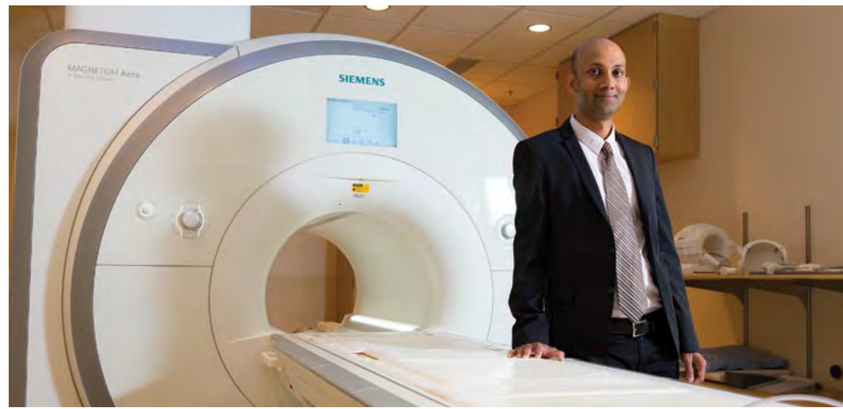
"We're not designing completely new treatments, but improving upon existing therapies," Dr. Foo said. "It's great to be part of a growing field…I'm very optimistic that math modeling will improve the quality of treatment for cancer patients."

Avoiding and treating heart problems following breast cancer treatment

So you've survived breast cancer, then developed heart failure from the treatments you got for your breast cancer? Chemotherapy and targeted therapies may put some patients at risk for heart disease while breast radiation may also affect cardiac function if the heart is included in the radiation field. Heart disease is the leading cause of non-cancer death among breast cancer survivors, according to Masonic Cancer Center clinical researcher Anne Blaes, M.D., who heads the University of Minnesota's Cancer Survivor program.

Masonic Cancer Center members are exploring innovative ways to detect, treat and sometimes even predict and prevent heart problems before they occur. As a medical oncologist Dr. Blaes' clinical life is focused on delivering systemic therapy to treat cancer while much of her research focuses on cardiac complications of such therapy. She is currently evaluating the impact of aromatase inhibitors – anti-estrogen therapy used to treat breast cancer – on overall health.

Cardiologist Chetan Shenoy, M.B.B.S., is approaching the question through imaging. He is using cardiovascular magnetic resonance imaging (CMR), to detect structural heart disease even in patients who show no symptoms and who have normal conventional screening tests.



Dr. Shenoy is using CMR to evaluate cardiac structure and function before patients begin cancer treatment with a goal of developing predictive tools to identify patients at most at risk for developing heart problems. He noted that the technique can detect even "silent" heart disease, which helps identify higher-risk patients.

When a patient has an increased risk of developing cardiac disease from cancer treatment Dr. Shenoy said, "We can think about alternative cancer treatment options, prescribe preventive cardiac medications and monitor patients more closely to detect heart problems sooner rather than later."

(continued on page 24)

Avoiding and treating heart problems, continued

In addition to their research, UMN opened one of the first cardio-oncology centers in the Midwest three years ago allowing cardiologists and oncologists to more effectively collaborate to minimize cardiac risk in patients undergoing cancer treatment.

Suma Konety, M.D., M.S., head of the Cardio-Oncology Clinic, also conducts research aimed at improving cardiac outcomes for breast cancer patients. She established a cardiac-cancer registry that provides researchers extensive data about patients with these dual diagnoses. Such registries have been shown to improve patient outcomes.

Dr. Konety also collects blood from patients who develop decreased cardiac function to identify genetic markers that might have been predictive of their increased risk. Identifying such markers may enable physicians to proactively identify patients at increased risk prior to starting systemic therapy. Ideally, strategies such as cardio-protective drugs, could be started to avoid this long-term complication.

In addition, Drs. Blaes and Konety are working together to improve breast MRI currently to capture both breast and cardiac imaging in one setting. In the I-SPY2 clinical trial, which tests investigational agents in the neoadjuvant setting, research MRI's are obtained at four separate points during the course of the systemic therapy. Combining breast imaging (to detect tumor response) with cardiac imaging (to identify decreased cardiac function) could improve both the quantity and quality of life of patients undergoing systemic therapy for breast cancer.

Perhaps the best way that breast cancer survivors can prevent heart problems is to stay informed about their health. "At our annual Cancer Survivorship Conference, we now include a special breakout session about heart health," said Dr. Blaes (the next conference is scheduled for April 23, 2016). Meanwhile, breast cancer survivors should do whatever they can to optimize heart health: don't smoke, maintain a healthy weight and cholesterol level and get 150 minutes of exercise a week.

For more information about the Cancer Survivorship Conference http://www.cancer.umn.edu/community-events-and-outreach/index.htm

UMN Children's Hospital renamed in honor of single largest donor to the University

The University of Minnesota announced on October 14, 2014 that following a new gift of $25 million from Minnesota Masonic Charities and in recognition of the legacy of support provided by the Masons to the University of Minnesota, it renamed the children's hospital University of Minnesota Masonic Children's Hospital.

The new $25 million gift will be used to enhance the patient experience for children and families and advance research in pediatric cancers, neurobehavioral development, rare and infectious disease and stem cell therapies impacting children here and around the world.

Last year, University of Minnesota Masonic Children's Hospital cared for children from 80 of Minnesota's 87 counties. It averages 6,700 in-patient stays per year.

With support from Minnesota Masons, the University built the 80-bed Masonic Memorial Hospital in 1958 and the Masonic Cancer Research Building in 1996. Minnesota Masonic Charities historic pledge of $65 million, made in 2008, to name the Masonic Cancer Center, continues to have a profound impact. The Masonic Cancer Clinic, opening in February 2016 in the new University of Minnesota Health Clinics and Surgery Center, will provide compassionate care and new treatment options through clinical trials until a cure is in hand. Minnesota Masonic Charities has become the largest donor to the University of Minnesota, having contributed $125 million to accelerate cancer and children's health research and outcomes.

Masonic Cancer Clinic to open in new University of Minnesota Health Clinics and Surgery Center in February

On February 22, 2016, the first cancer patient will be seen in the new Masonic Cancer Clinic on the second floor of the new Clinics and Surgery Center. The new clinic will combine all adult cancer care into one location, bringing a wide range of specialists to one easy-to-access building to work together in new ways to meet each patient's unique needs.

Changing the future of healthcare

Research and education at University of Minnesota fuel the breakthroughs that make care within University of Minnesota Health exceptional. All visitors to the Clinics and Surgery Center will be able to see how academic medicine is changing the face of healthcare now and in the future. Patients, families and community members will learn about biomedical research and clinical trials available at the Masonic Cancer Center from digital information displays, which are incorporated throughout the building.

2015 Top Doctors

The follow Masonic Cancer Center members were named among the Twin Cities' "Top Doctors" in *Mpls St.Paul Magazine*.

Colon & Rectal Surgery
Robert D. Madoff, M.D.
David A. Rothenberger, M.D.

Dermatology
Maria K. Hordinsky, M.D.
Peter K. Lee, M.D., Ph.D.

Hematology
Philip B. McGlave, M.D.
Mark T. Reding, M.D.
Marie E. Steiner, M.D.
Gregory M. Vercellotti, M.D.

Hematology/Oncology
Kathryn E. Dusenbery, M.D.
Edward W. Greeno, M.D.
Christopher L. Moertel, M.D.
Joseph P. Neglia, M.D., M.P.H.
Paul J. Orchard, M.D.
Jakub Tolar, M.D., Ph.D.
John E. Wagner, Jr., M.D.
Brenda J. Weigel, M.D., M.Sc.
Douglas Yee, M.D.

Gynecology
Peter A. Argenta, M.D.
Linda F. Carson, M.D.
Melissa A. Geller, M.D.

Orthopaedic Surgery
Edward Y. Cheng, M.D.
Denis R. Clohisy, M.D.

Otolaryngology
Bevan Yueh, M.D., M.P.H.

Pediatric Surgery
Daniel A. Saltzman, M.D., Ph.D.

Surgery, General
Maria R. Evasovich, M.D.
Eric H. Jensen, M.D.
Todd M. Tuttle, M.D.

Thoracic Surgery
Rafael S. Andrade, M.D.

Urology
J. Kyle Anderson, M.D.
Sean P. Elliott, M.D., M.S., FACS
Badrinath R. Konety, M.D., M.B.A.

Investigator-initiated clinical trials

Translation, from bench to bedside and beyond, is a core strength of the Masonic Cancer Center. The following are some of the MCC investigator-initiated clinical trials opened at the Masonic Cancer Clinic in the past two years and available in Minnesota and at affiliate sites. For more information on clinical trials, and specific trial inclusion and exclusion criteria, visit our "Find a Clinical Trial" page at https://omis.cancer.umn.edu/research/clinicaltrials/.

SOLID TUMOR

Protocol # 2014NTLS004
Mobile Phone Technology to Increase Genetic Counseling for Women with Ovarian Cancer and Their Families
Principal Investigator: Melissa Geller, M.D.

Protocol # 2013NTLS123
Quantitative Methods for Supplementing Contrast-Enhanced Magnetic Resonance Imaging of Breast Cancer
Principal Investigator: Patrick Bolan, Ph.D.

Protocol #2015NTLS026
Aromatase Inhibitors and Vascular Health
Principal Investigator: Anne Blaes, M.D.

Protocol #2012NTLS128
Patients Goals for Undergoing Surgery by a Gynecologic Oncologist
Principal Investigator: Deanna Teoh, M.D.

Protocol #2013NTLS073
Negative Pressure Wound Therapy in Obese Gynecologic Oncology Patients: A Randomized Controlled Trial
Principal Investigator: Deanna Teoh, M.D.

Protocol #2015NTLS032
Mitochondrial based biomarkers for early detection of breast cancer
Principal Investigator: Bharat Thyagarajan, M.D., Ph.D.

