Harrington Lecture... The Academy on the Road

MONDAY, JANUARY 23, 2006
SARASOTA, FLORIDA

Speaker: Timothy F. Murphy, MD
UB Distinguished Professor of Medicine
Division of Infectious Diseases

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In utero “malprogramming” of appetite center

Research News

By Lois Baker

Symposium Honors Leon Farhi

Scientists from Europe, Asia and the U.S. gathered in Buffalo September 29-October 1, 2005 for a symposium honoring the late Leon Farhi, MD, a pioneer in the field of pulmonary medicine, environmental physiology and bioengineering.

Farhi was a SUNY Distinguished Professor and chaired the Department of Physiology in the University at Buffalo School of Medicine and Biological Sciences for many years.

The symposium was held in the Buffalo Niagara Marriott, adjacent to UB’s North (Amherst) Campus.

Farhi’s research and leadership led the fields of pulmonary medicine, environmental physiology and bioengineering for more than 35 years. He pioneered the study of the distribution of respiratory gases and blood within the lungs and tissues and developed new approaches for measuring cardiac output and gas exchange. He worked with scientists from around the world, including young physicians who later became leaders in their fields. Farhi was a devoted teacher throughout his career and pioneered the use of computers and simulation programs in teaching.

Working with colleagues at UB, he studied man’s adaptation to space during NASA shuttle flights in the 1990s. That work led to establishment of the National Center of Excellence in Environmental Physiology at UB, which became the current Center for Research and Education in Special Environments (CRESE). CRESE contains the most advanced facilities in the world to simulate environmental stress.

Researchers from the following institutions served as symposium faculty: Harvard Medical School, Imperial College in London, England; Karolinska Institute in Stockholm, Sweden; Max Planck Institute of Experimental Medicine in Gottingen, Germany; National Institutes of Health; Stanford University; University of Alabama-Birmingham; University at Buffalo; University of Milan, Italy; University of North Carolina, Chapel Hill; University of Oklahoma; University of Udine, Italy; University of Washington; Yale University School of Medicine, and University of Zurich, Switzerland.

The symposium was supported by the departments of Physiology and Biophysics and Medicine, UB School of Medicine and Biomedical Sciences, CRESE, UB Rahn Lecture Series, ONY, Inc., Omni Quarter Technology, and Farhi’s friends and family.

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By Lois Baker

Perpetuating Obesity

In recent studies, the researchers now have shown that this metabolic “malprogramming” is permanent and occurs in utero, resulting in the next generation born to HC mothers carrying the HC phenotype. Rat fetuses had increased plasma insulin levels, increased mRNA levels of proinsulin, a precursor of insulin, and increased insulin in the pancreas, without an increase in body weight, plasma glucose level or a change in islet structure.

They also found changes in the hypothalamus, the brain’s center of appetite regulation, that result in appetite stimulation.

While these studies were done with rats, Mulchand Patel, PhD, UB distinguished professor of biochemistry and first author on the study, speculates that there is good reason to think the mechanism could be similar in humans.

“Obesity can be perpetuated via the maternal intrauterine environment,” says Patel, who reported the findings at the 2005 Experimental Biology meeting held in San Diego in early April.

“Our earlier studies looked at obesity in the post-weaning period, so we didn’t know how early this malprogramming occurred. Now we know it occurs in utero. We predicted that this could be the case, and our present findings support this prediction.”

Plasma levels of rat pups (2-HC) born to HC mothers returned to normal during the suckling period, results showed, but islets from 12-day-old suckling 2-HC rats showed a capacity for insulin oversecretion when maintained in culture medium containing high glucose levels. By the 28th day, approximately 4 days after weaning to rat chow, 2-HC rats once again had high insulin levels and showed a higher capacity for insulin secretion to a glucose stimulus. Even on rat chow, body weight began to increase around day 55, and 2-HC rats were obese by postnatal day 100.

“Patel speculates that in humans, it’s possible such malprogramming could be interrupted if an obese/insulin resistant mother brought body weight and plasma insulin levels back to normal before becoming pregnant.”

Malathir Srinivasan, PhD, Suhaed Shbiri-El Dika, Ravikumar Aalinkeel, PhD, Fei Song, PhD, Lisudmila Pitis, PhD, and Paul Mitrani from Patel’s lab, along with Roberta Pentney, PhD, from the UB Department of Pathology and Anatomical Sciences, contributed to the study, as did Shanthie Damodoran, PhD, and Sherin Devaskar, MD, from the Department of Pediatrics at UCLA, and Brenda Strutt and David Hill PhD, from the Lawson Research Institute in London, Ontario.

The research was supported by grants from the National Institutes of Health.

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