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The Second Annual Neuroscience Symposium at Kent State University: The Neuroscience of Obesity

Kent State University - Kent Campus

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The Second Annual Neuroscience Symposium at Kent State University:

The Neuroscience of Obesity

April 3-4, 2014

Kent State University Hotel and Conference Center

Support provided by Northeast Ohio Medical University
Dear Colleague,

It is my pleasure to welcome you to the Second Annual Neuroscience Symposium at Kent State University: The Neuroscience of Obesity. This event features internationally renowned scientists presenting leading-edge research on the mechanisms underlying obesity and the brain.

I’d like to take this opportunity to thank the Kent State University College of Arts and Sciences, including the Department of Biological Sciences and Department of Psychology for co-sponsoring this event, as well as members of the symposium organizing committee, listed in the back of this program. I also thank the Northeast Ohio Medical University for their support of the symposium.

We are delighted to welcome our keynote speaker, Michael Rosenbaum, M.D., professor of clinical pediatrics and medicine at Columbia University Medical Center, a world-renowned expert on the development and prevention of obesity. We look forward to stimulating and wide-ranging discussions catalyzed by all of the presentations. In addition to our keynote speaker, our presenters include Antonio Convit, M.D., NYU School of Medicine; Rajita Sinha, Ph.D., Yale University; Lei Cao, Ph.D., The Ohio State University College of Medicine, and Colleen Novak, Ph.D., of Kent State University.

We are also pleased to be able to showcase the research of more than 40 Kent State faculty members working in a broad range of the neurosciences, from molecular biology to behavior, producing interdisciplinary research on neurological diseases and conditions including: obesity, traumatic brain injury, post-traumatic stress disorder, the effects of aging, addiction and pain management. For more information on these researchers, please review our Kent State Neuroscience Researcher Directory, which includes contact information, research interests and major publications for each researcher.

Finally, I would like to thank you for attending and participating in our symposium, and I look forward to seeing you at our future neuroscience symposia to be held on an annual basis, including our Neuroscience of Aging symposium next April.

If you would like more information about our other research programs or partnering opportunities with us, please contact me at research@kent.edu or 330-672-3102.

Sincerely,

Grant McGimpsey, Ph.D.
Vice President for Research
Kent State University
Welcome
Todd A. Diacon, Ph.D., Provost and Senior Vice President for Academic Affairs, Kent State University

Introduction of Keynote Speaker
Grant McGimpsey, Ph.D., Vice President for Research, Kent State University

Keynote Address:
"Body Weight Regulation: Why Is It So Hard to Keep the Pounds Off?"
Michael Rosenbaum, M.D., Columbia University Medical Center

Reception and Poster Session

Welcome
Grant McGimpsey, Ph.D., Vice President for Research, Kent State University

Overview
Eric Mintz, Ph.D., Associate Professor and Director, School of Biomedical Sciences, Kent State University

"Brain Impairments Associated with Obesity and Insulin Resistance; Possible Mechanisms"
Antonio Convit, M.D., New York University School of Medicine

"Loving Food! How Does the Brain Lose Control Over Food Intake?"
Rajita Sinha, Ph.D., Yale University

Coffee Break

"Brain Modulation of Calorie Use Through Physical Activity"
Colleen M. Novak, Ph.D., Kent State University

Lunch Break

"Obesity Prevention and Treatment by Activation of a Brain-Adipocyte Axis"
Lei Cao, Ph.D., The Ohio State University College of Medicine

Panel Discussion
moderated by John Gunstad, Ph.D., Associate Professor, Department of Psychology, Kent State University

Final Comments
Heather Caldwell, Ph.D., Symposium Chair, Associate Professor, Department of Biological Sciences, Kent State University

Poster Session
Michael Rosenbaum, M.D.

7:15 – 8:15 p.m.

"Body Weight Regulation: Why Is It So Hard to Keep the Pounds Off"

Bio:
Michael Rosenbaum received his undergraduate degree from Amherst College and his medical degree from Cornell University Medical College. After completing his internship and residency at Columbia Presbyterian (Babies) Hospital and a fellowship in pediatric endocrinology at The New York Hospital, he was recruited as an assistant professor in the Laboratory of Human Behavior and Metabolism under the direction of Jules Hirsch, M.D., at Rockefeller University. In 1997, he came to Columbia with Rudolph Leibel, M.D. He is currently a professor of clinical pediatrics and medicine at Cornell University Medical College and associate program director of the Clinical and Translational Science Awards and Clinical Research Resource at Columbia University Medical Center. Rosenbaum’s research interests mostly focus on energy intake and expenditure in relation to body weight regulation in adults and the development and prevention of obesity and its co-morbidities in children. He has received a number of awards including the first Ethan Sims Young Investigator Award from the Obesity Society in 1987 and the Physician of the Year Award at Columbia in 2001. He is listed among the best physicians in the United States, Northeastern United States and the New York Metropolitan Area. He is a primary or senior author on more than 90 peer-reviewed, original research publications and, along with Rudolph Leibel, M.D., is internationally known for this work. He has served as a mentor on numerous internal and external grants for young investigators, numerous National Institutes of Health (NIH) study sections and sub-committees, and is an active part of the teaching faculty at Columbia. His work is funded by the NIH and the Nutrition Science Initiative.