Protocol # 2012LS101
MT2013-11: Indoleamine-2,3-dioxygenase (IDO) Inhibition with INCB024360 and Intraperitoneal Delivery of Allogeneic Natural Killer Cells for Women with Recurrent Ovarian, Fallopian Tube and Primary Peritoneal Cancer
Principal Investigator: Melissa Geller, M.D.

Protocol #2012LS101D
MT2013-11D: Indoleamine-2,3-dioxygenase (IDO) Inhibition with INCB024360 and Intraperitoneal Delivery of Allogeneic Natural Killer Cells for Women with Recurrent Ovarian, Fallopian Tube and Primary Peritoneal Cancer
Principal Investigator: Melissa Geller, M.D.
Protocol # 2013CG094
Prophylactic Antibiotic Regimens in Tumor Surgery (PARITY)
Principal Investigator: Edward Cheng, M.D.

HEMATOLOGIC MALIGNANCIES

Protocol # 2014LS092
MT2014-25: A Phase 2 Study of Subcutaneous Recombinant Human IL-15 (rhIL-15) and Haploidentical Donor Natural Killer (NK) Cell Infusion in Adults with Refractory or Relapsed Acute Myelogenous Leukemia
Principal Investigator: Jeffrey Miller, M.D.

Protocol # 2014LS092D
MT2014-25D: Haploidentical Donor Natural Killer (NK) Cell Infusion with Subcutaneous Recombinant Human IL-15 (rhIL-15) in Adults with Refractory or Relapsed Acute Myelogenous Leukemia (AML)
Principal Investigator: Jeffrey Miller, M.D.

Protocol # 2015NTLS023
Exploratory Characterization of Mast Cell Regulatory Gene Mutations in Mast Cell Activation syndrome (MCAS)
Principal Investigator: Lawrence Afrin, M.D.

Protocol # 2009NTLS116
MT2009-22R: Monitoring of Immune Function and Minimal Residual Disease in Patients and Donors After Hematopoietic Cell Transplantation (HCT)
Principal Investigator: Michael Verneris, M.D.

Protocol # 2012LS089
MT2012-17R:Safety of Nplate® in Patients Who Have Failed to Achieve Platelet Engraftment Following Umbilical Cord Blood Transplant
Principal Investigator: Angela Smith, M.D.

Protocol #2015NTLS001
The Feasibility of Recruiting Adolescent and Young Adult Hematopoietic Cell Transplantation Survivors to Participate in Clinical Research
Principal Investigator: Lucie Turcotte, M.D.

Protocol # 2013LS023
MT2014-23R: Prevention of Bone Loss after Pediatric Hematopoietic Cell Transplantation
Principal Investigator: Anna Petryk, M.D.

Protocol # 2013LS126
MT2013-37R: Voriconazole therapeutic drug monitoring in pediatric hematopoietic stem cell transplant patients
Principal Investigator: Angela Smith, M.D.

Protocol # 2013OC003
MT2013-06C : Treatment of graft Failure after HSCT
Principal Investigator: Troy Lund, M.D., Ph.D.

Protocol # 2013OC116
MT2013-33C:Reduced intensity (RIC) Conditioning and Transplantation of HLA-Haploidentical related bone marrow (Haplo-BM) for patients with hematologic malignancies
Principal Investigator: Nelli Bejanyan, M.D.

Protocol # 2014OC034
MT2014-10C : Allogeneic Hematopoietic Stem Cell Transplant for Patients with High Risk Hemoglobinopathies and Other Red Cell Transfusion Dependent Disorders
Principal Investigator: Angela Smith, M.D.

Protocol # 2013NTLS112
Establishing a BMT Legal Clinic to support patients with cancer undergoing blood or marrow transplant
Principal Investigator: Leslie Parran, R.N.

Protocol #2013LS081
Study of the ADAM17 Inhibitor INCB7839 Combined With Rituximab After Autologous Hematopoietic Cell Transplantation (HCT) For Patients With Diffuse Large B Cell Non-Hodgkin Lymphoma (DLBCL)
Principal Investigator: Veronika Bachanova, M.D., Ph.D.

Protocol # 2013LS104
MT2013-31:Allogeneic Hematopoietic Cell Transplantation for Inherited Metabolic Disorders and Severe Osteopetrosis following Conditioning with Busulfan (Therapeutic Drug Monitoring), Fludarabine +/- ATG
Principal Investigator: Weston Miller, M.D.

Clinical Trials, continued

Protocol # 2012OC066
MT2012-14C : Procedure Guidelines For Related Hematopoietic Stem Cell Donors
Principal Investigator: Claudio Brunstein, M.D., Ph.D.

Protocol # 2012NTLS130
MT2013-03R Impact of radiation therapy, gender and frailty on the geriatric hematopoietic cell transplant and advanced heme-malignancy population
Principal Investigator: Mukta Arora, M.D.

CANCER OUTCOMES/PREVENTION

Protocol # 2013NTLS080
Sexual Dysfunction and Quality of Life after Treatment for Gynecologic Cancer
Principal Investigator: Melissa Geller, M.D.

Protocol # 2014NTUC122
Healthy Kids after Cancer: A Physical Activity and Nutrition Intervention
Principal Investigator: Joseph Neglia, M.D.

Protocol # 2011NTLS081
Evaluating the Effectiveness of Reduced Nicotine Cigarettes, part of "Evaluating New Nicotine Standards for Cigarettes"
Principal Investigator: Dorothy Hatsukami, Ph.D.

Protocol #2013NTLS119
The Effect of a Home-based Fitness Intervention on Cardiometabolic Risk Profile in Acute Lymphoblastic Leukemia (ALL) Patients
Principal Investigator: Julia Steinberger, M.D.

Protocol # 2014NTLS010
Measuring Physical Activity in Children and Adolescents with Cancer
Principal Investigator: Mary Hooke, Ph.D., R.N.

Protocol # 2013OC116
MT2013-33C: Reduced intensity (RIC) Conditioning and Transplantation of HLA-Haploidentical related bone marrow (Haplo-BM) for patients with hematologic malignancies
Principal Investigator: Nelli Bejanyan, M.D.

Protocol # 2014OC034
MT2014-10C: Allogeneic Hematopoietic Stem Cell Transplant for Patients with High Risk Hemoglobinopathies and Other Red Cell Transfusion Dependent Disorders
Principal Investigator: Angela Smith, M.D.

Protocol # 2013NTLS112
Establishing a BMT Legal Clinic to support patients with cancer undergoing blood or marrow transplant.
Principal Investigator: Leslie Parran, M.S., R.N.

Training grant helps prepare next generation of cancer biology faculty, researchers

For more than 40 years, the University of Minnesota, in concert with the Masonic Cancer Center (MCC), has been preparing the next generation of cancer biology faculty and researchers thanks to a National Institutes of Health (NIH) T32 Cancer Biology Training Grant. "We are training a cohort of fabulous people who will be in leadership positions," said MCC member and training grant director, Carol Lange, Ph.D., professor of Medicine and Pharmacology and Tickle Family Land Grant Chair in Breast Cancer Research.

The T32 grant is a recognition that substantial breadth and depth of cancer research occurs in the Masonic Cancer Center. The grant allows institutions to train qualified pre and postdoctoral trainees in faculty laboratories with the goal of launching their careers in biomedical research that has significant impact on the health-related needs of the United States. The funds from the T32 provide financial support and require recipient institutions to create specialized training program designed to equip trainees to eventually establish themselves as independent researchers. There are funded positions for four graduate students and five postdoctoral fellows. A faculty steering committee reviews grant applications during a highly competitive process. "We attract the top one percent of students, both inside and outside the university," Dr. Lange said.

The grant program prepares and encourages postdoctoral candidates to apply for independent funding. Christy Hagan, Ph.D., a postdoctoral fellow in Dr. Lange's lab, was a former T32 participant and funding beneficiary. While supported on the T32 grant, she obtained independent funding for her research project. "You can generate preliminary data to get your own grant and that's what propels you forward in your career," said Hagan. Dr. Hagan is now an Assistant Professor of Biochemistry and Molecular Biology at Kansas University Medical Center in Kansas City, Kansas.

Successful T32 applicants can choose from one of four cancer research areas – cell metastasis/angiogenesis, immunology and cancer, cancer genetics/etiology and cancer therapy. About 37 faculty preceptors serve as mentors and provide state-of-the-art laboratory settings for the trainees. "Our faculty preceptors are required to be members of the Masonic Cancer Center, do cancer-focused research supported by the NCI and be experienced trainers," said Dr. Lange. All preceptors are also mentors in one or more of the graduate programs associated with the grant – Microbiology, Immunology and Cancer Biology; Molecular, Cellular, Developmental Biology and Genetics; Biochemistry, Molecular Biology and Biophysics; and Pharmacology.

Graduate students usually spend a maximum of two years on the grant; postdoctoral trainees are part of the grant for a maximum of three years. The grant pays a graduate student's tuition and stipend and a postdoctoral fellow's salary and benefits. "Saving that money allows the faculty labs to spend more on actual research, while enabling the trainees to make valuable contributions to the work being done without having to worry about funding," noted Dr. Lange.

The required training program includes two courses, a monthly Cancer Biology Research Club during which trainees present their work to faculty and fellow trainees, a monthly research roundtable where trainees present their work in a "chalk talk" and get feedback from other trainees and faculty mentors, a weekly Journal Club focused on trainee evaluation of the literature related to their projects and a weekly seminar series that features seasoned researchers from UMN as well as other organizations. The seminar series also brings in researchers from the private sector to help attendees understand how they might use their education and training to secure work in pharmaceutical, biotech or R&D companies.

(continued on page 30)

Next Generation, continued
Nicholas Brady, a fifth-year Ph.D. candidate at UMN, recently completed a stint on the grant. He saw the monthly chalk talks as a way to improve his own research grant applications. During these talks, the trainees have to "think on their feet" and explain their projects to others with nothing more than a whiteboard and marker. These talks helped him understand why non-experts struggled to understand his work and allowed him to communicate the impact of his work in a straightforward and understandable way.

