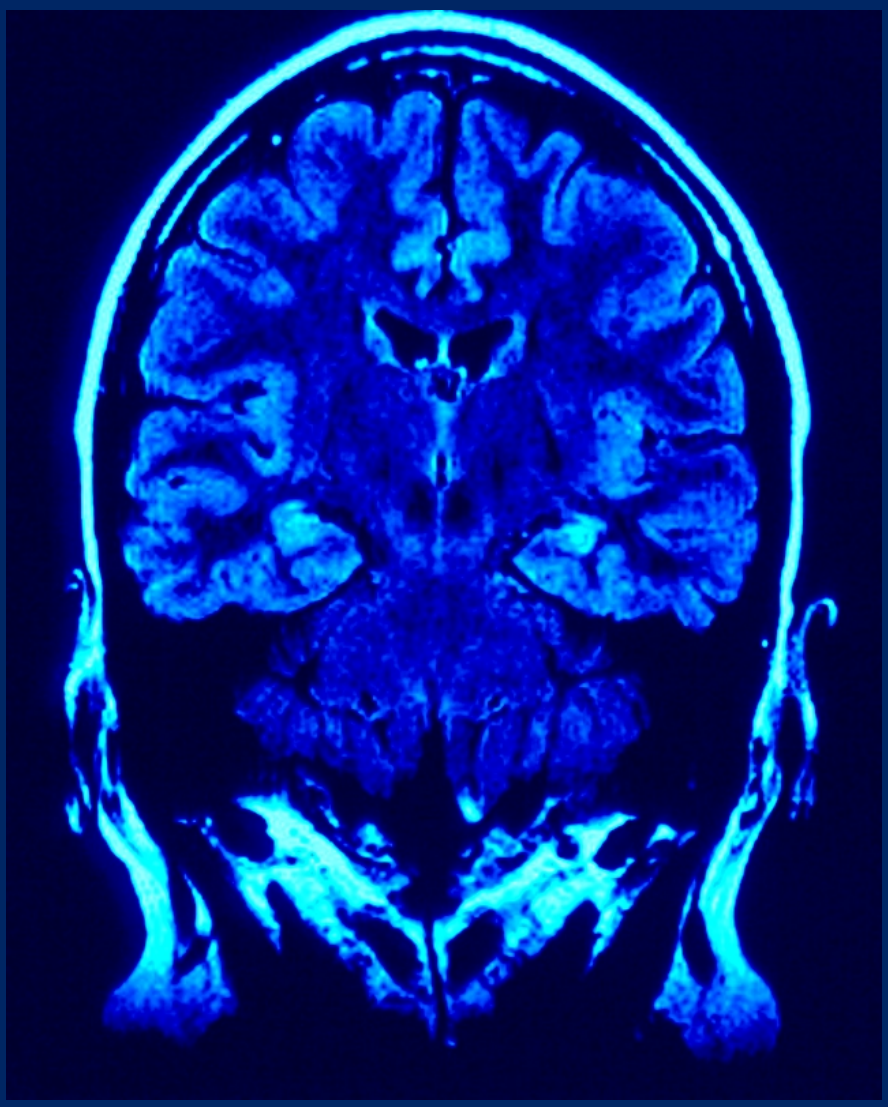
MCW
MEDICAL SCHOOL

ADVANCING A HEALTHIER WISCONSIN ENDOWMENT



Research and Education Program
Active Award
Progress Summaries

The following includes summaries of progress for AHW Research and Education Program awards active during the period ending June 30, 2016

MCW Community Engagement Core Implementation Initiative

Award Amount: $2,399,420 (2015-2019)

MCW MEDICAL SCHOOL

Goal

Establish a central, transformative resource that advances community-engaged research.

Background

Community-engaged research is increasingly recognized by the NIH and other leading research groups as critical to addressing racial, ethnic, socioeconomic, and environmental health disparities.

The Community Engagement Core's planning process identified the need at MCW for a centralized academic resource to enhance MCW's expertise and knowledge in community-engaged research.

Input informing the aims and approach of the proposal came from a wide group of MCW and community leaders, as well as other academic institutions in the state.

Award Summary

The Community Engagement Core will establish an accessible, organized selection of experts and training services to address complex, multi-dimensional community health needs.

By centralizing resources and knowledge in community-engaged research, the Community Engagement Core will strengthen MCW's academic expertise and position MCW as a national leader.

AHW's investment in the Community Engagement Core will result in:

- strengthened MCW expertise in community engagement through educational opportunities and mentoring;
- support of promising ideas in community-engaged research through seed grants;
- increased success in extramural funding for community-engaged research through grant support and assistance; and,
- increased community capacity for engaged research.

During this reporting period, Dr. Ahmed and his team launched the inaugural Community Engagement Core Health Science Square. The workshop provided dedicated resources regarding community-engaged research with an emphasis on cancer disparities. The Core helped to facilitate community-academic research partnerships through its Community Engaged Seed Grants program.

The Community Engagement Core contributed to MCW's Community Engagement Week celebration with a World Café-style facilitated discussion about assets and barriers of the nine principles of Community Based Participatory Research. In addition, the team is working on a manuscript titled "The Collective Power of We: Breaking Stereotypes in Community Engaged Research".

Relevance

Community-engaged research is increasingly recognized by the NIH and other leading research groups as critical to addressing racial, ethnic, socioeconomic, and environmental health disparities.

Significance to Science and Health

The Community Engagement Core will establish an accessible, organized selection of experts and training services to address complex, multi-dimensional community health needs.

Syed Ahmed, MD, MPH, DrPH, FAAFP
Senior Associate Dean for Community Engagement, Director of the Clinical and Translational Science Institute's Community Engagement Program, Professor of Family and Community Medicine

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

The Cardiovascular Roadmap: Bridging our Foundations to "Signature Programs"

MCW MEDICAL SCHOOL

Award Amount: $4,000,000 (2014-2019)

Goal

To improve cardiovascular health in southeastern Wisconsin and beyond through innovative, cutting-edge research and cost-efficient health care by building the foundation for innovation, collaboration, and the translation of research.

Background

Cardiovascular Disease is a leading cause of death and disability in Wisconsin and in the US. AHW's investment in this initiative aims to improve the health of Wisconsin residents by enhancing the capacity of multi-disciplinary translational research teams to adopt and employ new research findings into clinical practice. The award could lead to more effective tools and therapies to enhance clinical decision making and improve patient outcomes.

Award Summary

Significant progress continues to be made in the second year of this award. Several strategies have been developed to increase collaborations between basic and clinical scientists for cardiovascular research. In addition, the leadership team has provided several educational and network opportunities for physician scientists. In addition, the team is partnering with the MCW Community Engagement Core to implement lasting and transformative initiatives in the community.

Implementation of Signature Programs was strengthened through the reorganization of several Affinity Groups (like-minded researchers) and the introduction of a Precision Medicine Affinity Group. Internal and external scientific advisory boards were formed with the purpose of providing strategic guidance on several initiatives introduced in the past two years as well as to inform future directions.

Specific research studies funded through this award have the potential to lead to several promising lines of discovery. For example, research led by Aron Geurts, PhD, is contributing to increased understanding of gene mutation and its relationship to heart contraction. This research could help with the identification of biomarkers that will improve diagnosis and treatment of inflammatory disease.

The award has begun to increase trainees working in cardiovascular translational research through the creation of a formal training program for clinical and postdoctoral fellows. The team successfully secured $500K in additional funding through the AO Smith Foundation to leverage AHW's investment in the fellowship program.

Additional support for increased collaborative interactions across research disciplines was achieved through seminars and a research retreat. An e-newsletter was also launched to help increase awareness and foster collaboration for cardiovascular research.

In addition, the team contributed to the Diversity Summer Health Research Program that engaged 20 undergraduate students in cardiovascular research and laboratory experiences. The program aims to increase the number of under-represented minority students interested in pursuing careers in biomedical and health fields.

The team also continued to strengthen the infrastructure for cardiovascular translational research through the recruitment of new faculty and staff.

Relevance

Cardiovascular Disease is a leading cause of death and disability. The associated hospitalizations and economic burden result in significant costs. Part of this is related to inadequate treatments available due to delay in translating benchtop research findings into practice.

Significance to Science and Health

This work will enhance the capacity of multi-disciplinary translational research teams to adopt and employ novel research findings into clinical practice. Investments made in novel research performed in the Cardiovascular Center will provide more effective tools and therapies to enhance clinical decision making and improve patient productivity and outcomes.

Ivor J. Benjamin, MD

Director of the Cardiovascular Center, Professor of Medicine/ Cardiology

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Optimizing Functional Outcomes of Stroke Survivors through Translational Research

Award Amount: $1,003,673 (2015-2020)

MCW MEDICAL SCHOOL

Goal

Improve functional outcomes for stroke survivors by creating the Stroke Research Center of Southeastern Wisconsin, which will advance translational research in the region.

Background

While significant progress has been made in preventing strokes, fewer resources have been committed to improving rehabilitation for stroke survivors.

Stroke survivors face significant barriers to recover mobility and communication skills after neurologic stroke damage.

While some survivors fully recover, the majority live with chronic post-stroke deficits, which can involve motor skills, speech, thinking, memory, personality and emotional dysregulation. The temporary or permanent loss of independence due to stroke impacts families in addition to survivors.

Improving rehabilitation technology and techniques that lead to better functional outcomes will benefit stroke survivors and their caregivers.

Through dissemination of resources to stroke survivors statewide, the investigators aim to increase adherence to physician recommended home-based rehabilitation, as well as awareness of available advanced rehabilitation technology resources.

Award Summary

Significant progress was made in establishing the core infrastructure to support the new Stroke Research Center of Southeastern Wisconsin.

AHW's investment in the new Center has already led to new, cross-disciplinary research collaborations. A key innovation of this work is the engagement of community members with lived experience in a collaborative environment with researchers and clinicians, facilitating real-time, two-way communication opportunities.

Engaging stroke survivors and their caregivers in the research helps investigators better understand how the proposed new methods might "fit" with the demands and stress experienced by patients and families after a stroke occurs. Working with community members with lived experience is an innovative approach that will make sure new ideas are as implementable in practice as they are in laboratories.

A Community Academic Advisory Board was established that brings together diverse MCW and Marquette University expertise with community knowledge to guide the Center's efforts.

Another key milestone of this award is the development of a centralized database to ensure consistent data collection of disparate stroke functional outcome measures.

Efforts continue in the database's development as well as the creation of a toolkit to expand the database's use. Stroke survivors will be enrolled in the clinical database once fully operational. Data is overseen by dedicated staff who also will serve as a trainer to other therapists for functional outcome measurement.

In addition, an RFP process is being developed to award competitive seed funding to support stroke rehabilitation research collaborations. Scheduled for release in the coming years, the seed award program is expected to lead to new and innovative lines of research that can support improved therapies and tools for enhancing quality of life for stroke survivors.

Relevance

While significant progress has been made in preventing strokes, fewer resources have been committed to improving rehabilitation for stroke survivors.

Stroke survivors face significant barriers to recover mobility and communication skills after neurologic stroke damage.

Significance to Science and Health

This award advances research in rehabilitation technology and techniques that could lead to better functional outcomes for stroke survivors and their caregivers.

Diane Braza, MD
Chair and Professor of Physical Medicine and Rehabilitation

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Vascular Odorant Receptors (ORs): Regulation and Function

Award Amount: $200,000 (2016-2017)

MCW MEDICAL SCHOOL

Goal

Identify new approaches to regulate inflammation and cardiovascular disease through increased understanding of the role of odorant receptors (ORs), which are predicted to help blood vessels dilate and improve blood flow in inflammation and blood vessel health.

Background

More than 67.5 million American adults have hypertension, and 11.8% are resistant to current therapies. Hypertension, ischemic heart disease, diabetes, and other cardiovascular diseases associated with inflammation are major causes of death.

Identifying new internal factors and vascular mechanisms that help suppress inflammation is critical to developing new therapies for cardiovascular and inflammatory diseases.

Award Summary

The AHW Endowment's investment in Dr. Campbell and his research team could lead to the identification of vascular ORs and natural and synthetic molecules that activate the receptors. Pathways that are activated by ORs have an impact on human physiology and represent a new avenue for translational research.

Hypertension, ischemic heart disease, diabetes, and heart failure are associated with the vessels' impaired ability to dilate and the presence of inflammation. Cardiovascular diseases are a major cause of death, and while survival has improved, treatment failures remain high.

Because these diseases have vascular and inflammatory components, new approaches to understanding vascular regulation and function are needed in order to improve treatment and survival.

The identification of new odorant receptors (ORs) has led to new knowledge in areas of vascular biology, inflammation, and cardiovascular disease.

During this reporting period, Dr. Campbell and Dr. Gutterman worked together to help realize ORs full potential and thus advance understanding of vascular regulation and inflammation.

The research team discovered that the Ms4a family of proteins is expressed in high levels in vascular cells. These proteins are found in nasal tissue and known to sense some odorant. These proteins differ from typical odorant receptors in their structure, and their effects are due to calcium entry into cells. This is a significant and novel finding that suggests an important, unrecognized role for these proteins in vascular biology. This discovery exceeded the research team's expectations for the initiative and poses an exciting new changemaking direction to the research.

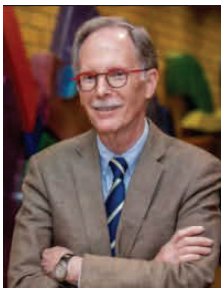
It is anticipated that AHW's investment in this research could lead to significant publications and extramural funding.

