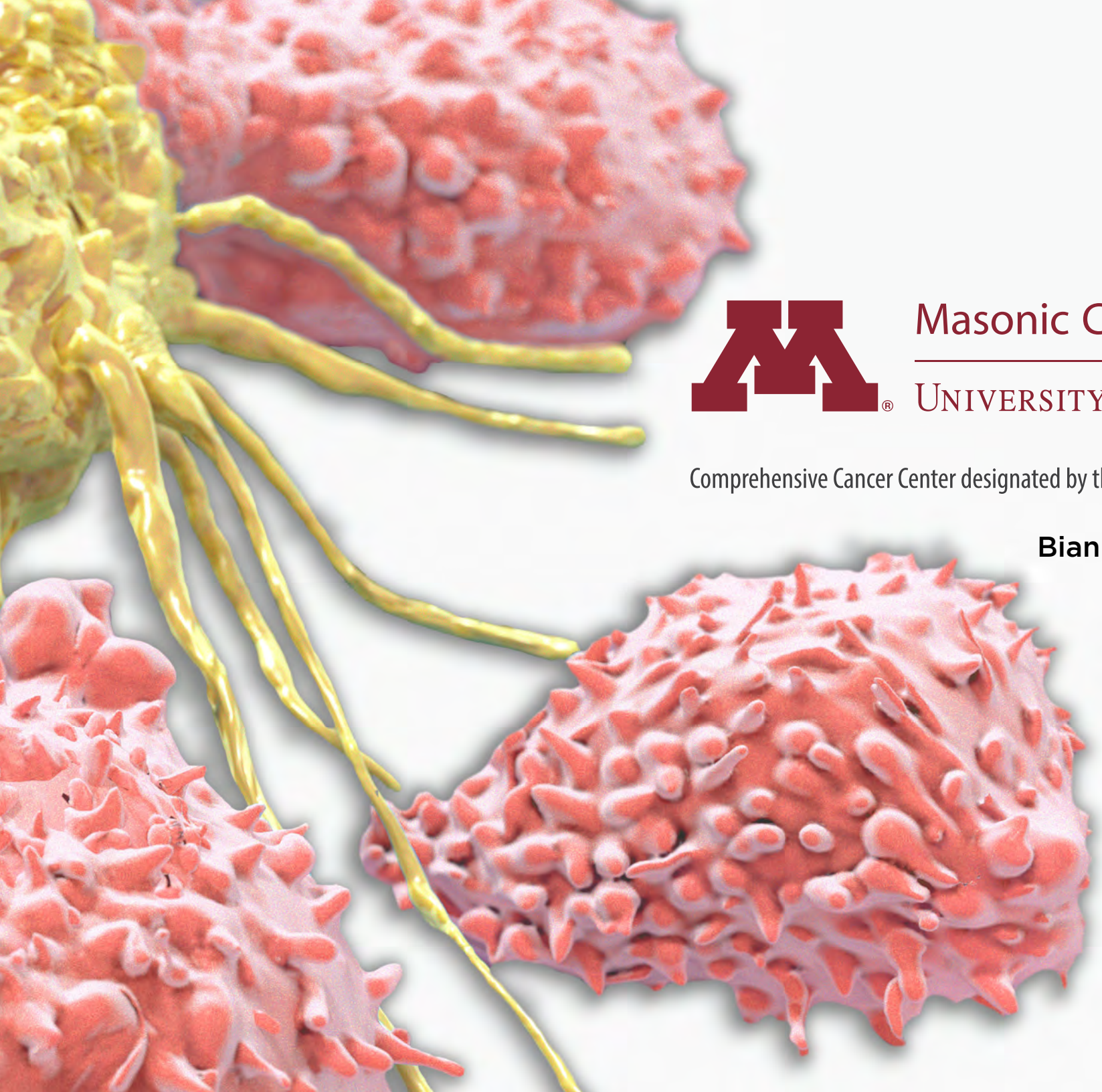

Masonic Cancer Center

University of Minnesota

Comprehensive Cancer Center designated by the National Cancer Institute

Biannual Report 2018

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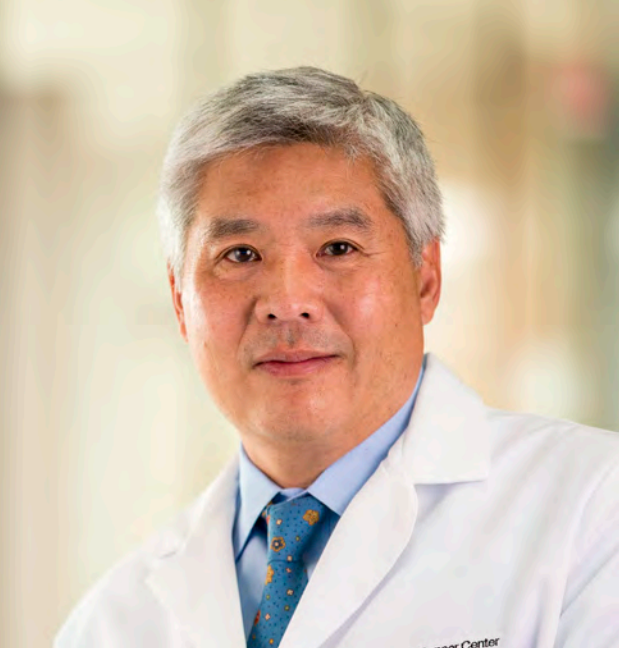
On the cover: Lymphocytes attacking cancer cell



Message from the Director

Dear Friends,

2018 is a noteworthy year for the Masonic Cancer Center as it marks the 20th anniversary of our designation as a Comprehensive Cancer Center by the National Cancer Institute. It has also been 50 years since the first bone marrow transplant at the University of Minnesota and 2018 is the 130th anniversary of the founding of University of Minnesota Medical School. These important anniversaries are linked; our state has a long history of exceptional medical care and research. In particular, the Masonic Cancer Center serves to focus the University of Minnesota's expertise on solving the problem of cancer.

Our national reputation and success in changing cancer outcomes have not gone unrecognized. Last year, the Minnesota State Legislature provided funding to create the Minnesota Cancer Clinical Trials Network. This network represents a new partnership, led by the Masonic Cancer Center, with other cancer research and care providers in the state. The goal of this network is to provide enhanced patient opportunities to participate in cancer clinical trials throughout greater Minnesota. The confidence our elected officials have placed in us is directly related to the research progress we've made improving cancer outcomes through clinical trials.

Moreover, our long-time supporters, the Minnesota Masonic Charities, stepped up with a $25 million acceleration of their original 2008 commitment. Our history has demonstrated the progress we've made in improving cancer outcomes; they wanted to do more. Their accelerated gift will be used to "turbocharge" our ability to enhance precision cancer prevention and care strategies through research. Each person is different and a solution to cancer prevention and treatment depends on understanding the key genetic and environmental differences between people. This investment will allow us to recruit new faculty, acquire the latest cancer research instruments, and provide support for new and ongoing projects.

It is critical we address the entire spectrum of cancer: from prevention to treatment and, happily, now to survivorship. Cancer is not a single disease; cancer solutions must take many different paths. In this report, you'll read about the progress we've made in cancer prevention, screening, therapy, and survivorship. I hope you will appreciate that Masonic Cancer Center members are driven to find answers to the problem of cancers impacting all Minnesotans and beyond. To fully cover the spectrum of cancer, Masonic Cancer Center's members come from the broadest range of disciplines, from nearly every school and college, within the University of Minnesota, yet all have a focus on cancer. At the Masonic Cancer Center, we can take a truly comprehensive approach, driven by the uniquely diverse research perspectives of our members.

I know many of you reading this report are long-time friends and supporters of the Masonic Cancer Center. All of our members appreciate your help; we cannot solve the problem of cancer alone and we would not exist without your support and advocacy. For those readers new to the Masonic Cancer Center, I hope this report sparks your interest in our work. More information can be found at cancer.umn.edu. I also welcome your comments or questions by email at ccinfo@umn.edu.

Sincerely,

Douglas Yee, MD
Director, Masonic Cancer Center

BMT: 50 Years of Research and Care Innovation

2018 marks the 50th anniversary of the world's first successful HLA matched bone marrow transplant, which was performed in 1968 at University of Minnesota Medical Center by Robert Good, MD. Since then, the University of Minnesota has been a leader in the blood and marrow transplant (BMT) arena and has seen amazing strides in both transplant biology research and the care for patients that receive them.

"Back in the 1960s, leukemia was a death sentence. Chemotherapy agents were limited and how best to combine them was just being explored," noted John Wagner, MD, director of the BMT Program at the University of Minnesota Masonic Children's Hospital. "In the context of bone marrow transplant, the first patients received increasing doses of chemotherapy and radiation to eradicate the leukemia, risking death from the treatment itself."

With this medical breakthrough by Dr. Good and the team at the University of Minnesota, already world renowned in human immunology, a new course was set for the use of bone marrow transplantation.

Other BMT firsts at the University of Minnesota include the first transplant to treat lymphoma (1975), the first transplant to treat an inherited metabolic disease (1982), first use of umbilical cord blood as a source of blood-forming stem cells using pre-implantation genetic testing to ensure a perfect HLA match (2000), and first transplant for epidermolysis bullosa, a life-threatening skin disease. The University's clinical program is one of the largest transplant programs in the country, and the largest unrelated umbilical cord blood transplant center in the world.

More diseases are treated with BMT in large measure due to work at the University of Minnesota. These include leukemias, lymphoma and myeloma, solid tumors, Fanconi anemia, adrenoleukodystrophy, Hurler syndrome and even HIV/AIDS.

While there have been a number of strides forward in the care of patients with the use of BMT, there are still hazards.

"With BMT there is no free lunch, you increase interventions to control one thing, you might compromise something else," noted Claudio Brunstein, MD, director of the University's Adult BMT program. "With partially matched (haploidentical) family donors, it seems like you can reduce graft versus host disease (GVHD) but when you reduce GVHD these patients may be at a higher risk of relapse and infections because the immune system has been suppressed too much. We are working to find ways to help the immune system of the donor react more against the cancer, leaving the normal tissues alone and to reduce the risk of GVHD leaving the effect effect against the cancer intact, making progress towards getting a 'free lunch'."

Many older adults were previously denied BMT as there were concerns about their ability to heal and to tolerate high doses of chemotherapy and radiation. But, thanks to a landmark study, led by Daniel Weisdorf, MD, director of the University's Hematology, Oncology and Transplant Division, they were able to determine that patients older than 65 did as well after BMT therapies as patients who were in their 40s or 50s who had similar health status.

"Many things have improved since our first BMT in the late '60s," Weisdorf said. "We have created better donor-recipient matching techniques, better conditioning processes, better transfusion practices, even better antibiotics

l to r: Claudio Brunstein, MD; John Wagner, MD; Daniel Weisdorf, MD

and antivirals, along with drugs to support immune recovery. We know way more now than we did even ten years ago, and that is enormously exciting, but we wouldn't be where we are today without those strikingly courageous doctors in the '60s who were tackling big problems with unknown expectations."

More patients are surviving today from diseases that were once viewed as death sentences. Those early patients, the ones who were told that their chance of survival was close to zero, helped pave the way for today's markedly increased survival rates.

"Those patients, who were told there was nothing that could be done for them, did the altruistic thing of saying, 'you might not cure me but you can learn something from it and help others,'" said Wagner. "That's been our philosophy all along, to continually make breakthroughs and make progress, and we're getting closer and closer to more cures for patients, but it's because we learn all we can from the patients that came before."

And in honor of this momentous anniversary, Governor Mark Dayton has declared August 24, 2018, to be 'University of Minnesota Blood and Marrow Transplant Day' in the state of Minnesota.

Putting Out Cigarettes

In the mid-1990s, University of Minnesota graduate Jack Henningfield ('74 BA, '77 PhD) and a colleague published an article in the *New England Journal of Medicine* theorizing that if nicotine levels in cigarettes were reduced below a certain threshold, they would no longer be addicting. It was an intriguing premise—but largely unproven and unlikely to be tested by the companies that made cigarettes.

In 2009, however, Congress passed the Tobacco Control Act, giving the U.S. Food and Drug Administration (FDA) the authority to regulate tobacco products, including the amount of nicotine in cigarettes.

Around the same time, Masonic Cancer Center member and tobacco researcher Dorothy Hatsukami, PhD, a UMN professor of psychiatry, convened a meeting of tobacco control researchers, policymakers, and government agencies to assess the feasibility of reducing nicotine in cigarettes as a national policy measure.

While the science supported such an approach based on results from prior studies conducted by Hatsukami and others, more research was needed. Would lowering the amount of nicotine reduce addiction? And

what reduction was required to do so?

In 2013, Hatsukami co-led a year-long study of 840 smokers at 10 sites across the United States. Researchers provided participants with cigarettes that either matched the nicotine levels of their preferred brand, or switched them with one of five investigational cigarettes with lower nicotine levels—a reduction that ranged from 66 percent less to 98 percent less. Participants in the double-blind study were asked to track the number of cigarettes they smoked each day for six weeks.

Dorothy Hatsukami, PhD

On average, the study showed, participants given lower-nicotine cigarettes smoked less per day at the end of the six weeks. "Cigarettes with lower nicotine content, as compared with control cigarettes, reduced exposure to and dependence on nicotine, as well as craving during abstinence from smoking," the study's authors wrote. This study was published in the *New England Journal of Medicine* last fall.

Quit attempts were most likely to occur when the nicotine content dropped to 0.4 mg per gram of tobacco, Hatsukami says. That level (roughly 2 percent of the nicotine dose found in a regular cigarette) no longer delivered enough nicotine to the brain to make smokers want to smoke more cigarettes.

