January 8, 2016

The Honorable LeRoy Stumpf, Chair
Senate Capital Investment Committee

The Honorable Paul Torkelson, Chair
House Capital Investment Committee

Dear Senator Stumpf and Representative Torkelson:

Pursuant to Minnesota Statutes 2015 Section 137.64, Subd. 4, I am pleased to submit the enclosed biennial report on the Biomedical Sciences Research Facilities Funding Program established by the State of Minnesota in 2008.

This dedicated funding program provides appropriations by the State to the University for up to 75% of the costs to design and construct four new and expanded research buildings on the University's Twin Cities Campus, in the area known as the Biomedical Discovery District (BDD). The State's portion of this funding program is $219 million; while the University's portion is $58 million.

The University has now completed the four research facilities anticipated in the original program: expansion of the Center for Magnetic Resonance Research, completed in July 2010; the combined Cancer and Cardiovascular Research Facility, completed in July 2013; and the Microbiology Research Facility, completed in October 2015.

These new facilities are enabling the University of Minnesota to establish its national prominence in health research and to fulfill its commitment to the State of Minnesota to conduct cutting edge research into the most challenging diseases and health conditions facing Minnesota families.

Sincerely,

Brooks Jackson, MD, MBA
Dean, Medical School
Vice President for Health Research
University of Minnesota

CC: Members of the Senate Capital Investment Committee
Members of the House Capital Investment Committee

Biomedical Sciences Research Facilities Funding Program

2016 Report to the Minnesota State Legislature
January 8, 2016

UNIVERSITY OF MINNESOTA

OVERVIEW

The University of Minnesota has set its sights on becoming one of the top public research institutions in the world. Achieving this goal requires state-of-the-art biomedical research facilities that can support leading edge research and attract and retain top-tier research faculty.

To assist with this effort, the University asked the State of Minnesota to create the Biomedical Facilities Authority as the mechanism to provide a predictable funding source for planning and building research facilities that, in turn, would allow the University to attract and retain the nation's top research talent.

The State established the $292 million Minnesota Biomedical Research Facilities Funding Program in 2008. This dedicated funding program provides appropriations by the State to the University for up to 75% of the costs to design and construct four new and expanded research buildings on the University's Twin Cities Campus, in the area known as the Biomedical Discovery District (BDD). The State's portion of this funding program is $219 million; while the University's portion is $58 million.

PROGRESS TO DATE

Project #1 – Expansion of the Center for Magnetic Resonance Research – Completed July 2010
Project #2 & #3 – Cancer Cardiovascular Research Facility - Completed July 2013
Project #4 – Microbiology Research Facility – Completed October 2015

These four projects comprise 422,000 gross square feet of new research space housing 97 faculty and 693 research support staff.

The Cancer-Cardio research facility also includes 35,000 square feet of shared research commons and support spaces. These areas house common instrumentation and research processing and support facilities, which are available to researchers throughout the district and the broader University community, including:

- Microscopy and specialized imaging facilities
- Biomedical Genomic Center
- Animal genetics
- Long term testing laboratories
- Flow cytometry.

In addition, several of the planning principles for the Biomedical Discover District provided for connectivity and the development of a cohesive research community. This interconnected, collaborative research environment is able to leverage common shared support spaces and resources while allowing for unique opportunities to collaborate across fields and disciplines of research.

The district has now been connected end-to-end by skyway to further enhance and support the principle of cohesiveness and opportunities for collaboration.

At its full build-out, the Minnesota Biomedical Research Program has provided 4,108 construction jobs and will house 790 faculty and research staff throughout the District with capacity to house an additional 8-10% as research programs grow and fluctuate.

Project	Construction Jobs	Principal Investigators	Other researchers/staff	Minnesota Biomedical Research Program Total
Wallin Medical Biosciences Building	850	35	165	1050
Center for Magnetic Resonance Research	560	10	90	660
Cancer- Cardio Vascular Research	1630	31	254	1915
Microbiology	1068	21	86	1175
District support staff			98	98
TOTAL	4108	97	693	4898

Summary Research Programs

Project # 1 - Center for Magnetic Resonance Research

There are currently 215 unique research projects happening at the Center for Magnetic Resonance Research (CMRR), which is one of the top imaging facilities in the world. The research involves multiple collaborators inside the medical school, as well as other partners within the University such as Psychology, Electrical and Computer Engineering, and the College of Veterinary Medicine, among others. CMRR itself generated $8,900,000 in external funding expenditures for the last fiscal year reported (FY14).