Trainees also are funded for travel to national meetings in their research field during where they present their own research and network with their peers and colleagues. All trainees present their work at the Masonic Cancer Center annual research symposium. Trainees also select a guest speaker for the weekly Masonic Cancer Center seminar and host an outstanding researcher from another institution. Guest speakers also provide the trainees an opportunity to discuss their science and career direction.

For more information about the grant, contact Sandi Sherman, 612-626-0671; or visit: http://www.cancer.umn.edu/education-and-training-opportunities/cancer-biology-training-grant/.

Creating opportunities in cancer research for racial/ethnic minority and under-represented undergradates

What if you gave minority undergraduate students already in two or four-year Minnesota colleges an opportunity to work with world-class UMN scientists for nine weeks over a summer? MCC member and Director of the Program in Health Disparities Research, Kola Okuyemi, M.D., M.P.H., believes the answer to that question is you might begin changing the face of the medical workforce. You might also bring in new perspectives that could help improve cancer patient care. So he and a colleague began a grand experiment.

About six years ago, Dr. Okuyemi co-founded the Health Disparities and Cancer Summer Internship program with Christopher Pennell, Ph.D., Associate Director for Education and Community Engagement. According to Dr. Okuyemi, the internship is designed to give college students from racial/ethnic minority and under-represented communities experiences that will enhance their research skills and resumes. "These students often fall between the cracks," said Dr. Okuyemi. "It's not that they're not equally talented, it's just that opportunities are not equally available."

The first two years of the internship were funded by NIH. Now, funding is through private donations from people who, "like this kind of story, this kind of student," noted Dr. Okuyemi. About 50 to 60 students apply for the eight internship spots each year. "We have enough mentors on campus to take more, but funding is a limitation," he said.

Internship participants are paired with faculty mentors and do real science. "We have a match process that we use for mentors and students," said Dr. Okuyemi. "They look at each other's work and decide where the interests match."

Program participants have partnered with cancer researchers in several areas, including looking at chemicals that cause cancer, identifying changes in cells before cancer is initiated, and observing how people respond to cancer treatment. Dr. Okuyemi has included students in his research on the Power to Quit program, which helps homeless people stop smoking. "In the long-term, we want to train enough

minority biomedical professionals so they can begin to ask relevant questions about the health of their own people," he noted.

The experiment is paying off. The majority of Health Disparities and Cancer summer interns are pursuing graduate or medical degrees. Dr. Okuyemi recalls a recent participant who, even though a straight-A student, thought she was lucky to get into the program. "We worked with her, helped build her confidence," said Dr. Okuyemi. "Then one day, I got a frantic email from her saying she had a big problem." The problem was that she had been accepted by Harvard, Yale and Stanford and didn't know what to do. "I would like to have your problem," he told the student.

The program stays in touch with former interns through social media and asks them to complete an annual follow-up survey. "We are creating opportunities for students who may not seek entrance to traditional programs," he said. "They are serving as role models. When you have students who don't think they can do this and now they can, they can tell those who come behind them."

More information on the Program in Health Disparities visit their webpage at http://www.healthdisparities.umn.edu/education/cancer-disparities-internship/index.htm.

Masonic Cancer Center welcomes new leaders

Seanne Falconer, M.B.A., new Masonic Cancer Center Associate Director for Administration

After a national search, Ms. Seanne Falconer was appointed the Associate Director of administration for the Masonic Cancer Center, University of Minnesota in August 2014. She assumed the position previously held by Mary Sumpmann, R.N.

Ms. Falconer has most recently served as the director of the Harvard Catalyst Clinical Research Program Operations which is the largest program of the Harvard Clinical and Translational Science Center. Prior to this position she served as the chief of staff for Harvard Catalyst during the Center's start up. She gained management, operations, HR and finance experiences in various roles with Empower New Haven, the Peace Corps and General Mills. She earned her bachelor of business administration degree cum laude from the University of Wisconsin-Madison in accounting and human resources management followed by a master of business administration, with a focus on nonprofit management, from the Yale School of Management. She also holds a certificate from Boston University in professional fundraising.

Lisa Peterson named Masonic Cancer Center program leader

Lisa Peterson, Ph.D., a professor in the Division of Environmental Health Sciences, was named Program Leader of the Masonic Cancer Center's Carcinogenesis and Chemoprevention program in November 2014. Dr. Stephen Hecht stepped down from this role after leading the program since its inception.

The scientific goals of the Carcinogenesis and Chemoprevention program are to elucidate chemical and molecular mechanisms of carcinogenesis and to use this knowledge to develop and evaluate practical methods for cancer prevention. The program has 27 members from 12 departments and institutes within the University of Minnesota.

Peterson received her B.S. in chemistry at Macalester College and conducted her Ph.D. thesis work in the laboratory of Neal Castagnoli, Jr. at the University of California, San Francisco. After 2.5 years as a postdoctoral fellow in Fred Guengerich's laboratory at Vanderbilt University, she joined the Division of Chemical Carcinogenesis led by Stephen Hecht at the American Health Foundation in Valhalla, NY. In 1997, Lisa moved to the University of Minnesota where she joined the Division of Environmental Health Sciences and Masonic Cancer Center's Carcinogenesis and Chemoprevention program. Her research focuses on mechanisms by which chemicals initiate carcinogenesis.

Dr. Peterson has been an active member of the Division of Chemical Toxicology, American Chemical Society since its inception, serving as chair of the Bylaws Committee (1997-1998), councilor (2002-2004) and chair (chair-elect, 2008; chair 2009-2010; immediate past chair, 2011-2012). She has also served as Treasurer for the International Society for the Study of Xenobiotics. She is currently Associate Editor of Chemical Research in Toxicology. She also coordinates the American Cancer Society Institutional Research Grant for the Masonic Cancer Center and is the co-leader of the MCC Junior Faculty Mentoring committee.

Christopher Pennell, Ph.D., appointed associate director of Education and Community Engagement

The Masonic Cancer Center appointed Christopher Pennell, Ph.D. to the newly created a position of Associate Director of Education and Community Engagement in September 2015. He joins the other Masonic Cancer Center Associate Directors of Cancer Prevention and Control; Clinical Affairs; Basic Sciences; Administration; Translational Research; and Experimental Therapeutics as well as the Deputy Director, who make up the Director's Cabinet.

Dr. Pennell is an associate professor of Laboratory Medicine and Pathology, and has been a research member of the Masonic Cancer Center for 21 years. He received his Ph.D. from the University of North Carolina at Chapel Hill in 1984. He has served as director of Graduate Studies for the Microbiology, Immunology and Cancer Biology Graduate Program and has an active research laboratory focused on tumor immunology and immunotherapy.

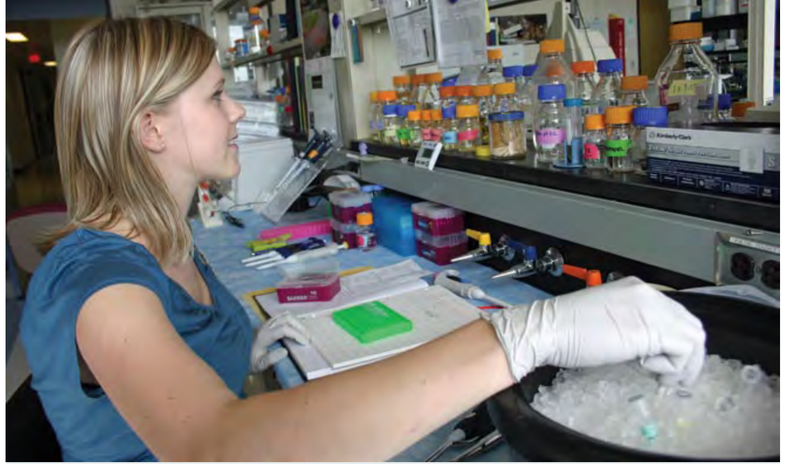
Dr. Pennell, along with Program in Health Disparities Director Kola Okuyemi, M.D., M.P.H., co-founded the Health Disparities and Cancer Summer Internship Program in 2010.

In his new role, Dr. Pennell will have responsibility for both internal and external education of students across the continuum of education, and will help guide the cancer center's community engagement activities. Internally, Dr. Pennell will bring together the various cancer center educational initiatives that involve all periods of training – high school students, undergraduates, graduate students and postdoctoral fellows – to create a comprehensive, evaluation-driven, supportive home for trainee educational initiatives of all stages. Existing programs that will find a home under Dr. Pennell's guidance will be T32 training grants, internship programs and cancer center postdoctoral fellowships. Externally, Dr. Pennell will have the responsibility of guiding the community engagement initiatives, in collaboration with the Program on Health Disparities Research and the Community Advisory Board.

Heather Nelson named Masonic Cancer Center co-program leader

Heather Nelson, M.P.H., Ph.D., Associate Professor, Epidemiology and Community Health, Masonic Cancer Center, University of Minnesota, has accepted the position of program co-leader of the Screening, Prevention, Etiology & Cancer Survivorship (SPECS) program as of June 1, 2015. DeAnne Lazovich, Ph.D., M.P.H., stepped down from her role as co-leader of that program which she jointly led with Anne Joseph, M.D., M.P.H., and Karen Kuntz, S.C.D.

Dr. Nelson received her M.P.H. from the University of Minnesota and a Ph.D. in Cancer Biology from Harvard University. She is a Tenured Associate Professor in the School of Public Health and has a long-standing interest in cancer etiology, and the intersection of environmental exposures, genetics and epigenetics in increasing cancer susceptibility. Her recent work has focused on inter-individual variation in immunity in cancer risk and outcome. Specific cancers of interest include skin cancer, leukemia, head and neck cancer and lung cancer. Dr. Nelson joined the cancer center in April 2007.



Undergraduate training in cancer biology

A new summer undergraduate research program in cancer biology called CREATE (Cancer Research, Education and Training Experience), led by Yoji Shimizu, Ph.D., Immunology Program Leader, and Jill Siegfried, Ph.D., Associate Director for Translational Research, will provide training in cancer biology for undergraduate students. The program, funded through a five-year R25 grant from the NCI with additional support from the Masonic Cancer Center, will support sixteen undergraduates selected from a national pool of applicants for hands-on exposure to cancer biology research for a full-time (40 hours per week) period of 10 weeks each summer. This National Cancer Institute program intends to stimulate the interest and advance the knowledge base of participants to consider further education and training for future careers as cancer researchers.