"If you reduce dependence on cigarettes, then you are likely to reduce the number of people who smoke," Hatsukami says.

Hatsukami's research group is now looking at whether it would be best to reduce nicotine content in cigarettes to minimally addictive levels immediately or more gradually. Then, she adds, with the mounting research data, it will be up to the FDA to decide if, when, and how to enact standards for lower nicotine levels in cigarettes.

"Randomized Trial of Reduced-Nicotine Standards for Cigarettes" *N Engl J Med* 373,1340-1349 (1 October 2015)

Help From The Pet Store

David Masopust, PhD

Researchers have long noted disparities between the functioning of the human immune system and that of laboratory mice. Could it be because, unlike us, the mice live in antiseptic cages, shielded from exposure to infectious organisms?

A landmark University of Minnesota–led study lends credence to that idea. In a study published in the journal *Nature*, the immune cells of lab mice were found to bear relatively little resemblance to those of adult humans. Instead, the lab mice immune cells resemble the immature immune cells of newborn babies who also have been sheltered from the unhygienic real world.

The researchers reasoned that intimacy with "dirty" pet store–raised cage companions could transfer microbes to the sheltered lab mice and give their immune systems the challenge they needed to develop to maturity. Sure enough, after 52 days of cohousing, the lab mice's immune systems matured to a state much more like that of adult humans, says Masonic Cancer Center member and study coauthor David Masopust, PhD.

While not discounting any previous investigations using lab mice, Masopust and his colleagues make the case that studying cohoused mice "could provide a relevant tool for modeling immunological events in free-living organisms, including humans."

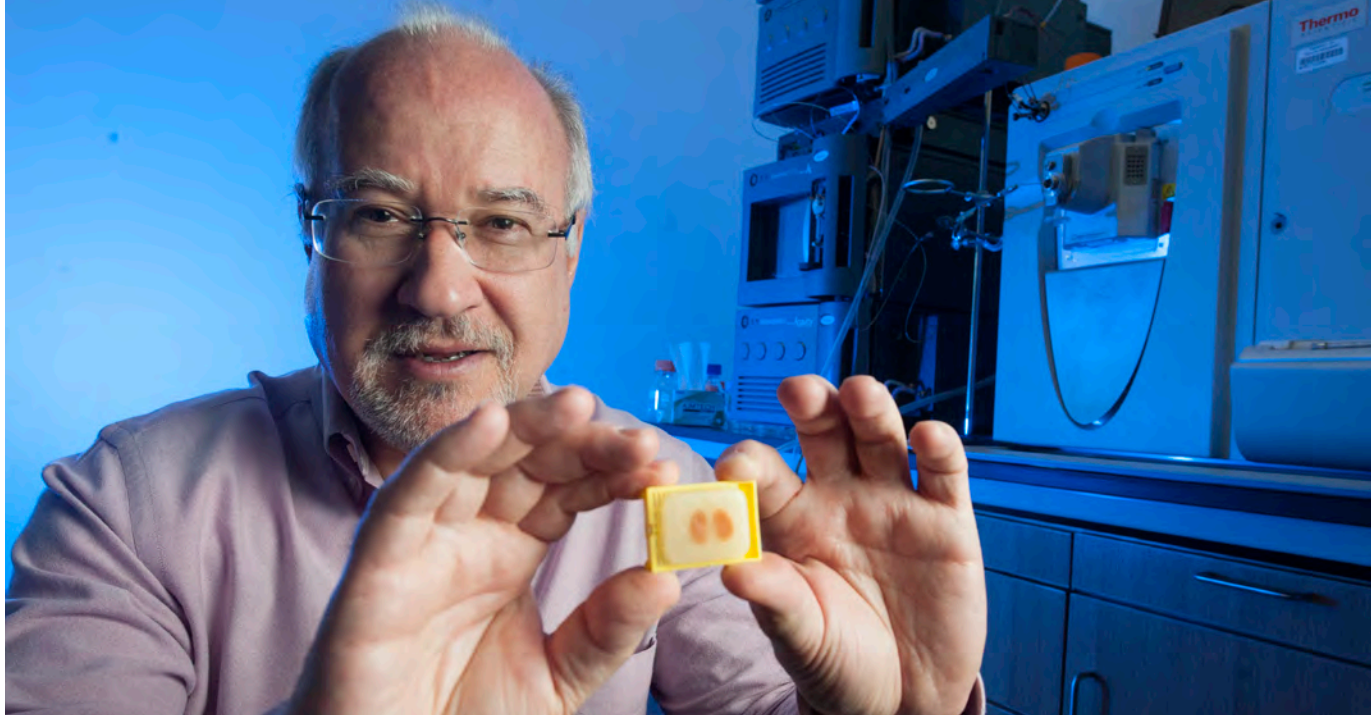
This type of innovative thinking has earned Masopust a place in the inaugural class of Howard Hughes Medical Institute (HHMI) Faculty Scholars. The Faculty Scholars program—led by the HHMI, Simons Foundation, and Bill and Melinda Gates Foundation—targets early career researchers and provides flexible funding resources to allow them to take chances and follow interesting and creative research leads. Eighty-four scholars were selected for the honor out of more than 1,400 applicants.

"This recognition of Dave's work puts him in a class with some of the most elite investigators in the nation," says Tucker LeBien, PhD, associate vice president for research in the U's Academic Health Center. "His fundamental research on immune cell function has changed the field in incredible ways, and this program will only provide more opportunity for discovery."

This new knowledge about "dirty" mice doesn't necessarily mean that research done with lab mice should be thrown out, Masopust cautions. "Clean mouse research is good, but dirty mouse research adds something," says Masopust, who is also an associate professor in the Medical School's Department of Microbiology and Immunology, "and we hypothesize that there are many cases where dirty mice will be more predictive [of human responses]."

"Normalizing the environment recapitulates adult human immune traits in laboratory mice" *Nature* 532, 294–295 (21 April 2016).

Healthier Grilled Meat



Robert Turesky, BSc, PhD

Could barbecuing, one of Minnesota's favorite summer pastimes, increase the odds of developing cancer?

According to Robert Turesky, BSc, PhD, a professor in the College of Pharmacy, the answer is: Perhaps.

While epidemiologists have definitively linked red meat consumption to the development of certain cancers, not much is known about the biological mechanisms of this relationship – until now.

Turesky, an analytical biochemist who was part of the World Health Organization's International Agency for Research on Cancer's report on the link between red meat consumption and cancer, found that after people eat charred, barbequed red meats containing small amounts of heterocyclic aromatic amines (HAA) and polycyclic aromatic hydrocarbons (PAH) – chemicals that are associated with tobacco smoke and cooked meats – are absorbed, undergo biochemical reactions in the body, and become DNA damaging compounds. In general, Turesky says, higher temperatures and longer cooking times lead to higher levels of HAAs and PAHs.

In collaboration with fellow Masonic Cancer Center members Christopher Weight, MD, a uro-oncologist in the Department of Urology, and Paari Murugan, MD, a uro-pathologist in the Department of Laboratory Medicine and Pathology, Turesky published a 2016 study in the journal *Analytical Chemistry* showing one of these chemicals from cooked meats was present in DNA of prostate cancer patients.

This is the first unequivocal proof that, once a person eats cooked meats, some of the cooked meat mutagens find their way to the prostate and damage it, Turesky said in a June 2017 interview with the Washington Post. "It could just be an association. Now we have to show that the mutations are attributed to the chemicals in cooked meat."

Strengthening this cause-and-effect hypothesis, Turesky and Weight have more recently found that some of the same mutagens in cooked meat are present in hair samples of prostate cancer patients. They are now studying if patients with more aggressive prostate cancer diagnoses have higher levels of HAA in their hair.

Turesky and his team have received a $2 million grant from the National Institutes of Health to continue exploring how these chemicals can damage the prostate genome and whether they cause prostate cancers. With more research, though, he hopes to determine who is most at risk for developing these cancers. In doing so, Turesky hopes his research will lead to precision prevention and ultimately reduce the prevalence of cancer.

"People aren't going to stop grilling meat, but if we can learn more and teach people how to prepare their food in a more healthy way, we can mitigate exposures to these chemicals and decrease cancer risk and improve quality of life," he said. "That's what all of our research boils down to, improving people's lives."

Computer Models Inform Colorectal Cancer Screening

Karen Kuntz, ScD, co-leader of the Screening, Prevention, Etiology, and Cancer Survivorship Program (SPECS) along with colleagues from the Cancer Intervention and Surveillance Modeling Network (CISNET), a consortium of NCI-funded investigators, are using computer modeling to inform colorectal cancer screening guidelines.

Kuntz, a Professor in the Division of Health Policy and Management, received a CISNET grant to evaluate models which can be used to project future trends and aid in the development of optimal cancer control strategies.

In 2015, the CISNET colorectal cancer models were used to inform the US Preventive Services Task Force's update of the national colorectal cancer screening recommendations. The CISNET models incorporated data on the history of colorectal adenomas, development of colorectal cancer and the characteristics of different screening tests to evaluate the benefits, burden, and harms of various colorectal cancer screening strategies under consideration by the Task Force. Colorectal cancer is the second most common cause of cancer death in the United States, despite the availability of a range of interventions to reduce its burdens, and identifying and implementing the most effective interventions for different populations will reduce this burden.

The CISNET guidelines informed the May 30, 2018, announcement by the American Cancer Society that colorectal screening should begin at age 45 instead of the previous guideline of first screening beginning at age 50.

"With our colorectal cancer models, we are able to simulate the benefits and the burdens of CRC screening strategies for a particular age to start screening, age to end screening, screening interval and screening modality." said Kuntz.

Karen Kuntz, ScD

Cancer-Preventing Vegetables

Brussels sprouts and watercress may contain compounds that can prevent tobacco-related lung cancer, according to a University of Minnesota study.

The research team includes renowned tobacco researchers professors Dorothy Hatsukami, PhD and Stephen Hecht, PhD, along with Vince Fritz, PhD, a professor of Horticultural Science who conducts research on plant production systems that enhance the concentration of chemopreventive compounds, and assistant professor Naomi Fujioka, MD, a medical oncologist, whose clinical practice centers on lung cancer and head and neck cancers - both tobacco-related cancers.

Their work includes a clinical trial, where biomarkers from current and former smokers' urine are evaluated to determine whether glucobrassicin-rich Brussels sprouts can favorably modify the metabolism of the participants' polycyclic aromatic hydrocarbon phenanthrene. This might be important because prior research suggests that the way individuals metabolize carcinogens in tobacco smoke might be related to their risk of developing tobacco-related lung cancer.

"My main interest is whether we can manipulate these plants [Brussels sprouts] to cause them to respond in a way that increases the concentration of glucobrassicin," noted Fritz. "We also have been studying the effects of proper storage and cooking. We have found that eating them fresh or raw is preferred, as the chemopreventive potential is lost during the cooking process."

Along with the main study on Brussels sprouts, the team has branched out into other cruciferous vegetables, including watercress, which is a dark, leafy green grown in natural spring water. Other vegetables from this family include arugula, kale, and broccoli.

"We have also pursued our studies of watercress, which is a great source of the chemopreventive agent Phenethyl isothiocyanate (PEITC)," said Hecht. "We have data showing that PEITC can protect against environmental stressors (such as pollutants released in fires) and are planning to work with the local fire chiefs on this project to test the effects of watercress consumption on PEITC."

"With these studies, our group hopes to eventually demonstrate a food-based strategy of preventing tobacco-related lung cancer," said Fujioka. "Whereby we can actually recommend how much and which foods to eat to minimize risk."

Predicting Cancer's Next Move

Cell movement is of paramount interest, particularly in cancers where cell migration—metastasis—is a major concern, such as brain and pancreatic cancers.

At the Masonic Cancer Center, researchers are looking at how cancer spreads in an unusual way: through the lens of physics. "There's been a real lack of application of the physical sciences to oncology research in the past, such as trying to understand how cells work by using engineering concepts like math modeling and instrumentation," says David Odde, PhD, a professor in the U's Department of Biomedical Engineering. "But now that's changing."

The National Cancer Institute (NCI) awarded an $8.2 million Physical Sciences Oncology Center grant to the University to develop a cell migration simulator. The grant welcomes the University of Minnesota into an elite network of 10 institutions around the country that are working on this physics-based approach to cancer research.

Odde and Pediatrics Professor David Largaespada, PhD, Associate Director for Basic Sciences at the Masonic Cancer Center and holder of the Hedberg Family/Children's Cancer Research Fund Chair in Brain Tumor Research, are co-leading the U's efforts, in partnership with Paolo Provenzano, PhD, an assistant professor in the Department of Biomedical Engineering.

Whereas Odde is looking at cancer cells from the inside out, Provenzano is looking at them from the outside in. "Paolo's studying the environment the cancer cells live within," Odde says, "while I'm focused on the guts of the cell."

Looking at cancer cells as tiny machines, Odde built a simulator (a computer model) to predict how they will move. "It's like a flight simulator," he says of the innovation. "One day you want to fly a Cessna, the next day you want to fly a fighter jet. It's the same simulator, but the details are different. Our 1.0 version of the simulator made powerful predictions that we tested and found to be true," he says. "Next, we want to take patient-derived cells and see if we can predict, using our simulator, how they'll progress."

The team has already published an article that has quickly become the second-most read article in the journal *Convergent Sciences Physical Oncology* a mere eight weeks after publication. The article, "A Brownian dynamics tumor progression simulator with application to glioblastoma," discusses the impact of accounting for the volume cells occupy when simulating Glio-

l to r: Paolo Provenzano, PhD; David Odde, PhD; David Largaespada, PhD

blastoma progression.