Relevance

More than 67.5 million American adults have hypertension, and 11.8% are resistant to current therapies. Hypertension, ischemic heart disease, diabetes, and other cardiovascular diseases associated with inflammation are major causes of death.

Significance to Science and Health

Identifying new internal factors and vascular mechanisms that help suppress inflammation is critical to developing new therapies for cardiovascular and inflammatory diseases.



William B. Campbell, PhD,
Chair & Professor,
Pharmacology and Toxicology

Co-Investigator: David D. Gutterman, MD, Northwestern Mutual Professor of Cardiology and Senior Director of the Cardiovascular Center

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Functional Pain and Autonomic Disorders (FPAD) Program Development

Award Amount: $1,943,400 (2013-2018)

MCW MEDICAL SCHOOL

Goal

To develop a comprehensive center for clinical excellence, research, teaching, and community outreach for the treatment of functional pain and autonomic disorders (FPADs).

Background

Functional pain is ongoing pain for which there is no known medical explanation. Autonomic disorders affect the autonomic nervous system, which controls our involuntary functions such as heart rate and breathing and are wide-ranging. These disorders (FPAD) cause patients to experience pain in various regions of the body. FPADs affect around 500,000 individuals in Wisconsin.

AHW's investment in the FPAD program will help better define these disorders, educate physicians about new discoveries in FPAD, and improve treatment options for patients.

Award Summary

Establishing the clinical and computational infrastructure to support autonomic disorder research is key to the FPAD program. With the creation of a patient registry database, researchers can collect clinical data and evaluate specific outcomes for FPAD patients. The team has successfully recruited more than 700 patients into the autonomic disorders registry, a 40% increase in recruitment from the previous year.

Identifying and analyzing large and complex epidemiologic, genomics and proteomics datasets requires specialized machines and highly skilled personnel. Under the leadership of Charles Welzig, MD, the computational infrastructure has been strengthened and machine learning models have been developed in several areas.

Investment in new technologies enabled the development of specialized methods to assess brain function in combination with MRI and MEG imaging, and to measure pathways that lead to central and peripheral pain. These new technologies are key to developing a better understanding of disease patterns and the identification of potential therapeutic targets as well as helping clinicians better predict outcomes. For example, Near-infrared spectroscopy (NIRS) instruments provide rapid analysis of brain activities through non-invasive methods. Tools and programs developed with Dr. Welzig's lab improve diagnostics for FPAD as well as other areas, such as cardiology.

The team continues to strengthen genetics research with a focus on the role of mitochondria (the cells powerhouse) in FPAD.

Research supported through the FPAD program revealed that impaired mitochondrial bioenergetics (energy deficits in mitochondrial function) may contribute to FPAD. As a result, research is investigating how high intensity exercise may improve and, possibly, restore mitochondrial function, leading to promising therapies for FPAD patients.

In addition, research is underway focusing on the clinical investigation of events underlying pediatric FPADs.

The education of Wisconsin primary care physicians in FPADs continues to be a key priority. A survey of over 100 physicians showed a high degree of discomfort in treating FPAD patients. Educational videos, online tools and outreach efforts for both patients and physicians are being used to improve understanding about FPADs.

More than $3.9M has been received in additional funding to successfully leverage AHW's investment.

Relevance

Functional pain and autonomic disorders (FPADs), such as fibromyalgia and migraines, affect around 500,000 individuals in Wisconsin. Despite a large patient population, understanding of these disorders has progressed slowly.

Significance to Science and Health

By better defining and understanding FPADs, the researchers can create an educational infrastructure for teaching physicians and offer improved treatment options for patients in and outside of Wisconsin.

Thomas Chelimsky, MD
Professor of Neurology/
Autonomic Disorders

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine

Novel Target for the Treatment of Type 2 Diabetes

Award Amount: $200,000 (2015-2017)

MCW MEDICAL SCHOOL

Goal

Understand why obesity only leads to type 2 diabetes in part of the patient population, which will help develop new methods for preventing the disease.

Background

Wisconsin has the 22nd highest adult obesity rate in the United States at almost 30 percent, a dramatic increase from 12 percent in 1990. Obesity increases the risk of a number of serious health issues, including heart disease, dementia, and type 2 diabetes. Type 2 diabetes, the seventh leading cause of death in the nation, affects more than 475,000 adults in Wisconsin. The disease costs the state 6.1 billion annually in health care costs and lost productivity.

Award Summary

The scientists recently discovered that a key enzyme plays a significant role in protecting insulin-producing cells in the pancreas by preventing an accumulation of free fatty acids. If free fatty acids build up to significant levels, the resulting chemical environment can become toxic and even deadly to the cell.

Approximately one-third of patients develop type 2 diabetes due to obesity. The remaining two-thirds of individuals retain the ability to produce and respond to insulin in order to normally process food. By better understanding this phenomenon, methods may be able to be developed to protect more patients from becoming resistant to insulin and requiring insulin injections. In addition to further studying the key enzyme that preliminary data shows to be a protector of insulin-producing cells in the pancreas, the investigators are developing potential therapies for future studies.

In the first year of funding, biochemical and cellular studies have been conducted using the human enzyme involved in degrading proteins modified with FFA, palmitoyl-protein thioesterase 1 (PPT1). The protocols, involving both cell culture conditions and the protein purification scheme, have been optimized to produce significant quantities of PPT1 protein for biochemical and cell-based assays. Assay conditions have been developed and optimized to evaluate small molecular weight compounds as either activators or inhibitors of the enzyme PPT1. The top candidate small molecules identified have been tested for their effect on purified recombinant PPT1 activity.

To date, compounds exhibit no, or minimal, inhibitory effects on PPT1 activity.

Studies to be conducted in the coming year of the award will address whether aberrant protein modification with palmitic acid correlates with T2D development in Wisconsin residents that are metabolically healthy lean, metabolically healthy obese, or metabolically unhealthy obese.

Fat samples have been obtained from all of these subject groups and a portion of those samples will be available for use in the second year of the study.

By generating new knowledge about how certain fatty acids harm insulin-producing cells, as well as about the enzyme that maintains a healthy level of fatty acids, the investigators will be better able to design new approaches to delay or prevent the onset of type 2 diabetes due to obesity.

Relevance

Wisconsin has the 22nd highest adult obesity rate in the United States at almost 30 percent, a dramatic increase from 12 percent in 1990. Obesity increases the risk of a number f serious health issues, including heart disease, dementia, and type 2 diabetes. Type 2 diabetes, the seventh leading cause of death in the nation, affects more than 475,000 adults in Wisconsin.

Significance to Science and Health

This award aims to understand why obesity only leads to type 2 diabetes in a portion of the patient population, which will help develop new methods for preventing the disease.

Nancy M. Dahms, PhD
(Principal Investigator)
Biochemistry

Co-investigators: Srividya Kidambi, MD and Rebekah Gundry, PhD

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Effects of Inflammation on Cognition, Behavior and Psychiatric Illness

Award Amount: $200,000 (2015-2017)

MCW MEDICAL SCHOOL

Goal

Study the effects of inflammatory Diseases, such as Graft Versus Host Disease, on the brain in rodents and in a clinical trial, which may lead to the development of new approaches for reducing anxiety and depression.

Background

Reports indicate that between 35 and 40 percent of cancer patients experience elevated levels of anxiety, depression and adjustment disorders.

Cancer patients are not alone, however, as cognitive difficulties and depression can occur in a number of human diseases that do not seem to have anything to do with the brain, including heart disease and infections.

Emerging evidence indicates that inflammation is a major contributor to problems in brain function. Inflammation is a characteristic of cancer, infections, heart disease and other disorders that can affect the brain.

Award Summary

Inflammation is an underlying characteristic of virtually all significant human disease states.

Moreover, the cognitive and emotional challenges that can accompany these diseases have profound adverse effects on patient quality of life and can persist even after the underlying disease has been resolved.

Findings from this research have the potential to benefit large patient populations suffering from many different disorders.

The research team is investigating the effectiveness of an available drug in reducing cognitive dysfunction, anxiety and depression in stem cell transplant patients being treated to prevent Graft Versus Host Disease.

This research expands on preliminary data showing that the protein called interleukin-6 can reduce brain inflammation.

To-date the research team has demonstrated that systemic inflammation leads to behavioral and cognitive dysfunction in a well characterized animal model. Furthermore, the researchers discovered that systemic inflammation directly promotes inflammation within the brain.

The team is working to complete a clinical trial that assesses how an inflammatory molecule, termed interleukin 6, affects behavioral function. Analysis of the clinical trial data is expected in the coming year.

By advancing knowledge regarding the relationship of inflammation and brain function, this research may lead to new, targeted treatments that are applicable beyond Graft Versus Host disease due to the broad range of disorders that cause increased inflammation throughout the body.

Relevance

Emerging evidence indicates that inflammation is a major contributor to problems in brain function. Inflammation is a characteristic of cancer, infections, heart disease and other disorders that can affect the brain.

Significance to Science and Health

Define the inflammatory pathways that cause brain dysfunction in order to develop better therapies for patients with these diseases by increasing knowledge about a protein, interleukin-6, that can reduce brain Inflammation. This research could results in a better understanding of the relationship of inflammation and brain function, which may lead to new, targeted treatments.

William Drobyski, MD
(Principal Investigator)
Medicine (Neoplastic Disease and Related Disorders)

Co-Investigators: Cecilia Hillard, PhD, Neuroscience Center, Jennifer Knight, MD, Psychiatry and Behavioral Medicine

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Systematic Analysis of Molecular pathways implicated in amyotrophic lateral sclerosis (ALS)

MCW MEDICAL SCHOOL

Goal

Identify genes that play a major role in the development and progression of Amyotrophic Lateral Sclerosis (ALS) to understand their contributions and develop potential treatments.

Background

ALS is the most common form of motor nerve cell disease. It causes muscle weakness, paralysis, and death within two to five years of diagnosis.

ALS places enormous financial and emotional strain on patients and families. No treatments that currently exist go beyond relieving symptoms to resist the underlying causes of the disease.

Through a better understanding of the genes involved in ALS, the researchers aim to find new ideas for interrupting its progression that can be turned into potential therapies.

Award Summary

Only about five to ten percent of ALS cases are caused by inherited mutation. Advances have been made in determining the genes involves in this hereditary form, although little is yet understood about how these mutated genes work in concert to cause ALS.

These scientists are studying both the functions of the inherited mutant genes and the genetic underpinnings of non-hereditary ALS cases.
The generation of new knowledge about the similarities and differences of hereditary and non-hereditary ALS may lead the design of new approaches to treating ALS.

To-date the team has recruited 54 participants in the research study to screen for a specific ALS gene mutation. The experimental systems have now been established to allow us to assess convergent and divergent molecular pathways to motor neuron loss in ALS.

This award features collaboration with Brian Link, PhD, Cell Biology, Neurobiology and Anatomy, and Matthew Scaglione, PhD, Biochemistry.

Dr. Link provides expertise on the use of zebrafish models to study ALS. Dr. Scaglione specializes in diseases that degrade the nervous system, and will focus on studying ALS using an amoeba, D. discoideum, which is often called slime mold. These amoebas have demonstrated resistance to the toxic effects of an excessive buildup of proteins that occurs to motor nerve cells in ALS.

AHW's investment in this award will help to establish a basic-to-clinical science pipeline for the study of ALS through collaboration with Paul E. Barkhaus, Professor of Neurology, who leads Froedtert and MCW's ALS clinic. The clinic has been continuously certified as one of approximately 38 centers of Excellence by the ALS Association Since 2006.

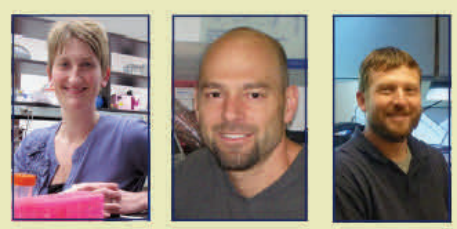
This pipeline aims to generate the infrastructure necessary to collect patient samples for genetic screening and eventual stem cell production. This collaboration between clinical research and basic science expertise should accelerate the discovery and evaluation of new treatments for ALS.

Relevance

This award aims to identify genes that play a major role in the development and progression of Amyotrophic Lateral Sclerosis (ALS) to understand their contributions and develop potential treatments.

Significance to Science and Health

AHW's investment in this award has the potential to advance knowledge about genes involved in ALS and build a basic-to-clinical research pipeline to accelerate ALS science.



Allison Ebert, PhD
(Principal Investigator)
Assistant Professor, Cell Biology, Neurobiology and Anatomy

Co-Investigators: Brian Link, PhD, Professor, Cell Biology, Neurobiology and Anatomy and Matthew Scaglione, PhD Assistant Professor, Biochemistry

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

STEP-UP: Student Enrichment Programs for Underrepresented Professions in Medicine

Award Amount: $925,915 (2015-2020)

MCW MEDICAL SCHOOL

Goal

Partner with educational institutions to nurture underrepresented in medicine students to better prepare them for success in the field of medicine.

Background

Only fifteen students of African American, Native American, Hispanic or Native Hawaiian descent from Wisconsin matriculated to a medical school last year. MCW has enrolled approximately 30 students considered to be underrepresented in medicine in each of the last three classes. This group constitutes about 15 percent of each class. Many of these students, however, leave Wisconsin for residencies closer to home.