The NCI Cancer Research Education Grants Program (CREGP) provides support for educational activities that complement and/or enhance the training of a workforce to meet the nation's biomedical, behavioral and clinical research needs. The University of Minnesota Life Sciences Summer Undergraduate Research Programs (LSSURP) will manage the applications and administer the program. More information is available on the web at http://bit.ly/1lUf9C7.

Masonic Scholars project support

The Masonic Cancer Center is grateful for the philanthropic support from Minnesota Masonic Charities which helps to recruit scientists to join our research efforts. The following researchers were selected as Masonic Scholars in 2015.

Professor

Robert Turesky, Ph.D.

Dr. Turesky was recruited from a joint appointment at the State University of New York, Albany, and the Wadsworth Center, New York State Department of Health to be a Professor of Medicinal Chemistry in the College of Pharmacy and leader of the MCC's Analytical Biochemistry shared resource. As a member of the Carcinogenesis and Chemoprevention program, his work is focused on biochemical mechanisms by which hazardous chemicals undergo metabolism and bioactivation to form protein and DNA adducts, which are implicated in toxicity and the onset of cancer. His lab's long-term objective is to implement chemical markers of these genotoxicants for employment in molecular epidemiology studies that seek to understand the origin of human cancer for which an environmental cause is suspected. The analyses of these biomarkers at ultra-trace levels in human biological fluids have been conducted by state-of-the-art mass spectrometry (MS) methods. Dr. Turesky earned a Ph.D. from the Massachusetts Institute of Technology in Nutrition and Food Science, followed by a career as a research investigator at the Nestle Research Center in Lausanne, Switzerland. He then went on to serve as Division Director at the National Center for Toxicological Research at the United States Food and Drug Administration, in Jefferson, Arkansas.

Associate Professor

Susanta Hui, M.S., Ph.D.

Dr. Hui is an Associate Professor in Therapeutic Radiology and a member of the Transplant Biology and Therapy program. He conducts interdisciplinary and translational radiation research on how the bone and marrow—as an integrated system—respond to radiation treatment. He is a translational investigator interested in using the laboratory to understand the clinical needs and as such, conducts preclinical and clinical research to evaluate this system. He has published over 50 papers on these topics.
Dr. Hui received his M.S. in Physics and a Ph.D. in Experimental Nuclear Physics at the University of Calcutta. He continued his training at the Racah Institute of Physics at Hebrew University, Western Kentucky University and University of Wisconsin.

Assistant Professors

Sylvia Balbo, Ph.D.

Dr. Balbo was recently recruited as an Assistant Professor of Environmental Health Sciences, School of Public Health and is a member of the Masonic Cancer Center's Carcinogenesis and Chemoprevention Research program. She began her career at UMN as a postdoctoral research associate in the lab of Stephen Hecht, Ph.D. in 2008. Balbo received her Laurea degree in Pharmaceutical Chemistry and Technology and her Ph.D. (2006) in Drug Science, both from the University of Turin. She conducted postdoctoral research in genetics and epidemiology with Professor Paolo Boffetta at the International Agency for Research on Cancer, Lyon, France, from 2006-2008. Balbo has pioneered new mass spectrometric methods for the detection of diverse DNA damage in cells and tissues exposed to carcinogens. She has broad experience in medicinal chemistry, toxicology, and carcinogenesis, and has published some important papers in these areas.

Vikas Dudeja, M.B.B.S.

Dr. Dudeja returned to the University of Minnesota in July 2015 as an Assistant Professor of Surgery. His laboratory research is in pancreatic cancer and has already published over 30 papers on this topic. He will be an active member of the Division of Surgical Oncology and will participate in clinical research and care as a member of the Tumor Microenvironment program. He received his MBBS from the All India Institute of Medical Sciences. His surgical training at the same institution resulted in a Masters of Surgery (General Surgery). He had a research position at the University of Massachusetts followed by a surgical residency at the University of Minnesota. He is coming to Minnesota after a fellowship in surgical oncology at the Memorial Sloan Kettering Cancer Center in New York City.

Peter Gordon, M.D., Ph.D.

Dr. Gordon is a new Assistant Professor of Pediatrics in the Division of Hematology/Oncology at the University of Minnesota and a member of the Cell Signaling program. Dr. Gordon's laboratory interests focus on how an improved understanding of leukemia development and maintenance at the molecular and cellular level can be leveraged into better therapies.

A particular area of interest includes investigating how soluble factors that are secreted by different cell types within the bone marrow and extra-medullary environments impact leukemia development and response to therapy. An additional interest is in using pediatric bone marrow failure syndromes, which often have a significantly increased risk for leukemia development, as model systems for investigating how cooperativity amongst oncogenes leads to leukemia development. Dr. Gordon received his M.D./Ph.D. from the University of Chicago in 2004. He completed his residency in Pediatrics in 2006 at Boston Children's Hospital and his fellowship in Pediatric Hematology, Oncology and Bone Marrow Transplant in 2010 at Boston Children's Hospital/Dana Farber Cancer Institute. After completing his fellowship, Dr. Gordon served as an Instructor in Pediatric Hematology/Oncology until 2014. During his fellowship and time as an instructor, he completed postdoctoral research fellowships in the laboratories of Dr. David Fisher (Massachusetts General Hospital) and Dr. David Williams (Children's Hospital Boston) where his work focused on the role of the proto-oncogene c-KIT in cancer development.

Anna Prizment, M.P.H., Ph.D.

Dr. Prizment is a new Assistant Professor in Epidemiology and Community Health, recruited jointly by the School of Public Health and Masonic Cancer Center after a national search. Prizment received her Ph.D. in epidemiology (biological emphasis) with a sub emphasis in biostatistics at the University of Minnesota. She continued her training at UMN as a postdoctoral trainee on an NIH T32 grant at the Division of Epidemiology and Community Health. As a member of the SPECS research program, her primary interest is in cancer etiology and survival with a focus on the role of inflammatory and immune processes in the development of cancer. Prizment's current research includes studies of colorectal, pancreatic and lung cancers with the exposure information obtained from questionnaires as well as using circulating, genetic and tissue biomarkers. Recently she has received a CTSI KL2 career development award to conduct research about the role of allergy biomarkers (e.g. eosinophils and IgE) in colorectal cancer development.

Paolo Provenzano, Ph.D.

Dr. Provenzano is an Assistant Professor in Biomedical Engineering and a member of the Tumor Microenvironment program. Following M.S. and Ph.D. degrees in Biomedical Engineering focused on cell and tissue mechanics and tissue engineering at the University of Wisconsin, Paolo joined the laboratory of Dr. Patricia Keely as a postdoctoral fellow to study cell and molecular cancer cell biology. During this time Dr. Provenzano was awarded a postdoctoral grant from the DOD and became a CDMRP Breast Cancer Research Program postdoctoral fellow. Following his postdoctoral fellowship, Dr. Provenzano became a research associate at the Fred Hutchinson Cancer Research Center in Seattle, studying pancreatic cancer. He was recruited to the University of Minnesota in 2012. His research focuses on understanding the molecular mechanisms by which the stromal extracellular matrix and stromal cell populations influence epithelial cell behavior in cancer. His lab is particularly interested in how these factors influence disease progression and resistance to therapeutic intervention in breast and pancreatic cancer. They utilize advanced quantitative imaging, cell and matrix mechanics, tissue engineered 3D microenvironments as well as cell and molecular biology techniques to gain a quantitative understanding of cancer cells behavior and develop novel technologies and therapeutic strategies for cancer diagnosis and treatment. Dr. Provenzano also directs the Laboratory for Engineering in Oncology.

Deanna Teoh, M.D.

Dr. Teoh is an Assistant Professor in the Department of Obstetrics, Gynecology, and Women's Health and participates in the SPECS program. Dr. Teoh attended medical school at the Medical College of Wisconsin, completed her residency in obstetrics and gynecology at UCSF, San Francisco, California, and a fellowship in gynecologic oncology at Duke University Medical Center in Durham, North Carolina. Dr. Teoh has received several awards in teaching, professionalism and research during both her residency and fellowship. Her clinical research interests are focused on advanced laparoscopic surgery including robotics. She is also principal investigator for a randomized controlled clinical trial evaluating thermal injury at the vaginal cuff during total laparoscopic hysterectomy using two different modes of electrothermal energy.

Bringing the best research to the University of Minnesota

Shilpa Gupta, M.D., is an Assistant Professor in the Hematology Oncology and Transplantation Division. Dr. Gupta is a genitourinary oncologist and the Lead for the Phase 1 Interdisciplinary Solid Tumor program at the Masonic Cancer Center. She came to the University of Minnesota in July 2015 from the H. Lee Moffitt Cancer Center and Research Institute/University of South Florida, Tampa, FL where she had been an assistant professor in the Departments of Genitourinary Oncology and Experimental Therapeutics since 2011.

Dr. Gupta obtained her M.D. at the Lady Hardinge Medical College in New Delhi, India, after which she did a fellowship in Emergency Medicine through the Royal College of General Practitioners, UK. She pursued a Masters in Health Informatics at the University of Minnesota and went on to do a residency in Internal Medicine at the University of Connecticut Health Center where she consistently received awards for excellence in patient care. She completed her Hematology-Oncology Fellowship at Georgetown University and Thomas Jefferson University and, to pursue her strong interest in genitourinary cancers, she then completed a genito-urinary translational research fellowship in Dr. Marja Nevalainen's laboratory at Thomas Jefferson University, focusing on Jak2/Stat5 in prostate cancer and ex vivo prostate cancer models.

She served as a panel member on the National Comprehensive Cancer Network (NCCN) committees for kidney and testicular cancers; she also served on the NCCN subcommittee on testicular cancer to review the evidence and guidelines on follow-up of testicular cancer. She is a member of several committees, including the SWOG and Alliance genitourinary cancers committees as well as the Big Ten Cancer Research Consortium.