Odde ultimately hopes that by understanding cell migration dynamics, he and his colleagues can unlock the secret to suppressing tumor cell movement, stopping cancer from progressing to more deadly stages and turning it into a low-grade, localized disease that can be managed.

Odde is currently pilot testing the integration of his Cell Migration Simulator (CMS) into early stage clinical trial design. He hopes the CMS will help new brain cancer clinical trials succeed. Odde, Largaespada, and Provenzano hope to integrate their research findings into clinical practice within the next five years.

"There are some big ideas here," Odde says. "We don't have new treatments yet, but maybe we hit a home run. I'm pretty optimistic that this kind of modeling will have a big impact, and from that, we'll keep building."

Measuring Environmental Influences on Childhood Health

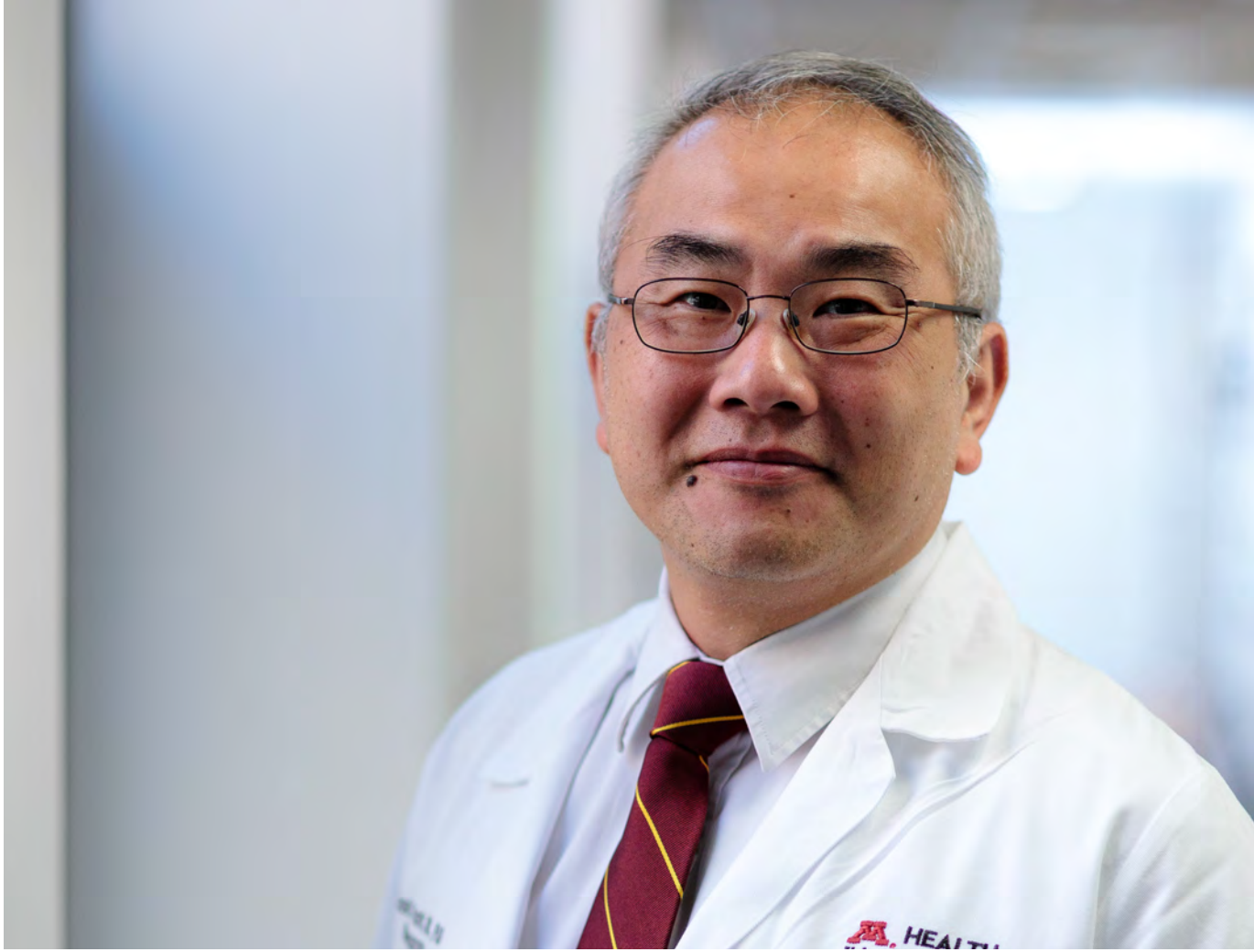
Lisa Peterson, PhD, and her team were awarded an NIH-grant to establish the Children's Health Exposure Analysis Resource Assessment Hub, or CHEAR, followed by an additional supplement fund the Environmental Influences on Child Health Outcomes (ECHO) award. The researchers used these funds to create a national Exposure Assessment Laboratory Network that provides targeted and untargeted analyses of environmental exposures as well as biological response indicators in human samples (child and/or their parents) and will investigate how exposure to a range of environmental factors in early development–from conception through early childhood–influences the health of children and adolescents.

The Masonic Cancer Center, in partnership with the Minnesota Department of Health, is one of only six centers in the United States selected to participate in this program, adding to the prestige of the Masonic Cancer Center and complementing its expertise in analytical biochemistry and mass spectrometry.

A robust team of Masonic Cancer Center researchers will focus on factors that may influence health outcomes around the time of birth as well as into later childhood and adolescence, including upper and lower airway health and development, obesity, and brain and nervous system development.

"The Masonic Cancer Center researchers are world-renowned experts in the characterization of humans' exposures to the harmful effects of tobacco, dietary and lifestyle choices, and the associated risks to health," said Peterson, co-leader of the Carcinogenesis & Chemoprevention Research Program at the Masonic Cancer Center and professor at the Division of Environmental Health Sciences at the UMN School of Public Health. "This opportunity expands the impact of our research program."

Renowned Neurosurgeon Chen Joins UMN



Clark C. Chen, MD, PhD

In the quest to cure the incurable—brain cancer, Parkinson's disease, Alzheimer's disease, and other devastating neurologic diseases—Clark C. Chen, MD, PhD, believes that the key to success lies in the synergy that results from multidisciplinary collaborations. Recruited from University of California, San Diego (UCSD), Chen took the helm of the University of Minnesota Medical School Neurosurgery Department, attracted by its legacy and the faculty's passion for discovery through team-based science.

"For ideas to thrive and blossom, they need to be shared, scrutinized, and fostered among thinkers who approach these ideas from different perspectives and utilizing distinct frameworks," says Chen, who holds the Lyle French Chair in Neurosurgery. "The University of Minnesota has a group of like-minded people who are genuinely interconnected in mission and in intellect, who are committed to translating ideas into measurable human benefits."

Chen investigates glioblastomas and how they become resistant to radiation and chemotherapy. He was the principal investigator on multiple clinical studies developing and applying novel surgical tools such as high thermal energy lasers and focused ultrasound, as well as oncolytic viruses, to destroy brain cancer cells. Prior to his role at UCSD, he led the brain tumor programs at Beth Israel Deaconess Medical Center at Harvard Medical School and the Dana-Farber Cancer Institute.

"With malignant brain cancer, the treatment paradigm has been cure rarely and comfort always. Frankly, the effect of these treatments is modest at best," Chen says. "The cure that we seek requires innovation beyond the currently available treatment options. To genuinely make a difference in the trajectory of our brain tumor patients, we will need to throw away the preconception of yesteryear and reframe the problem in ways that we had not previously conceptualized."

Goldy vs. Cancer: The Masonic Cancer Center at the Minnesota State Fair

For the first time ever, the Masonic Cancer took over the entire University of Minnesota Building at the Minnesota State Fair to bring cancer research, from across the U, to the Great Minnesota Get Together.

"We were very excited to bring our researchers, who are found all across campus in most every school and college, together with the people of Minnesota," said Kiara Ellis, MSW, Manager of the Community Engagement and Education Office of the Masonic Cancer Center and the event director. "The cancer research that we do is amazing and we wanted to be able to share that information with as many people as possible."

Volunteer faculty and staff members from 11 UMN Schools as well as volunteers from clinical partner, University of Minnesota Health - Cancer Care, displayed 120 exhibits ranging from genetic risks to e-cigarettes to the role of zebrafish in blood and marrow transplant research. Fairgoers who participated in quizzes and activities at the exhibits took home sun-blocking visors and tote bags. On the building's main stage, 15 presenters connected their research to the crowds who stopped by to hear talks on everything from sunscreen to survivorship, and many took the opportunity to ask questions in the "Ask the Experts" forums.

UMN School of Dentistry students offered on-site oral cancer screenings as well as information about signs and symptoms of oral cancer. "This was a great opportunity, not only to educate fair attendees about oral cancer, prevention, and screenings, but to also give some our dental students a first hand experience in performing oral cancer screenings," noted Nelson Rhodus, DMD, MPH, School of Dentistry Professor who was overseeing the screenings. "It was wonderful to see a number of my cancer research colleagues also sharing their research with attendees and to know that people could take away a great deal of cancer fighting information."

In additional to dental screenings, the Department of Dermatology, in collaboration with clinical staff from University of Minnesota Health, offered skin cancer checks to almost 200 people, as well as handed out information about sun exposure and UV-monitoring beaded bracelets. They also encouraged Fair-goers to frequently reapply the SPF 30 sunscreen provided by the Masonic Cancer Center and partner Vanicream, available at every Info kiosk throughout the fairgrounds.

In addition to disseminating research findings, the Masonic Cancer Center was also recruiting volunteers to join clinical research studies. Both in the main University of Minnesota Building and in the brand new Driven to Discover research facility, researchers Logan Spector, PhD, DeAnn Lazovich, PhD, and Heather Nelson, PhD, were signing up generations of Minnesotans interested in joining the 10,000 Families Cohort Study which will assess both genetic and environmental exposure impact on Minnesotans over a period of years.

Located down the street from the main UMN building, the Driven to Discover Building, also known as D2D by investigators, grew out of a successful 2014 pilot project, in which Dr. Spector, director of the Division of Epidemiology and Clinical Research in the University

of Minnesota Department of Pediatrics, partnered with Ellen Demerath, PhD, a professor in the division of Epidemiology and Community Health in the University of Minnesota's School of Public Health, to create a research environment at the State Fair to tap into this amazing annual pilgrimage for many Minnesotans. The newly built D2D building offered not only cancer-related clinical studies, but also psychology, child-development, physical therapy, and even marketing. Said Demerath, "The University of Minnesota prides itself on research and finding innovative ways to solve problems and address the needs of our state and world at large."

Nelson Rhodus, DMD, MPH

The New Medical School Dean Leads via Research and Care

In October 2017, University of Minnesota President Eric Kaler, PhD, announced Jakub Tolar, MD, PhD, Masonic Cancer Center member, as dean of the University of Minnesota Medical School.

Dr. Tolar is a laboratory-based physician scientist with a career in cancer research. He came to to Minnesota 25 years ago because of the University's reputation in cancer research and Blood and Marrow Transplant. As a researcher in the Masonic Cancer Center's Transplant Biology and Therapy Program, Dr. Tolar's research focuses on finding new ways of treating children with lethal diseases—cancer, inborn errors of metabolism, and devastating genetic disorders—using stem cell transplantation. He is also looking for safer, more effective methods of repairing and using a patient's own cells in diseases such as Fanconi anemia and epidermolysis bullosa.

Jakub Tolar, MD, PhD

"To give patients the best care, to find solutions when there are no therapies, and to provide hope for the future, we have to have active and rigorous research," said Dr. Tolar. "We need the physician-scientist at the bedside, we need the interdisciplinary teams, we need fluency in basic and clinical science, we need to train and encourage the next generation of researchers. It is not enough to give patients the best-known therapies, we need to create better ones."

In addition to his role as dean, President Kaler appointed Dr. Tolar as vice president for the Health Sciences.

"I am confident that Jakub will continue our positive momentum through his energetic commitment to advancing discovery, educating the next generation of healthcare leaders, and leading in high-quality clinical care," said Kaler. Tolar succeeded Dean/VP Brooks Jackson who accepted a position as Vice President for Medical Affairs and Dean of Medicine at the University of Iowa.

Wall of Scholarship Honors Hecht and Hatsukami

In October 2017, noted Masonic Cancer Center tobacco researchers Dorothy Hatsukami, PhD, and Stephen Hecht, PhD, were added to the Wall of Scholarship, an honor reserved for UMN health sciences faculty who have first or last author credits on publications that have been cited at least 1,000 times.

"I am honored and humbled to receive this prestigious award, and delighted that my colleague Professor Hatsukami was also chosen," said Dr. Hecht. "Our collaborative studies provide a beautiful example of the unique strengths of the Masonic Cancer Center and University of Minnesota Medical School."

The two long-time members of Masonic Cancer Center, University of Minnesota are internationally recognized for their research in the field of nicotine addiction and cancer caused by tobacco use.

"There's an element of courage in what they've done because you don't wade into the arena of tobacco products without having some very powerful individuals on the other side in the tobacco industry who will view this research with great skepticism," said Tucker LeBien, PhD, vice dean for research in the University of Minnesota Medical School. "I give them extraordinarily high scores for their courage and convictions and exceptional quality of their science."

l to r: Dorothy Hatsukami, PhD; Jakub Tolar, MD, PhD; Stephen Hecht, PhD

There are just 48 publications on the Wall of Scholarship, 13 of which are authored by members of Masonic Cancer Center.

