



Michael J. Dunn, MD

Translational research has new home on Medical College campus

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Dean and Executive Vice President, Medical College of Wisconsin

In a modern example of form facilitating function, the Medical College of Wisconsin and the Children's Research Institute dedicated a new, \$140 million biomedical research building on January 16 to meet our growing needs for space and resources.

The 298,000 square-foot facility provides shared research space and 2 wings of laboratories, one for the Medical College's Translational and Biomedical Research Center and the other for the Children's Research Institute.

This building tells a great story, not only of outstanding collaboration between the Medical College and Children's Hospital and Health System, but of the opportunities created to improve patient care through innovative research. This center represents our commitment to translational research—the acceleration of basic science research into new clinical applications.

Four major research initiatives will be housed in the College's Translational and Biomedical Research Center.

Cancer Center

With more than 200 faculty physicians and scientists, the College's Cancer Center is dedicated to providing comprehensive cancer care, education, research, and service. The College is currently recruiting additional faculty members whose laboratories will be housed in

the Translational and Biomedical Research Center. These scientists will expand fundamental research on the genetic basis of cancer growth factors that stimulate cancer cells and the profiles of genes and proteins that help predict the invasiveness of different types of cancer. Fortunately, the development of Medical College Cancer Center research programs coincides with the availability of the forthcoming Froedtert Cancer Pavilion, which will allow significant clinical and translational research in oncology.

Biotechnology and Bioengineering Center

The College's Biotechnology and Bioengineering Center is dedicated to the development and application of novel technology in biomedical research through proteomics, genomics, computational biology, molecular imaging, cell and tissue engineering, drug discovery, and technology development. Five investigators from this center will run laboratories in the new facility.

Andrew S. Greene, PhD, is director of the Biotechnology and Bioengineering Center and professor of Physiology. His research attempts to understand the fundamental principles of cardiovascular regulation and disease and to develop new technologies for better diagnosis and treatment. Studies

in the laboratory focus on mechanisms of blood vessel growth and regression as well as the control of blood flow to tissues such as skeletal, muscle, and brain. Researchers use a number of measurement tools (gene and protein expression, receptor numbers, oxygen transport, local blood flow) to assess the ability of the body's microscopic cardiovascular circulatory network to meet the needs of tissues. Mathematical and computer models developed in the lab have been extremely valuable in understanding complex signals that cause changes in the body's blood circulation in diseases such as hypertension and cancer.

The lab of Michael Kron, MD, MSc, professor of Medicine and of Biotechnology and Engineering, is studying the structure and function of AARS (aminoacyl-tRNA synthetases) enzymes, which have been found in some parasites in unusually high levels. College researchers seek to understand the mechanisms of AARS enzymes and their effects on human immune cells. Research is also focused on understanding the chronic impact of these substances on the human immune system and to help design novel anti-inflammatory or novel anti-parasite therapies. This may benefit patients with tropical infectious diseases and autoimmune diseases.

Michael Olivier, PhD, associ-

ate professor of Physiology, and his team are examining how DNA sequence differences between individuals affect gene function and ultimately human disease susceptibility. The focus is on the genetic basis of 2 disorders: obesity and its related abnormalities (diabetes, abnormal cholesterol, high blood pressure) and Down syndrome (in particular, an increased leukemia risk).

Aoy Tomita-Mitchell, PhD, assistant professor of Biotechnology and Bioengineering and Surgery (Pediatric Cardiothoracic), has research focused on identifying underlying genetic risk factors for congenital heart disease and understanding their molecular causes. A goal is to develop early diagnostic genetic tests.

Research in the lab of Tetsuro Wakatsuki, PhD, assistant professor of Physiology and Biotechnology and Bioengineering, is focused on tissue engineering in the study of cardiovascular disease. Reconstituted or engineered heart tissues developed in this lab are used instead of animal models as researchers study the regulation of normal and diseased heart. Tissue engineering has great potential to not only improve the understanding of cardiovascular disease and heart regeneration, but also to reduce the use of animals in future biomedical research and to improve efficiency of drug discovery.