Current projects include:

The Adolescent Brain Cognitive Development Study, or the ABCD Study, which will begin in 2016. This landmark study, funded by a National Institutes of Health (NIH) grant, is a collaboration between Psychology, Psychiatry and CMRR. Researchers will study the effects of adolescent substance use on the developing brain through the process of scanning roughly 600 nine and 10-year-olds over a five-year period.

The Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative, which is part of a NIH Presidential focus aimed at revolutionizing our understanding of the human brain, is wrapping up its first phase of funding, with funding renewal expected to start for both the Development and Aging areas of research April 1, 2016.

The CMRR is home to the world's first 10.5 Tesla whole body human magnetic resonance imaging (MRI) magnet, the largest MRI magnet in existence. By comparison, most medical MRIs utilize magnets rated 1.5-3 Tesla or lower. The University's magnet will be used to aid in brain research and human body imaging, with hopes of beginning human scanning in 2016.

Lastly, CMRR was awarded one of four Medical School Discovery team awards in September. This is a 10-year, $30 million award focused on Imaging across Multiple Scales of Neuronal Organization: Circuit-Based Approaches to Brain Function. Recruiting will start for this program early in 2016.

Total Cost = $51.2 million, including $14 million for magnets and imaging equipment

- Square Feet = 62,000 GSF
- FY 15 Research Dollars = $6.2 million

Projects # 2 & 3 - Cancer-Cardiology Research Building

The Cancer and Cardiovascular Research Building (CCRB) has had a profound impact on the University of Minnesota's efforts to develop new treatments and cures for devastating illnesses. Whether it's efforts to tap the body's immune system to attack cancer cells, or using regenerative stem cells to repair heart tissue, the CCRB is helping researchers from the Masonic Cancer Center and the Lillehei Heart Institute lead the way in groundbreaking research. The CCRB is allowing for new collaboration and new lines of investigation that have the potential to change the lives of patients everywhere.

CCRB researchers generated nearly $27 million in external research funding for FY15.

Current projects include:

Cancer

Could stress hormones be fueling certain types of breast cancer? In Carol Lange's lab in the CCRB, researchers are investigating how hormones — and specifically cortisol, the stress hormone — may cause breast cancer cells to survive under stress, in part by "ignoring" the body's immune system and resisting cancer treatments aimed at killing cancer cells, thus encouraging cancer growth. Lange, a Professor in the departments of Medicine and Pharmacology and a member of the Masonic Cancer Center, University of Minnesota, is collaborating with with Drs. Kaylee Schwertfeger and Julie Ostrander, whose labs are also located at CCRB, to leverage their combined expertise to understand the role of hormones in breast tumorigenesis.

Rob Turesky, Ph.D., an expert in biochemical toxicology, (College of Pharmacy, Masonic Cancer Center) was asked to serve on a World Health Organization work group to assess the relationships between processed meat, red meat and certain cancers including colorectal, pancreatic and prostate. The work group reported processed meats, like bacon, have carcinogenic properties like cigarettes but Turesky emphasizes that despite the connection, the risk is still low and moderation is key. Turesky's lab is focused on toxicology and mechanisms sparking the development of human cancers related to environmental causes.

E-cigarettes have emerged as a new alternative to traditional cigarettes, but are they a safer choice or just a new public health threat? Masonic Cancer Center researchers Stephen Hecht, Ph.D. (College of Pharmacy), Dorothy Hatsukami, Ph.D. (Medical School), and Irina Stepanov, Ph.D. (School of Public Health) are investigating the carcinogens associated with e-cigarettes and how they compare to traditional combustible cigarettes. The research group is also addressing the unique concerns posed by smokeless tobacco such as micro particulates in the flavor additives and adjustable nicotine regulators, and utilizing the resulting data to encourage and inform FDA regulations on the product to better protect the American public.