Commercializing Discoveries

It's not hard to see why some of the best researchers in the world call the Masonic Cancer Center home, with state-of-the-art equipment, well-appointed and abundant laboratory space, translational support, collaboration opportunities, and a legacy of innovation. Thanks to that reputation, some of the top pharmaceutical companies are catching on and calling the Masonic Cancer Center a partner.

Jeffrey Miller, MD, Deputy Director of the Masonic Cancer Center, and his collaborators, Frank Cichocki, PhD, and hematologist/oncologist Sarah Cooley, MD, have partnered with a variety of companies such as Altor Bioscience, Fate Therapeutics, and GT BioPharma, bringing industry dollars to Minnesota.

"A number of these groups found out about us based on our expertise in natural killer (NK) cells," said Dr. Miller. "We are a world leader in NK cell therapy and they are working with us to bring potentially life saving drugs to clinical trials."

Drs. Miller and Cichocki are part of a research team that holds a patent for their NK cell immunotherapy which was very interesting to Fate Therapeutics. Funded by Fate Therapeutics, Miller/Cochocki team handles everything from the manufacturing of the specific NK cellular products at the Molecular and Cellular Therapeutics laboratory, manages and executes clinical trials to test the products in patients, and analyzes the data to test the efficacy of the product and outcome of the clinical trial.

l to r: Frank Cichocki, PhD; Jeffrey Miller, MD; Sarah Cooley, MD

The Fate Therapeutics collaboration has yielded results, showing stable disease with tumor shrinkage in the Phase-1 clinical trials of administering adapted NK cells, the NK100 product, intraperitoneally in women with ovarian, fallopian tube or primary peritoneal cancer resistant to, or recurrent on, platinum-based treatment.

Altor BioScience, Miltenyi Biotec, GT Biopharma, and Gamida all have relied on the expertise of the Masonic Cancer Center as a collaborative partner. The level of partnership between each group and the cancer center varies, but each of the groups sees a major value by investing in the University.

"Working with the excellent researchers and physicians of the University of Minnesota, including Dr. Jeffrey Miller who has been at the forefront of cancer research for over three decades, Fate Therapeutics is changing the paradigm of cancer therapy by developing next generation cellular immunotherapies," said Bob Valamehr, Vice President, Cancer Immunotherapy at FATE Therapeutics. "In collaboration with Drs. Miller and Cooley, Fate Therapeutics is advancing first-in-class adaptive memory NK cells modulated for enhanced anti-tumor properties and first-of-kind off-the-shelf cancer immunotherapy that has the potential to change the way cellular therapy is conducted today. Fate Therapeutics is very fortunate to have the unique opportunity to work with the University of Minnesota where the future of medicine is being developed today."

Minnesota's Cancer Moonshot

Bringing Together Local Cancer Experts, Community to Put an End to Cancer

The Masonic Cancer Center and University of Minnesota Health co-hosted the Minnesota Cancer Moonshot Summit June 29, 2016, supporting former Vice President Joe Biden's Cancer Moonshot Summit in Washington, D.C. The Minnesota summit convened over 500 community partners, state legislators, research collaborators, and clinical colleagues, including the American Cancer Society, Mayo Clinic and The Hormel Institute, to work toward the same goal: achieve a decade's worth of cancer research and treatment advances in half the time. The Minnesota summit attracted the largest attendance of any summit nationwide, including the one in Washington, D.C.

"Collaboration is key to the success of the Cancer Moonshot initiative," said Douglas Yee, MD, director of the Masonic Cancer Center and oncologist with University of Minnesota Health. "By taking this opportunity to connect on strengths and identify the resources we need, we are setting the course for unprecedented discovery."

Panel discussions at the all-Minnesota event discussed cancer prevention and health disparities, viral and immune therapies, clinical trials and patient advocacy. Joining in the conversation was researchers, community members and legislators invested in identifying and advancing potential collaborations and ideas related to cancer. Following the summit, a summary of the suggestions and topics was shared with the National Cancer Moonshot Initiative and National Cancer Institute, informing the national next steps in this bold challenge, including Cancer Moonshot grants from the NCI. Several members of the Masonic Cancer Center have since been awarded grants from this initiative including Brian VanNess, PhD, Elizabeth Pluhar, DVM, Michael Olin, PhD, and Laurie Parker, PhD.

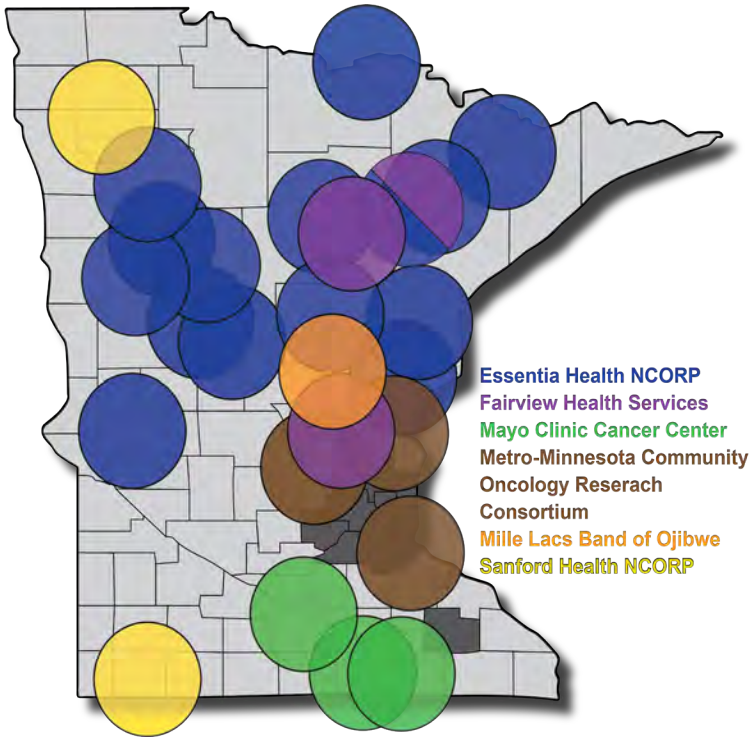
CANCER MOONSHOT
SUMMIT

The Minnesota Cancer Clinical Trials Network

Patients across Minnesota will soon have better access to new ways to prevent cancer, new cancer treatments and enhanced care delivery thanks to a new state-funded partnership between University of Minnesota and the state's major health systems.

As part of the Minnesota Discovery Research and InnoVation (MnDRIVE) partnership with the State of Minnesota, the University is launching the Minnesota Cancer Clinical Trials Network (MNCCTN), with multiple locations across the state.

Led by the Masonic Cancer Center the goal of the MNCCTN is to improve cancer outcomes for all Minnesotans through greater access to cancer clinical trials in prevention, treatment, and survivorship. These trials will originate from Minnesota's two NCI-Designated Comprehensive Cancer Centers, the Masonic Cancer Center and Mayo Clinic Cancer Center, along with the Hormel Institute in Austin.



"This MnDRIVE initiative fuels research that addresses a pressing challenge—access to world-class cancer care for Minnesotans in every corner of our state," said University of Minnesota President Eric Kaler, PhD. "We are grateful for the State of Minnesota's support for the University's work to advance innovative and quality healthcare for Minnesotans."

Nearly half of all Minnesotans will be diagnosed with a potentially life-threatening cancer during their lifetime; but 56 percent of Minnesotans have fewer options for treatment because they live more than 30 miles from a hospital or clinic that offers access to clinical trials. By bringing cancer clinical trials to those living in Greater Minnesota, the MNCCTN will increase access to potentially lifesaving and life-changing preventative and therapeutic treatments, strengthen healthcare systems, create more equitable access to care, and could improve cancer outcomes throughout the state.

"Early cancer screening and world-class care saved my life," said Governor Mark Dayton. "The $8 million in new MnDRIVE funding secured last session will help ensure greater access to new cancer treatments and enhanced care for patients across Minnesota."

"It was an honor to serve as the chief author of legislation to support this network," said Rep. Bud Nornes, R-Fergus Falls. "As the

higher education chairman in the House, I am pleased to see the U of M take the lead on such an important project. I look forward to seeing this endeavor bring positive results in cancer treatments and care delivery."

The MNCCTN is a collaboration between the Masonic Cancer Center, Essentia Health Community Oncology Research Program, Mayo Clinic Cancer Center, Fairview Health System, Sanford Community Oncology Program of the North Central Plains, Metro-Minnesota Community Oncology Research Consortium and The Hormel Institute. In all, there will be 15 new locations across Minnesota that will participate in MNCCTN cancer clinical trials in the first year of the program with additional sites across the state to be added in the subsequent years.

The MNCCTN is led by Senior Manager Marie L. Rahne, MBA, who will lead the administrative efforts. Dr. Charles Loprinzi, a medical oncologist with Mayo Clinic Cancer Center, is the newly appointed MNCCTN medical director. The MNCCTN team will oversee the administrative, clinical, and research aspects that are integral to the launch of a statewide cancer clinical trials network.

For more information about the MNCCTN visit: mncancertrials.umn.edu.

Life After a Blood or Marrow Transplant

The goal of survivorship care is to support patients as they transition back to a healthy "life after cancer." For Shernan Holtan, MD, and Sasha Skendzel, NP, the Blood and Marrow Transplant (BMT) Survivorship Clinic is the first stop for patients after their transplant.

"We want to be involved in actively restoring health and helping people get back to their best possible life," says Shernan Holtan. "Recovery from chemotherapy, regeneration of damaged cells and tissues, and empowerment to take control of health should be an active component of a patient's treatment plan. Health is not a passive thing."

The University of Minnesota's BMT Survivorship program uses a survivorship care framework approved by the Center for International Blood and Marrow Transplant Research and adds additional screenings for post-transplant complications and healthy lifestyle practice promotions. Patients work with their provider to create an individualized care plan to help guide their journey. This comprehensive, active recovery-based approach, provided by a team of experienced professionals, ensures patients have access to the highest standards in survivorship care at the University of Minnesota.

"For most of the patients, while they were in treatment, they weren't in charge of anything, and they were told by doctors and nurses what to do, what pills to take, when to be here, and so on," said Sasha Skendzel. "Once they finish their treatment, we are all about patient empowerment and passing the baton back to the patient and telling them they are in charge now. We are here to help them transition their mind set to one of self-efficacy."

When a patient starts the BMT Survivorship program, they begin to address a myriad of challenges that emerged during and immediately following their cancer treatments, including deterioration of their metabolic, muscular, and even emotional processes.

"There are no medications that help patient empowerment or self-efficacy. Loss of muscle function during the transplant process can directly relate to self-efficacy," noted Dr. Holtan. "We will be conducting a clinical trial of a personalized strength training programs for transplant patients. We think that restoration of muscle strength is likely to be a key

l to r: Shernan Holtan, MD; Sasha Skendzel, NP

contributor to recovery in many domains of health."

"Along with the physical aspects of recovery, we see the benefit of the emotional and spiritual recovery of our patients," said Skendzel. "We want our new survivorship patients to meet with people who went through this 10, 15, 20 years ago and see that you can not only survive this, but thrive as well."

Although survivorship begins when a patient is diagnosed with cancer, it represents a lifelong journey.

Speed-testing Breast Cancer Treatments

A new exemplar of breast cancer research has been released, showcasing the successful studies of three new drugs that have widely improved outcomes in patients with high-risk, rapidly growing breast cancer.

Douglas Yee, MD, director of the Masonic Cancer Center and renowned breast cancer oncologist, is a co-author of two studies that were published in the *New England Journal of Medicine* (NEJM) July 7, 2016. The studies found that adding three novel drug therapies, known as the drug neratinib and the drug combination veliparib plus carboplatin, to standard therapy improved the outcome in patients with two types of breast cancer, HER2-positive, hormone-receptor- negative and triple-negative.

The studies are part of a nationwide research initiative called I-SPY 2. Dr. Yee is on the I-SPY 2 Executive Committee, co-chair of the Agent Selection Committee, and a member of the Data Access and Publication Committee. He is also the principal investigator at the Masonic Cancer Center, one of only 16 centers in the United States currently participating in the clinical trials.

"I-SPY 2 was employed to speed the testing of new drugs and determine which were more effective in eliminating tumors before surgery than standard first step chemotherapy," said Dr. Yee. "We have not run trials like this before in breast cancer; we screened multiple experimental regimens in combination with standard chemotherapy. Our goal is to find which combination of drugs works best with which types of breast cancer."

Yee and his research team use an adaptive trial design that minimizes patients' exposure to drugs that do not work, as well as detects more active regimens sooner. Typically, a clinical trial examines one drug at a time and often involves years of collecting data and analyzing the treatment's effectiveness. In the I-SPY 2 trial, multiple drugs are approved for testing simultaneously. In addition, each participant's tumor was profiled according to its molecular signature and then matched with the drug that researchers believed would be most effective in treating it.

"With I-SPY 2, we are capable of treating a patient's tumor in real-time," Dr. Yee said. "Typically, women with breast cancer undergo chemotherapy after surgery. In the I-SPY 2 trial, women first received the standard-of-care chemotherapy and might also have received another drug—and then surgery."

The end goal is to eliminate the tumor when it is examined by a pathologist.

Based on the positive results, the sponsor for one of the experimental drugs, AbbVie, Inc., is proceeding with a phase III trial to test the combination identified in the two studies.

"My hope is that the combination of continued Masonic Cancer Center research and I-SPY 2 clinical trials will bring new drugs to breast cancer faster, helping all women with the disease," said Yee.