Abstract:
About 68 percent of adults and 34 percent of children in the U.S. are overweight or obese. Only about 1 out of 6 people are successful in sustaining a 10 percent or greater weight loss for over 1 year. The current prevailing perception is that this lack of long-term success is due to a lack of willpower in the obese while similar difficulties in lean individuals are accepted as reflecting "slow metabolism." This presentation reviews the compelling evidence that body weight is regulated and that the almost inevitable weight regain after otherwise successful weight loss is the logical biological product of human evolution rather than a psychological weakness.

Classical animal and human studies demonstrate interactions between peripheral signals reflecting fat stores and the central nervous system such that our brains direct energy intake and output to regulate both long-term and short-term energy balance. The energy expenditure of obese and lean humans maintaining a 10 percent or greater reduced weight is on average ~300-400 kcal/day below that predicted by weight changes. In addition, attempts to sustain weight loss invoke delayed satiation and decreased awareness of how much has been eaten. This "perfect storm" for weight regain (decreased energy expenditure and increased appetite) reflects coordinate actions of endocrine, autonomic, metabolic and behavioral systems. Obesity is thus a biological disease that continues to manifest itself as a potent biology favoring weight regain long after obesity has been supposedly "cured" by weight reduction. Delineation of this biology has multiple practical implications for the treatment and prevention of obesity.
Antonio Convit, M.D.
9:15 – 10 a.m.

“Brain Impairments Associated with Obesity and Insulin Resistance; Possible Mechanisms”

Bio:
Antonio Convit was born and raised in Caracas, Venezuela, obtaining his medical degree from the University of Chicago, Pritzker School of Medicine and training in psychiatry at the New York University Langone Medical Center. He has been involved in research and teaching throughout his career. For the last 13 years, Convit's lab has focused on using in vivo MRI imaging techniques, neuropsychological test performance, and endocrine, inflammatory and neuroprotective markers to understand how the brain is affected by obesity and associated metabolic disease. His work centers on studying the brain as a site of "complications" in type 2 diabetes and insulin resistance. He also directs a community outreach program - the Banishing Obesity and Diabetes in Youth (BODY) Project that medically screens overweight and obese adolescents in New York City public schools and provides them with feedback on how to improve their medical numbers.

Abstract:
The presentation will very briefly highlight some of the epidemiology of obesity and diabetes, touching upon possible racial differences, and then focus on the brain abnormalities that have been associated with obesity and accompanying insulin resistance. Further, the presentation will touch upon potential mechanisms for the brain dysfunction and focus on endothelial integrity and microvessel disease as an example of a possible mechanism.
Rajita Sinha, Ph.D.
10 – 10:45 a.m.

“Loving Food! How Does the Brain Lose Control Over Food Intake?”

Bio:
Rajita Sinha is a professor of psychiatry, neurobiology and child study at Yale University and is a licensed clinical psychologist. She holds the endowed Foundations Fund Professorship in psychiatry at Yale University School of Medicine. She is founding director of the Yale Stress Center (YSC), established when she received one of the largest collaborative interdisciplinary science consortium grants awarded from the National Institutes of Health Roadmap Common Fund. She is also the deputy director of interdisciplinary research for the Yale Clinical and Translational Science Award at the Yale Center for Clinical Investigation and the chief of psychology in psychiatry at Yale.

She completed her Ph.D. in biological psychology at the University of Oklahoma Health Sciences Center and then obtained a respecialization in clinical psychology from Yale University. Her laboratory was the first to characterize stress-induced craving for rewarding substances like alcohol or drugs and more recently stress-induced craving for high calorie foods, and is identifying biobehavioral and neural mechanisms underlying high craving states and how they jeopardize self control over rewarding behaviors. She is internationally known for her pioneering research on the mechanisms linking stress to compulsive seeking, addictive behaviors and to health outcomes. Her findings are leading to development of new addiction prevention and treatment strategies that target stress and emotion regulation in individuals both at-risk for and those with addictive behaviors.

To conduct this research, her laboratory has used interdisciplinary human laboratory, neuroendocrine, physiological, neuroimaging, behavioral, neurocognitive and clinical outcome approaches to elucidate stress and maladaptive behavior interactions. Recent work also extends the neuroscience of stress to assess overeating, obesity, chronic diseases and health outcomes. She has published widely on these topics with more than 200 scientific papers, reviews and book chapters. She has served on many National Institutes of Health special emphasis panels, review committees and workshops, presented at numerous national and international conferences, and her work is widely cited. She also conducts workshops, lectures and retreats on stress management, the effects of stress on the brain, health and wellness, as well as self care for the stressed professional to enrich and enhance work, family and life.