Dr. Gupta is the Principal Investigator for several high-impact early phase biomarker-driven clinical trials with novel targeted agents and immunotherapy agents in solid tumors, with a focus on genitourinary cancers. She has also been the Principal Investigator of translational research projects and projects involving computational modeling. She has presented her work at several national and international forums, including American Society of Clinical Oncology (ASCO), American Urologic Association (AUA), American Association of Cancer Research (AACR), Society of Urologic Oncology (SUO), Men's Health World Congress and the European society of Medical Oncology (ESMO) meetings. Besides presenting her research as oral abstracts at ASCO and AUA, she has been an invited speaker at several forums, including the Annual World Cancer Congress in Beijing where she discussed the role of novel therapeutics and preclinical models for personalized medicine in prostate cancer. Dr. Gupta has developed several clinical trials exploring targeted therapies and immunotherapies in genitourinary cancers. She has received several awards and grants to advance her translational and clinical research and has authored several peer reviewed articles and book chapters.

Her goals are to develop translational and clinical research in genitourinary cancers and develop the Phase 1 solid tumor clinical trials portfolio at Masonic Cancer Center. Since her arrival at Masonic Cancer Center, Dr. Gupta has opened several early and late phase clinical trials, including the First-in-Human TLR7/8 agonist trial for intratumoral injection, and several other immunotherapy and targeted therapy trials in genitourinary cancers.

Masonic Cancer Center Shared Resources provide state-of-the art tools for researchers

The primary goal of the Masonic Cancer Center, University of Minnesota is to facilitate and support cancer research. One important role is to provide access to technologies, services and scientific consultation that enhance interaction and scientific productivity for cancer researchers. Shared resources provide stability, reliability, cost-effectiveness and quality control that would be difficult for individual investigators to achieve otherwise. These combined resources support a broad spectrum of molecular, cellular, animal, human and behavioral/epidemiology studies for advancement of the overall mission of the center.

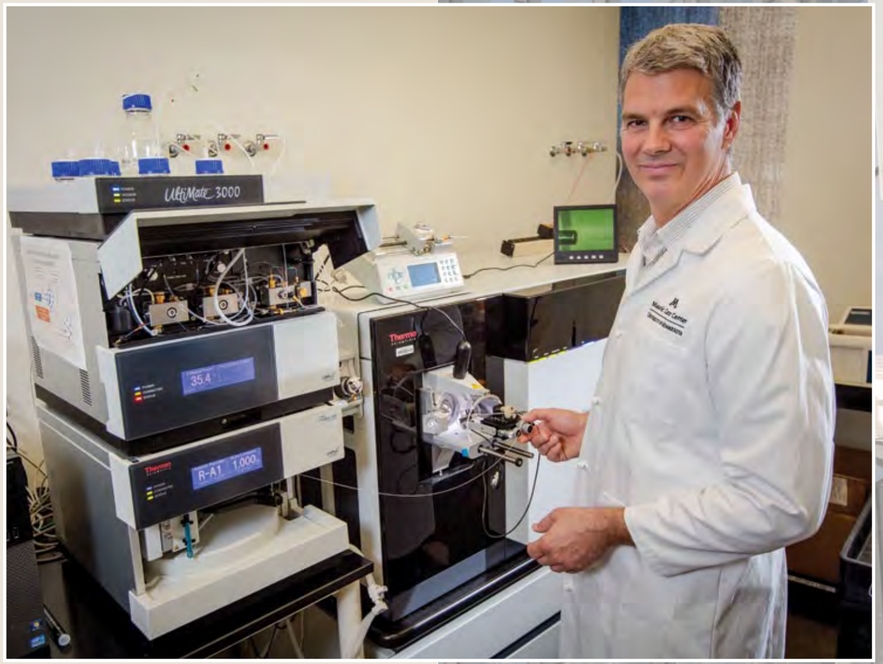
The Masonic Cancer Center's designation by the National Cancer Institute as a comprehensive center includes support for many of these resources – many of which are prohibitively expensive or require special technical staff to operate. Investigators with peer-reviewed, funded projects are the primary beneficiaries of all shared resources. Visit the website for information on the Masonic Cancer Center's 12 shared resources: http://www.cancer.umn.edu/research/shared-resources/index.htm.

Shared Resource highlight

The Masonic Cancer Center's Analytical Biochemistry Shared Resource is the only core facility on campus providing access to a new and very powerful analytical tool for basic scientists – the Thermo Scientific Orbitrap Fusion™ Tribrid liquid chromatography-mass spectrometry (LC-MS) system. This instrument combines three mass analyzers in a unique and extremely powerful "Tribrid" architecture that offers unprecedented depth of analysis of complex biological samples. This instrument is housed in the MCC's Mass Spectrometry Facility, a state-of-the art laboratory in the new Cancer and Cardiovascular Research Building. Expert staff, like lab manager Peter Villalta, Ph.D., are on hand to apply the equipment to address a variety of questions in cancer-related research.

Other Shared Resources include:

- Mouse Genetics Laboratory
- Oncology Medical Informatics
- Genome Engineering
- Cytogenomics
- Biostatistics and BioInformatics
- Comparative Pathology
- Flow Cytometry
- Analytical Biochemistry
- Translational Cell Therapy
- Clinical Trials Office
- Irradiator
- Autoclave and Sterilization Facilities



Executive Committee

The Executive Committee provides leadership in the strategic planning and implementation of Masonic Cancer Center goals and objectives. It is responsible for formulating, directing, revising and implementing research, educational objectives, budget priorities, distribution of space and recruitment of faculty and staff.

Douglas Yee, M.D., Director

Jeffrey Miller, M.D., Deputy Director

Seanne Falconer, M.B.A., Associate Director, Administration

Dorothy Hatsukami, Ph.D., Associate Director, Cancer Prevention and Control

Badrinath Konety, M.D., M.B.A., Associate Director, Clinical Affairs

David Largaespada, Ph.D., Associate Director, Basic Sciences

Christopher Pennell, Ph.D., Associate Director, Education and Community Engagement

Ashok Saluja, Ph.D., Associate Director, Experimental Therapeutics

Jill Siegfried, Ph.D., Associate Director, Translational Research

Anja Bielinsky, Ph.D., Program co-Leader, Genetic Mechanisms of Cancer

Peter Bitterman, M.D., Program co-Leader, Genetic Mechanisms of Cancer

Edward Greeno, M.D., Director, Oncology Service Line

Kalpna Gupta, Ph.D., Program co-Leader, Tumor Microenvironment

Lisa Peterson, Ph.D., Program Leader, Carcinogenesis and Chemoprevention

Anne Joseph, M.D., M.P.H., Program co-Leader, SPECS (Screening, Prevention, Etiology, Cancer Survivorship)

Karen Kuntz, Sc.D., Program co-Leader, SPECS (Screening, Prevention, Etiology, Cancer Survivorship)

Carol Lange, Ph.D., Program Leader, Cell Signaling

James McCarthy, Ph.D., Program co-Leader, Tumor Microenvironment

Heather Nelson, Ph.D., Program co-Leader, SPECS (Screening, Prevention, Etiology, Cancer Survivorship)

Yoji Shimizu, Ph.D., Program Leader, Immunology

John Wagner, M.D., Program co-Leader, Transplant Biology and Therapy

Daniel Weisdorf, M.D., Program co-Leader, Transplant Biology and Therapy

Shared Resource Leadership

Shared resources are core cancer center facilities and directly supported by the cancer center. The services offered by these facilities advance the prevention, early detection and management of cancer by providing access to equipment and technical personnel for use by many investigators in their pursuit of discovery. These combined resources support a broad spectrum of molecular, cellular, animal, human and behavioral/ epidemiology studies for advancement of the overall mission of the center.

Anindya Bagchi, Ph.D., Mouse Genetics Laboratory (Co-director)

Sarah Cooley, M.D., Oncology Medical Informatics

Eric Hendrickson, Ph.D., Genome Engineering

Betsy Hirsch, Ph.D., Cytogenomics

David A. Largaespada, Ph.D., Mouse Genetics Laboratory (Co-director)

Chap Le, Ph.D., Biostatistics and BioInformatics

Gerry O'Sullivan, M.V.B., Ph.D., Diplomate A.C.V.P. & ECVP, Comparative Pathology

Christopher Pennell, Ph.D., Flow Cytometry

Robert Turesky, Ph.D., Analytical Biochemistry

Michael Verneris, M.D., Translational Cell Therapy

Brenda Weigel, M.D., Clinical Trials Office Medical Director

External Advisory Board

The External Advisory Board consists of national cancer experts in basic, clinical and population-based research, participates in an annual external scientific review of the Masonic Cancer Center's activities and provides perspective and recommendations to the Executive Committee.

David Beer, Ph.D., Professor of Surgery and Radiation Oncology, Co-director, Cancer Genetics Program, University of Michigan Comprehensive Cancer Center

Smita Bhatia, M.D., M.P.H., Chair and Professor, Population Sciences City of Hope National Medical Center

MaryAnn Bjornsti, Ph.D., Chair, Department of Pharmacology, Program leader of Cancer Cell Biology, Associate Director for Translational Research, University of Alabama Birmingham, Comprehensive Cancer Center

Melissa Bondy, Ph.D., Professor, Department of Epidemiology, M.D. Anderson Cancer Center, Houston

Cathy Bradley, Ph.D., Professor and Associate Director, Cancer Prevention and Control, University of Colorado School of Public Health (ad hoc)

Kevin Cullen,* M.D., Director, University of Maryland Greenebaum Cancer Center, Baltimore

Michael Darling, M.H.A., Associate Director for Administration, Melvin and Bren Simon Cancer Center, Indiana University

Patrick Dougherty, Ph.D., Professor, Department of Pain Medicine, Division of Anesthesiology, University of Texas M.D. Anderson Cancer Center

Thomas Kensler, Ph.D., Johns Hopkins Bloomberg School of Public Health, Baltimore

Patricia LoRusso, D.O., Professor of Medicine and Associate Director of Innovative Medicine, Yale Cancer Center, New Haven

James Mulè, Ph.D., Associate Center Director, Translational Science & Technology Development, H. Lee Moffitt Cancer & Research Institute, Tampa

Vito Quaranta, M.D., Professor of Cancer Biology, Vanderbilt-Ingram Cancer Center, Nashville

Scott Ramsey, M.D., Ph.D., Director, Cancer Outcomes Research, Fred Hutchinson Cancer Research Center

Glorian Sorensen, Ph.D., M.P.H., Director, Center for Community-Based Research, Dana-Farber Cancer Institute, Boston

Dan Theodorescu, M.D., Ph.D., Director, University of Colorado Cancer Center, Denver

Louis Weiner, M.D., Director, Georgetown Lombardi Comprehensive Cancer Center

**External Advisory Board Chairperson*

Erasing borders, barriers to cancer care

When Masonic Cancer Center member Rahel Ghebre, M.D., M.P.H., considers her life's work, she is perhaps most satisfied with her contributions in educating underserved populations about women's cancers. "While women aren't dying from it like they once were in this country, cervical cancer is the number one or two killer of women from countries like Somalia," she said. Because Minnesota has a significant Somali population, it became a focal point for Dr. Ghebre's work.