PTSD After Cancer

Post traumatic stress disorder is usually associated with the scars of war and violence, but research recently published in the journal *Cancer* shows 1 in 5 cancer patients experience PTSD-like symptoms.

"Cancer changes a person's entire world and often times their identity," said Jeffrey Kendall, PsyD, LP, director of Oncology Support Services for University of Minnesota Health and Masonic Cancer Center member. "In patients, PTSD symptoms include recurrent thoughts and dreams about cancer, intense distress when they see something about cancer, difficulty sleeping and concentrating, irritability, and being easily startled."

For Kendall, who has worked with cancer patients for over 20 years, the findings are not entirely surprising. A large body of research has shown that some patients will live with ongoing psychological morbidity following their treatment. New research indicates these symptoms are widespread, affecting about 20 percent of cancer survivors.

Kendall's experience shows these symptoms have implications for patient care, too.

"If a patient is too depressed or scared to leave their home for a follow up appointment with their oncologist, they won't receive the care they need," he said. "Addressing PTSD and related mental health conditions in patients is critical to improving survivorship."

Cancer patients do not have to suffer from all the symptoms of PTSD to have their survivorship compromised. For the majority of people in treatment and those finished with treatment, there are residual psychological effects that are chronically impacting their wellbeing. Research demonstrates that access to adequate emotional or psychological support can improve long-term cancer outcomes.

Kendall and his team implemented this research by incorporating mental health screenings and psychotherapy for all cancer patients. Led by Kendall, University of Minnesota Health is addressing the physical, psychological, social, and spiritual needs of cancer patients. University of Minnesota Health Cancer Care providers administer a verbal screening system to measure a person's distress before each visit with a cancer specialist and use the results to trigger additional supportive care if needed.

2016/2017 Top Doctors

The following Masonic Cancer Members were named among the Twin Cities' "Top Doctors" or "Rising Stars" in Mpls. St. Paul Magazine

2016 Mpls. St. Paul Magazine

Cardiac Surgery
Rosemary Kelly, MD

Colon and Rectal Surgery
David A. Rothenberger, MD
Robert Madoff, MD
Genevieve Melton-Meaux, MD, PhD
Mary Kwaan, MD, MPH*

Critical Care Medicine
David H. Ingbar, MD

Dermatology
Kimberly Bohjanen, MD
Maria Hordinsky, MD
Ingrid Polcari, MD*
Peter K. Lee, MD, PhD

Endocrinology and Metabolism
Bradley Miller, MD, PhD
Lynn Burmeister, MD

General Surgery
Daniel Saltzman, MD, PhD

Gynecologic Oncology
Peter Argenta, MD
Boris Winterhoff, MD*
Levi Downs, MD
Linda Carson, MD
Deanna Teoh, MD*
Melissa Geller, MD, MS

Hematology
Mark Reding, MD
Rahel Ghebre, MD, MPH
Craig Eckfeldt, MD, PhD*
Gregory Vercellotti, MD, FACP
Philip McGlave, MD

Hematology/Oncology
Naomi Fujioka, MD*
Douglas Yee, MD
Emily Greengard, MD*
Peter Gordon, MD, MPH*
Anne Blaes, MD*
Bruce Peterson, MD
Christopher Moertel, MD
Joseph Neglia, MD, MPH
Karim Sadak, MD, MPH, MSE*
Lucie Turcotte, MD, MPH*
Marie Steiner, MD, MS
Brenda Weigel, MD, MSc
Jakub Tolar, MD, PhD
Edward Greeno, M
John E. Wagner, MD

Infectious Disease
Shane McAllister, MD, PhD*

Internal Medicine
Bradley Benson, MD

Neurological Surgery
Matthew Hunt, MD, FRCS

Orthopaedics
Edward Cheng, MD
Denis Clohisy, MD

Otolaryngology
Bevan Yueh, MD, MPH
Stephanie Misono, MD, MPH*

Pediatrics
Paul J. Orchard, MD

Pulmonary Medicine
Abbie Begnaud, MD*

Radiation Oncology
Kathryn Dusenbery, MD

Radiology
Tim Emory, MD
Tina Sanghvi, MD*

Surgery, General
Eric Jensen, MD
Todd Tuttle, MD, MS
Maria Evasovich, MD

Thoracic Surgery
Rafael Andrade, MD

Urology
Badrinath Konety, MD
Christopher J. Weight, MD*
Sean Elliott, MD
James Kyle Anderson, MD

2017 Mpls. St. Paul Magazine

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***Rising Stars**

Interns Diversify the Cancer Research Pipeline

The first class of CURE interns, 5 high schoolers and 4 undergraduates, joined the Masonic Cancer Center in the summer of 2017. Funded by a National Cancer Institute's Continuing Umbrella of Research Experiences (CURE) grant, this internship engaged talented Minnesota students from underrepresented backgrounds in cancer research.

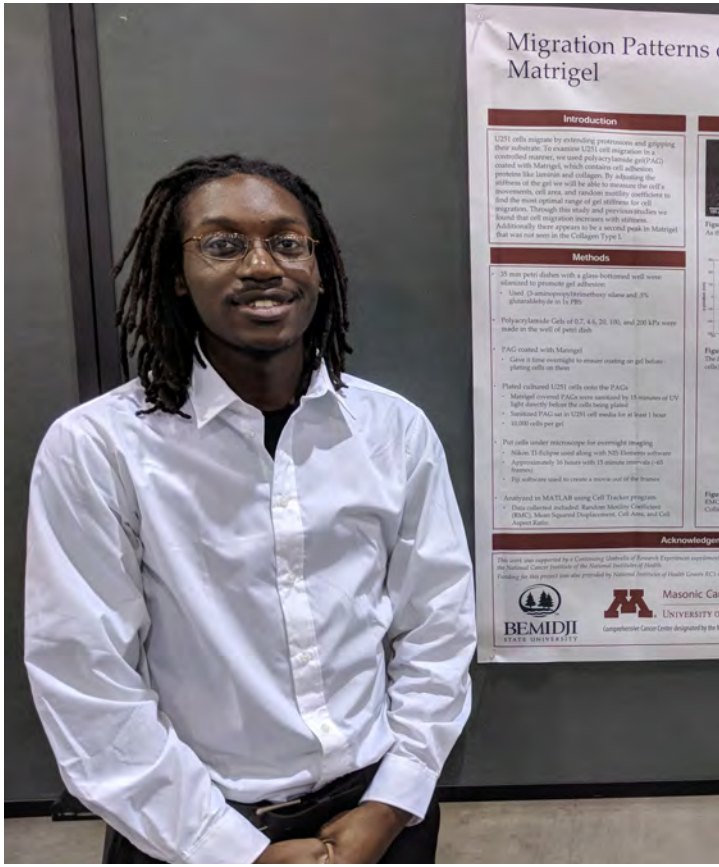
The interns represent scholars who are racially and ethnically diverse, first generation immigrants, inner-city scholars, and female students. The CURE program's goal is to create a pipeline of opportunity and resources which in turn will encourage wider diversity within the cancer research community.

The multi-year grant brings extraordinary student interns into the laboratories of established cancer researchers, provides mentoring, facilitates hands-on STEM education, and arranges work experiences for motivated high school and college students.

"We strive to be great partners in our community and we take great pride in mentoring these driven students as they explore careers in cancer research," explained Christopher Pennell, PhD, Associate Director of Community Engagement and Education for the Masonic Cancer Center.

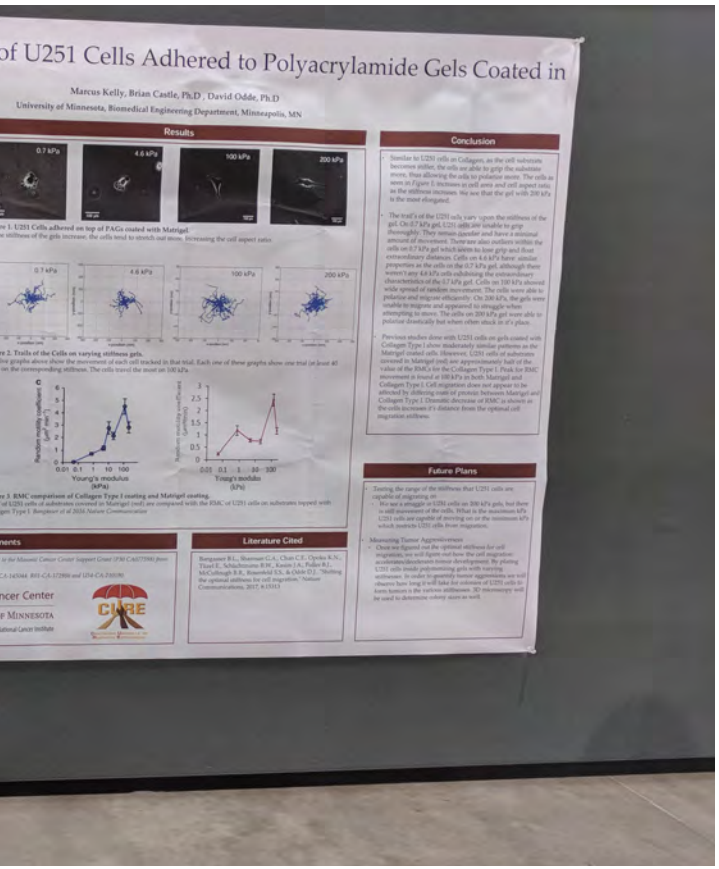
All of the students come from Minnesota schools. The five high schoolers were recruited from Washington Technology Magnet High School in St. Paul and the undergraduates were from the University of Minnesota and Bemidji State University. The internship's goal is to immerse high potential students from underrepresented backgrounds into biomedical studies and expose them to potential career paths and educational options.

After completing a rigorous semester-long "Cancer Biology Boot Camp" in lab safety and protocol, students are paired with a Masonic Cancer Center faculty mentor. From their mentors, interns receive hands-on training in laboratory research techniques and career development advice. Throughout the internship program, students contribute to active research projects addressing cancer biology and pharmacology research. And after the internship has ended, the students will receive continued resources and support from the Masonic Cancer Center.



Marcus Kelly, BS, CURE Intern.

"As an NCI-designated comprehensive cancer



center charged with supporting excellence in research, clinical care and education, the Masonic Cancer Center is proud to offer such a robust experience for student scientists. Developing young, talented researchers, of all backgrounds, is a critical step in preparing the next generation of outstanding investigators to fight cancer in the state of Minnesota." said Douglas Yee, MD, Director of the Masonic Cancer Center.

Community Engagment and Education

Community engagement and education in cancer research is essential to reducing cancer's burden and ensuring that Minnesota has a robust supply of investigators performing cutting-edge cancer research.

Led by Associate Director for Community Engagement and Education, Christopher Pennell, PhD, the Community Engagement and Education Office, established in 2015, administers and drives the continually increasing number and diversity of our community engagement activities as well as creating and implementing stage-specific education and development programs. The team, comprised of curriculum development and community health experts, works together on separate foci - but together under a broad umbrella of education: educating the community, educating students, and educating junior faculty.

Taking the Research out of the Lab

Not only has the team grown in number of staff members, but also in the overall outreach and connections in the state. The CEE team, in partnership with University of Minnesota Health Cancer Care, held the first-ever complete takeover of the University of Minnesota Building at the State Fair in 2017 - "Goldy vs. Cancer." Goldy vs. Cancer showcased cancer research from across the University and was visited by over 12,000 fairgoers. From engineering to veterinary medicine, from Hormel Institute nutraceutical researchers to laboratories using neon zebrafish for BMT research - the breadth and depth of MCC research was on display. Stage presentations drew in the crowds, as did free bags and visors for participating in educational quizzes, plus UMN Health clinicians and staff conducted over 200 free skin and oral cancer checks.

Community partnerships are key to bringing MCC's evidence based cancer research to the community - and hear from the community where there are gaps in the research. At the Cora McCorvey YMCA in north Minneapolis, CEE has started a new community-centric series entitled "Food for Thought: Conversations about Cancer." This series has included community-directed presentations and discussions about prevention, screening, clinical trials, and a men's event focused on prostate cancer. That led to a "Cancer Fighters" series focused on nutrition as prevention, culminating in a cookoff using chemopreventive ingredients and eventually, a cookbook of the winning recipes created by the community.

Cancer Research Career Enhancement

Facilitating the career development of cancer researchers from pre-teen middle schoolers through junior-level faculty is the charge of

the education side of CEE. Via stage-specific education and training programs, the team attracts the best and brightest students and new trainees, trains and retains these folks, and provides the research support infrastructure to enable great discoveries.

Internships have been an ongoing strength of the MCC. Supplemental funding to the MCC's core grant from the NCI for a Continuing Umbrella of Research Experiences (CURE) program provided year-round internships for 5 high school students and 4 undergrads from groups under-represented in cancer research. The Program in Health Disparities Research and MCC collaborate on 8 summer internships every summer for undergrads and MCC received an NCI R25 award for an additional 16 undergraduate summer internships in cancer research through the Cancer Research, Education, and Training Experience (CREATE) program.

The Masonic Cancer Center has a strong history of training cancer researchers through training grants. Twelve of the 32 NIH T32 training grants at the University of MN are cancer-related. Our Cancer Biology Training Grant is in its 44th year and is currently training 4 predoctoral and 5 postdoctoral fellows. The Translational Pediatric Cancer Epidemiology Research Training Grant is supporting the training of 1 predoctoral and 3 postdoctoral fellows. And the Cancer-Related Health Disparities Training Program is training 3 predoctoral and 3 postdoctoral fellows.

l to r: Patricia Beckman, RN; Lissandra Huebner; Kiara Ellis, MSW - CEE Staff

New Leaders

Masonic Cancer Center welcomes new leadership

Anja Bielinsky, PhD - Associate Director for Basic Shared Resources
Dr. Bielinsky is a Professor in Biochemistry, Molecular Biology and Biophysics with a research focus in the regulation of DNA replication. She also co-leads the Genetic Mechanisms Program and was recently named Associate Dean for Foundational Science in the UMN Medical School.

