A Big Year for Obesity & Metabolism Research

With America’s obesity epidemic showing no signs of slowing down, millions of overweight children and adults are cruising headlong toward a future full of heart disease, diabetes, joint problems and strokes.

The need for new ideas is urgent, to help keep people from putting on so much weight, to help them lose excess pounds and keep them off, and to identify and treat those who have the highest risk of becoming obese and developing obesity-related illnesses.

This year, the University took several major steps toward accelerating the pace of discovery in obesity and metabolism. In both instances, Metabolism, Endocrinology & Diabetes (MEND) faculty member Charles Burant, MD, PhD (left), took the lead.

The year began with the official launch of the Michigan Metabolomics and Obesity Center, or MMOC, with Dr. Burant as director. Created with a $1 million grant from the Medical School’s Endowment for the Basic Sciences, the MMOC is bringing together physicians and basic science researchers from across the U-M campus and providing scientific tools and funding to help them carry out experiments.

It is one of five centers that make up the Michigan Comprehensive Diabetes Center, headed by MEND division chief Peter Arvan, MD, PhD.

MMOC’s 67 members are joined by a common goal of exploring the science behind weight gain and loss through molecular-level research on how the body breaks down and uses food, and how metabolism varies among individuals.

Many of them study aspects of the metabolome: the collection of small molecules (metabolites) created by the breakdown of food. Others are probing different metabolic “phenotypes”—the collection of specific genetic differences and other characteristics that influence metabolism and weight. Still others use systems biology methods to look for patterns and important traits in obesity and metabolic data. The center also has clinical researchers, who test new ways of helping patients lose weight and study the long-term effects of obesity.

This year, the MMOC held its first grant competition, and awarded $150,000 in research funds to help boost new scientific efforts. It also held its first national symposium, which attracted dozens of participants and speakers from U-M and beyond. And, it geared up three core laboratory facilities that can be used by all MMOC members to speed their research. Two are headed by Internal Medicine faculty: research investigator Jaeman Byun, PhD, of Nephrology, and MEND research investigator Nathan Qi, PhD.

At the same time that all this activity was occurring, a major gift recognized Dr. Burant’s leading position in the field of metabolic research and gave him additional resources to pursue his work.

The gift came from the Atkins Foundation, and allowed the creation of the Dr. Robert C. and Veronica Atkins Professorship of Metabolism. Before his death, Dr. Atkins became widely known for his approach to weight loss and maintenance, and his widow Veronica is now working to foster independent research on metabolism and obesity through the foundation.

The support of the Atkins Foundation will give Dr. Burant the freedom to perform higher-risk research that could yield unexpected results, without having to spend funds that are specifically assigned to certain projects and topics. He also holds grants from the National Institute of Diabetes and Digestive and Kidney Diseases, as well as from the American Diabetes Association.

U-M, which was Dr. Atkins’ alma mater, is only the seventh university to receive an Atkins professorship gift. The Atkins Foundation is also committed to funding additional research applications from universities where Atkins Professorships have been established; in 2006, Dr. Burant received one of the first.
Percentage of Overweight & Obese Adults, Ages 20–70 years

- 70%
- 50%
- 30%
- 10%

Percentage of Overweight Children & Adolescents

- 12 - 19 Years Old
- 6 - 11 Years Old
- 2 - 5 Years Old

Source: Centers for Disease Control and Prevention
Two Groundbreaking Developments

This year marked two significant events related to the $44 million gift for diabetes research and facilities that the Health System received from William and Delores Brehm in late 2004 (far right, top).

First, the first Brehm Scholar joined the faculty, and established his laboratory in the Brehm area of the Biomedical Science Research Building (BSRB). Then, in the fall, the ground was broken for the future home of the Brehm Center for Type 1 Diabetes Research and Analysis and the expansion of the Kellogg Eye Center (far right, center).

The first Brehm Scholar, Massimo Pietropaolo, MD (left), moved to Michigan from the University of Pittsburgh, bringing with him a research effort that tries to get at the heart of Type 1 diabetes. This form of the disease, sometimes called “juvenile” diabetes, is known to stem from an attack on the pancreas by the body’s own immune system, leaving the patient dependent on insulin to survive. It often strikes in childhood or the teen years, and requires intensive daily monitoring and injections. Delores Brehm has battled it for more than 50 years.

Dr. Pietropaolo focuses on the “immunogenetics” of Type 1 diabetes—the interplay of genetic predisposition and altered immune response that combine to cause the disease. He also studies a condition called Latent Autoimmune Diabetes in Adults, or LADA, which is Type 1 diabetes that doesn’t begin until after age 30.

One of his major efforts is to develop ways of determining whether someone is at high risk of developing Type 1 diabetes—for example, the siblings of the 13,000 Type 1 diabetics diagnosed each year. Recently, he and his colleagues developed a combination of old and new testing methods which better predicted which of a patient’s siblings, children and cousins would develop the disease. The test is based on autoantibodies, or immune system components that prompt immune cells to mistakenly recognize the insulin-producing beta cells in a patient’s pancreas as foreign, and attack them.

Now, Dr. Pietropaolo and his team are working to block the immune system’s anti-islet cell attack by encouraging the growth of immune system cells that counteract the attack. The research is still being performed in rodents, but a clinical trial may be ready to start as early as 2007. In the meantime, U-M is preparing to take part in national clinical trials of drugs that dampen the immune system reaction.

Even as Dr. Pietropaolo pursues his research in the BSRB, a new building is rising up from a hole in the earth on Wall Street, across the river from the main medical center. When it opens in 2009, its topmost floors will become the new home of the Brehm Center—a hub for U-M Type 1 diabetes researchers to work, collaborate and push toward Bill and Dee Brehm’s urgent goal: a cure for Type 1 diabetes.
Number (in millions) of Persons with Diagnosed Diabetes in USA, 1980 - 2004

Source: Centers for Disease Control and Prevention