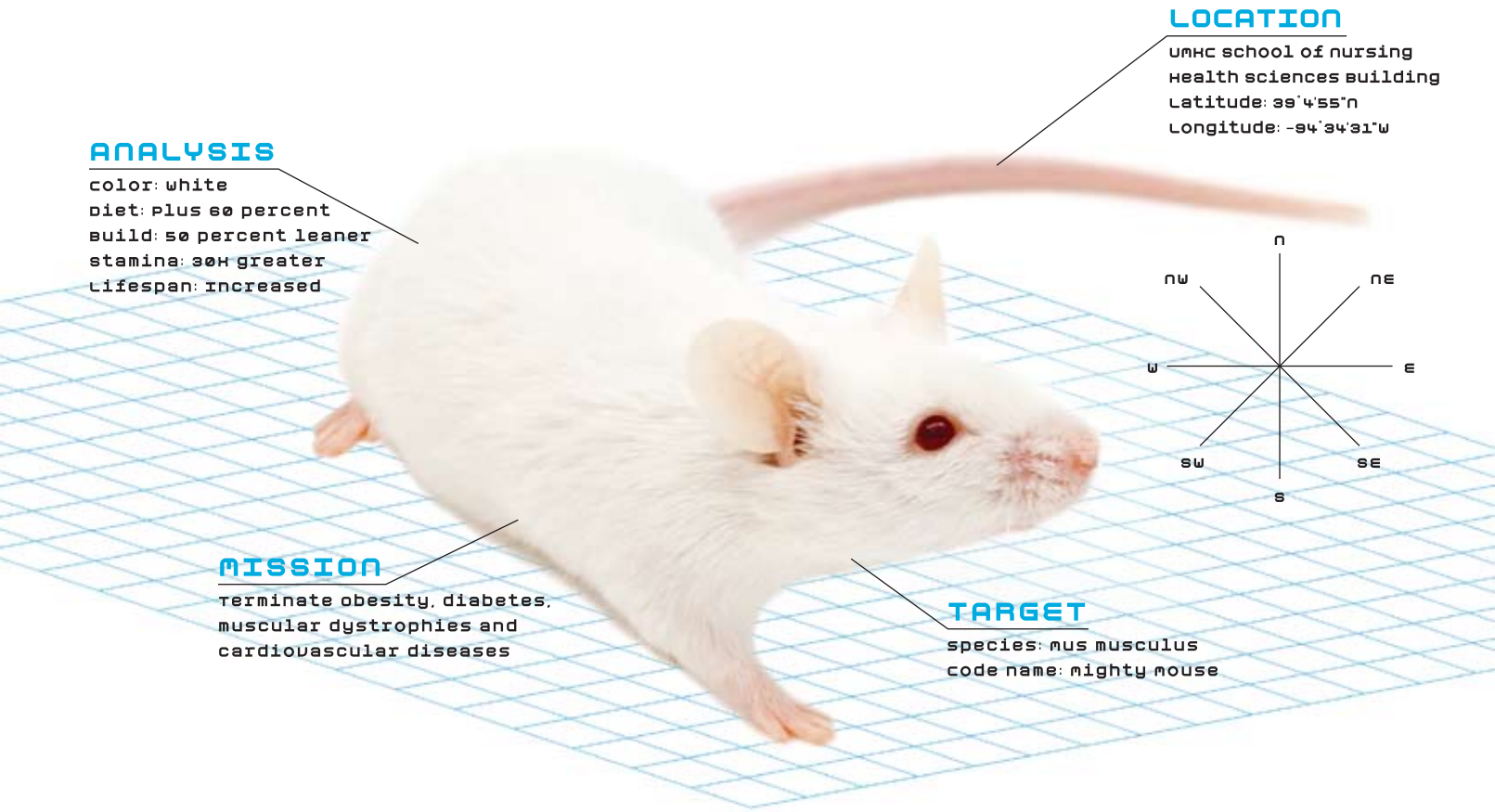

Mighty mouse

A UMKC research group's new super mouse won't fight crime or injustice, but it will help combat diseases

by RICK MANN

Believe it or not, a super mouse is coming to campus. Dubbed "Mighty Mouse" by scientists, the new research mouse is no relation to the superhero, but it may become as welcomed by humans as the animated hero was in the 1940s.