With Wisconsin growing increasingly diverse each year, the need also grows for physicians that can provide culturally competent care and practice effectively within rural and urban areas that have had less access to health care services. To enhance cultural competence and address health disparities, MCW has worked to expand diversity among medical students, residents and faculty members.

AHW's investment in the STEP-UP Program aims to significantly enhance these efforts through in-state community partnerships with educational institutions throughout the instructional spectrum.

Award Summary

Through collaborative enrichment activities, the STEP-UP program leaders are building a strong community-engaged pipeline that will enhance science education and increase interest in medical careers.

This award features extensive collaboration among MCW's medical school, graduate school and educational institutions in Southeastern, Northeastern and Central Wisconsin.

To-date, the program has been successful in cultivating partnerships with several schools and community centers. Participating schools include, University of Wisconsin-Milwaukee, University of Milwaukee- Parkside, University of Wisconsin-Green Bay, Marquette University and Ripon College.

In addition, retreats and meetings are underway with several additional possible collaborators including: United Community Center, Hmong American Peace Academy, Indian Community Medical School, Carmen High and Middle School, Golda Meir Middle School, Vieau Middle school, South Division High School, Morse Marshall High School, North Division High School and Hamilton High School.

Undergraduate students will have the option of being matched with a professional mentor in addition to support in preparing for the MCAT entrance examination.

A planning committee is working to develop the curriculum that will guide the program. A fall 2016 open house is planned and the first portion of the curriculum will be held at MCW in early 2017.

Also, the program series titled Kaloidoscope was developed. This encompasses a film series as well as a research forum. Both have been well received.

Relevance

With Wisconsin growing increasingly diverse each year, the need also grows for physicians that can provide culturally competent care and practice effectively in areas that have less access to health care services.

To enhance cultural competence and address health disparities, programs are needed to help expand diversity among medical students, residents and faculty members.

Significance to Science and Health

The proposed program will develop best practices related to the creation and implementation of a pipeline program across many institutions in Southeastern, Northeastern and Central Wisconsin. The project team will also track the performance of pipeline students over time.

Jose Franco, MD

Associate Dean of Educational Improvement and Professor of Medicine

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

A Structure-Based Drug Discovery Resource for Clinical and Basic Scientists

Award Amount: $200,000 (2015-2017)

MCW MEDICAL SCHOOL

Goal

Build a resource to promote drug discovery research at the Medical College of Wisconsin in order to expedite translational research in the areas of infectious disease, inflammation, cancer and nervous system decline in dementia and other diseases.

Background

As scientists have uncovered more information about the cause and progression of disease at the molecular level, it is now up to researchers to find new potential medicines using that knowledge. This process of drug discovery starts by finding a small molecule that interacts with a targeted protein with the potential to influence the development and/or progression of a disease. While MCW has expertise in this area, this award proposes to formalize a pipeline for investigators throughout MCW in order to expedite their clinical and translational research projects.

Award Summary

The research team has made significant progress toward implementation of a fragment-based drug discovery screening platform. The platform uses recently-acquired specialized instrumentation at MCW and is widely applicable to any protein target.

This platform searches through a sample from a database with the structures of about 10 million protein fragments. The output is a set of fragments with an affinity to interact with the targeted protein. These fragments can be linked to increase the potential drug's probability of interaction and improve its potency.

To-date, the research team has created a drug discovery program to screen chemical libraries against 11 proteins with the initial goals of identifying small molecule "hits" to develop into therapeutic compounds to treat infectious diseases, inflammation, cancer, and neurodegeneration.

Three proteins have been successfully screened. The research team has identified small molecules that specifically bind to these proteins, which are implicated in cancer, psoriasis, and diabetes. This work has already contributed to eight research studies that have been submitted to NIH.

The research team's program is the first Nuclear Magnetic Resonance (NMR) based screening of chemical fragments at MCW and one of the few in academic medical schools world-wide.

The team has successfully developed new computational methods for automatic identification of chemical hits from the chemical library screening. This method is faster than previous methods, with no loss in accuracy.

The research team is positioned to significantly enhance research capacity and speed drug discovery research for MCW investigators with promising targets for new drugs.

By providing this resource to advance drug discovery efforts, the investigators will take advantage of the collaborative nature and expertise of MCW's structural biologists and medicinal chemists to remove existing barriers preventing other MCW scientists from fully exploring this important field of study.

Relevance

As scientists have uncovered more information about the cause and progression of disease at the molecular level, more research is needed to translate these findings into new medicines. This process of drug discovery starts by finding a small molecule that interacts with a targeted protein with the potential to influence the development and/or progression of a disease.

Significance to Science and Health

This award has the potential to advance knowledge about how to best screen existing compounds to find new drugs and contribute to long-term discovery of new therapies to treat infectious disease, inflammation, cancer and nervous system decline in dementia and other diseases.

Blake Hill, PhD
(Principal Investigator)
Professor, Biochemistry

Co-investigators: Brian Volkman, PhD, Francis Peterson, PhD, and Brian Smith, PhD

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Program for the Study of Neuronal Synaptic Plasticity in Health and Illness

Award Amount: $3,042,309 (2012-2016)

MCW MEDICAL SCHOOL

Goal

Advance understanding of nervous system function in health and in illness through the creation of a collaborative and translational research program focused on the mechanisms, triggers and consequences of changes in synaptic plasticity (the ability of the brain to rewire over time).

Background

Neurological disorders affect 116 million Americans and it is estimated that Wisconsin residents and businesses incur more than $10 billion each year in health care and lost productivity due to pain costs.

The Neuroscience Research Center at MCW was established to confront the most complex neurological research problems facing our citizenry, with particular focus on:

- neurodegenerative diseases like Alzheimer's and Parkinson's diseases,
- nervous system injuries including brain trauma, concussion, and stroke,
- developmental disorders such as autism, cerebral palsy, and attention deficits, and,
- mental disorders like schizophrenia, depression, and substance abuse.

This award promotes an innovative team of scientists who study synaptic plasticity, which is the ability of the neurons in our brain to rewire in response to normal activity or pathologic stress. Synaptic plasticity has a role in all neurological disorders and thus, the program has the potential to impact many diseases facing Wisconsin residents.

Award Summary

A primary goal of the award is to increase research capacity and collaboration for neuronal synaptic plasticity research. In addition to securing new faculty expertise to advance this area of research, the program has been highly productive in fostering collaboration through educational seminars, networking opportunities, and a pilot award funding program.

Pilot awards require collaboration o spur research, and all accomplished the aims for which they were intended.

To-date, the AHW investment of $3M has leveraged more than $8.6M in extramural funding through more than 50 grant submissions that build from the AHW-funded research.

In addition, Dr. Hillard's team has advanced knowledge in the field through more than 50 publications in established journals and scholarly texts.

Specific successes include two publications in the prestigious *Journal of Neuroscience*. One, by Nashaat Gerges, PhD, included Dr. Olsen as a co-author; the other was led by Sang Hyeong Lee, PhD, and included both Drs. Liu and Olsen as co-authors.

These efforts highlight how important collaborations are to completing impactful, high-quality research studies.

Research advances include creation of novel tools to study schizophrenia, and identification of a novel mechanism by which exposure to neglect in early life results in changes in the brain, among several others.

Relevance

Neurologic disorders affect a large number of Wisconsin residents, and the social and monetary costs of care for neurologic disorders is significant.

Significance to Science and Health

The team's research directly relates to learning and memory disorders, the consequences of addiction, diseases in which neurons are lost, including Parkinson's Disease and ALS, and to chronic pain, all of which are significant problems in Wisconsin.

Cecilia Hillard, PhD
Associate Dean for Research, Director of the Neuroscience Research Center, Professor of Pharmacology and Toxicology

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Development of a Redox Biology Program

Award Amount: $1,600,000 (2011-2017)

MCW MEDICAL SCHOOL

Goal

Create a premier program in redox biology at the Medical College of Wisconsin (MCW) to foster the sharing of ideas and enhance the ability of researchers to translate basic research discoveries into clinical treatments.

Background

Humans obtain energy from food through "oxidation", which is the transfer of an electron from a molecule to oxygen.

The reverse process of gaining an electron is "reduction", and the study of electron transfer is called "redox" biology.

Some redox processes generate free radicals that can damage tissues, including the heart, which leads to heart disease. Free radicals also play an important role in the development of cancer and its spread.

Researchers in MCW's Redox Biology Program study biological processes involving the transfer of electrons and seek to prevent the damage caused by free radicals by studying how the body produces and controls them.

Such work will help Wisconsin residents suffering from diabetes, cancer, and heart disease. Because of the wide role played by free radicals in human disease, this work may help with designing therapies for other diseases in which free radicals participate.

Award Summary

AHW's investment in the MCW Redox Biology Program expanded expertise and capacity in promising areas of basic science and clinically relevant research through the successful recruitment of three investigators.

The Redox Biology Program recruited Brian Smith, PhD, whose research advances knowledge of aging and inflammation in heart disease, as well as cancer, neurodegeneration, diabetes.

In addition, Shayne Squires, MD, a cardiologist who specializes in the area of redox imaging. Dr. Squires is creating new approaches to visually monitor changes in redox status in animals and humans.

Most recently, Dr. Squires and Dr. Smith were joined by Andreas Beyer, PhD, who combines his expertise in genetics and physiology to advance research in vascular biology that could lead to new therapies to reduce heart disease.

The work of the Redox Biology Program is highly collaborative and researchers have partnered with MCW's Neuroscience Center, Cancer Center, and Cardiovascular Center.

To further collaboration, the researchers have continued the Redox Journal Club and Work-in-Progress program to bring together like-minded faculty, which has been increasingly well attended and is proving a great success.

Through seminar series, symposiums, and journal clubs, AHW's investment in the Redox Biology Program is helping to create a collaborative and fertile environment for the exchange of ideas and experimental data.

Committed to fostering education and training of future generations of researchers in this areas, the Redox Biology Program also has provided training opportunities to graduate, post-doctoral and summer students.

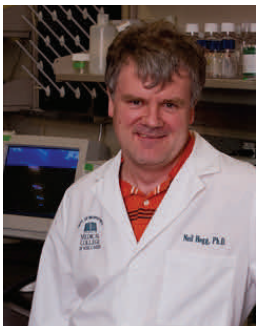
As of the 2016 reporting period, Dr. Hogg and his team have garnered more than $2M in extramural funding and published more than 40 scholarly works contributing to knowledge in the field.

Relevance

Advances in redox biology have the potential to identify new therapies for several leading causes of death, including diabetes, cancer, and cardiovascular disease.

Significance to Science and Health

The researchers seek to advance discoveries in the area of redox biology, an exciting area of biomedical research that studies oxidative stress and the body's ability to counteract this stress by using DNA repair enzymes and/or antioxidants. If not regulated properly, oxidative stress can induce a variety of chronic and degenerative diseases.



Neil Hogg, PhD
Associate Dean of Graduate Students, Director of the Redox Biology Program, and Professor of Biophysics

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Magnetoencephalography (MEG) Research Development Program

Award Amount: $694,124 (2013-2017)

MCW MEDICAL SCHOOL

Goal

Establish a world-class MCW magnetoencephalography (MEG) research program through the support of pilot projects and development of new imaging technologies.

Background

Magnetoencephalography (MEG) is a technique for measuring small changes in magnetic fields produced by the electrical activity of neurons in the brain that can help to produce neural images. MEG has several advantages over other imaging approaches, including the ability to accurately locate specific areas of activity within the brain.

The Froedtert MEG scanner is currently used to evaluate patients in the MCW epilepsy and brain tumor programs. Unfortunately, only a small number of projects so far have used the facility for research. Several factors, including the unavailability of funds for pilot projects, lack of familiarity with MEG methodology among local scientists, and a relatively steep learning curve for MEG data analysis have contributed to this low level of adoption.

AHW's investment in the MEG Research Development Program seeks to promote the MEG's potential as a tool in health research.

Award Summary

AHW's investment in the MEG Research Program has supported a competitive pilot funding program to foster use of the MEG for health research. In addition, Dr. Humphries and his team have developed education and training tools as well as enhanced data analysis and software programs regarding use of the MEG for health research.

Through the pilot funding program, eight awards were funded that advance investigations using the MEG as a research tool.

Examples include a pilot project dedicated to identifying the biomarkers of concussion led by Lindsay Nelson, PhD and a pilot project that explores the spatiotemporal dynamics of attention control led by Merav Sabri, PhD.

In addition, the research team secured funding of the first NIH grant at MCW to use MEG as a primary measure. This award aims to study brain connectivity in Epilepsy using fMRI and MEG is part of the NIH Human Connectome Project. According to NIH guidelines, all collected data for this project will be released to the public, providing a high degree of publicity for MEG research in Wisconsin.

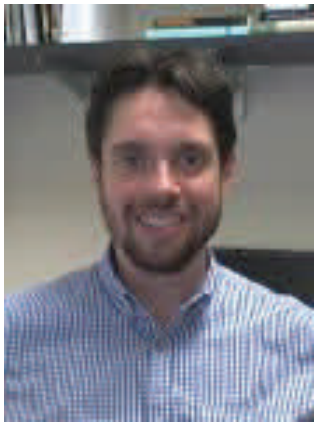
The Program also held an educational workshop and hosted an open house at the MEG scanner to educate the MCW community about MEG.

Relevance

Brain imaging studies are an important tool researchers use to continue exploring the brain's role in health and in disease, and magnetoencephalography (MEG) offers advantages over other imaging approaches.

Significance to Science and Health

Expanding the use of MEG technology will improve research projects that use imaging to better understand how the brain works.