"When UMN's Center for Health Disparity Research wanted to put together an NIH grant to address some of the barriers to cancer care in underserved populations in the state, my work fit into that puzzle," she said. "We published preliminary studies showing Somali women in Minnesota have a low rate of cervical cancer screening."

Dr. Ghebre used a community engagement model to help boost screenings, partnering with Somali Health Solutions in Minneapolis and New American Community Services in St. Paul. "It's wonderful," she said. "The community research partners implemented many parts of the project in the Minneapolis-St. Paul Somali community."

It was a win-win situation. "It gave them skills in research and health engagement and they were at the forefront of the information," Dr. Ghebre added. "It's more likely to be sustainable when the community is engaged in the process. We trained practitioners who were already part of the community so there is less of a gap between the findings and the application."

In 2014, Dr. Ghebre expanded her vision, this time focusing on Rwanda. She became part of the Ministry of Health's Human Resources for Health Program (HRHP). This ambitious seven-year initiative, which formally launched in the summer of 2012, is designed to help replenish the country's healthcare workforce and infrastructure.

Sub-Saharan Africa bears 24 percent of the global burden of disease, but only 4 percent of the global health workforce, according to a 2013 article about HRHP in the New England Journal of Medicine (NEJM). "They are in dire need of physicians, nurses, dentists, and pharmacists," said Dr. Ghebre. "They reached out to me to help them build up their curriculum and education around women's oncology."

Dr. Ghebre went to Rwanda during a sabbatical through Yale University, which was funded by the CDC and USAID. While there, she delivered residency-level training on cervical, endometrial and ovarian cancers that she helped develop. "I learned a lot during that process," she said. In many cases, Dr. Ghebre had to brainstorm more than one solution to the healthcare problems she was trying to help her students overcome. "One was impossible, another was dangerous and the third might possibly work," she said, laughing. "There was a lot of adjustment."

That makes sense when you consider the state of the country. With a provider density of .84 physicians, nurses and midwives per 1,000 population, Rwanda fell far below the minimum level of 2.3 providers recommended by the World Health Organization, according to the NEJM article. In addition, the country is trying to rebuild and adequately equip health facilities to ensure proper training environments.

During her time teaching in Rwanda, Dr. Ghebre relied on her colleagues at the Masonic Cancer Center, University of Minnesota. "Breast cancer, which isn't my forte, is treated by gynecologists there, so I would reach out to specialists at the MCC to get answers to many questions," she said. "There were so many people at the cancer center that I could tap into."

Her experience in Rwanda was both humbling and affirming. "It made me love my institution," Dr. Ghebre said. "If I could have, I would have hugged the entire university when I got back. It takes lots of pieces to make medical education work. If we didn't have medical institutions like the University of Minnesota, we wouldn't have the doctors, dentists, nurses, pharmacists, epidemiologist and therapists who are out there all around the state. It's an amazing thing that we do."

The next phase for Dr. Ghebre will be to expand her work on cervical cancer prevention both in Minnesota and Sub-Saharan Africa countries such as Rwanda. "Women do not have to die from cervical cancer in this day and age," she said. "In my daily work as an oncologist, I do see a disproportionate number of women from underserved communities who have cervical cancer in Minnesota." Dr. Ghebre identifies this as a big challenge. "We have to do a better job as researchers to solve the problem," she said.

Her dream, however, is to encourage the Masonic Cancer Center to get more involved with global oncology. "That's the next frontier," said Dr. Ghebre. "I believe in the excellence of our institution and look forward to seeing us expand our impact on cancer care globally." She believes there are many ways to do that. "Partnerships between universities in high-resource and low-resource countries is one model that can help change medical education, clinical practice and research at both institutions," she noted. "It's a long-term project but the rewards are limitless."

Her work in Rwanda and with the Somali community in Minnesota helped Dr. Ghebre look at the healthcare issues she is passionate about from different perspectives. "It can inform your work," she said, adding that it helps to be a natural risk-taker. "You do have to get out of your comfort zone; that, I know."

Using mobile phones to encourage immigrant populations to get cancer screenings

To Hee Yun Lee, Ph.D., member of the Screening, Prevention, Etiology and Cancer Survivorship program, cancer research is deeply personal. As a Korean immigrant, she saw how immigrant populations in this country are not as aware as other healthcare consumers about the importance of getting regular cancer screenings.

"When we moved to Minnesota, we discovered that my husband had late-stage lung cancer," she said. "It was a tragedy…his survival time was very limited." Like many people faced with this kind of diagnosis, Dr. Lee felt isolated and alone. "But when I took my husband to the clinic, I saw many immigrants who were in the same situation."

That's when Dr. Lee, who is a Professor and Director of Research for the School of Social Work, decided to change her research focus from family violence to cancer screening and prevention. "I wanted to use my own experience to help change the patterns I saw in the immigrant population," she said.

Her first project focused on Korean American women. She began with cervical cancer screening because this population has the second highest cervical cancer mortality rate in the country and the lowest cervical cancer screening rate.

She learned through the literature that it doesn't work to invite immigrant populations to churches or schools to learn about cancer. That's when she had an epiphany. "Every immigrant population uses mobile phones and Korean American women are no exception," Dr. Lee said, asking herself, "Why don't we deliver the information through their phones?" She then decided to use the mobile health or mHealth technology such as the mobile phone application. It's a technological tool that delivers health information and care through mobile devices, which is intended to improve preventive care by promoting behavioral change.

Using her background in social work, Dr. Lee reached out to the target population. Her community-based participatory research approach included getting an advisory board together, consisting of community leaders, clinic healthcare professionals and policy makers. "They gave me ideas about what content should be included," Dr. Lee said. "It really made our efforts more effective."

Another aspect of Dr. Lee's research was to identify cultural barriers that affect an immigrant population's willingness to get screenings. In a blog post about her experience, she wrote, "I found a variety of cultural factors that function as barriers to cancer screening adherence, including a belief that screening is unnecessary in the absence of symptoms or pain, a lack of knowledge regarding cancer and appropriate screening guidelines and culture-based modesty and embarrassment — particularly for breast and cervical cancer screening."

To succeed, Dr. Lee would need to reshape those perceptions. She developed a number of web-based tools, including a series of culturally relevant online video clips to explain, for instance, that having no symptoms doesn't necessarily mean you're healthy. She also sent short, tailored texts, as well as multi-media messages that included photos.

"I found a variety of cultural factors that function as barriers to cancer screening adherence."

"It was a huge success," she said, smiling. "They actually went to the clinic to get their screenings done." Based on a study she conducted afterward, she is now thinking about translating the application for other ethnic groups and other types of cancer, such as breast and colorectal.

Numerous organizations have supported Dr. Lee's work, including the National Cancer Institute, U.S. Department of Defense, Minnesota Agricultural Experiment Station and Susan G. Komen for the Cure Foundation.

With ongoing support, Dr. Lee wants to make her mobile applications available to other underserved groups. "My dream is that everyone in the world downloads this app and updates their cancer screenings regularly," she said.

Philanthropy

What's a great idea without the means to test it? In fiscal year 2015, with their eyes toward advancing cancer research and supporting cancer-related programs, donors gave nearly $13.5 million cumulatively to the Masonic Cancer Center, University of Minnesota. Here are just a few examples of recent gifts that are making a difference at the U and far beyond.

For the Zachs and the Karens

Zach Sobiech
(Photo by J. Dunn Photography)

For Masonic Cancer Center scientists Branden Moriarity, Ph.D., and David Largaespada, Ph.D., it's about the Wyckoffs, the Sobiechs, and thousands of other families who are all too familiar with osteosarcoma and its devastating effects.

These families fuel the researchers' passion to cure this often deadly form of bone cancer. And they recently got a little closer to that goal.

A new mouse model developed at the Masonic Cancer Center has revealed the genes and pathways that, when altered, can cause osteosarcoma. The information could be used to improve treatments for future patients.

The research was funded by the Karen Wyckoff Rein in Sarcoma Foundation and the Zach Sobiech Osteosarcoma Fund of Children's Cancer Research Fund, as well as the National Cancer Institute (NCI) and American Cancer Society.

"Philanthropy played a major role in helping us to establish the mouse model we used," says Largaespada. "Moreover, we used philanthropy to study specific osteosarcoma genes further. Without these funds, we could not have gone as fast or as far in this work, perhaps delaying delivery of new cures to patients."

Largaespada is a pro at turning philanthropic support into wider funding success. With data from pilot studies made possible by donors, he and his colleagues have secured more than $15 million in external peer-reviewed grants from the NCI and other agencies.

The Masonic Cancer Center team's progress brings hope to many who have seen this "horrible, ugly disease" firsthand, says Laura Sobiech, whose son Zach died of osteosarcoma in 2013.

"They are the superstars that nobody knows," she says of the researchers. "They are in this for reasons that go so far beyond just recognition. They truly care about these kids. I have hope now, and it's because of that team."

Pete Wyckoff, whose daughter, Karen, died of sarcoma in 2001, agrees that it's easy to support this team of "bright, committed researchers" whose hearts are in the right place.