Center for Biopreparedness and Infectious Diseases

The College's Center for Biopreparedness and Infectious Diseases focuses on the development of diagnostics, therapies, and vaccines to combat the emergence of exotic, imported infectious diseases and the threat of biological agents used as tools of terrorism. Dara W. Frank, PhD, professor

of Microbiology and Molecular Genetics is the center's director.

Dr Frank's research focuses on 2 serious infectious diseases. For *Pseudomonas aeruginosa*, her team hopes to develop enzyme inhibitors, antibody reagents or vaccines that can neutralize its toxic effects when it infects humans. The bacterium can affect lung function in patients with serious health problems such as cystic fibrosis or HIV. For *Francisella tularensis*, College researchers are using genetic approaches to understand its pathology with the goal of identifying virulence factors as potential targets for therapeutic or vaccine development. This organism causes tularemia, which has been used in the past as a biological weapon.

Structural Biology Program

In the Structural Biology program, researchers study the architecture, shape, structure, and mechanisms of proteins and nucleic acids.

In the lab of Jung-Ja Kim, PhD, professor of Biochemistry, researchers are studying how structures of proteins relate to their functions by using X-ray diffraction methods. Projects in the lab will include studies on enzymes in drug metabolism, fat metabolism, and on molecules involved in protein targeting. A detailed knowledge of the structures of enzymes in metabolic diseases will help scientists understand how these enzymes function and why abnormal enzymes found in patients malfunction.

Brian F. Volkman, PhD, associate professor of Biochemistry, and his team are seeking to define the 3-dimensional structures of protein complexes, including the molecular basis of Wiskott-Aldrich syndrome, an inherited disease of the immune system. With nuclear magnetic resonance (NMR) spec-

troscopy as their primary tool, researchers in this lab examine the relationship between biomolecular structure, dynamics and function.

The laboratory of Evgueni Kovriguine, PhD, assistant professor of Biochemistry, employs state-of-the-art biophysical techniques to explain the molecular mechanisms of human diseases. Work in this lab is focused on studying the Ras protein and understanding why and how certain mutations render Ras protein cancerous. This knowledge may enable investigators to design efficient therapeutic pathways for the prevention of such common cancers as colorectal, pancreatic, and acute leukemias.

In addition to this impressive array of talent in the Medical College's Translational and Biomedical Research Center, 7 key Children's Research Institute programs will be expanded in the new building. They include developmental genetics and zebrafish; molecular critical care; developmental biology; vascular biology/pediatric surgery; Children's Kidney Disease Research Program; the Individualized Medicine Institute; pathology/vascular anomalies and histology; and clinical pharmacology, pharmacogenetics and teratology.

The Children's Research Institute provides infrastructure and support for pediatric basic science research and clinical research at Children's Hospital of Wisconsin, a clinical partner with whom we are proud to share a commitment to discovery as well as a new place to conduct our important work. The building is mere geography, but the talented people inside are the key to the translational research that brings health care innovation to us all.

Wisconsin Medical Journal

The mission of the *Wisconsin Medical Journal* is to provide a vehicle for professional communication and continuing education of Wisconsin physicians.

The *Wisconsin Medical Journal* (ISSN 1098-1861) is the official publication of the Wisconsin Medical Society and is devoted to the interests of the medical profession and health care in Wisconsin. The managing editor is responsible for overseeing the production, business operation and contents of the *Wisconsin Medical Journal*. The editorial board, chaired by the medical editor, solicits and peer reviews all scientific articles; it does not screen public health, socioeconomic or organizational articles. Although letters to the editor are reviewed by the medical editor, all signed expressions of opinion belong to the author(s) for which neither the *Wisconsin Medical Journal* nor the Society take responsibility. The *Wisconsin Medical Journal* is indexed in Index Medicus, Hospital Literature Index and Cambridge Scientific Abstracts.

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