Colin Humphries, PhD
Director of MEG Research,
Assistant Professor of Neurology

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Treatment of Pancreatic Ductal Adenocarcinoma with Combined Immunotherapy, Nox Inhibition, and Altered Chemokine Signaling

Award Amount: $200,000 (2016-2017)

MCW MEDICAL SCHOOL

Goal

Test therapies that alter the normal cells surrounding a tumor (called the tumor microenvironment) in pancreatic ductal adenocarcinoma (PDAC) so that tumor-killing immune cells can reach the tumor and be activated to kill the cancer cells.

Background

Milwaukee County has one of the highest rates of pancreatic cancer mortality in the U.S., 15 percent higher than the national average. Our immune system has the ability to kill cancer cells, but solid tumors alter the microenvironment such that immune cells poorly penetrate the tumor and are inactivated by inhibitory substances. Recent advances to harness the power of the human immune system to fight cancer (called immune therapy) has shown success for leukemia (blood cancer), but not for solid tumors. This research seeks to improve infiltration of immune cells into the tumor using a "homing" molecule called CXCL12, and to reduce production of immune suppressive molecules by inhibiting the enzyme Nox (NADPH oxidase).

It is critical that scientists with diverse backgrounds and expertise work together to develop novel treatments, such as immune therapy.

Award Summary

The AHW Endowment's investment in this initiative enabled Dr. Johnson and his research team to investigate the potential of immune therapy to halt pancreatic cancer progression when used in combination with repurposed FDA-approved Nox inhibitors and a novel immune cell homing molecule produced at MCW.

There is a critical need for new treatments to limit pancreatic cancer progression. Immune therapy is increasingly recognized as a powerful tool in fighting cancer, but it has not worked well with solid tumors, such as pancreatic cancer.

The research approaches undertaken through this initiative are changemaking and have not been previously used for any cancer. The research has the potential to advance to clinical trials using clinical protocols at MCW.

Completion of the proposed work is expected to reveal new strategies and approaches to limit the devastating effects of pancreatic cancer and improve patient survival, especially in areas with high mortality rates, such as Milwaukee County.

During this reporting period, Dr. Johnson's team completed a series of studies to improve detection of tumor reactive lymphocytes in pancreatic cancer.

Further, studies were completed to test a new biologic drug compound developed and unique to MCW in its ability to influence immune suppression by pancreatic cancers. These studies are laying the critical groundwork to a combinatorial approach to activate the immune system and improve its killing of pancreatic cancer.

Relevance

There is a critical need for new treatments to limit pancreatic cancer progression. Immune therapy is increasingly recognized as a powerful tool in fighting cancer, but it has not worked well with solid tumors, such as pancreatic cancer.

Significance to Science and Health

Completion of the proposed work is expected to reveal new strategies and approaches to limit the devastating effects of pancreatic cancer and improve patient survival, especially in areas with high mortality rates, such as Milwaukee County.

Byron Johnson, PhD

Professor, Pediatrics and Microbiology and Molecular Genetics

Co-Investigators: Michael Dwinell, PhD, Professor, Microbiology and Molecular Genetics; Director of the Bobbie Nick Voss Laboratory; Leader of the Tumor Progression and Metastasis Program

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

High Impact Integrated Behavioral and Biomedical Interventions to Eradicate AIDS

Award Amount: $999,395 (2014-2017)

MCW MEDICAL SCHOOL

Goal

Support research to develop and test the efficacy of novel interventions designed to reach HIV-positive persons in the community, connect them to medical care, increase treatment adherence, and thereby reduce transmission of HIV disease.

Background

In the first thirty years of AIDS prevention, campaigns to reduce risk have limited the growth of the HIV epidemic, but have not stopped it.

Recent groundbreaking clinical trials have shown that early treatment with anti-retroviral drugs is now the best available treatment and method of prevention.

Approximately 8,500 Wisconsin residents live with HIV infection.

Significant racial disparities exist among those living with the disease, as new infections disproportionately impact Milwaukee's African American community.

Efforts to decrease HIV transmission will be beneficial to Wisconsin residents and beyond.

Award Summary

The interdisciplinary research team established project operations, conducted interviews, analyzed interview data, and designed a proposed intervention.

A community advisory panel guides the research efforts whose members included representatives from HIV-affected communities, leaders of Wisconsin agencies that serve persons living with HIV infection, community constituencies, and community stakeholders.

Consistent with Wisconsin's HIV epidemiology and incidence trends, interviews were primarily undertaken with men who have sex with men (MSM) especially young African American men in Milwaukee.

Over the past several years, large-scale medical trials have unequivocally demonstrated that MSM who are presently uninfected but at high behavioral risk for contracting HIV infection can be substantially protected from contracting HIV if they follow a daily oral prophylaxis medication regimen.

Based on data showing over 92% protection from HIV afforded by the use of pre-exposure prophylaxis (PrEP) regimens, the CDC and the Wisconsin Department of Health (DOH) now recommend PrEP for MSM at high risk for contracting HIV infection.

However, PrEP uptake in Wisconsin is very low. MCW's Division of Infectious Diseases estimate that only about 50 persons in Wisconsin are on PrEP regimens even though the Wisconsin DOH (2016) estimates that over 8,000 residents are high-risk MSM and are appropriate candidates for PrEP.

Interventions that can increase uptake of PrEP by high-risk but still uninfected MSM carry the potential to dramatically reduce HIV transmissions in Wisconsin, the aim of our AHW project.

Interviews identified several reasons for low PrEP use. Based on this information, our team first developed the protocol for a social network/social media intervention designed to increase awareness, increase benefit perception, and reduce PrEP barriers among high-risk MSM in the community.

Over the coming year, Dr. Kelly and his team will lead an intervention that will enroll and deliver the PrEP awareness and benefit perception intervention to a sample of approximately 130 high-risk MSM community volunteers in Milwaukee.

The innovative approach will combine behavioral and biomedical interventions culturally tailored to the needs of African American MSM in Milwaukee to learn if such approaches are effective in addressing this critical challenge.

Relevance

Decreasing HIV transmission requires an understanding of why HIV positive persons are not receiving regular HIV care, do not adhere to medication regimens, or do not seek HIV testing, among other areas that will be addressed through this investment.

Significance to Science and Health

This work will benefit the health of Wisconsin by identifying and testing strategies that: 1) maintain health and decrease HIV-related morbidities and mortality, and 2) prevent downstream HIV incidence by engaging HIV positive persons in care, thereby reducing viral load infectivity, and the likelihood of HIV transmission to others.

Jeffrey A. Kelly, PhD
Director of the Center for Aids Intervention Research, Professor of Psychiatry and Behavioral Medicine

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Roles of Subcutaneous Adipose Tissue and Adiponectin on the Pathogenicity of Visceral Adipose Tissue

Award Amount: $200,000 (2016-2017)

MCW MEDICAL SCHOOL

Goal

Identify how peripheral adipose tissue (SAT, or subcutaneous fat) protects against metabolic diseases compared to visceral adipose tissue (VAT, or central/abdominal fat) in healthy obese persons, resulting in lower rates of metabolic diseases, such as diabetes.

Background

Visceral obesity with VAT accumulation is associated with type 2 diabetes, cardiovascular disease, and other diseases caused in part by inflammation.

To help control and prevent these emerging health conditions, emphasis has largely been put on weight loss. However, adipose tissue distribution in peripheral skin depots may not be as harmful as previously thought, and may, in fact, be protective. If findings do point to this, they may suggest that "all obesity is not equal." Less emphasis could be placed on weight loss for certain individuals and instead limited health care resources could be shifted to better control other cardiovascular risk factors, such as smoking, hypertension, and type 2 diabetes, which can be present independent of obesity.

Award Summary

The AHW Endowment's investment in this initiative enabled Dr. Kidambi and her research team to identify innovations in obesity treatment by suggesting that "not all fat is equal" and that adipose tissue distribution determines the contribution of obesity to type 2 diabetes and cardiovascular risk.

The research team aims to increase understanding of how different body fats influence metabolic diseases and how SAT may be protective. Ultimately, this knowledge can shift emphasis from weight loss to other measures in order to control inflammatory diseases.

During this reporting period, the research team has recruited 55 subjects to participate in the study.

Significant progress was made in completing the sequencing for small molecules called microRNAs that control other genes.

Preliminary research findings are showing differences in expression of 46 molecules between visceral and subcutaneous adipose tissue depots.

In addition, the research team found seven microRNAs changed in relation to a subject's body mass index and three microRNAs were associated with a protective hormone secreted by fat tissue called adiponectin.

Further research is underway to learn more about the metabolic pathways and their association with obesity-related diseases.

Relevance

Visceral obesity with VAT accumulation is associated with type 2 diabetes, cardiovascular disease, and other diseases caused in part by inflammation.

To help control and prevent these emerging health conditions, emphasis has largely been put on weight loss. However, adipose tissue distribution in peripheral skin depots may not be as harmful as previously thought, and may, in fact, be protective.

Significance to Science and Health

Researchers are learning how peripheral adipose tissue (SAT, or subcutaneous fat) protects against metabolic diseases compared to visceral adipose tissue (VAT, or central/abdominal fat) in healthy obese persons, resulting in lower rates of metabolic diseases, such as diabetes.

Srividya Kidambi, MD, MS

Associate Professor of Medicine—Endocrinology

Co-Investigators: Daisy Sahoo, PhD, Associate Professor of Medicine and Vice Chair for Research; Jon Gould, MD, Chief, Professor, Surgery; Pengyuan Liu, PhD, Associate Professor, Physiology; Leah Solberg Woods, PhD, Associate Professor, Pediatrics

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Improving Clinical Imaging Diagnostics through Use of Cutting-Edge MRI Technology

Award Amount: $500,000 (2015-2018)

MCW MEDICAL SCHOOL

Goal

Improve high-strength magnetic resonance imaging (MRI) technology and techniques to better assess cancer, inflammation, brain degeneration and brain injury.

Background

The implantation of metallic devices has become increasingly common, especially with the rise of joint replacements. The need is projected to continue rising with the age of the population, as 3.5 million knee replacements are projected to be done in 2030. And that is just the prediction for the United States.

Better imaging techniques are needed to assess complications due to tissue inflammation near the implant, as well as to better check for any cancer recurrence near the implant site after treatment for osteosarcoma.

In addition, the researchers aim to implement a number of newly designed techniques to improve clinical monitoring of brain degeneration and traumatic brain injury, among other conditions.

Award Summary

By improving MRI images near metal implants, physicians will be better able to test for a number of potential post–implantation complications, including local tissue inflammation, loosening of the implant, infection and recurrence of osteosarcoma.

These improved tests will improve the ability of physicians to assess the status of an implant and make more informed treatment decisions if any problems arise.

Dr. Koch and his team have made excellent progress toward implementing new techniques to improve the images taken by MCW's most powerful MRI machine, which will enhance imaging for Alzheimer's disease, traumatic brain injury and cancer. Currently, work is underway to develop and refine techniques to help physicians look for abnormal iron levels that will help in imaging of cancer and micro-bleeds in the brain indicative of head trauma.

Outcomes anticipated as a result of this research include:

- improvements in clinical imaging near implants to better assess cancer recurrence and inflammation; and,
- implementation of a number of new MRI techniques to improve imaging of cancer, traumatic brain injury and brain degeneration.

During this reporting period, the research team disseminated its findings through five conference abstracts, three podium presentations, and one accepted manuscript in a leading academic journal. Two newly filed patent disclosures and five additional manuscripts are in development based on data acquired in just the past year.

The success of this award may lead to significant new intellectual property regarding enhanced clinical MRI techniques.

This award features collaboration within the Departments of Biophysics and Radiology. The team also includes members from the Departments of Neurosurgery and Orthopaedic Surgery.

Relevance

Better imaging techniques are needed to assess complications due to tissue inflammation near the implant, as well as to better check for any cancer recurrence near the implant site after treatment for osteosarcoma.

Significance to Science and Health

By improving MRI images near metal implants, physicians will be better able to test for a number of potential post–implantation complications, including local tissue inflammation, loosening of the implant, infection and recurrence of osteosarcoma.

Kevin Koch, PhD
Biophysics and Radiology

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Ensemble Prediction Models for Personalized Therapy and Survival Analysis

Award Amount: $200,000 (2015-2017)

MCW MEDICAL SCHOOL

Goal

Develop new statistical techniques for predicting the success of stem cell transplants used to treat many disorders of the blood.

Background

Hematopoietic stem cell transplant is a curative treatment for patients with many blood disorders. The outcomes, however, are highly dependent on genetic factors in both the patient and the donor as well as the interaction between these factors. The use of a donor who is not a perfect genetic match results in Graft Versus Host Disease, a devastating immune system complication that reduces quality of life and can be deadly. The disease leads to frequent hospital readmissions, and its treatment is both expensive and not particularly effective.

Award Summary

The availability of Big Data in biomedical applications has never been greater and continues to grow. Population health databases can link information on large numbers of patient characteristics, including genetic information, with clinical outcomes. These databases can be examined to develop better prediction models for patient outcomes and more effectively tailor treatment to individual patients by predicting how they will respond to different treatments.

The research team is working to develop new statistical methods that will better predict patient outcomes. The investigators expect that these methods will improve the selection of donors, reduce the probability of Graft Versus Host Disease, and increase patients' post-transplant quality of life.

This award features strong collaboration across multiple disciplines and areas of biostatistics. In addition, researchers with the University of Wisconsin-Madison are partnering with the research team.