Christopher Pennell, PhD - Associate Cancer Center Director for Community Engagement and Education
Dr. Pennell is an Associate Professor in Laboratory Medicine and Pathology with a research focus in immunology and a passion for connecting with the community - from energizing middle school students to follow a cancer research career path to bridging the town and gown divide with Minnesotans from all over the state.

Masato Yamamoto, MD, PhD - Genetic Mechanisms Program co-leader
Dr. Yamamoto is a Professor jointly appointed in the Division of Basic and Translational Research and the Division of Gastroenterology Hepatology and Nutrition and has a research interest in gene and viral therapy. He joins Dr. Bielinsky to co-lead the Genetic Mechanisms Program.

Frank Ondrey, MD, PhD, FACS - Carcinogenesis and Chemoprevention Program co-leader
Dr. Ondrey is an Associate Professor in the Department of Otolaryngology, Head and Neck Surgery, with an active surgery practice and a research interest in precancerous mouth and throat lesions. He joins Lisa Peterson, PhD, to co-lead the Carcinogenesis and Chemoprevention Program.

Sarah Cooley, MD - Cancer Research Translational Initiatives Director
Dr. Cooley is an Associate Professor of Medicine in the Division of Hematology, Oncology and Transplantation, with a research interest in Natural Killer (NK) cells. She leads the Cancer Research Translational Initiatives (CRTI) which supports researchers translating their work from bench to bedside by offering a comprehensive infrastructure and coordinated integration of services from MCC shared resources to quickly develop and implement highly complex Phase I clinical trials.

Martin Felices, PhD - Translational Research Shared Resource co-leader
Dr. Felices is an Assistant Professor of Medicine in the Division of Hematology, Oncology and Transplantation, with research interests in innate and adaptive immunology and signal transduction. He joins John Wagner, MD, to co-lead the Translational Research Shared Resource which includes the Translational Therapy Laboratory (TTL) and the Molecular and Cellular Therapeutics (MCT) cGMP-compliant production facility.

Kenneth Beckman, PhD - Cancer Genomics Shared Resource co-leader
Dr. Beckman is an Associate Professor, Genetics, Cell Biology, & Development Biology and the Director of the Biomedical Genomics Center, with a research interest in genomic technology. He joins Betsy Hirsch, PhD to co-lead the Cancer Genomics Shared Resource.

Branden Moriarity, PhD - Genome Engineering Shared Resource co-leader
Dr. Moriarity, an Assistant Professor in the Division of Pediatric Hematology and Oncology with research interests in pediatric cancer genetics, gene editing, and immunotherapy. He joins Eric Hendrickson, PhD, to co-lead the Genome Engineering Shared Resource.

Jinhua Wang, PhD - recruited to lead the Cancer Informatics Shared Resource
Dr. Wang is a Professor in the Institute for Health Informatics with a research interest in computational analysis for high-throughput cancer genomics projects. He leads the Cancer Informatics Shared Resource with oversight for Cancer BioInformatics as well as Clinical Informatics Shared Services.

Timothy Hallstrom, PhD - Mouse Genetics Laboratory Shared Resource leader
Dr. Hallstrom is an Assistant Professor in the Division of Pediatric Blood and Marrow Transplantation, with a research interest in the cellular mechanisms controlling the retinoblastoma (Rb) protein. He directs production of CRISPR/Cas9-altered mice with the Genome Engineering Shared Resource.

Honors

Masonic Cancer Center Scientists Receive Outstanding Honors

Masonic Cancer Center researchers are frequently recognized for their advances and expertise. Some examples include:

Mustafa al'Absi, PhD, received the 2016 National Institute on Drug Abuse (NIDA) International Program Awards of Excellence.

Silvia Balbo, PhD, named a 2017 American Society for Mass Spectrometry Emerging Investigator and the 2016 ISSNAF Hogan Lovells Award for Research in Medicine, Biosciences and Cognitive Science.

Ran Blekman, PhD, awarded an Alfred P. Sloan Foundation 2016 Sloan Research Fellowship.

Connie White Delaney, PhD, RN, elected President-elect of Friends of the National Institute of Nursing Research and elected President of the Women's Health Leadership TRUST.

Bin He, PhD, received the 2017 Institute of Electrical and Electronics Engineers (IEEE) Biomedical Engineering Award.

Linda Koehler, PhD, PT, CLT-LANA, was the recipient of the Dorothy Briggs Memorial Scientific Inquiry Award from the American Physical Therapy Association (APTA).

Badrinath Konety, MD, MBA, elected President of the Société Internationale d'Urologie.

Robert Kratzke, MD, appointed as the first chair of the Big Ten Cancer Research Consortium's Steering Committee.

Mary Jo Kreitzer, RN, PhD, won the 2016 Women's Health Leadership Trust Health & Wellness Innovation Award.

David Largaespada, PhD, awarded the Hedberg Family/Children's Cancer Research Fund Endowed Chair in Brain Tumor Research and renewed as an American Cancer Society Research Professor for a 5-year term.

Aaron LeBeau, PhD, awarded a Paul Calabresi K12 Award in Clinical-Translational Research by the National Cancer Institute.

David Masopust, PhD, named to the inaugural class of Howard Hughes Medical Institute (HHMI) Faculty Scholars

Marilyn 'Susie' Nanney, PhD, named a 2016-2017 Robert Wood Johnson Foundation Health Policy Fellow.

Susan O'Conner-Von, PhD, RN**,** awarded the Dr. Jo Eland, Excellence in Pediatric Nursing Award from the American Society for Pain Management.

William Pomerantz, PhD, selected by the Research Corporation for Science Advancement (RCSA) as a 2016 Cottrell Scholar.

James Robinson, PhD, named an American Cancer Society Research Scholar.

Nelson Rhodus, DMD, MPH, inducted as a fellow in the Royal College of Surgeons of Edinburgh.

Robert Turesky, PhD, served World Health Organization's International Agency for Research on Cancer Monograph Working Group.

John Wagner, MD, received the Pediatric Blood and Marrow Transplant Consortium Lifetime Achievement Award.

Erica Warlick, MD, named Woman of the Year by the Leukemia and Lymphoma Society Minnesota Chapter.

Daniel Weisdorf, MD, received the 2015 Lifetime Achievement Award from the American Society for Blood and Marrow Transplantation (ASMBT).

Masato Yamamoto, MD, PhD, named the Eugene C. and Gail V. Sit Chair in Pancreatic and Gastrointestinal Cancer Research.

Masonic Scholars

The Masonic Cancer Center is grateful for the philanthropic support from Minnesota Masonic Charities.

Aaron LeBeau, PhD, Medical School - Department of Pharmacology

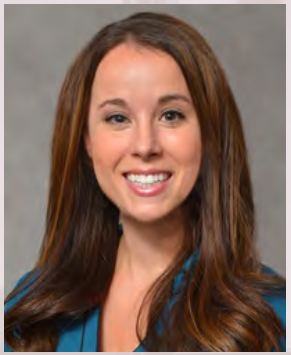
Andrew Nelson, MD, PhD, Medical School - Department of Laboratory Medicine and Pathology

Silvia Balbo, PhD, Carniogenesis and Chemoprevention School of Public Health - Division of Environmental Health Sciences

Anna Prizement, MPH, PhD, School of Public Health - Division of Epidemiology and Community Health

David Stenehjem, PharmD, BCOP, College of Pharmacy - Department of Pharmacy Practice and Pharmaceutical Sciences

Peter Gordon, MD, PhD, Medical School - Department of Pediatrics - Division of Pediatric Hematology/Oncology



Rachel Isaksson Vogel, PhD, Department of Obstetrics, Gynecology, and Women's Health

Anja Bielinsky, PhD, College of Biological Sciences - Biochemistry, Molecular Biology, and Biophysics

Julie Ostrander, PhD, Medical School - Department of Medicine - Division of Hematology, Oncology, and Transplantation

Anne Blaes, MD, Medical School - Department of Medicine - Division of Hematology, Oncology, and Transplantation

Heather Beckwith, MD, Medical School - Department of Medicine - Division of Hematology, Oncology, and Transplantation

Vivian Bardwell, PhD, College of Biological Sciences - Genetics, Cell Biology, and Development

Craig Eckfeldt, MD, PhD, Medical School - Department of Medicine - Division of Hematology, Oncology, and Transplantation

Shilpa Gupta, MD, Medical School - Department of Medicine - Division of Hematology, Oncology, and Transplantation

Zohar Sachs, MD, PhD, Medical School - Department of Medicine - Division of Hematology, Oncology, and Transplantation

Evidio Domingo-Musibay, MD, Medical School - Department of Medicine - Division of Hematology, Oncology, and Transplantation

Emil Lou, MD, PhD, FACP, Medica School - Department of Medicine - Division of Hematology, Oncology, and Transplantation

Martin Felices, PhD, Medical School - Department of Medicine - Division of Hematology, Oncology, and Transplantation

Surbhi Shah, MD, Medical School - Department of Medicine - Division of Hematology, Oncology, and Transplantation

Sherman Holtan, MD, Medical School - Department of Medicine - Division of Hematology, Oncology, and Transplantation

New Researchers

Emily Greengard, MD
Pediatrics

Clark Chen, MD, PhD
Neurosurgery

Kenneth Beckman, PhD
Biomedical Genomics Center

Susan M. Wolf, JD
Medicine

Constantin Aliferis, MD, MS, PhD, FACMI
Institute for Health Informatics

Aaron Sarver, PhD
Institure for Health Informatics

Hangbo Pang, PhD
Pharmaceutics

Alessio Giubellino, MD PhD
Laboratory Medicine and Pathology

Dorraya El-Ashry, PhD
Laboratory Medicine and Pathology

Ingunn Stromnes, PhD
Microbiology and Immunology

Jinhua Wang, PhD
Institute for Health Informatics

Britt Erickson, MD
Obstetrics, Gynecology, and Women's Health

Alexander Khoruts, MD
Gastoenterology, Hepatology, and Nutrition

Boris Winterhoff, MD, MS
Obstetrics, Gynecology, and Women's Health

Armin Rashidi, MD
Hematology, Oncology, and Transplantation

Frank Cichocki, PhD
Hematology, Oncology, and Transplantation

Shernan Holtan, MD
Hematology, Oncology, and Transplantation

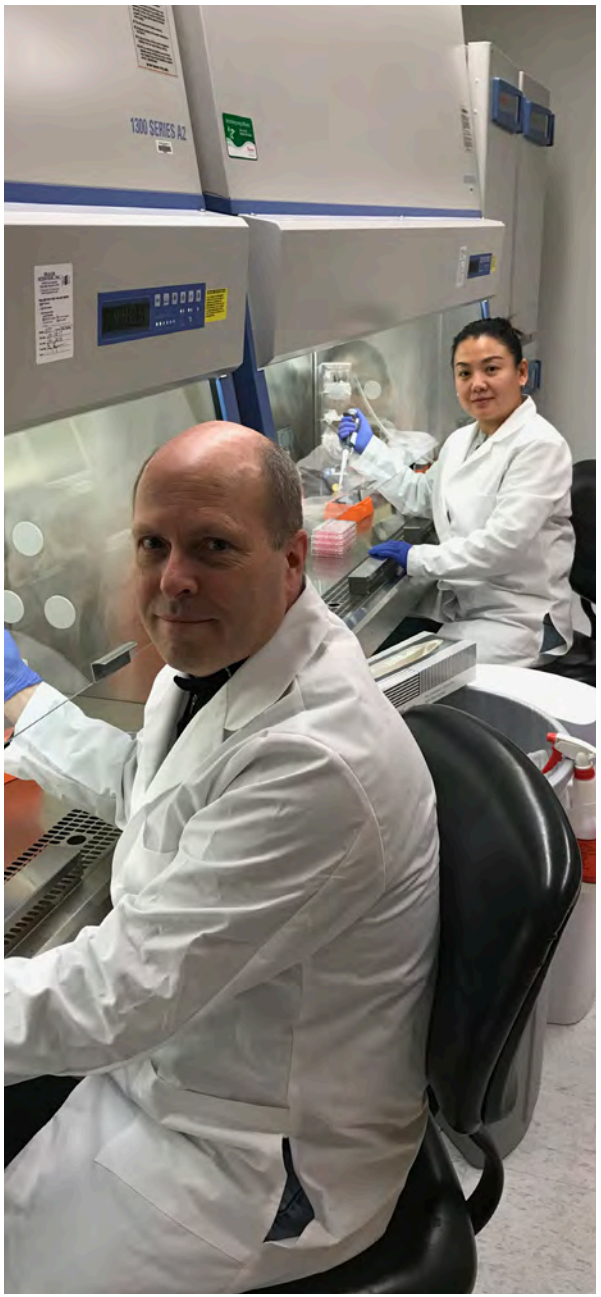
Rita Perlingiero, PhD
Medicine, Cardiovascular Division

Genome Engineering Shared Resource

Tech, Tools, and Advice

The Masonic Cancer Center's Genome Engineering Shared Resource (GESR) is the only facility at the University of Minnesota offering genome editing services and requisite reagent and/or cell line generation. GESR provides state-of-the-art services in precision genome engineering of mammalian cell lines, specifically, the GESR is capable of genetically engineering human cell lines such that they are tailored to each principal investigator's research specifications. And in collaboration with the Mouse Genetics Laboratory Shared Resource, the GESR is capable of designing gene editing reagents necessary for the generation of transgenic mice. The GESR is co-Directed by Drs. Eric Hendrickson and Branden Moriarity.