"We're very proud that we were in on the ground floor to help make this idea happen," he says.

A critical partner: Children's Cancer Research Fund

What started 35 years ago as a small, grassroots, single-event fundraiser is now a national nonprofit that has provided more than $70 million exclusively to the pioneering pediatric hematology/oncology and blood and marrow transplantation research at the University of Minnesota.

Many discoveries funded by Children's Cancer Research Fund, such as the work made possible by the Zach Sobiech Osteosarcoma Fund, have revolutionized the way childhood cancer is treated worldwide. Children's Cancer Research Fund also helps to support quality-of-life programs for pediatric cancer patients and their families.

Children's Cancer Research Fund®

Building support

Following a $25 million gift from Minnesota Masonic Charities and to recognize the Masons' legacy of support, the U in 2014 renamed its children's hospital University of Minnesota Masonic Children's Hospital.

When combined with other gifts the Masonic family has made over the last six decades—including $75 million to support cancer research and care since 2008—it brings the Masons' total support of the University to more than $125 million.

The Masons' latest gift is enhancing the hospital experience for children and families and advancing research in areas such as neurobehavioral development, rare and infectious diseases and stem cell therapies.

Honoring significant contributions

Surgical oncologist and Masonic Cancer Center member Todd Tuttle, M.D., recently was named the inaugural holder of the Regis Chair for Breast Cancer Research, funded by gifts totaling $2 million from the Regis Corporation.

Since 1990, Regis stylists have been donating their time and proceeds from haircuts on a specific day in October—Breast Cancer Awareness Month—to the company's foundation.

Endowed scholar positions are one of the highest forms of recognition for University of Minnesota faculty members. They are a time-honored means of paying tribute to faculty members who have made truly significant contributions to the University and to the larger community.

Tuttle is well known for his research on the rise of double mastectomy rates while evidence has shown little to no survival benefit.

With an additional $400,000 gift last year, Regis is funding four breast cancer research initiatives at the Masonic Cancer Center: I-SPY clinical trials that test new treatments in less time and for a fraction of the cost, the development of new hormonal therapies, the sensitive detection of breast cancer metastasis by MRI and the sensitive detection of bone loss during breast cancer therapy.

Todd Tuttle, M.D.
Professor and Chief of Surgical Oncology
(Photo by Tim Rummelhoff)

Growing ideas

Many families have been affected by cancer in some way. But in the late 1990s, it hit the family of KARE 11 news anchor Randy Shaver especially hard. Within 11 months, Roseann Giovanatto-Shaver, Randy's wife, was diagnosed with melanoma, Roseann's mother was diagnosed with uterine cancer, and Randy was diagnosed with stage IV Hodgkin's lymphoma.

The Shavers had been raising money for cancer research through a golf tournament for years before this. But after their own experiences with the disease, they began to focus their funding efforts locally. Since 2003, 37 forward-thinking Masonic Cancer Center investigators such as Reuben Harris, Ph.D. (see page 7), have received seed grants totaling more than $2 million from the Randy Shaver Cancer Research and Community Fund.

"I wondered: 'When Randy had cancer, what good would come of it?'" Giovanatto-Shaver says. "I think this is a good answer to my question. I get to support these wonderful researchers, and it's a privilege."

Dick Koats and Danna Mezin
(Photo courtesy of Dick Koats)

Randy Shaver and Roseann Giovanatto-Shaver
(Photo courtesy of Roseann Giovanatto-Shaver)

"Every step forward helps somebody"

Even while she was going through Stage IV colon cancer treatment that's exhausting at best and grueling at worst, Danna Mezin was determined to make an impact on the disease that had taken over her life.

"Every step forward helps somebody," Mezin had said. "When you don't have any control over your own destiny, you think, 'What can I be doing instead of just saying there are no options? What can I be doing to make a difference?'"

Sadly, Mezin passed away in March 2015. But the Mezin-Koats Colon Cancer Research Fund, which Mezin started with her husband, Dick Koats, lives on. Since April 2004, they inspired more than 800 gifts totaling about $340,000 and have funded two promising Masonic Cancer Center research efforts. Their goal is to support one innovative project through the Mezin-Koats fund each year.

Three cheers for research

The grassroots, volunteer-led Varsity Team Rally event has a dual mission: to raise money for critically needed "team research" at the Masonic Cancer Center, University of Minnesota, and to raise awareness and camaraderie among Masonic Cancer Center supporters.

Attendees of this casual, inspiring evening are treated as insiders—learning about research that's transforming cancer care, getting to know the researchers behind these transformative discoveries and meeting survivors whose lives have been changed by the Masonic Cancer Center's work. Proceeds are used as seed funding for promising multidisciplinary projects.

In its first four years, the Varsity Team Rally raised more than $400,000 for research at the Masonic Cancer Center and funded two projects called "Genomic Signatures for Colorectal Cancer" and "Altered Estrogen Receptor/Progesterone Receptor/PELP1 Complexes in Breast Cancer."

Masonic Cancer Center in the community

The Masonic Cancer Center is an active partner in the health of Minnesotans by engaging with different communities to listen and to educate on the research and clinical sides of cancer prevention, detection and control. From the valued input from our Community Advisory Board, to our annual Cancer and the Human Body exhibit at the Science Museum of Minnesota, to community meetings on cancer for specific groups of Minnesotans, the Masonic Cancer Center collaborates with Minnesota communities to reduce the burden of cancer.

Highlights of several successful educational and outreach events:

Innovations in Cancer Care & Prevention Day at the Minnesota State Fair

The Masonic Cancer Center, University of Minnesota teamed up with University of Minnesota Cancer Care to bring advances in research and care to a broad cross-section of Minnesotans on Thursday, September 3, 2015.

Thousands of fairgoers learned about cancer research and care from M Cancer Care's Institute for Prostate and Urologic Cancers, Department of Surgery, School of Dentistry, Long Term Care Follow-up Clinic and Cancer Risk Management Program. Masonic Cancer Center researchers talked to fairgoers about e-cigarettes, oral cancer screenings and nutrition and cancer. Pathologists were on hand with samples of tissues from lungs, livers, brains and other organs both with tumors and without. Staff were on hand to answer questions, distribute information on clinical trials and specific cancers and give away MCC-branded prizes to those who took the time to take a cancer quiz.

The Masonic Cancer Center funded two research projects conducted at the fair. The first involved the installation of free sunscreen dispensers at each fair information booth and evaluated the impact of readily-available sunscreen on usage. The second was a study on evaluating different methods of communicating cancer information.

On the stage in front of the UMN building, cancer-related presentations drew crowds during five different demonstrations which emphasized audience participation and Q&A. And down the street, volunteers at UMN's Driven to Discover building helped to recruit fairgoers to participate in clinical research studies using the StudyFinder application on mobile devices.

Pinked Out Party & Scandal Premiere

More than 90 women, ranging in age from 14 to 80, attended the third annual Pinked Out Party at the Robbins Urban Wellness Retreat in North Minneapolis. Hosted by the ANIKA Foundation in partnership with the University of Minnesota's Program in Health Disparities Research (PHDR) and the Masonic Cancer Center, community members gathered for an event prior to a screening of the season premiere of the television program, Scandal. The event's purpose was to educate women on risk factors impacting women of color and provide tips on prevention and lifestyle changes. Masonic Cancer Center faculty presented their research and hosted a panel discussion on breast cancer, along with the African American Breast Cancer Alliance.

Super Bowl & Men's Health

In partnership with the Program in Health Disparities Research at the University of Minnesota and the Robbins Urban Wellness Retreat, our members presented information on health disparities impacting African-American men at the Men's Health Super Bowl Party.

Quality Life Magazine

As a proud sponsor, Masonic Cancer Center researchers and clinicians are featured in this health and wellness magazine available in health clinics, barber shops and beauty salons throughout North Minneapolis. Articles cover topics ranging from heath disparities research to outcomes of our nutrition research with a focus on cancers which disproportionately impact African-Americans.

Left to right: Dr. Susan Everson-Rose, Program Director, Health Disparities Research; Dr. Carol Lange, Cell Signaling Program Leader, Masonic Cancer Center; Anika Robbins, Executive Director of the Anika Foundation; Seanne Facloner, M.B.A., Associate Director for Administration, Masonic Cancer Center

Left to right: Dr. Kola Okuyemi, Director of Program in Health Disparities Research; Chongchith Saengsudham, Health Prevention & Cancer Education Program Manager at the Lao Assistance Center Of Minnesota; Dr. Douglas Yee, Director of the Masonic Cancer Center, University of Minnesota; Denise Blumberg-Tendle, Director of Mission Initiatives with Susan G. Komen Minnesota

Community dialogue with researchers about cancer and equity in the Asian community

In conjunction with the airing of the PBS documentary series "Cancer: The Emperor of All Maladies," a community meeting was held at the Lao Assistance Center of Minnesota in Minneapolis in April 2015. A packed house of community members, leaders and professionals living and working with Southeast Asian communities heard presentations from Douglas Yee, M.D. and Kola Okuyemi, M.D., M.P.H., on cancer and equity. The research presentations segued into a community dialogue and discussion of the disproportionate impact liver cancer has on the Lao community. The event and discussion were videotaped, edited and replayed on the local Lao TV channel for the duration of the month.

PHDR pilot grants

Community organizations and Masonic Cancer Center researchers partner annually to submit proposals for community-based participatory research pilot grant funding. In 2015, the projects selected were:

The Dissemination of Faith – Based Messages to Encourage Somali Women to Participate in Breast and Cervical Cancer Screening. Submitted by the Islamic Civic Society of America (University PI – Dr. Rebekah Pratt, Community PI – Imam Sharif Mohamed)

Quality Life in MN: A Dissemination – Intervention Framework for Reducing Disparities in Cardiovascular Disease and Colorectal Cancer among African Americans. The ANIKA Foundation (University PI – Dr. Charles R. Rogers, Community PI – Anika Robbins)

Grants highlights

Masonic Cancer Center researchers have over $120,000,000 in research funding as of 2015.