To-date, the team has demonstrated that a method of generating individualized treatment rules to improve patient care and outcomes is superior to leading methods available at this time.

Much research in this area has focused on optimizing classification of patients into treatment groups. However, the research team is exploring an approach that takes a conceptually different strategy by focusing on improved predictions and using those to recommend treatments.

Simulation studies conducted by the research team have shown that this shift in approach has resulted in better performance in terms of expected patient outcomes.

The researchers are continuing to advance this area of their work and anticipate that use of this method will improve patient treatment and outcomes for a variety of diseases suffered by Wisconsin residents.

Relevance

Population health databases can link information on large numbers of patient characteristics, including genetic information, with clinical outcomes. These databases can be examined to develop better predictions of how patients will respond to different treatments in complex diseases such as Graft Versus Host Disease. and result in more effective, tailored treatment to individual patients.

Significance to Science and Health

The research team is working to develop new statistical methods that will better predict patient outcomes. The investigators expect that these methods will improve the selection of donors, reduce the probability of Graft Versus Host Disease, and increase patients' post-transplant quality of life.

Brent Logan, PhD,

Institute for Health and Equity (Biostatistics)

Co-Investigators: Rodney Sparapani, PhD, Institute for Health and Equity (Biostatistics) and Purushottam Laud, PhD, Institute for Health and Equity (Biostatistics) and Bronwen Shaw, MD, PhD, Medicine

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

An Innovative Model for Educating the Pharmacists of the Future: Pharmacy School Design and Development

Award Amount: $3,024,132 (2015-2017)

MCW MEDICAL SCHOOL

Goal

Design and develop a School of Pharmacy at the Medical College of Wisconsin to address workforce needs in rural and urban underserved communities in Wisconsin.

Background

In Wisconsin, there is a continuing maldistribution of pharmacists in medically-underserved communities. MCW aims to emphasize student clinical training in these locales. With an aging population and health care changing to emphasize team-based preventive care, pharmacists must adapt and deliver primary care to meet the rising need. MCW aims to prepare pharmacists to provide quality care in a team setting.

Award Summary

AHW's investment in the School of Pharmacy aims to reshape pharmacist training in Wisconsin to focus on the pharmacist of the future.

The proposed School of Pharmacy will train pharmacists to provide patient–centered care in a team-based model, enabling pharmacists to provide direct support to address community health needs.

MCW will explore a three-year curriculum that is rigorous yet time efficient, allowing pharmacists to enter residency or the workforce more quickly. The program will emphasize interprofessional education to prepare pharmacists that deliver cost-efficient primary care within a team-based model of care.

To-date, the School of Pharmacy has made significant progress in creating the Pharmacy School curriculum.

Highlights of accomplishments include:

- Recruitment of the founding dean for the School of Pharmacy
- Initiated the accreditation processes through the Higher learning Commission and Accreditation Council for Pharmacy Education
- Developed the Doctor of Pharmacy (PharmD) curriculum
- Developed the course schedule and delivery methods
- Developed student and educational services
- Coordinating inter-professional education experiences
- Collaborating to identify introductory pharmacy practice experiences (IPPEs) and applied pharmacy practice experiences (APPEs)
- Proposing evaluation methods for the students and faculty

In addition, Dr. MacKinnon and the School of Pharmacy team are working on the student application and admissions process. It is expected that the first provisional admission offers will be sent out in early 2017.

MCW's graduating pharmacists will be able to practice at the top of their licenses due to Wisconsin's regulations that promote the role of pharmacists in health care. The core curriculum will be taught at MCW's Milwaukee campus, yet students will be able to complete practice experiences at health care partners of MCW's campuses in Green Bay and Central Wisconsin. By building upon these key partnerships, MCW will create pathways for addressing pharmacist shortages in Green Bay and Central Wisconsin.

Relevance

In Wisconsin, there is a continuing maldistribution of pharmacists in medically-underserved communities. MCW aims to emphasize student clinical training in these locales. With an aging population and health care changing to emphasize team-based preventive care, pharmacists must adapt and deliver primary care to meet the rising need.

Significance to Science and Health

Through the development of a School of Pharmacy at MCW, the project team will innovate by emphasizing interprofessional education to prepare Wisconsin's pharmacists of the future.

George MacKinnon III, PhD, RPh
Founding Dean and Professor
MCW School of Pharmacy

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Defining the Nature and Extent of Nervous System Trauma and Its Modifications: New Strategies

Award Amount: $1,053,108 (2015-2020)

MCW MEDICAL SCHOOL

Goal

Improve the diagnosis and treatment of brain injuries, including concussions, and other forms of nervous system trauma.

Background

Wisconsin has a higher rate of per capita brain injuries than the national average, which makes improving diagnosis and treatment even more important in Wisconsin.

Concussions are a significant source of nervous system trauma. While much continues to be learned about concussions, results to-date indicate that patients lacking appropriate care may develop post-concussion syndrome and potentially suffer long lasting effects on functionality, learning and behavior. Even minor brain injuries, if repeated, may lead to the accumulation of nervous system trauma and cause permanent brain damage.

Award Summary

Recent research has demonstrated that mild traumatic brain injuries, including concussions, alter the metabolism of blood flowing in the brain. While this metabolism problem normalizes relatively quickly in most patients, abnormalities after one month are associated with more severe post-concussion symptoms.

By better understanding this phenomenon, the investigators aim to develop methods for using blood samples to diagnose the presence and severity of injury.

Two talented researchers were recruited with expertise that can advance this important area of study.

Timothy Meier, PhD, studies the metabolic pathways associated with head injury. Antje Kroner-Milsch, MD, PhD, has worked extensively in studying the characterization of specific cells involved in spinal cord injury and has published in the most prominent journals in the field of neuroscience.

These scientists are studying the effects of repeated concussions. Chronic concussions may lead to brain tissue loss due to the blood containing abnormal amounts of a substance that destroys nerve tissue. This research may lead to new treatments for major nervous system traumas and those that are minor but repeated.

As a result of the AHW investment, the research team have established a database of existing data and analyzing inflammatory markers to help better establish the neurophysiological mechanisms of mild traumatic brain injury in patients that do not show typical recovery.

While the investigators will continue to advance research in this area and to work to improve MRI brain scans related to nervous system trauma and concussion, they also aim to develop a new, simplified procedure for diagnosing concussions, assessing their severity and monitoring patient recovery. The protocol is likely to include a neurological exam and a blood test. In addition, the researchers aim to create methods for enhancing healing after a patient suffers major nervous system damage. Many patients would benefit from new methods to slow or reverse progression of dysfunction from serious nervous system damage.

Relevance

Wisconsin has a higher rate of per capita brain injuries than the national average, which makes improving diagnosis and treatment important for the people of Wisconsin.

Chronic concussions may lead to brain tissue loss due to the blood containing abnormal amounts of a substance that destroys nerve tissue.

Significance to Science and Health

AHW's investment in this award supports research that may lead to new treatments for major nervous system traumas and those that are minor but repeated.

Dennis Maiman, MD, PhD
Professor of Neurosurgery

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Neuroimaging Research Program- Neuroscience Translational Research Initiative

Award Amount: $749,995 (2011-2017)

MCW MEDICAL SCHOOL

Goal

Build a Neuroimaging Research Program committed to using emerging radiologic techniques to develop new means of diagnosing neurologic disorders and measuring neurological changes following treatment.

Background

The more than 600 known neurological disorders, which include stroke, epilepsy and Parkinson's disease, impact the lives of 50 million Americans each year according to estimates from the National Institutes of Health's Institute of Neurological Disorders and Stroke. The future of both experimental and clinical neuroscience research will increasingly emphasize advanced imaging capabilities. In recent years, rapid evolution of imaging science has made it possible to identify disease in unique ways.

Ultimately, these advances in medical imaging will improve long-term outcomes for patients suffering from neurological disease and injury. There is a high likelihood that such techniques will allow clinicians to begin therapies much earlier, and hopefully improve the health of patients in Wisconsin and elsewhere. Furthermore, it will also allow us to evaluate changes associated with disease and treatment, and thus, make decisions that will affect the quality of peoples' lives.

Award Summary

AHW's investment in the Neuroimaging Research Program led to the recruitment of two researchers whose work is positioned to improve the health of the people of Wisconsin.

Matthew Budde, PhD, uses brain imaging to detect and monitor injury in the nervous system such as traumatic brain injury (TBI), spinal cord injury, and stroke. As a result of Dr. Budde's research, an approach has been developed that can assess spinal cord injury in less than 5 minutes and provides a single metric of injury severity immediately after completion of the scan. This is a significant improvement on existing methods that require extensive post-processing and computational time. This work has the potential to have a meaningful impact on spinal cord injury patients once adopted in the clinical setting. For example, the technique could be predictive in determining if patients will likely respond to surgical treatment as opposed to those who will not.

L. Tugan Muftuler, PhD, studies spinal cord anomalies and his work indicates that the deterioration of the disc endplate, which separates the vertebrae, has a direct effect on back pain by affecting blood flow and nutritional delivery to the disc.

Dr. Muftuler also continues his work to improve MRI imaging technology for neurodegeneration issues such as Alzheimer's disease. The advances improve image resolution and allow rapid scanning. The research team is also applying this technique in studying long-term brain injury after concussion.

To-date, the Neuroimaging Research Program has resulted in more than $2.5M in extramural funding and 20 publications in scholarly journals.

Relevance

The researchers are building a Neuroimaging Research Program committed to developing new means of diagnosing neurologic disorders and measuring neurological changes following treatment.

Significance to Science and Health

Each year, 50 million Americans are affected by more than 600 known neurological disorders. Through the Neuroimaging Research Program, these patients will have access to new treatment options and advanced care.

Dennis Maiman, MD, PhD
Professor, Neurosurgery

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Population Health Improvement: Research and Education to Help Patients and Employees with Diabetes or Cancer

MCW MEDICAL SCHOOL

Award Amount: $1,800,000 (2013-2017)

Goal

To establish a research infrastructure to improve population health, initially focused on diabetes control for patients and employees through better coordinated, patient-centered care to ultimately increase affordable, equitable access to quality services.

Background

26 million Americans have diabetes. Another 79 million have pre-diabetes in which heart complications begin.

Despite prevention and treatment options, many individuals lack education, motivation, and support in modifying their lifestyle.

Through a focus on diabetes control, the project aims to help participating patients and employees make improvements toward achieving stable blood sugar, normal cholesterol and blood pressure, decreased tobacco use and lower body-mass index.

Award Summary

During the reporting period, the project team, led by Staci Young, PhD, held focus groups of 115 adults with diabetes and 15 clinicians, which demonstrated some important themes.

First is improvement in patient and provider communication: patients need encouragement and motivation, relationship building, compassion, and to identify communication preferences for in-person and for MyChart email.

Second was health service delivery: clinicians need support for patient health education, care coordination, data management, and the financial resources to achieve performance outcomes and cost control.

Third was self-care and management: patients need family and social support of diet/nutrition and physical activity, help with the financing the costs of self-care, and help facing emotional challenges and stigma.

These themes provide a conceptual framework for quality improvements in care coordination initiatives.

Additionally, a value-stream mapping effort in ambulatory care settings for 28 diabetes patient visits significantly improved hemoglobin A1c and micro-albumin testing, as well as patient satisfaction at a pilot clinic. Sergey Tarima , PhD, is leading analysis of hypertension and depression in the Clinical Research Data Warehouse sample of 10,000 patients with diabetes.

The research team has produced six publications in scholarly journals in diverse areas of population health management, sociology, ethics, diabetes self-management, ambulatory care, among other areas.

In addition, AHW's investment in the Population Health Improvement initiative advanced capacity building efforts to expand education and training opportunities in population health management.

During this reporting period, a graduate certificate program was launched in Population Health Management as well as a new certificate in Community Health Needs Assessment and Planning.

Relevance

26 million Americans have diabetes, and many also have cancer. Another 79 million have pre-diabetes in which heart complications begin. Despite prevention and treatment options, many individuals lack education, motivation, and support in modifying their lifestyle.

Significance to Science and Health

Through a focus on diabetes control, the project aims to help participating patients and employees make improvements toward achieving stable blood sugar, normal cholesterol and blood pressure, decreased tobacco use and lower body-mass index. The project also aims to decrease the cost of diabetes care and optimize the rate of needed referrals.

John Meurer, MD, MBA
Professor and Director, Institute for Health and Society

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Patient-Centered Outcomes Research Program

Award Amount: $900,000 (2012-2017)

MCW MEDICAL SCHOOL

Goal

Advance the health of Wisconsin populations through improving methods for conducting patient - centered outcomes research, and applying those methods to key Wisconsin health issues.

Background

Treatment and prevention for chronic diseases and conditions such as obesity, diabetes, and cardiovascular disease have experienced significant advancement over the last few years. The adoption of these discoveries into real-life practice continues to lag behind, particularly for underserved patients and populations, and the impact of these gaps on treatment outcomes is substantial. This program has the potential to improve the diagnosis, treatment, and adoption of best treatment practices of a number of chronic conditions relevant to people in southeast Wisconsin.

Award Summary

A main purpose of the award is to increase capacity in outcomes research through recruitment of faculty expertise.

The Program successfully recruited two faculty to advance patient-centered outcomes research.

Onur Asan, PhD, specializes in human factors engineering. His research advances understanding of how technology influences people and health outcomes in health systems. For example, Dr. Asan's research has led to new knowledge regarding the impact of the electronic health record on health system workflow, quality of patient/physician interactions, patient safety, among other areas.

Dr. Asan's published his research findings in peer-reviewed journals.