For more information on the Genome Engineering Shared Resource please go to https://www.cancer.umn.edu/for-researchers/shared-resources/genome-engineering



Masonic Cancer Center Leadership

Executive committee

Douglas Yee, MD, Director

Jeffrey Miller, MD, Deputy Director; co-leader, Immunology Program

Anja Bielinsky, PhD, Associate Director, Basic Shared Resources; co-leader, Genetic Mechanisms Program

Seanne Falconer, MBA, FACHE, Associate Director, Administration

Dorothy Hatsukami, PhD, Associate, Director, Cancer Prevention and Control

Badrinath Konety, MD, MBA, Associate Director, Clinical Affairs & Clinical Research

David Largaespada, PhD, Associate Director, Basic Sciences

Christopher Pennell, PhD, Associate Director, Education and Community Engagement

Jill Siegfried, PhD, Associate Director, Translational Research

Yoji Shimizu, PhD, co-leader, Immunology Program

Masato Yamamoto, MD, PhD, co-leader, Genetic Mechanisms Program

Lisa Peterson, PhD, co-leader, Carcinogenesis and Chemoprevention Program

Frank Ondrey, MD, PhD, FACS, co-leader, Carcinogenesis and Chemoprevention Program

Anne Joseph, MD, MPH, co-leader, SPECS (Screening, Prevention, Etiology, and Cancer Survivorship) Program

Karen Kuntz, ScD, co-leader, SPECS (Screening, Prevention, Etiology, and Cancer Survivorship) Program

Heather Nelson, PhD, co-leader, SPECS (Screening, Prevention, Etiology, and Cancer Survivorship) Program

Carol Lange, PhD, co-leader, Cellular Mechanisms Program

James McCarthy, PhD, co-leader, Cellular Mechanisms Program

John Wagner, MD, co-leader, Transplant Biology and Therapy Program

Daniel Weisdorf, MD, co-leader, Transplant Biology and Therapy Program

Edward Greeno, MD, Director, Oncology Service Line

Sarah Cooley, MD, MS, Director, Investigator Initiated Clinical Research; Director, Cancer Research Translational Initiatives (CRTI)

Brenda Weigel, MD, MSc, Medical Director, Clinical Trials Office

Shared resource leadership

Jinhua Wang, PhD, Director, Cancer Informatics Shared Resource

Timothy Hallstrom, PhD, Director, Mouse Genetics Laboratory Shared Resource

Christopher Pennell, PhD, Director, Flow Cytometry Shared Resource

Martin Felices, PhD, co-Director, Translational Therapy Shared Resource

John Wagner, MD, co-Director, Translational Therapy Shared Resource

Eric Hendrickson, PhD, co-Director, Genome Engineering Shared Resource

Brandon Moriarity, PhD, co-Director, Genome Engineering Shared Resource

Betsy Hirsch, PhD, co-Director, Cancer Genomics Shared Resource

Kenneth Beckman, PhD, co-Director, Cancer Genomics Shared Resource

Mark Kirstein, PharmD, Director, Clinical Pharmacology, Shared Resource

Chap Le, PhD, Director, Biostatistics Shared Resource

M. Gerard O'Sullivan, MVB, PhD, Diplomate ACVP & ECVP, Director, Comparative Pathology Shared Resource

Robert Turesky, PhD, Director, Analytical Biochemistry Shared Resource

External advisory board

Kevin Cullen, MD, Director, University of Maryland Greenebaum Cancer Center

Alan Ashworth, PhD, FRS, Director, University of California - San Francisco, Helen Diller Family Comprehensive Cancer Center

David Beer, PhD, Professor of Surgery and Radiation Oncology, co-Director, Cancer Genetics Program, University of Michigan Comprehensive Cancer Center

Smita Bhatia, MD, MPH, Chair and Professor, Population Sciences, City of Hope National Medical Center

Mary-Ann Bjornsti, PhD, Chair, Department of Pharmacology, Program Leader of Cancer Cell Biology, Associate Director for Translational Research, University of Alabama Birmingham Comprehensive Cancer Center

Melissa Bondy, PhD, Professor, Department of Epidemiology, MD Anderson Cancer Center

Michael Darling, MHA, Associate Director for Administration, Melvin and Bren Simon Cancer Center, Indiana University

Stanton Gerson, MD, Director, Case Comprehensive Cancer Center, Cleveland

Thomas Kensler, PhD, Johns Hopkins Bloomber School of Public Health

James Mulé, PhD, Associate Cancer Director, Translational Science & Technology Development, Moffitt Cancer Center

Vito Quaranta, MD, Professor of Cancer Biology, Vanderbilt-Ingram Cancer Center

Scott Ramsey, MD, PhD, Director, Cancer Outcomes Research, Fred Hutchinson Cancer Research Center

Thomas Sellers, PhD, MPH, Center Director and Executive Vice President, Moffitt Cancer Center

Louis Weiner, MD, Director, Georgetown Lombardi Comprehensive Cancer Center

Investigator-Initiated Clinical Trials

Protocol #2015LS057
A Phase I Trial Testing NAM Expanded Haploidentical or Mismatched Related Donor Natural Killer (NK) Cells Followed by a Short Course of IL-2 for the Treatment of Relapsed/Refractory Multiple Myeloma and Relapsed/Refractory CD20+ Non-Hodgkin Lymphoma
Veronika Bachanova, MD, PhD
Heme/BMT

Protocol #2016LS132
Autologous Stem Cell Transplant In Patients with Hodgkin Lymphoma (HL) and Non-Hodgkin Lymphomas (NHL)
Veronika Bachanova, MD, PhD
Heme/BMT

Protocol #2016LS092
Reduced Intensity (RIC) Conditioning And Transplantation of HLA-Haploidentical Related Hematopoietic Cells (Haplo-HCT) For Patients With Hematologic Malignancies
Nelli Bejanyan, MD
Heme/BMT

Protocol #2013OC013
Umbilical Cord Blood Transplantation Using a Myeloablative Preparative Regimen for the Treatment of Hematological Diseases
Claudio Brunstein, MD, PhD
Heme/BMT

Protocol #2015LS149
Transplantation of Umbilical Cord Blood from Unrelated Donors in Patients With Hematological Diseases Using a Non-Myeloablative Preparative Regimen
Claudio Brunstein, MD, PhD
Heme/BMT

Protocol #2014LS005
A Randomized Trial Comparing CD3/CD19 Depleted or CD3 Depleted/CD56 Selected Haploidentical Donor Natural Killer (NK) Cell Based Therapy for Adults With Acute Myelogenous Leukemia Who Have Failed 1 or 2 Induction Attempts
Sarah Cooley, MD
Heme/BMT

Protocol #2016LS056
Haploidentical Donor Natural Killer (NK) Cell Infusion with Subcutaneous ALT-803 in Adults with Refractory or Relapsed Acute Myelogenous Leukemia
Sarah Cooley, MD
Heme/BMT

Protocol #2016LS153
Open Label Dose Escalation Trial of an Adaptive Natural Killer (NK) Cell Infusion (FATE-NK100) with Subcutaneous IL-2 in Adults with Refractory or Relapsed Acute Myelogenous Leukemia (AML)
Sarah Cooley, MD
Heme/BMT

Protocol #2014LS020
Phase I/II Study of Human Chorionic Gonadotropin and Epidermal Growth Factor Supplementation (Pregnyl®) to Support Tolerance and Repair As Adjunct Therapy in High-Risk or Refractory Acute Graft-Versus-Host Disease
Shernan Holtan, MD
Heme/BMT

Protocol #2015NTLS018
Microbial, Graft and Host Interactions in Hematopoietic Cell Transplantation Reducing sepsis-related mortality in cancer patients through microbiome therapy
Shernan Holtan, MD
Heme/BMT

Protocol #2016NTLS119
Physical Activity in Children Completing Treatment for Leukemia; How Does it Relate

to Other Symptoms?
Casey Hooke, PhD, APRN, CPON, PCNS-BC
Heme/BMT

Protocol #2015LS136
CliniMACS CD34 Reagent System as a Humanitarian Use Device (HUD) for the Processing of Allogeneic Hematopoietic Progenitor Cells to Obtain a CD34+ Cell-Enriched Product for Hematopoietic Reconstitution
Margaret MacMillan, MD, MSc
Heme/BMT

Protocol #2015NTLS002
Defining Medical and Psychosocial Issues in the Fanconi Anemia Population
Margaret MacMillan, MD, MSc
Heme/BMT

Protocol #2016OC182
Autologous Hematopoietic Cell Transplantation for Multiple Myelom
Brian McClune, DO
Heme/BMT

Protocol #2017NTLS044
The Role of Gut Microbiota in Conditioning-Induced Intestinal Barrier Damage in Patients Undergoing Stem Cell Transplantation
Armin Rashidi, MD, PhD
Heme/BMT

Protocol #2016LS058
Relapse Prophylaxis with IL-15 Super Agonist ALT-803 in Patients with Acute Myelogenous Leukemia and Myelodysplastic Syndrome Following Allogeneic Stem Cell Transplantation
Celalettin Ustun, MD
Heme/BMT

Protocol #2016NTLS038
Immune Monitoring During ASP2215 Therapy in Relapsed/Refractory Acute Myeloid Leukemia (AML)
Erica Warlick, MD
Heme/BMT

Protocol #2015LS152
Allogeneic Hematopoietic Stem Cell Transplantation Using Reduced Intensity Conditioning (RIC) for the Treatment of Hematological Diseases
Heather Stefanski, MD, PhD
Pediatric Heme/BMT

Protocol #2015LS108
Tandem Myeloablative Consolidation Therapy and Autologous Stem Cell Rescue for High-Risk Neuroblastoma
Jakub Tolar, MD, PhD
Pediatric Heme/BMT

Protocol #2015LS076
Biochemical Correction of Severe Epidermolysis Bullosa by Allogeneic Cell Transplantation and Serial Donor Mesenchymal Cell Infusions
Jakub Tolar, MD, PhD
Pediatric Heme/BMT

Protocol #2015LS154
Study of Epidermal Grafting Using the CelluTome Epidermal Harvesting System for the Treatment of Individual Lesions in persons with Epidermolysis Bullosa
Karim Sadak, MD, MPH, MSE
Pediatric Oncology

Protocol #2016NTLS144
The Development of Data Capture Methodologies in Pediatric Cancer Patients Treated with Targeted Agents and Immunotherapies: Leveraging the Research Infrastructure of a Childhood Cancer Survivor Program
Carrie Earthman, PhD
Solid Tumor

Protocol #2016NTLS046
Determination of Protein Requirements Using a Stable Isotope Multi-Step Feeding Protocol and Evaluation of an Innovative Ultrasound Device and other Bedside Technologies for Lean Tissue Assessment in Individuals with Head and Neck Cancer
Naomi Fujioka, MD
Solid Tumor

Protocol #2015NTLS120
Masonic Cancer Center Thoracic Translational Working Group Lung Cancer and Pulmonary Nodule Biorepository
Melissa Geller, MD, MS
Solid Tumor

Protocol #2016LS034
Randomized Study of Single Course of Intraperitoneal (IP) ALT-803 Followed by Subcutaneous (SQ) Maintenance ALT-803 Versus Subcutaneous (SQ) Maintenance ALT-803 Only after 1st Line Chemotherapy for Advanced Ovarian, Fallopian Tube, and Primary Peritoneal Cancer
Melissa Geller, MD, MS
Solid Tumor

Protocol #2016LS186
Intraperitoneal Delivery of Adaptive Natural Killer (NK) Cells (FATE-NK100) with Intraperitoneal Interleukin-2 in Women with Recurrent Ovarian, Fallopian Tube, and Primary Peritoneal Cancer
Melissa Geller, MD, MS
Solid Tumor

Protocol #2016NTLS151
Cytomegalovirus Status and Adaptive Natural Killer Cells in Ovarian Cancer: A Pilot Study
Shilpa Gupta, MD
Solid Tumor

Protocol 2016NTLS130
Identifying resident memory T cells in human tumors
David Masopust, PhD
Solid Tumor

Protocol #2014NTLS052
Pilot Study of Clone 6 scFv As a Novel Marker for Isolation and Characterization of Circulating Tumor Cells (CTCs) in Metastatic Breast Cancer and Bladder Cancer
Jayanth Panyam, PhD
Solid Tumor

Protocol #2017IS061
FATE-NK100 as Monotherapy and in Combination with Monoclonal Antibody in Subjects with Advanced Solid Tumors
Manish Patel, DO
Solid Tumor

Protocol #2016NTLS071
Risk Factors of 'Chemo Brain' among Women Treated for Ovarian Cancer
Rachel Vogel, PhD
Solid Tumor

Protocol #2016NTLS175
Gynecologic Oncology Life after Diagnosis (GOLD) Survivorship Cohort
Rachel Vogel, PhD
Solid Tumor

Protocol #2016NTLS145
Assessing the Effect of Glucobrassicin-Rich Brussels Sprouts on the Metabolism of Deuterated Phenanthrene: Developing Food-Based Chemoprevention of Tobacco-Related Lung Cancer
Naomi Fujioka, MD
Tobacco Research

Protocol #2015NTLS139
Changes in Biomarkers Associated with Use of Electronic Cigarettes among African American Menthol and Nonmenthol Smokers
Anne Joseph, MD, MPH
Tobacco Research

Protocol #2016NTLS115
A Comparison of Toxicant Exposure among Tobacco, Marijuana, and Co-users
Ellen Meier, PhD
Tobacco Research

Philanthropy

Time, Talent, Treasure

Longtime Masonic Cancer Clinic volunteer takes her generosity to new heights with a matching gift pledge.