Rather than foiling the plans of evil cats, though, this mouse is expected to one day help find solutions to pressing medical issues, including obesity, aging-decline in muscle function, diabetes, muscular dystrophies and cardiovascular diseases.

Mighty mouse is a new animal model for muscle and metabolism research, and was recently developed by Richard Hanson and his colleagues at Case Western Reserve University. A collaborative team of researchers from the schools of Nursing and Medicine will be breeding and studying these mice at UMKC.

These transgenic mice are not clones, in which a genetic copy is created. Rather, the transgenic mice were bred with an overexpression of the gene for the enzyme phosphoenolpyruvate carboxykinase (PEPCK-C). This was accomplished by a process called knock-in, in which researchers are able to increase the expression of a single gene. Several lines of these mice were generated, and the male and female pairs with the highest activity for the PEPCK enzyme were selected. These animals were then bred creating the new colony of transgenic mice.

Marco Brotto, Ph.D.

Tina Hines, Ph.D.

Michael Wacker, Ph.D.

These super mice are white and the same length of ordinary mice, but many similarities end there. While their "regular" cousins weigh 30 grams by three to six months, the mighty mouse can weigh a little more than half as much. Astonishingly fit, these mice can run 30-fold farther than control mice, eat 60 percent more, are 50 percent thinner and survive longer than control mice.

"They're metabolically similar to Lance Armstrong biking up the Pyrenees; they utilize mainly fatty acids for energy and produce very little lactic acid," says Hanson, the Leonard and Jean Skeggs Professor of Biochemistry at Case Western Reserve.

"Some of the changes observed in these models include astonishing fitness and elite athleticism," says Tina Hines, Ph.D., the UMKC Thompson Endowed Professor of Research.

"They are fatigue resistant and can run six kilometers in a single test," says Marco Brotto, Ph.D., an expert in muscle fatigue. "These remarkable mice eat more and weigh less than their controls despite having high blood sugar and fat levels. In addition, they continue to reproduce well past their controls."

The UMKC research team who will use the super mice for research is called the Muscle Biology Research Group (MUBIG), and includes Tina Hines, Ph.D., Marco Brotto, Ph.D., a new associate professor of Nursing with joint appointments in the schools of Medicine and Biological Sciences; and School of Medicine physiologists Jon Andresen, Ph.D., an expert in smooth muscle and potassium channels, and Michael Wacker, Ph.D., a cardiac muscle and arrhythmias expert.

Through collaborations with Case Western Reserve, scientists at the schools of Nursing and Medicine said they hope to understand the molecules responsible for changes in muscle function that lead to the amazing physical abilities in these mice.

Developer Hanson cautions that the mice may help lead to important insights into human diseases, but "the technique used to create the animal model reported in our study is not appropriate for application to humans … any attempt to tamper with the metabolic processes in human muscle will surely do more harm than good."

In addition to the mighty mice, MUBIG will pursue other collaborative studies, high-profile research grants, seminars, journal articles and collaborations with other UMKC groups and individuals, such as researchers in the School of Pharmacy, leading bone researcher Lynda Bonewald, Ph.D., at the School of Dentistry, and the School of Medicine's Hong-Wen Deng, Ph.D., with his extensive human tissue database that relates to obesity and osteoporosis.

"The days of the lone researcher working away in solitude in the lab are really gone," said John Baumann, Ph.D., vice provost for Research and director, Office of Research Services. "The health questions facing science today are complex, and they really require interdisciplinary teams of experts tackling these challenges. The proximity of our health and life sciences schools at UMKC creates some natural partnerships, and I expect that will only continue to grow as these groups make discoveries and inroads that improve patient health."

In the Mighty Mouse cartoons, the small but powerful superhero identified a problem and solved it within a matter of minutes. UMKC researchers know that the complex issues surrounding devastating human diseases will take much more time and energy, but the new super mice have provided a potential giant leap forward.

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