In addition to Dr. Asan, the Program recruited Cynthia Kay, MD, a VA-supported researcher who studies the way chronic non-cancer pain is managed with an emphasis on the role of opioids in pain management.

The Program also furthers outcomes research through a small seed research grants program. Seed research grants were awarded through three funding cycles to a total of five investigators for $15,000 one-year research awards.

The study start-up funds reflected in these five seed awards have the potential of leading to extramural funding.

Seed grants are exploring the value of yoga therapy in chronic low back pain management, clinical outcomes of invasive bedside procedures, development of a osteoporosis clinical registry, among other areas.

A recent seed grant funded study explores barriers to obesity reduction among African American women in Milwaukee. Despite the high prevalence of obesity among African American women, recruitment of African American women in weight reduction interventions and health behavior research is very low. The study aims to explore the underlying factors limiting weight reduction program specific to this population.

To-date, AHW's investment in the Patient-Centered Outcomes Research Program has garnered $1.5M in extramural funding and 20 publications in scholarly journals.

Relevance

This program has the potential to improve the diagnosis, treatment, and adoption of best treatment practices of a number of chronic conditions relevant to people in Milwaukee and southeast Wisconsin.

Significance to Science and Health

This project will help narrow the gap between what is known to improve patient outcomes and how health care providers and patients act upon this knowledge to improve health. Data generated by this project will also inform how healthcare can be redesigned to achieve better outcomes with reduced spending.

Ann Butler Nattinger MD, MPH, MACP
Senior Associate Dean for Research,
Director of the Center for Patient Care and Outcomes Research
Professor of Medicine

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Clinical Effectiveness Research - Improving the Value of Healthcare

MCW MEDICAL SCHOOL

Award Amount: $300,000 (2013-2017)

Goal

Improve health outcomes for children across the continuum of care by generating, evaluating, synthesizing, and disseminating research findings that ultimately provide the evidence to enhance medical decisions made by patients and their health providers.

Background

Clinical Effectiveness Research (CER) is an area that is designed to address improvements in health care by providing better evidence for what works best for patients.

New evidence will guide health care decisions to improve health care delivery and improve patient outcomes. Because CER research is not limited to a specific disease, there is the possibility for any disease to be studied and treatment approaches improved.

This work will benefit the larger goals of the Center for Clinical Effectiveness Research (CCER), whose goals are to develop and implement key resources to stimulate, facilitate, and support high-quality, high-impact clinical effectiveness research.

Award Summary

AHW's investment in the Clinical Effectiveness Research Program has resulted in the expansion of new research collaborations advancing this important area of study improved quality healthcare.

To-date, the Clinical Effectiveness Research team has led to more than 45 new collaborations to advance clinical effectiveness research.

The collaborations were with internal and external groups, and consisted of a national research network workgroup on sickle cell disease; a newly formed sickle cell foundation; internal groups like CTSI and CRI; individual researchers at MCW; and external groups like the Patient-Centered Outcomes Research Institute (PCORI), NIH and the Cincinnati Children's Hospital Medical Center.

A collaboration with the Clinical and Translational Science Institute bioinformatics team resulted in the creation of computable phenotypes and the use of a i2b2 data warehouse for sickle cell patients. The i2b2 data warehouse enables researchers to identify patient cohorts with specific demographics and clinical encounter characteristics, among other data. No patient identifies or clinical data is revealed through the database, however, the information retrieved is very helpful to advancing clinical effectiveness research for sickle cell patients.

In addition to research efforts, the team is committed to enhancing mentoring and training opportunities to foster future generations of clinical effectiveness researchers.

Enhancing communication, information sharing and awareness for clinical effectiveness research continues to be a priority of the award. The Program distributes monthly newsletters to the campus community to communicate CER activities and highlight publications, conferences, training events, and funding opportunities.

Relevance

By examining existing data or conducting new studies, clinical effectiveness researchers generate new knowledge that patients and their health providers can use to make informed health decisions.

Significance to Science and Health

Advances in comparative effectiveness research are key to advancing innovation, developing new therapies, and ensuring that optimal health care decisions are made for the people of Wisconsin.

Julie Panepinto, MD, MSPH
Director of the Center for Clinical Effectiveness Research of the Children's Research Institute, Professor of Pediatrics/Hematology

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Genetic Mapping and Gene Identification in Acute Kidney Injury Using Outbred Rats

Award Amount: $200,000 (2015-2017)

MCW MEDICAL SCHOOL

Goal

Uncover specific genes that increase the risk of acute kidney injury, a deadly complication that can occur along with other illnesses or during a surgical procedure.

Background

When acute kidney injury arises as a complication of another illness or during a surgical procedure, the patient's risk of death also increases.

Acute kidney injury happens in approximately seven percent of hospitalized patients and about 20 percent of critically ill patients.

Acute kidney injury, which can happen during treatments ranging from cardiac surgery to kidney transplantation, does not have any effective treatments. Clinical data have only been able to predict a small portion of patient risk.

Genetics may hold the key for better identifying patients that are at greater risk so that preventive methods can be developed to reduce the likelihood of acute kidney injuries and save lives.

Award Summary

Prior research in rodents revealed the importance of genetic factors in the risk of acute kidney injury. Human studies have strengthened those findings, but also have struggled to discover which specific genes are the important ones to investigate.

By advancing knowledge regarding the specific genes that increase risk for acute kidney injury, the researchers may pave the way for long-term improvement in clinical practice so that patients' risk for acute kidney injury is accurately assessed and methods for prevention developed and implemented.

Researchers are increasingly interested in uncovering the genetic basis of risk for acute kidney injury.

Few direct, causal genetic links have been found due to the complexity of the genetic relationships and the lack of appropriate rodent models to use as research subjects.

The team and resources assembled for this research study have the correct expertise, rodent models and genetic sequencing technologies to overcome the barriers that have stymied earlier research on the topic.

To-date, the research team has completely characterized (phenotyped) the severity of acute kidney injury in 470 rats and have found a wide degree of variability in the severity of acute kidney injury in this population that mimics the variability seen in the human condition. The team has begun the process of sequencing the genes of the rats to fully characterize each rats unique genetic code (genotyping).

The research study is the first large-scale study to use a genome-wide association approach to identify genes that modulate susceptibility to acute kidney injury in rodents. This approach bridges the gap between genome-wide association studies in humans with acute kidney injury and traditional experimental studies in rodents.

By identifying new genes that increase risk for acute kidney injury, this research may improve clinical practice by providing a genetic map to use in larger clinical studies. As those studies use this map to validate methods for screening human patients for acute kidney injury risk, clinics will be better able to develop and implement methods for preventing and mitigating acute kidney injuries.

Relevance

Acute kidney injury, which can happen during treatments ranging from cardiac surgery to kidney transplantation, does not have any effective treatments. Clinical data have only been able to predict a small portion of patient risk.

Genetics may hold the key for better identifying patients that are at greater risk so that preventive methods can be developed to reduce the likelihood of acute kidney injuries and save lives.

Significance to Science and Health

This award will uncover specific genes that increase the risk of acute kidney injury, a deadly complication that can occur along with other illnesses or during a surgical procedure.

Kevin R. Regner, MD, MS, FASN

(Principal Investigator)

Chief and Associate Professor, Medicine (Nephrology)

Co-Investigator: Leah Solberg Woods, PhD, Associate Professor, Pediatrics (Genomics)

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

CTSI Mentored Clinical Translational Research Scholars Program

Award Amount: $1,980,000 (2011-2017)

MCW MEDICAL SCHOOL

Goal

Improve human health by transforming the research and training environment to expand and enhance the career development of junior faculty as independent investigators through a mentored clinical and translation research experience.

Background

Junior medical faculty members often wish to pursue careers in biomedical research but do not have protected time, research experience, or dedicated research funding. Enhancing the career development of junior medical faculty members through mentored research will establish new investigators focused on clinical and translational science.

Award Summary

AHW's investment in the CTSI Mentored Clinical Research Scholars Program provided resources for four MCW junior faculty to develop as independent clinical/translational investigators in the Clinical Research Scholars Program.

The program provided each scholar three years of salary support and research training support. It addresses the individualized preparation needs of trainees from diverse backgrounds. The curriculum is broad in scope in terms of opportunities available and length of training.

Training includes coursework through a structured clinical-translational research curriculum; interactions with multidisciplinary research centers; mentoring; the establishment of research colleague network; the development of a research-career professional portfolio; and the opportunity to participate in an interdisciplinary research project under the guidance of a mentor.

John Densmore, MD, was the program's first scholar. Dr. Densmore is an Assistant Professor of Pediatric Surgery at MCW. His areas of expertise include rodent models of injury, NO analysis, protein analysis, microvessel preparations, eNOS signaling, and cell culture. Dr. Densmore and his team studied the mechanism of microparticle-induced lung injury in an effort to develop a meaningful intervention in microparticle-induced lung injury to benefit critically ill patients.

Venkatesh Sampath, MD, completed his third year of AHW funding and received an NIH-funded R01 grant. In addition, Dr. Sampath published several manuscripts related to his original research project dealing with gene-environment interactions in bronchopulmonary dysplasia, and transitioned to a project studying genetic factors contributing to necrotizing enterocolitis in premature infants. This last project received additional funding by a CTSI pilot award and has recently been funded by an NIH R01 grant.

Arash Babaei, MD, completed his third year of AHW support and is studying the basis for swallowing difficulties (dysphagia) in patients with various clinical disorders. In addition, he was author or co-author of several manuscripts related to studies of dysphagia, and co-investigator of two NIH-funded grants related to mechanisms of dysphagia.

Carmen Bergom, MD, PhD, completed her second year of support and is studying the role of DiRas proteins in protection from breast cancer. In addition, Dr. Bergom co-authored five publications dealing with genetic modifiers of breast cancer.

Relevance

Junior medical faculty members often wish to pursue careers in biomedical research but do not have protected time or dedicated research funding.

Significance to Science and Health

Enhancing the career development of junior medical faculty members through mentored research will establish new investigators focused on clinical and translational science.

Reza Shaker, MD
Senior Associate Dean and Director, Clinical and Translational Science Institute, Professor and Chief of Gastroenterology and Hepatology

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

CTSI Mentored Clinical and Translational Research Training Program and Pilot and Collaborative Clinical and Translational Research Program

Award Amount: $5,327,956 (2015-2020)

MCW MEDICAL SCHOOL

Goal

Improve health by transforming the research and training environment for junior physician-scientists and advance new discoveries in clinical and translational research through the Clinical and Translational Science Institute of Southeastern Wisconsin (CTSI).

Background

Translational research is one of the most promising fields of medical research today. Ultimately, translational research leads to new clinical treatments by translating scientific knowledge into new tools and methods to improve patient care. The translational spectrum moves from research into the biological basis of health and disease to interventions that improve the health of individuals and populations.

While biomedical research has led to extraordinary improvements in many areas of medicine, effective therapies to address several diseases are still greatly needed. By preparing a stronger workforce skilled in research along the translational spectrum, the CTSI can advance more research aimed at bringing optimal interventions and practices into clinics and communities.

The KL2 mentorship program will recruit and nurture young investigators who would otherwise lack protected research time and have limited access to funds for conducting translational research.

Using separate funding strategies for basic science and population health, the innovative pilot and collaborative grants program will support the testing and growth of promising ideas in clinical and translational science to turn basic scientists' laboratory results into better clinical practice.

By enhancing career development opportunities for early career scientists, the KL2 mentored training program will expand the breadth and depth of clinical and translational research being conducted by CTSI members.

By fostering a positive environment for biomedical researchers, healthcare providers, educators, citizens, and members of industry, the pilot and collaborative grant program facilitates diverse groups working together to translate fundamental discoveries into better health for Wisconsin.

Award Summary

Translational research, broadly defined, aims to find and test new or improved therapies derived from basic science discoveries. AHW's investment supports two programs within CTSI.

To-date, five junior faculty were selected to develop as independent clinical and translational investigators.

Twelve new research awards totaling $600K were launched that bring together interdisciplinary research teams to enhance discoveries leading to better treatments and cures for Wisconsin's leading diseases.

This award has the potential to leverage an estimated $20+ million in NIH funding. Also, both programs support future extramural grant applications. Scientists who conduct mentored research are better positioned to obtain external funding, as are teams that obtain promising preliminary data through pilot and collaborative grants.

The long-term goal for both programs is to support and enhance clinical and translational research to improve community health.

Relevance

NIH recognizes increasingly recognizes community engagement as essential to addressing health disparities. Many studies also show that community engagement in research improves the translation of research discoveries into the improved health of communities.

Significance to Science and Health

The MCW Community Engagement Core will advance community engagement in research by creating a core resource center that provides expertise, training, and other resources to aid MCW researchers and community partners in bettering the health of Wisconsin residents.

Reza Shaker, MD
Senior Associate Dean and Director, Clinical and Translational Science Institute and Professor and Chief, Medicine (Gastroenterology)

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Microbial Approaches for the Treatment of Multi-Drug Resistant Enterococcus

Award Amount: $200,000 (2016-2017)

MCW MEDICAL SCHOOL

Goal

Eradicate multi-drug resistant strains of enterococci bacteria from the gastrointestinal tract without disrupting host microbiota in order to prevent systemic infection from, and spread of, drug-resistant organisms.

Background

Enterococci bacteria are among the three most common causes of hospital-acquired infection. Many of these infections are caused by multi-drug resistant enterococci (MDRE), rendering antibiotics ineffective.