Two days a week, Hinda Litman offers smiles, hugs, and sometimes even a cookie at the Masonic Cancer Clinic in the new University of Minnesota Health Clinics and Surgery Center. And on November 16, 2017, on UMN's Give to the Max Day, she offered up something new. Litman, a good friend and gracious donor to the Masonic Cancer Center, made a $25,000 matching gift pledge to support cancer research.

"To me, research is most important. For these patients, it's research that's going to cure them or give them a longer life," she says. "I really feel that whatever anybody gives, whether it's $1 or $20, will be good and do good for our patients."

Litman started volunteering in 1978 at the University of Minnesota Medical Center gift shop. When she learned that a rabbi, who visited the hospital on Fridays, was looking for volunteers to meet with patients, Litman and a friend saw an opportunity to do more good. However, they quickly realized they were ill-prepared to meet with some of the patients—especially those battling significant or life-threatening conditions.

The pair developed a simple routine of introducing themselves and offering any kind of assistance. Soon, they learned that many of the patients were only looking for friendly conversation and a smile.

Over the next three decades in various areas of the University of Minnesota Health system, including hospice care, Litman has been the ear, the shoulder, and the heart many patients needed. "A hug works when words don't," she says.

Today, at the Masonic Cancer Clinic, Litman is still the first to open the door, first to assist someone in a wheelchair, and first to greet a new visitor. Weekly, she brings flowers and baked goods for patients and staff. Most of all, she listens well, remembering names, families, and stories.

After volunteering in the Masonic Cancer Clinic for four decades, Litman has made a lot of friends, supported a lot of patients, and established herself as a member of the Masonic Cancer Center family. And she's charmingly persuasive. Together with Litman's matching gift, friends, family, and strangers raised $70,000 for the Masonic Cancer Center on Give to the Max Day 2017.

Our dear friend, Hinda Litman.

Wanted: the adventurous and the generous

When it comes to improving health, clinicians and researchers at the Masonic Cancer Center rely on inspiration as much as know-how as they explore new avenues for treatments and cures. Gifts accelerate the journey.

In September the University of Minnesota embarked on the largest philanthropic initiative in its history, Driven: The University of Minnesota Campaign, with a $4 billion goal.

Learn more at driven.umn.edu.

Harmon Killebrew's Legacy

A new plaque in the Masonic Cancer Research Building on the University of Minnesota campus commemorates a longtime partnership between the Masonic Cancer Center and the Killebrew-Thompson Memorial Foundation. Since its inception, the annual Killebrew-Thompson Memorial Golf Tournament has donated a total of nearly $8 million to the Masonic Cancer Center for innovative leukemia and related disease research.

Masonic Cancer Center Director, Douglas Yee, MD, and Janet Smith Yee, JD.

Chasing down cancer

They rode in honor of family members whose lives cancer has claimed. They rode to fight back against a disease that upended their lives. They rode to support the doctors and scientists who combat cancer on the front lines.

More than 1,000 cyclists—ranging from age 14 to 81—and 400 volunteers took part in the first-ever Chainbreaker ride in August, 2017, for hundreds of reasons.

Every rider-raised dollar - a whopping $1.3 million - goes to support collaborative, life-saving cancer research at the Masonic Cancer Center, University of Minnesota. The Masonic Cancer Center is directing these funds to team-based grants investigating the relationships between cancer and microorganisms in our environment.

Chainbreaker offers a full-service cycling experience that ensures a safe, successful, and fun weekend of cycling and entertainment. Join us for this year's event, which will be held August 10–12, 2018.

Find more information at chainbreakerride.org.

Dogs, Kids, and Cancer

When a homegrown cancer therapy didn't work as anticipated, Masonic Cancer Center researchers went back to the lab to find—and solve—the problem.

Hope was high as scientists and physicians at the Masonic Cancer Center, University of Minnesota tested a therapy designed to fight off deadly brain tumors during a 2012 clinical trial. In most cases, the immunotherapy—which was developed at the U and trains a person's own immune system to fight off disease—performed admirably to prolong adults' and children's lives by preventing their tumors from returning.

But the progress was short-lived when the tumors eventually came roaring back.

The team's curiosity about what went wrong led to an important discovery of a little-known protein called CD200, which seems to play a leading role in suppressing the immune system and perpetuating brain cancer. Such findings by researchers Christopher Moertel, MD, and Michael Olin, PhD, hold the potential to make a big breakthrough in brain cancer treatment.

The clinical–scientific pair aims to launch a human clinical study later this year that would test a new cancer immunotherapy based on their CD200 discoveries. They are building on the successes they've had treating dogs that have similar naturally occurring brain tumors, prolonging their lives from typically just weeks after diagnosis to more than a year and a half.

Michael Olin, PhD; Liz Pluhar, DVM, PhD

"I think we can probably show a similar difference in humans," says Moertel, a pediatric neuro-oncologist at University of Minnesota Masonic Children's Hospital and holder of the Kenneth and Betty Jayne Dahlberg Endowed Professorship in Pediatric Brain Tumor Research.

Wet Noses - Similar Tumors

Canine and human brain tumors are very similar, as are the canine and human immune systems. Working with fellow Masonic Cancer Center Liz Pluhar, DVM, PhD, a professor in the U's College of Veterinary Medicine, Moertel and Olin's team has extended dogs' lives by as many as 214 days with their immunotherapy alone, well beyond the typical 30 to 60 days after a canine cancer diagnosis.

A newer protocol is even more effective. Using the immunotherapy paired with the CD200 inhibitor has extended the dogs' lives well beyond the survival of those that had received the vaccine only. Now 25 percent of the dogs involved in the newer studies are still alive, after as many as 730 days—and counting.

"We've seen some fantastic results," Olin says.

Back to the Clinic

When it begins, the human clinical trial will involve 10 to 14 adult glioblastoma patients who have experienced a first or second recurrence of their tumor, says Elizabeth Neil, MD, a new Masonic Cancer Center member and University of Minnesota Health neuro-oncologist who will lead the study. If it is successful, the team hopes to enroll children who have brain tumors as well.

Because this work is inherently expensive, Olin and Moertel started a company called OX2 Therapeutics to create an avenue for venture capital investment. They see the promise of their work in fighting brain cancer and want to help patients as quickly as possible while also expanding the anti-CD200 immunotherapy model to other cancers.

"This will be a rock star for breast cancer and melanoma as well," Olin predicts. "If we give the inhibitor to mice modeling human breast cancer, they have an 80 percent survival rate."

Philanthropy has fueled the team's immunotherapy research to this point. Key donors include the Dahlberg Family Foundation, Bob and Corinne Ferris, Children's Cancer Research Fund (CCRF), CCRF's Dr. Daniel G. Carey Brain Tumor Research Fund, the American Brain Tumor Association, Randy Shaver Cancer Research and Community Fund, Humor to Fight the Tumor, and Love Your Melon.

"We have a long list of people who have made significant contributions to this work and helped us move the research along," Moertel says. "Before, we were taking baby steps. This work is a big leap."

Elizabeth Neil, MD

Christopher Moertel, MD

Noteworthy Research Grants

Hideki Aihara, PhD, was awarded a 5-year research grant, totaling $2.2 million, from the National Institutes of Health for his project "Structural studies of DNA-processing enzymes."

Timothy Griffin, PhD, was awarded a 4-year U24 NIH grant, totaling $2.1 million, for "A Galaxy-based multi-omic informatics hub for cancer researchers."

Dorothy Hatsukami, PhD, received a Consortium on Methods Evaluating Tobacco (COMET) PO1 grant, totaling $12.7 million for 5-years.

Stephen Hecht, PhD, received a renewal on his Mechanisms of Ethnic/Racial Differences in Lung Cancer Due to Cigarette Smoking grant for $16.7 million.

Stephen Hecht, PhD, and **Naomi Fujioka,** MD, received a $2.2 million R01 grant for five years from the NCI for their study, "Clinical Trial of Watercress in Detoxification of Environmental Toxicants and Carcinogens."

Kristin Hogquist, PhD, was awarded a 5-year renewal of her P01 grant "Mechanisms of peripheral induction of T-cell tolerance" for a total of $1.1 million.

Samir Khariwala, MD, and **Irina Stepanov,** PhD, were awarded a $1.4 million R01 from the NIH's Fogarty International Center for five years for their International Tobacco and Health Research and Capacity Building Awards project, "Analytical capacity building for the study of tobacco carcinogen exposures in India."

Jeffrey Miller, MD, was awarded a 5-year renewal of his P01 grant "NK Cells, Their Receptors, Transplantation and Cancer Therapy" from the National Cancer Institute for a total of $9.2 million.

Jaime Modiano, VMD, PhD, was awarded a 2-year $239,250 NCI Provocative Questions R21 grant for his project "Modulation of osteosarcoma biology by inflammation and immunity defined through a comparative approach."

David Odde, PhD, was awarded a 5-year Physical Sciences in Oncology Center grant of $8.2 million.

Liz Pluhar, DVM, PhD, was awarded a $1.6 million NCI Cancer Moonshot grant for her canine immunotherapy study "Novel Combined Immunotherapeutic Strategies for Glioma: Using Pet Dogs as a Large Animal Spontaneous Model."

Simon Rosser, PhD, MPH, received a 5-year R01 grant, in collaboration across 6 UMN schools, from the NIH, totaling $2 million for his study "Improving Sexual Outcomes of Gay and Bisexual Prostate Cancer Survivors."

Aaron Sarver, PhD, was awarded an R50 Research Specialist Award from the NCI for $368,230 over 5 years, for his study "Bioinformatics approaches to solve the 'Missing Driver' problem in solid tumors."

Irina Stepanov, PhD, was awarded a $1.2 million grant from the NIH National Institute for Drug Abuse to fund her project "Biomarkers of exposure and effect in SREC users."

Peter Villalta, PhD, was awarded an R50 Research Specialist Award from the NCI for $549,190 over 5 years, for his study "Mass Spectrometric Analytical Collaborations with Members of the Carcinogenesis and Chemoprevention Program of the University of Minnesota Masonic Cancer Center."

Publications

Selected Masonic Cancer Center Publications
Names of MCC members are in bold

Armstrong GT, Chen Y, Yasui Y, Leisenring W, Gibson TM, Mertens AC, Stovall M, Oeffinger KC, Bhatia S, Krull KR, Nathan PC, **Neglia JP**, Green DM, Hudson MM, Robison LL. Reduction in Late Mortality among 5-Year Survivors of Childhood Cancer. *N Engl J Med*. 2016;374(9):833-42. Epub 2016/01/14. doi: 10.1056/NEJMoa1510795. PubMed PMID: 26761625; PMCID: PMC4786452.

Bangasser BL, Shamsan GA, Chan CE, Opoku KN, Tuzel E, Schlichtmann BW, Kasim JA, Fuller BJ, McCullough BR, Rosenfeld SS, **Odde DJ**. Shifting the optimal stiffness for cell migration. *Nat Commun*. 2017;8:15313. Epub 2017/05/23. doi: 10.1038/ncomms15313. PubMed PMID: 28530245; PMCID: PMC5458120.

Beura LK, **Hamilton SE**, Bi K, Schenkel JM, Odumade OA, Casey KA, Thompson EA, Fraser KA, Rosato PC, Filali-Mouhim A, Sekaly RP, **Jenkins MK, Vezys V**, Haining WN, **Jameson SC**, **Masopust D**. Normalizing the environment recapitulates adult human immune traits in laboratory mice. *Nature*. 2016;532(7600):512-6. Epub 2016/04/21. doi: 10.1038/nature17655. PubMed PMID: 27096360; PMCID: PMC4871315.

Brunstein CG, Miller JS, McKenna DH, Hippen KL, DeFor TE, Sumstad D, Curtsinger J, **Verneris MR, MacMillan ML**, Levine BL, Riley JL, June CH, **Le C, Weisdorf DJ, McGlave PB, Blazar BR, Wagner JE**. Umbilical cord blood-derived T regulatory cells to prevent GVHD: kinetics, toxicity profile, and clinical effect. *Blood*. 2016;127(8):1044-51. Epub 2015/11/14. doi: 10.1182/blood-2015-06-653667. PubMed PMID: 26563133; PMCID: PMC4768428.

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Du J, Paz K, Thangavelu G, Schneidawind D, Baker J, Flynn R, Duramad O, Feser C, **Panoskaltsis-Mortari A**, Negrin RS, **Blazar BR**. Invariant natural killer T cells ameliorate murine chronic GVHD by expanding donor regulatory T cells. *Blood*. 2017;129(23):3121-5. Epub 2017/04/19. doi: 10.1182/blood-2016-11-752444. PubMed PMID: 28416503; PMCID: PMC5465838.

Felices M, Miller JS. NK cells pave the road for alloengraftment. *Blood*. 2016;127(9):1083-4. Epub 2016/03/05. doi: 10.1182/blood-2016-01-692202. PubMed PMID: 26941391.

Forster J, Poupart J, Rhodes K, Peterson-Hickey M, Lamont G, D'Silva J, Erickson D. Cigarette Smoking Among Urban American Indian Adults - Hennepin and Ramsey Counties, Minnesota, 2011. *MMWR Morb Mortal Wkly Rep*. 2016;65(21):534-7. Epub 2016/06/03. doi: 10.15585/mmwr.mm6521a2. PubMed PMID: 27253754.

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