Melissa Geller, M.D., Transplant Biology and Therapy program (TBT), **Hee Yun Lee, Ph.D.**, Prevention and Etiology program, and **Kristin Niendorf, M.S., CGC**, were awarded a 2-year Ovarian Cancer Pilot Award of $225,000 from the U.S. Department of Defense Health Program for the Mobile Health Genetic Counseling (mAGIC) study, which aims to develop and assess an intervention using mobile phone technology to promote genetic counseling among women with ovarian cancer and their families.

Kola Okuyemi, M.D., M.P.H., Screening, Prevention, Etiology and Cancer Survivorship (SPECS) program and director of the Program in Health Disparities, received a $3.37 million renewal of his NIH grant (HL081522) for the project "Enhancing smoking cessation in homeless populations."

Anindya Bagchi, Ph.D., Genetic Mechanisms of Cancer program, was named an American Cancer Society Research Scholar, for his project "Functional analysis of low copy number gain of human 8q24 in breast cancer." This four year grant provides $792,000 for this project.

Melissa Geller, M.D., TBT program, was awarded a three-year, $792,000 Research Scholar Award from the American Cancer Society for her project "Natural Killer Cell Immunotherapy for Ovarian Cancer."

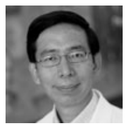
Kaylee Schwertfeger, Ph.D., Tumor Microenvironment program, received a $363,660 NCI grant (CA18454) in response to the NIH/NCI Provocative Questions. The project "Characterization of the immune response during mammary tumor initiation," is a collaboration with Mike Farrar, Ph.D., Immunology program.

The Program in Health Disparities Research, led by **Kola Okuyemi, M.D., M.P.H.**, SPECS program, is sharing a $19.2 million award with the NIH's National Research Mentoring Network (NRMN) to promote professional development of underrepresented minorities in biomedical research.

Brenda Ogle, Ph.D., Tumor Microenvironment program, received a grant from the Department of Defense for her project "A unique opportunity to test whether cell fusion is a mechanism of breast cancer metastasis," with funding of $302,802 per year.

Robert Turesky, Ph.D., Carcinogenesis and Chemoprevention program, received a $663,438 NCI R33 grant (CA186795) for his project "Carcinogen DNA adduct biomarkers in formalin fixed tissues."

Paulo Provenzano, Ph.D., Tumor Microenvironment program, received a $1.55 million NCI grant (CA181385) for his project "Stellate cells and their progenitor precursors in pancreas cancer progression."



Zigang Dong, M.D., Dr.P.H., Carcinogenesis and Chemoprevention program member and Executive Director of The Hormel Institute at the University of Minnesota, will serve as principal investigator of a $1.7 million NCI (CA187027) grant for his study "Chemoprevention of colon cancer by targeting the WNT/Beta catenin pathway."

Scott Dehm, Ph.D., Cell Signaling program co-leader, received a $392,392 DOD Prostate Cancer Research Program grant for his project "Development of a new class of drugs to inhibit all forms of androgen receptor in castration-resistant prostate cancers."

Peter Bitterman, M.D., Genetic Mechanisms of Cancer program co-leader, received a $1.87 million NHLBI grant (1R01HL125236) to study the "Role of fibrotic extracellular matrix in generating the IPF fibroblast."

Carol Lange, Ph.D., Cell Signaling program leader, received a $1,799,000 five-year NCI grant (CA192178) for her project "Inducible PTK6 expression drives oncogenic signaling in breast cancer."

Jeffrey Miller, M.D., Transplant Biology and Therapy program member and MCC Deputy Director, received a $2 million NCI program project grant (CA111412) for his project "NK cells, their receptors, and unrelated donor transplant."

Sergio Gradilone, Ph.D., Cell Signaling program member and leader of the Hormel Institute's Cancer Cell Biology and Translational Research Section, received a five-year, $1.7 million NCI grant to fund his project "The cholanigiocyte primary cilium as a tumor suppressor organelle."

Gregory Metzger, Ph.D., Tumor Microenvironment program, and Joseph Koopmeiners, Ph.D., received a 3-year, $1,935,097 grant from the Department of Defense Prostrate Cancer Research Synergistic Idea Development Program for their project "Development of multiparametric MRI model of clinically significant prostate cancer."

Honors and awards

Carol Lange, Ph.D., Cell Signaling program leader, was elected Endocrine Society Vice President of Basic Science.

Dorothy Hatsukami, Ph.D., Associate Director for Cancer Prevention and Control, was appointed to the World Health Organization Study Group for Tobacco Product Regulation.

Heather Stefanski, M.D., Ph.D., Transplant Biology and Therapy program member, was inducted into the Society for Pediatric Research.

Daniel Weisdorf, M.D., co-leader, Transplant Biology and Therapy program, received the 2015 Lifetime Achievement Award from the American Society for Blood and Marrow Transplantation.

Reuben Harris, Ph.D., Genetic Mechanisms of Cancer program member, was named a Howard Hughes Medical Institute investigator.

Jeffrey Miller, M.D., MCC Deputy Director, was recently awarded a $7 million NCI R35 Outstanding Investigator Award for his study "Viral priming and targeting NK cells against solid tumor malignancies."

Ashok Saluja, Ph.D., MCC Associate Director for Experimental Therapeutics and Cell Signaling program member, was the 2015 recipient of the medal of the Australian Society for Medical Research.

Masato Yamamoto, M.D., Ph.D., Genetic Mechanisms of Cancer program member, was elected to the Board of the Directory of the Japanese Society of Gene and Cell Therapy.

Robert Turesky, Ph.D., Carcinogenesis and Chemoprevention program member, is a member of the World Health Organization's International Agency for Research on Cancer, which recently issued a report of the cancer risk associated with red and processed meat.

Masonic Cancer Center members **Sharon Allen, M.D., Ph.D., Susie Nanney, Ph.D., M.S.** and **Kola Okuyemi, M.D., M.P.H.**, Prevention and Etiology program, were ranked in the top 30 for NIH-funded Family Medicine principal investigators in 2014.

Yusuf Abul-Hajj, Ph.D., was named an American Chemical Society Fellow.

Publications

Masonic Cancer Center researchers have published 952 papers in the past two years. Highlights are included below:

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MAKING *hope* HAPPEN FOR 25 YEARS

January 2016 marks the 25th anniversary of the Masonic Cancer Center at the University of Minnesota. Since its founding, the Masonic Cancer Center has become one of the top centers for cancer care and research in the country. Its several hundred members are some of the world's leaders in research on bone marrow transplantation, childhood cancers, cancers of the breast and bone, cancer genetics, tobacco research, immunology, new treatment development and epidemiology. Our researchers apply that knowledge to improve quality of life for patients and survivors, and share their discoveries with other scientists, students, professionals and the community.

Winter 2016

February 20, 2016: Cancer and the Human Body

12-4 p.m., Science Museum of Minnesota, 120 W. Kellogg Blvd., St. Paul

For 16 years the Masonic Cancer Center has partnered with the Science Museum of Minnesota to highlight the science of cancer research. Researchers from the Masonic Cancer Center develop interactive displays to explain what cancer is and looks like and what they are doing that could lead to better ways to find, treat and beat cancer. This takes place in the Human Body exhibit area and is open to anyone who pays admission to the Science Museum for that afternoon.

Spring 2016

March 7–April 4, 2016: Mini Medical School: Breakthroughs in Cancer Research and Treatment

Malcolm Moos Health Sciences Tower, Room 2-650, 515 Delaware St. S.E., Minneapolis

Join us for the spring 2016 session of Mini Medical School, "Breakthroughs in Cancer Research, Detection and Treatment," to learn from world-renowned experts in the Academic Health Center and the Masonic Cancer Center. Speakers from across our health sciences schools will discuss discoveries in cancer treatment and care. Visit http://bit.ly/1SmB956 or contact 612-624-5100, minimed@umn.edu with questions.

Summer 2016

June 30, 2016: John H. Kersey Lecture

Alan Ashworth, Ph.D., FRS, E. Dixon Heise Distinguished Professor in Oncology, University of California San Francisco; President, UCSF Helen Diller Family Comprehensive Cancer Center; Senior Vice President for Cancer Services, UCSF Health; Professor of Medicine, Division of Hematology/Oncology, Department of Medicine

Fall 2016

September 14, 2016: 6th Annual Varsity Team Rally

The VTR guests are highly committed supporters of the research conducted at the Masonic Cancer Center. They come together annually to celebrate and support the research of the Masonic Cancer Center, having raised more than $400,000 in five years to advance high-impact cancer research.

November 2-3, 2016: 7th Annual Masonic Cancer Center Research Symposium

TCF Bank Stadium

November 2: A day dedicated to Lee Wattenberg, M.D., and his legacy of carcinogenesis and chemoprevention research. Presentations by Douglas Yee, M.D., Director and Keynote Speaker, Thomas Kensler, Ph.D., John Hopkins University, the 2016 B.J. Kennedy Lecturer in Medical Oncology, followed by two engaging talks by former Masonic Cancer Center trainees, a reception and dinner to honor Wattenberg.

November 3: A celebration of the 25 years of research of the Masonic Cancer Center. Talks by former trainees, poster sessions and presentations from abstract winners, and a reception.

Visit http://www.cancer.umn.edu/about/25th-anniversary/index.htm for updates.

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M Health Clinics and Surgery Center Opens February 22, 2016

With a wide range of specialists located in one, easy to access location, the space is designed for collaboration and will allow our care teams to work together in new ways to meet each patient's unique needs.

The entire second floor is dedicated to cancer screening, treatment and prevention. Clinics opening on February 22 include:

- Breast Center
- Masonic Cancer Clinic, including Blood and Marrow Transplant, Gynecologic Oncology, Medical Oncology and Surgical Oncology, Palliative Care
- Advanced Treatment Center, including Oncology Infusion, BMT Infusion, Apheresis and Specialty Infusion

Visit http://mhealth.org/clinics-and-surgery-center for more information.

Masonic Cancer Center
University of Minnesota

Comprehensive Cancer Center designated by the National Cancer Institute

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