Antimicrobial resistance has been increasing rapidly. While the current approach has been to use multiple combinations of antibiotics, this may be ineffective and result in massive disruption of the intestinal microbiome.

Using multiple combinations of antibiotics may also exacerbate the disease and cause secondary complications, such as increased susceptibility to intestinal and system infections, and increased local and systemic inflammation.

Led by Dr. Salzman, the research team is testing a new approach to prevent and reduce MDRE infections.

Award Summary

The AHW Endowment's investment in this initiative enabled Dr. Salzman and her research team to use a new approach for preventing and reducing MDRE infections.

Rather than attempting to eliminate resistant infections once they have occurred, the researchers aim to prevent infections and reduce the spread of MDRE, by preventing MDRE from colonizing and spreading from the gut. Using targeted microbial therapy to achieve this goal is a new approach that will prevent undesirable collateral damage to the GI tract and preserve beneficial microbes that reside there.

This approach is expected to prevent the infection and curtail the spread of MDRE within hospitals and other environmental contamination.

During this reporting period, Dr. Salzman and the research team made excellent progress toward testing a therapeutic strain of enterococcus that is capable of eliminating MDRE in GI tract of mice. This strain of bacteria promises to be effective in vivo to eliminate enterococcal colonization and reduce enterococcal expansion.

Findings from this research could be applied to benefit susceptible hospitalized populations, but could also be applied agriculturally, to prevent transmission of these organisms into food. The rapid increase in multi-drug resistant bacteria, combined with the lack of effective antibiotics, supports the need for novel and effective approaches, such as those proposed and validated by this work.

Relevance

Antibiotic resistance is growing yet development of new antibiotics effective against resistant strains lags behind. Therefore, there is an urgent need for new approaches to address antibiotic-resistant infections.

Significance to Science and Health

Rather than attempting to eliminate resistant infections once they have occurred, the researchers aim to prevent infections and reduce the spread of MDRE, by preventing MDRE from colonizing and spreading from the gut.

Nita H. Salzman, MD, PhD
Professor, Pediatrics and Microbiology and Molecular Genetics

Co-Investigators: Christopher Kristich, PhD, Associate Professor, Microbiology and Molecular Genetics; Michele Battle, PhD, Associate Professor, Cell Biology, Neurobiology and Anatomy

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

MCW Tissue Bank

Award Amount: $5,219,068 (2010-2020)

MCW MEDICAL SCHOOL

Goal

Centralize the collection, storage, and distribution of human specimens to be used for research at the Medical College of Wisconsin and partnering institutions, and to sponsor cooperative research programs, specimen-based basic research, and translational research.

Background

Having access to human tissue specimens is crucial for advances in biomedical science and developing disease therapies.

Cancer is a health priority for Wisconsin due to it being an important contributor to mortality in Wisconsin, and the second most common cause of death in the United States.

Cancer is a primary area of research supported by the MCW Tissue Bank, which serves as the Tissue Procurement Core for the MCW Cancer Center to meet the scientific needs and objectives to become a National Cancer Institute designated Cancer Center.

The central tissue bank provides the resources necessary for individual faculty members to acquire tissue samples for research, expediting MCW's tissue-based translational research.

Award Summary

During this reporting period, the MCW Tissue Bank continued to grow its consent program and overall collection of specimens.

In the prior reporting period, the MCW Tissue Bank had 6,321 tissue samples, 18,050 blood samples, and 877 bone marrow samples banked.

In this reporting period, the Bank had 12,344 tissue samples, 42,274 blood samples, and 5,543 bone marrow samples banked.

This is an increase of 6,023 tissue samples (49% increase), 24,224 blood samples (57% increase), and 4,666 bone marrow samples (84% increase).

The bank concentrated efforts to grow its Cord Blood Banking Program. In addition to consenting more participants and training OBGYN clinic staff to obtain consent for the Cord Blood Banking Program, the Bank broadened the scope of the program to include banking of discard placenta, umbilical cord, and a one-time peripheral blood draw in addition to cord blood collection.

The ongoing efforts of the MCW Tissue Bank to collect, store, and distribute human specimens to basic and clinical researchers is a clear benefit Wisconsin residents. The project team will continue working toward its goal through the next reporting period.

Relevance

Cancer continues to be a national disease focus and is an area of research that benefits tremendously from access to patient specimens. The MCW Tissue Bank serves as the Tissue Procurement Core for the MCW Cancer Center to meet the scientific needs and objectives of a National Cancer Institute designated Cancer Center.

Significance to Science and Health

A central tissue bank provides the resources required for individual faculty members to acquire tissue samples for research, and the MCW Tissue Bank continues to expedite MCW's tissue-based translational research.

Saul Suster, MD
Chairman and Professor, Department of Pathology and Laboratory Medicine

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Cancer Biomarkers for Early Detection and Prediction of Clinical Outcomes

Award Amount: $1,309,260 (2012-2017)

MCW MEDICAL SCHOOL

Goal

Strengthen critical research fields of cancer genetics and translational research in the Medical College of Wisconsin Cancer Center.

Background

Small noncoding RNAs that are 19-23 nucleotides long, known as microRNAs (miRNAs), are involved in almost all biological mechanisms during carcinogenesis.

Recent studies show that miRNAs released from live cells are detectable in body fluids and may be taken up by other cells to confer cell-cell communication. These released miRNAs (here referred to as extracellular miRNAs) are often protected by RNA-binding proteins or embedded inside circulating microvesicles.

Due to their relative stability, extracellular miRNAs are believed to be promising candidates as biomarkers for diagnosis and prognosis of disease, or even as therapeutic agents for targeted treatment.

In addition, studies have shown that DNA released into the blood from dead tumor cells is detectable. Due to frequent DNA variations in tumor cells, detection of tumor-related DNA is believed to be an attractive approach for early diagnosis of cancer and outcome prediction.

Award Summary

The research team validated 2 miRNA markers for prediction of overall prostate cancer survival in an additional 100 advanced prostate cancer patients.

The team built a multivariate statistical model to estimate survival. This model showed better performance in risk assessment than a clinical factor-based model. This result was published in the journal *European Urology,* a highly regarded journal in the field.

In addition, Dr. Wang's team tested the plasma in 20 advanced prostate cancer patients and eight early stage lung cancer patients for tumor DNA.

With the use of advanced DNA sequencing technology, the team detected gene signatures indicative of tumor DNA; these sequences were sensitive biomarkers for prediction of treatment effectiveness.

The research team also found that early detection of lung cancer is possible by using the plasma DNA.

The findings of this research were published in the scientific journal *Oncotarget*.

Dr. Wang has published in 10 academic journals to disseminate his reserach findings in the field. In addition, he has secured more than $500K in extramural funding to leverage AHW's investment in expanding this important area of cancer research.

Relevance

Prostate cancer is the most common non-skin cancer among male Wisconsin residents, accounting for 28 percent of new cases diagnosed in Wisconsin men between 2003 and 2007. The work could lead to early detection and treatment advances in prostate as well as other cancers.

Significance to Science and Health

This may be the first study to employ next-generation sequencing technology to identify biological markers in micro-vesicles, which are containers of genetic information residing in human plasma and other fluids. This advance may help physicians detect and treat prostate cancer.

Liang Wang, MD, PhD
Professor of Pathology

This award was funded by the Advancing a Healthier Wisconsin Endowment at the Medical College of Wisconsin.

Developing an Anesthesiologist Assistant Program at MCW

Award Amount: $969,426 (2015-2018)

MCW MEDICAL SCHOOL

Goal

Increase the number of well qualified anesthesia care providers in Wisconsin through the development of an innovative Master of Science in Anesthesia (MSA) Program at MCW.

Background

In the Midwest, 80 percent of health care facilities report the need for additional anesthesiologists and certified nurse anesthetists. Many rural areas are in especially great need due to a significant proportion of anesthesia providers living and working in urban locations.

Due to the aging population's projected demand for health care services, the current shortage and maldistribution of anesthesia specialists is expected to worsen in coming years.

While the static number of residency positions is a barrier for filling the anesthesia shortage with physicians, anesthesiology assistants are exempt from that requirement and can provide cost-efficient anesthesia care in a physician-led care model.

Currently, Wisconsin residents interested in becoming anesthesiology assistants have to leave the state for training, increasing the likelihood that some graduates may not return to Wisconsin to practice. In total, fewer than 3,000 anesthesiology assistants currently practice in the US.

In order to meet the rising need for cost-effective anesthesia services, however, anesthesiology assistants represent a ripe opportunity to expand the workforce and deliver needed care without sacrificing quality.

Award Summary

Through a focus on interprofessional training, research and patient safety, AHW's investment is helping to build a leading program to train and retain anesthesia providers prepared to meet Wisconsin's evolving needs.

During its first year, the leadership team made significant progress in the development of the MSA Program. A MSA Program advisory committee was formed to guide the development of the program.

In addition, the MSA Program Development Team worked with a recognized consultant to design key features of the program.

As a result of the team's excellent work, the MSA program successfully received initial accreditation in May 2016.

An admissions process was established and the program is on target for enrollment of its first class of 12 students anticipated in August 2016. The 12 students were selected from more than 115 applicants.

Faculty development efforts are ongoing and clinical sites for the students have been identified.

It is anticipated that the MSA Program will continue its progress in meeting its long-term outcomes of fostering growth in anesthesia providers in Wisconsin and addressing the anesthesia provider disparity between rural and urban areas of Wisconsin.

Relevance

This program will increase access to quality anesthesia care through an innovative education program for anesthesiology assistants.

Significance to Science and Health

It is anticipated that the MSA Program will continue its progress in meeting its long-term outcomes of fostering growth in anesthesia providers in Wisconsin and addressing the anesthesia provider disparity between rural and urban areas of Wisconsin.

David Warltier, MD, PhD
Chairman and Professor of Anesthesiology

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Gaseous Intoxication by Bacterial Infection: A Mechanism for Abscess Formation

Award Amount: $200,000 (2016-2017)

MCW MEDICAL SCHOOL

Goal

Develop new non-antibiotic treatments that limit damage and accelerate recovery from deep tissue infections.

Background

Many bacteria produce a gaseous environmental toxicant—hydrogen sulfide. Exposure to toxic substances such as hydrogen sulfide is a common cause of injury and death in the workplace. Being freely diffusible, hydrogen sulfide can intoxicate across tissue boundaries, much like thermal burns or radiation, causing abscesses. Antibiotic therapy cannot modify the effects of the gas, resulting in prolonged disease and poor outcomes, including death.

The research team has identified a novel virulence mechanism in the hydrogen sulfide gas that explains the severe and prolonged complications that are unresponsive to antimicrobials. Using their novel detection method, they plan to develop new, non-antibiotic treatments that limit damage and accelerate recovery from deep infections.

Award Summary

The AHW Endowment's investment in this initiative enabled Dr. Willoughby and his research team to capitalize on their unique detection method for hydrogen sulfide to develop non-antibiotic treatments that effectively limit damage and speed recovery from infections resulting from contact with the gas.

The outcome of bacterial infections has not changed for decades, despite regular increases in potency and spectrum of antimicrobials and major advances in critical care.

The team offers a changemaking shift of treating these infections as environmental toxins. AHW's investment in this research could translate into applications in inflammation and immunology, neurodegenerative diseases, cancer, and cardiovascular medicine.

For example, despite being treated with antibiotics, meningitis in a 4-year-old patient continued to progress. The patient improved dramatically when the research team began treating the child with nitrate and hyperbaric oxygen to reduce hydrogen sulfide. This case highlights the potential for immediate translation into medical practice.

By conducting this research, the team is uniquely positioned to leverage expertise in genetics, physiology, and biochemistry to achieve the goals of the proposed research, and ultimately, improving the lives of patients who have been affected.

During this reporting period, the team experienced several setbacks due to faulty equipment and challenges with the genetic work for streptococci. However, the team succeeded in excluding current known inhibitors of hydrogen sulfide production as therapeutic agents. They also identified vitamin B12 as a novel binder of hydrogen sulfide, a safe inhibitor in humans yet to be tested in bacteria. In addition, the team has identified a novel intervention by anesthesiologists engaged in clinical medicine as a promising agent for bacterial sepsis and abscess formation.

Relevance

Many bacteria produce a gaseous environmental toxicant—hydrogen sulfide. Exposure to toxic substances such as hydrogen sulfide is a common cause of injury and death in the workplace. Antibiotic therapy cannot modify the effects of the gas, resulting in prolonged disease and poor outcomes, including death.

Significance to Science and Health

Using a novel detection method, as well as an advanced animal model, researchers plan to develop new, non-antibiotic treatments that limit damage and accelerate recovery from deep infections.

Rodney Willoughby, MD

Professor, Pediatrics and Program Director for Antibiotic Stewardship at Children's Hospital Wisconsin

Co-Investigators: Brian Smith, PhD, Assistant Professor, Biochemistry; Chris Kristich, PhD, Associate Professor, Microbiology and Molecular Genetics

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Cancer Biology Research Program

Award Amount: $5,097,898 (2011-2021)

MCW MEDICAL SCHOOL

Goal

Determine the biological and chemical causes of cancer, and promote outstanding research aimed at identifying new therapeutic targets and developing more effective therapies to treat cancer for the citizens of Wisconsin.

Background

In 2016, the American Cancer Society and Wisconsin Division of Public Health estimated that 285,000 Wisconsin residents are living with a cancer diagnosis. This is a significant increase from 2013.

While much of this increase is attributed to improved cancer screening rates, survivorship is also on the rise because of improved treatments, and the rate of cancer mortality in Wisconsin is falling.