Cardiovascular

Jop van Berlo, M.D., Ph.D, discovered that cells believed to regenerate heart cells actually create vessels, a finding that could have significant therapeutic implications. His lab aims to find new ways of stimulating cardiac regeneration that can be translated to human patient care.

According to an interdisciplinary research collaboration, a specific block copolymer membrane stabilizer could be particularly suited to treatment of Duchenne muscular dystrophy. Joseph Metzger, Ph.D., Department of Integrative Biology and Physiology, and his team look to target membranes as cell defense. They have partnered with several departments across the University to share knowledge and piece together the puzzle. Recent results show not only the importance of the polymers, but the delivery method, shedding new light on potential translational benefits and strategies.

Can we find treatments for genetic diseases like the devastating and common Fascioscapilohumeral Muscular Dystrophy (FSHD)? The lab of Michael Kyba, PhD., Associate Professor of Pediatrics and the Lillehei Heart Institute, is revealing how the gene that causes this disease works, and using this information to discover new gene- and drug-therapies for FSHD and other genetic diseases. Rita Perlingeriro, PhD, Associate Professor of Medicine and the Lillehei Heart Institute, is developing new ways to coax stem cells into skeletal muscle; as a therapeutic tool to treat congenital diseases such as muscular dystrophy.

Dan Garry, MD, Professor of Medicine and Director of the Lillehei Heart Institute, has a long-standing interest in regenerative and stem cell biology with a focus on the heart and skeletal muscle. In their studies of the heart and skeletal muscle, the Garry laboratory has utilized an array of technologies to discover the molecular markers of stem cell populations that regulate critical networks during heart and skeletal muscle development and regeneration. The manipulation of these pathways using chemical genetics and molecular technologies has provided a platform focused on rebuilding and repairing the injured heart and skeletal muscle.

Total Cost = $180.3 million

- Square Feet = 274,000 GSF
- FY 15 Research Dollars = $17,657,018 in Cancer Research
- FY 15 Research Dollars = $9,205,072 in Cardiovascular Research

Project #4 – Microbiology Research Facility

The Microbiology Research Facility (MRF), which opened in fall 2015, houses and facilitates research by faculty in the Medical School's Department of Microbiology as well as faculty from many other disciplines, colleges and schools throughout the University. The building is home to Microbiology, Immunology, Infectious Diseases, and Drug and Vaccine Discovery. The building promotes and enhances collaboration among all of these teams and also offers "hotel" lab space for investigators wanting a collaborative environment for specific research projects.

The main emphasis of the work in the MRF is on particularly deadly illnesses such as HIV/AIDS/tuberculosis and fungal diseases that extract an enormous toll on life and health worldwide. Investigators are focused on innovative ways to treat, cure and prevent infectious diseases.

MRF researchers generated more than $8 million in external research funding for FY15.

Current projects include:

Ryan Langlois, Ph.D., is focused on developing a live, attenuated vaccine that would simultaneously work in both humans and poultry animals. The goal is to create an option to protect multiple species against the virus reservoirs in birds and limit the possibility of the virus mutating and creating new strains or pandemics. With this new vaccine system, doses would be quicker to make and easier to update for new strains. Langlois considers his research a combination of vaccination and public health work.

Using a multipronged approach, Anna Tischler, Ph.D., Department of Microbiology and Immunology, seeks to identify "counter-immune" factors allowing Mycobacterium tuberculosis (Mtb) to persist in the lungs of infected humans despite strong immune responses. Tischler and her colleagues seek to understand the genes controlling the immune response and find novel targets for therapeutic intervention.

Lymphatic system reservoirs for HIV are larger and more complex than previously thought, shows research from Ashley Haase, M.D., and Timothy Schacker, M.D., both of the Medical School. Their lab looks closely at lymphatic tissues and the response to HIV and evaluations of currently available treatments. Their work shows there is much work to left to do in finding ways to attack the virus in these reservoirs and how to better formulate medications able to penetrate lymphatic tissues to limit HIV replication

Total Cost = $60.5 million

- Designed Square Feet = 89,700GSF
- FY 15 Research Dollars = $8,252,758