Abstract:
Obesity is a global epidemic where the finely tuned balance between food intake and physical activity goes awry, and lifestyle and other pharmacological interventions are only modestly effective in reducing obesity. Genetics, biology and social factors all contribute to this complex medical condition that is driving up costs of healthcare today. How the brain loses control over regulation and control of food intake is complex and has received recent focus in the challenge to understand and treat the obesity epidemic. This presentation will focus on brain systems regulating food intake and their overlap with brain systems that drive stress regulation, survival and motivated behaviors. A role for the frontal brain systems that regulate emotions and self control over food intake will be discussed and evidence that disruption of such control may promote excessive intake of high calorie foods will be presented. Finally, a discussion of whether the neuroscience of control over food intake provides new avenues for treatment and prevention will be presented.
Colleen M. Novak, Ph.D.
11:15 – Noon

“Brain Modulation of Calorie Use through Physical Activity”

Bio:
Colleen M. Novak is an assistant professor in the Department of Biological Sciences at Kent State University. After earning her bachelor's degree at the University of Iowa, she focused on neuroscience in graduate school, receiving a Ph.D. in psychology/neuroscience in 1999. Novak then completed a postdoctoral fellowship in biology at Georgia State University, and subsequently went on to acquire additional training in metabolism, physical activity and obesity at the Mayo Clinic in Rochester, Minn. Currently, Novak’s research program focuses on the neuroscience of obesity, specifically the role of the brain melanocortin system in modulating the energy expenditure of physical activity.

Abstract:
As obesity rates have risen in the past few decades, people have become more interested in why some individuals seem to be able to resist gaining weight. We know that lean people tend to be more physically active over the course of the day than overweight or obese people. More and more evidence points to the direct metabolic and cardiovascular health benefits of daily activity—standing up and walking around instead of sitting. Similar to what is found in active people, we have found that laboratory animals that show more physical activity are lean and metabolically healthy, and they also lose more weight on a low-calorie diet. What about these animals makes them more physically active? After examining brain systems that modulate appetite and energy expenditure in the lean, active rats, we found that the brain system controlled by neuropeptides called melanocortins was different in the lean rats. Specifically, some brain regions in the lean rats have enhanced expression of receptors for these peptides. Applying drugs to activate these receptors in these brain regions makes the lean rats more physically active, but does little to the obesity-prone rats. Brain melanocortins not only make the rats more active but also make them more effective at burning calories during physical activity. The importance of brain melanocortins in modulating non-exercise activity thermogenesis (NEAT) is consistent with the genetics of human obesity—mutations and variants in this pathway and the receptors are known to be associated with monogenic and polygenic obesity in people.
Lei Cao, Ph.D.
1:30 – 2:15 p.m.

“Obesity Prevention and Treatment by Activation of a Brain-Adipocyte Axis”

Bio:
Lei Cao earned her Ph.D. at the Chinese Academy of Science in 1998, and completed fellowship trainings in Freiburg University Germany and Thomas Jefferson University. She was a research scientist and faculty member at Thomas Jefferson University and Weill Medical College, Cornell University before joining The Ohio State University in 2006. Her research interest is to understand how environmental stimuli to the central nervous system shape biological processes and disease pathology and how this knowledge can be harnessed to improve health and treat diseases. Her recent work has revealed a brain-fat axis linking physical and social environment to the regulation of metabolism and cancer. She has published in leading journals including Cell, Nature Medicine, Nature Genetics, and Cell Metabolism. She also has patents of novel technology for gene therapy.

Abstract:
Obesity is rapidly becoming a major global health, social and economic problem with substantial morbidity and mortality highlighting the urgent need for new therapeutic strategies. Obesity is controlled by variable interactions between genetic background, environmental factors, behavioral factors and socioeconomic status. Our recent work has shown that environments that are more complex and challenging, but not stressful per se, have robust anti-obesity and anticancer effects by activating a specific neuroendocrine brain-adipocyte axis. These enriched environments with social, physical and cognitive stimulation lead to activation of the sympathetic innervation of fat tissue, suppression of leptin, phenotypic switch from white fat to energy-dissipating brown fat, decreased adiposity, increased energy expenditure, and resistance to diet-induced obesity by inducing hypothalamic, brain-derived neurotrophic factor (BDNF) expression. This presentation summarizes this work and discusses how to target the key players of this neuroendocrine brain-adipocyte axis for the prevention and treatment of obesity and the cancers with a strong association with obesity.
Kent State University is the region's first-choice public university

- Programs, schools and colleges ranked among the world's best
- Ranked by the Carnegie Foundation for the Advancement of Teaching among the nation's top 74 public high-research universities
- Generated $1.96 billion in added income to the Northeast Ohio economy
- More than 200,000 graduates worldwide
- Celebrating more than 100 years of excellence in action
Research for Life

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Join us at our upcoming research symposia:

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October 30-31, 2014

The Annual Kent State University Symposium on Aging: Life in the Balance – Fall Prevention from Multidisciplinary Perspectives
November 13, 2014

The Annual Neuroscience Symposium at Kent State University: The Neuroscience of Aging
April 2015 (date TBA)

Find the latest Research for Life news and symposia at: WWW.KENT.EDU/RESEARCH
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