AHW's investments in cancer research through this and other initiatives are leading to a transformative impact in improving health for Wisconsin residents suffering from cancer.

The Cancer Biology program serves the citizens of Wisconsin by supporting research to develop new ways to eradicate tumors after cancer has been diagnosed, halt the spread of tumors throughout the body, and prevent the recurrence of cancer.

Award Summary

Cancer Biology researchers published over 67 scientific papers that addressed the goal of identifying unique genetic, signaling, and metabolic features of cancer cells. Nineteen were published in collaboration with members of other cancer center programs.

To further these efforts, the Program established an interactive community of investigators through participation in the Cancer Cell Biology Research Forum, which meets weekly to promote the sharing of ideas and collaboration.

The Cancer Biology Program also provided technology resources to support scientific advancement. The state-of-the-art Bioenergetics Core Facility is fully operational and supports researchers working to better understand how cancer cells differ from normal in creating and using energy. The Program also provided funding for new research ideas through seed grants.

To increase cancer research expertise, the Program recruited two new team members: Carmen Bergom, MD, PhD, an internal candidate with expertise in radiation oncology and Laura Kresty, PhD, whose expertise lies in chemoprevention.

Dr. Bergom's research continues to advance knowledge regarding the role of the DiRas family of tumor suppressors in breast and brain cancers.

Dr. Kresty's research studies the benefits of cranberry extracts on esophageal cancer cells. Preliminary studies show that cranberry extracts appear to increase reactive oxygen resulting in the death of esophageal adenocarcinoma cells.

In addition, several researchers funded through this program are continuing to advance discovery in cancer prevention and treatment strategies.

Relevance

More than 29,000 Wisconsin residents were diagnosed with cancer in 2010. The program can have a significant positive impact on the people of Wisconsin through better understanding of the causes and mechanisms of cancer.

Significance to Science and Health

The Cancer Biology program supports Wisconsin residents by developing new ways to eradicate tumors after cancer has been diagnosed, halt the spread of tumors throughout the body, and prevent the recurrence of cancer.

Ming You, MD, PhD
Senior Associate Dean for Cancer Research, Director of the MCW Cancer Center, Professor of Pharmacology and Toxicology

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Cancer Center Infrastructure Grant

Award Amount: $5,366,551 (2010-2021)

MCW MEDICAL SCHOOL

Goal

Develop strong and nationally recognized interdisciplinary programs in cancer-related research, education, clinical care, and community service in order to become a National Cancer Institute (NCI)-Designated Cancer Center.

Background

Through NCI designation, MCW can further develop strong and nationally recognized interdisciplinary programs in cancer-related research, education, clinical care, and community service.

Wisconsin's highest rates of cancer are in the Southeastern Wisconsin area, including Milwaukee, Kenosha, Ozaukee, Racine, Walworth, Washington, and Waukesha counties. Through AHW's investment in the MCW Cancer Center, AHW is advancing the translation of cancer-related discoveries to improve outcomes, decrease rates of incidence, and reduce cancer disparities in underserved populations.

Award Summary

During this reporting period, the MCW Cancer Center continued to make significant progress toward its program goals.

Building from AHW's investment in the MCW Cancer Center, Dr. You and his fellow researchers submitted several applications for extramural funding to support promising lines of research discovery.

Dr. You aligned the MCW Cancer Center seed grant structure with research focus areas of breast, pancreas, immunology and disparities. The pilot funding program Request for Applications was revised to better position recipients for success through strengthening mentorship in research.

In support of its goal to create a strong, vibrant research community to advance discovery of new cancer therapies and treatments, the MCW Cancer Center sponsored several individual program retreats as well as a collaborative annual retreat. The retreats provided opportunities for researchers to share knowledge and foster cross-disciplinary research collaborations.

More than 100 participants engaged in the retreats that featured more than 50 posters.

The MCW Cancer Center has significantly increased both internal and external communications, especially through enhancements in its website. The MCW Cancer Center communications continues to reach more than 25,000 people throughout Wisconsin, and the team continues to collaborate with MCW's, Froedtert's and the MCW Clinical and Translational Science Institute's marketing and public affairs leadership.

In addition, during this reporting period MCW Cancer Center hosted participation in the national Cancer Moonshot Summit, convened by Vice President Biden. More than 200 attendees and participants joined MCW for this event, which focused on removing barriers to cancer clinical trials for patients, researchers and physicians.

Relevance

Through this project, the researchers seek to develop strong and nationally recognized interdisciplinary programs in cancer-related research, education, clinical care, and community service in order to obtain NCI designation.

Significance to Science and Health

Through NCI designation, MCW can further develop strong and nationally recognized interdisciplinary programs in cancer-related research, education, clinical care, and community service.

Ming You, MD, PhD
Senior Associate Dean for Cancer Research, Director of the MCW Cancer Center, Professor of Pharmacology and Toxicology

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Hematologic Malignancy & Transplantation (HMT)

Award Amount: $4,329,820 (2011-2021)

MCW MEDICAL SCHOOL

Goal

Develop new approaches to augment the immune response against cancer and reduce complications associated with bone marrow transplantation so that this therapy is more effective.

Background

Over 2,500 new cancer cases in Wisconsin each year are cancers of the blood. Many patients who develop these diseases are in the prime years of their life, and almost half die from the disease. New approaches are needed to boost the immune system's ability to fight cancer and reduce complications associated with bone marrow transplants. Research in this program may lead to clinical applications that improve survival rates and quality of life for patients with cancer and those receiving bone marrow transplants.

Award Summary

During the past year, the Hematologic Malignancy & Transplantation (HMT) Program recruited Alex Minella, MD, and Nan Zhu, PhD, to MCW and the Program. Both are accomplished researchers who bring prestigious NIH grant funding. Additionally, HMT researchers published more than 85 articles to share their research findings with the larger scientific community. Several program members actively participated in research with members from other programs, resulting in 26% inter-programmatic publications involving at least one HMT program member.

The Program also awarded MCW Cancer Center seed grants to several scientists to spur research and provide preliminary data for grants to outside agencies, including the National Cancer Institute of the NIH.

Lily Wang, PhD, was recruited to MCW and the HMT program in 2014 from Dartmouth University. She discovered a novel role of an immune suppressive protein called VISTA in the activation of immune cells. VISTA may be a useful target to inhibit in developing "immunotherapy" – training the immune system to attack cancer cells – which may be useful to treat hematological malignancies.

The program's accrual to clinical trials focused on the treatment of patients with hematological malignancies. Clinical trial participation increased substantially in this reporting period resulting in MCW being positioned as one of the highest accruing institutions in the United States to bone marrow transplant clinical trials.

In addition, the AHW Endowment's investment in the HMT program of the Cancer Center resulted in significant additional leveraged dollars for Wisconsin cancer research through extramural funding. Examples of significant additional funding resulting from the AHW investment includes an award from the National Cancer Institute for $2.3M and a NIH award for $4.1M.

Relevance

Over 2,500 new cancer cases in Wisconsin each year are cancers of the blood. Many patients who develop these diseases are in the prime years of their life, and almost half die from the disease.

New approaches are needed to boost the immune system's ability to fight cancer and reduce complications associated with bone marrow transplants.

Significance to Science and Health

Research through this program may lead to clinical applications that improve survival rates and quality of life for patients receiving bone marrow transplants.

Ming You, MD, PhD
Senior Associate Dean for Cancer Research, Director of the MCW Cancer Center, Professor of Pharmacology and Toxicology

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Population Sciences

Award Amount: $4,991,871 (2012-2021)

MCW MEDICAL SCHOOL

Goal

Conduct outstanding research aimed at influencing the implementation of improved prevention, screening, and therapeutic strategies for cancer, and reducing disparities in care.

Background

Cancer is a leading cause of death among Wisconsin residents.

Although the development of new technology is important to preventing and treating cancer in the Wisconsin population, better use of existing tools could decrease morbidity and mortality from cancer more quickly.

The most common cancers all have methods available for prevention, screening, treatment, and/or improving survivorship care, but unfortunately these methods are known to be underused.

Increasing our cancer knowledge will improve outcomes, decrease rates of incidence, and reduce cancer disparities in underserved populations.

Award Summary

During this reporting period, the Population Sciences (PS) researchers published more than 65 articles to share their research findings with the larger scientific community.

Several program members actively participate in research with other programs, resulting in 34% inter-programmatic publications involving at least one PS program member. A key function of the Program is to provide members with resources not otherwise available to an individual due to cost or space issues.

Biostatisticians from the Observational Methods Core assist in developing new prevention and population health research projects. The Core is heavily used and assists in grant development for outside funding opportunities.

To bring scientific expertise to MCW, the Program recruited Kirsten M. Beyer, PhD, MPH, who examines how cancer burdens segregate geographically in our communities, and the causes of the segregation.

Also recruited was Kathryn Flynn, PhD, who focuses on patient-reported outcomes measures with the goal of standardizing the measures across disease populations, and Melinda Stolley, PhD, who focuses on obesity, health behaviors, cancer disparities, and survivorship.

Dr. Flynn, in collaboration with Dr. Ehab Atallah in the Division of Hematology/Oncology, received a large extramural funding award from the National Cancer Institute that leverages AHW's investment in her work. The study explores recurrence and quality of life for patients with leukemia who stop taking their medication under medical supervision. Work on understanding and improving decision making for these same patients is ongoing.

Dr. Stolley's work increased cancer prevention, screening and education efforts through a series of presentations and community-based efforts. She and her team have presented on cancer prevention and control at over 20 community events in the last year. Dr. Stolley continues to research methods for increasing understanding of community perspectives on cancer disparities.

To develop mentorship opportunities and collaboration, program leaders and staff held individual mentorship meetings and a series of monthly research presentations.

Relevance

Cancer is a leading cause of death among Wisconsin residents. Wisconsin's highest rates of cancer are in the MCW Cancer Center's eight-county catchment area, and breast cancer mortality rates for minority women in Milwaukee County are some of the highest in the nation.

Significance to Science and Health

This program facilitates the translation of cancer-related discoveries to all residents within the state. Increasing knowledge about the impact of cancer will improve outcomes, decrease rates of incidence, and reduce cancer disparities in underserved populations.

Ming You, MD, PhD
Senior Associate Dean for Cancer Research, Director of the MCW Cancer Center, Professor of Pharmacology and Toxicology

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.

Tumor Progression and Metastisis (TPM)

Award Amount: $4,856,491 (2012-2021)

MCW MEDICAL SCHOOL

Goal

Promote and support cancer-related basic, translational, and clinical research in imaging sciences and technology that result in improved diagnostic and therapeutic approaches.

Background

In 2016, the American Cancer Society and Wisconsin Division of Public Health estimated that 285,000 Wisconsin residents are living with a cancer diagnosis. This is a significant increase from 2013.

While much of this increase is attributed to improved cancer screening rates, survivorship is also on the rise because of improved treatments, and the rate of cancer mortality in Wisconsin is falling.

It is estimated that one-third of all cancer deaths would be prevented if no one smoked, and another third could be prevented if everyone maintained a healthy weight and active lifestyle.

AHW's investments in cancer research through this and other initiatives are leading to a transformative impact in improving health for Wisconsin residents suffering from cancer.

Award Summary

Over the last fiscal year, tumor progression and metastasis (TPM) researchers published 109 articles to share their research findings with the larger scientific community. Several program members actively participate in research with other cancer center programs, resulting in 18% inter-programmatic publications involving at least one TPM Program member.

Through seed grants, the program provides the funding needed to jumpstart collaborations among Cancer Center members and support future funding applications to outside agencies, including the National Institutes of Health. These seed grants are supplemented by mentoring committees that lend additional experience and knowledge to new research projects.

Scientific expertise was expanded by recruitment of faculty.

Amit Joshi, PhD, established an optical molecular imaging laboratory and facilities to use nanoparticles for cancer imaging and treatment.

Eric Paulson, PhD, strengthened collaborations with Elekta, Siemens Healthcare, and Philips Healthcare in his work to develop tools and approaches for MRI-guided radiation therapy. A total of five new patents have been submitted based on the new technology developed through Dr. Paulson's contributions to this award. In addition, Dr. Paulson has authored 13 abstracts of which nine were accepted as oral presentations at national conferences.

Peter LaViolette, PhD, focused on applying imaging technology to detect tumor cells that infiltrate nearby healthy tissue in both brain cancer and prostate cancer, and also on how brain tumors respond to recently approved drugs. This is relevant to local brain tumor patients in Wisconsin, as the drug is extraordinarily expensive and a monetary burden in cases where it is ineffective. Dr. LaViolette's research led to findings that patients with tumors showing a decrease in abnormal vessels categorized by imaging technology survived longer than those with an increase following treatment. This study was published in the leading Neuro-Oncology journal and showed the first perfusion MRI biomarker able to detect patient response to the drug.

Relevance

The Tumor Progression and Metastasis Research program serves the citizens of Wisconsin by supporting research to develop new ways to eradicate tumors after cancer has been diagnosed, halt the spread of tumors in the body, and prevent the recurrence of cancer.

Significance to Science and Health

Progress in imaging sciences and technology that advances personalized medicine approaches to cancer will lead to better diagnosis and treatment for Wisconsin residents suffering from cancer.

Ming You, MD, PhD
Senior Associate Dean for Cancer Research, Director of the MCW Cancer Center, Professor of Pharmacology and Toxicology

This award was funded by the Advancing a Healthier Wisconsin Endowment in the MCW School of Medicine.